Appendix 15 Financial Assurance

Appendix 15.1	Construction Year 1 Contingency Reclamation Plan
Appendix 15.2	Construction Year 1 Contingency Reclamation Estimate
Appendix 15.3	Construction Year 2 Projected Financial Assurance Estimate
Appendix 15.4	Mine Year 1 Projected Financial Assurance Estimate
Appendix 15.5	Estimating Methodology for NorthMet Closure in Mine Years Beyond Mine Year 1

Appendix 15.1 Construction Year 1 Contingency Reclamation Plan

Contents

1 Introduction

This report describes the reclamation actions that would be implemented as part of the Construction Year 1 Contingency Reclamation Plan. Minnesota Rules, part 6132.1200, subpart 2 item B(2), as part of the Permit to Mine (PTM), requires a Year 1 Contingency Reclamation Plan for the first year of mine activities. The Construction Year 1 Contingency Reclamation Plan is defined as the scope of work required to reclaim the Project if the permittee defaults on its PTM obligations during the first year of construction. The Contingency Reclamation Estimate (CRE) for this scope of work, and the basis of the CRE, are provided in Appendix 15.2 of the Permit to Mine Application (Application).

Every year, when the CRE is updated, this Contingency Reclamation Plan will be updated, and submitted to DNR for approval.

The first year of construction will commence upon issuance of permits for the NorthMet Project (Project). For purposes of this Application, the first year of construction is termed Construction Year 1. There will be two years of construction prior to operations commencing at the Project.

During Construction Year 1 at the Mine Site, there will be no Duluth Complex or Virginia Formation rock blasted, and no pits will be created and no waste rock will be placed in stockpiles. Therefore, water treatment would not be needed if the mine closes during this timeframe.

Also during the first year of construction, no processing will occur at the Plant Site, and therefore no nonferrous tailings will be deposited in the Flotation Tailings Basin (FTB). The closure of the existing LTVSMC tailings basin and Plant Site facilities will remain Cliffs Erie's responsibility during Construction Year 1. These ferrous closure responsibilities, including any necessary water treatment, are currently financially assured with the State of Minnesota with a Cliffs Natural Resources Corporate Guaranty.

1.1 Legacy and AOC Sites

If PolyMet's activities during Construction Year 1 affect any of the existing legacy sites or Areas of Concern (AOC), PolyMet would be responsible for remediating these sites as part of the Construction Year 1 Contingency Reclamation Plan and CRE. If legacy or AOC sites are not impacted by PolyMet construction activities, remediation of these sites would remain Cliffs Erie's responsibility. See the CRE and basis for the CRE (Appendix 15.2) for more detailed information.

2 Contingency Reclamation Plan

Construction Year 1 Contingency Reclamation is defined as those reclamation actions that would be required if PolyMet defaults on its PTM obligations during Construction Year 1. This section details the activities that would occur at the Mine Site, the Plant Site, and the Transportation and Utility Corridors during Construction Year 1, and would therefore require reclamation.

Anticipated reclamation activities for Construction Year 1 would include:

- demolition and removal of nonferrous buildings and structures
- reclamation of stockpile footprints
- reclamation of the first lift of the Flotation Tailings Basin (FTB) dams
- reclamation of water management controls

2.1 Mine Site Reclamation

Mine Site development is anticipated to take 18 to 24 months of construction. Mine Site development activities that will take place during Construction Year 1 are listed below:

Development activities at the Mine Site will include:

- construction of approximately 22,000 feet of haul roads
- preparation of stockpile foundations, with approximate areas as follows: 13 acres for the Category 1 Waste Rock Stockpile, 63 acres for the Category 2/3 Waste Rock Stockpile, 29 acres for the Category 4 Waste Rock Stockpile, and 32 acres for the OSP
- construction of stormwater ponds A, B, C, and D and related ditches and dikes
- partial construction of the WWTF, including east and west equalization basins and CPS
- construction of mine water management system infrastructure, including sumps, ponds, pipelines, and pumping systems
- stripping of approximately 95 acres of overburden from the East Pit - rock blasting within the pit will not occur during this period
- construction of the Mine Site power distribution system
- construction of the Mine Site Fueling and Maintenance Facility (MSFMF)

These features are shown on Figure 1, and the following subsections describe how they would be reclaimed.

2.1.1 Buildings and Structures

All NorthMet structures, including the MSFMF, would be demolished and removed from the site. Foundations and slabs at or below site final reclamation grades would be left in place. These areas would be covered with a minimum of two feet of soil, and vegetated.

2.1.2 Mine Pit and Haul Roads

Approximately 95 acres will be stripped, producing approximately 1,950,000 cubic yards of overburdened material (Saturated Mineral Overburden, Unsaturated Mineral Overburden and Peat) will be removed from the pit footprint areas during Construction Year 1. For reclamation, these materials would be hauled from temporary stockpiles back to the pit footprint areas. The pit areas would be graded and vegetated. All haul roads would also be reclaimed. Because mining would not have occurred, pit rock slope grading would not be required.

2.1.3 Stockpiles

Overburden material placed in the stockpiles during Construction Year 1 would be returned to the mine pit areas. Under liner systems would be covered with topsoil, sites regraded, and vegetated. The Ore Surge Pile (OSP) facility would be removed and reclaimed similar to the pit footprint areas. All disturbed areas would be restored to pre-construction conditions.

2.1.4 Mine Site Water Management Systems

2.1.4.1 Wastewater Treatment Facility

Construction of the Waste Water Treatment Facility (WWTF) will begin during the Construction Year 1. However, because no mining of ore will have occurred, the WWTF will not need to be operational. Reclamation of this facility would require its demolition and removal of all structures. Foundations and slabs at or below site final reclamation grades would be left in place. These areas would all be covered with a minimum of two feet of soil, and vegetated.

2.1.4.2 Mine Site Water Management System Infrastructure

Mine Site water management infrastructure to be reclaimed would include mine water pipes and pumps, which could either be abandoned in place or removed and recycled. PolyMet would remove the CPS building, and would reclaim and revegetate the area. The CPS Pond could be reclaimed as a wetland or filled and revegetated.

Stormwater sedimentation ponds and the mine water ponds would be reclaimed by developing wetlands or by filling and revegetating the areas.

2.2 Plant Site Reclamation

Plant Site development is anticipated to take 18 to 24 months of construction. Plant Site development activities that will take place during Construction Year 1 are listed below:

- partial construction of Phase 1 of the WWTP
- refurbishment of the LTVSMC plant to accommodate Project ore beneficiation processes and production schedule
- construction of the Flotation Building
- construction of the Concentrate Dewatering and Storage and Concentrate Loadout Building
- construction of the first lift of FTB dams and installation of shear walls in the existing LTVSMC ferrous tailings

- construction of approximately 24,000 linear feet of the FTB Seepage Containment System, including access road, cutoff wall, piping, valves, pumps, and other mechanical and electrical systems
- construction of stormwater ponds and related ditches and dikes
- construction of the Sewage Treatment Systems
- refurbishment of raw water, potable and fire water systems for plant operations
- refurbishment of power distribution systems across the Plant Site

These features are shown on Figure 2, and the following subsections describe how they would be reclaimed.

2.2.1 Buildings and Structures

All NorthMet structures would be demolished and removed from the site. Foundations and slabs at or below site final reclamation grades would be left in place. These areas would all be covered with a minimum of two feet of soil. Building areas would be graded, have topsoil applied, and seeded. Any new utility tunnels would be sealed and closed in-place.

2.2.2 Roads and Parking

Roadways not needed for future uses would be removed, and the roadway alignments graded to near surrounding site conditions. Where culverts are removed, they would be replaced with channels and the locations graded and vegetated to provide a stable restored area.

Parking areas not needed for future uses would be reclaimed as described above for roadways.

2.2.3 Flotation Tailings Basin

The first lift of the Flotation Tailings Basin (FTB) dams would be reshaped and reseeded. No nonferrous tailings would have processed or placed in the FTB, so other aspects of Tailings Basin reclamation would remain Cliffs Erie's responsibility.

2.2.4 Plant Site Water Management Systems

2.2.4.1 Wastewater Treatment Plant

Construction of the Waste Water Treatment Plant (WWTP) will begin during Construction Year 1. However, because no discharge to the environment is planned for the Project during this period, the WWTP will not need to be operational. Reclamation of this facility would require its demolition and removal of all structures. Foundations and slabs at or below site final reclamation grades would be left in place. These areas would all be covered with a minimum of two feet of soil and vegetated.

2.2.4.2 Plant Site Water Management System Infrastructure

The recently installed FTB Seepage Containment System would be sealed and covered with 2 feet of soil, where possible. The FTB Seepage Containment System could be breached, if needed, for funnel and gate options for a non-mechanical water treatment system. The closure of

the tailings basin, as well as the South Seepage Management System, would remain Cliff's responsibility during this timeframe.

Plant Site water management infrastructure to be reclaimed would include process water pipes and pumps, which could either be abandoned in place or removed and recycled. Ponds would be reclaimed by developing wetlands or by filling and revegetating the areas.

2.3 Corridors Reclamation

Development of the Transportation and Utility Corridors and the Colby Lake Pipeline Corridor is anticipated to take 18 to 24 months of construction. Corridor development activities that will take place during Construction Year 1 are listed below:

- installation of approximately 40,000 linear feet of Treated Water Pipeline (TWP) in the Dunka Road and Utility Corridor, along with associated mechanical and electrical controls
- construction of approximately 11,000 linear feet of new rail and adjacent service road between the Mine and Plant Sites and refurbishment of the railroad track along the Railroad Corridor
- upgrades to Dunka Road
- refurbishment of the Colby Lake Pipeline and Colby Lake Pumphouse

The following subsections describe how these features would be reclaimed.

2.3.1 Roads and Culverts

Where roads are abandoned, the road culverts would be removed to prevent potential flow obstructions due to clogged or dammed culverts. Where culverts are removed, channels would be graded to maintain a stable restored area. Road surfaces would be regarded to similar surroundings conditions followed by topsoil placement and seeding.

2.3.2 Pipelines

The TWP and the Colby Lake Pipeline would be removed, recycled, disposed, or abandoned in place. Buried pipelines that are left in place would be capped off and details of pipe size, material, and purging would be documented.

Aboveground pipelines and other facilities (i.e., pump booster station, associated controls) would be disassembled or demolished and the material recycled or disposed. Underground pipelines would be abandoned in place. Manholes and aboveground pipeline supports and foundations would be demolished to ground level or below and covered with at least two feet of soil. All surface areas would be vegetated to achieve restoration goals.

2.3.3 Railroad Tracks

The newly installed railroad spur would be removed and recycled or disposed of. The rail bed would be regraded to similar surrounding conditions, followed by topsoil placement and seeding.

2.4 Associated Reclamation

2.4.1 Sanitary Systems and Wells

Construction Year 1 Contingency Reclamation would include removal of all Project septic systems, including removing all liquids or solids from tanks and filling these tanks with either soil or crushed rock. Monitoring wells would be sealed by a licensed well driller in accordance with Minnesota Department of Health rules when no longer needed.

2.4.2 Power Lines

Power lines (poles, pole hardware, and conductors) and substations that would not remain as regional infrastructure would be removed and recycled. Foundations and anchors would be removed or demolished to at least ground elevation and covered with at least two feet of soil and seeded to achieve restoration goals.

2.4.3 Tanks

Large aboveground storage tanks would be cleaned, and painted surfaces tested for lead prior to demolition. Tanks with insulation and associated wall and/or roof covers would be evaluated for potential asbestos-containing material (ACM). Insulation and coverings would be removed and disposed of appropriately. Tank cleaning would remove remaining materials and sludge. The tanks would be cleaned, materials removed, and cleaning residues would be sent to an appropriate recycling or waste disposal facility.

Tanks would be disassembled for disposal or recycling, as appropriate. Below-grade foundations would be left in place and covered with a minimum of two feet of soil and seeded. Smaller aboveground storage tanks would be cleaned and removed without disassembly.

2.5 Waste Disposal

This section presents waste disposal plans that would be implemented during contingency reclamation activities.

2.5.1 Demolition Waste Disposal

The majority of the demolition waste from structure removal would be disposed of off-site.

2.5.2 Special Material Disposal

Special materials on-site at the time of Construction Year 1 Contingency Reclamation may include ACM, partially used paint, chemical and petroleum products, fluorescent and sodium halide bulbs, certain batteries, electronic waste, lighting ballasts, small capacitors, and oil or chemical-stained concrete. All of these materials would be safely collected, removed, and properly recycled or disposed.

2.6 Watershed and Wetland Restoration

This section presents the storm water and watershed restoration reclamation actions that would be conducted as part of Construction Year 1 Contingency Reclamation.

2.6.1 Watershed Restoration

All ditches and dikes would be reclaimed and areas restored to near pre-construction site conditions. Ditches would be filled in and graded, and dikes would be removed. The reclaimed areas would have topsoil applied and would be seeded.

All ponds would either be filled or converted into wetlands. Once filled, the ponds would be covered with topsoil and seeded with the goal of restoring these areas to similar surrounding conditions.

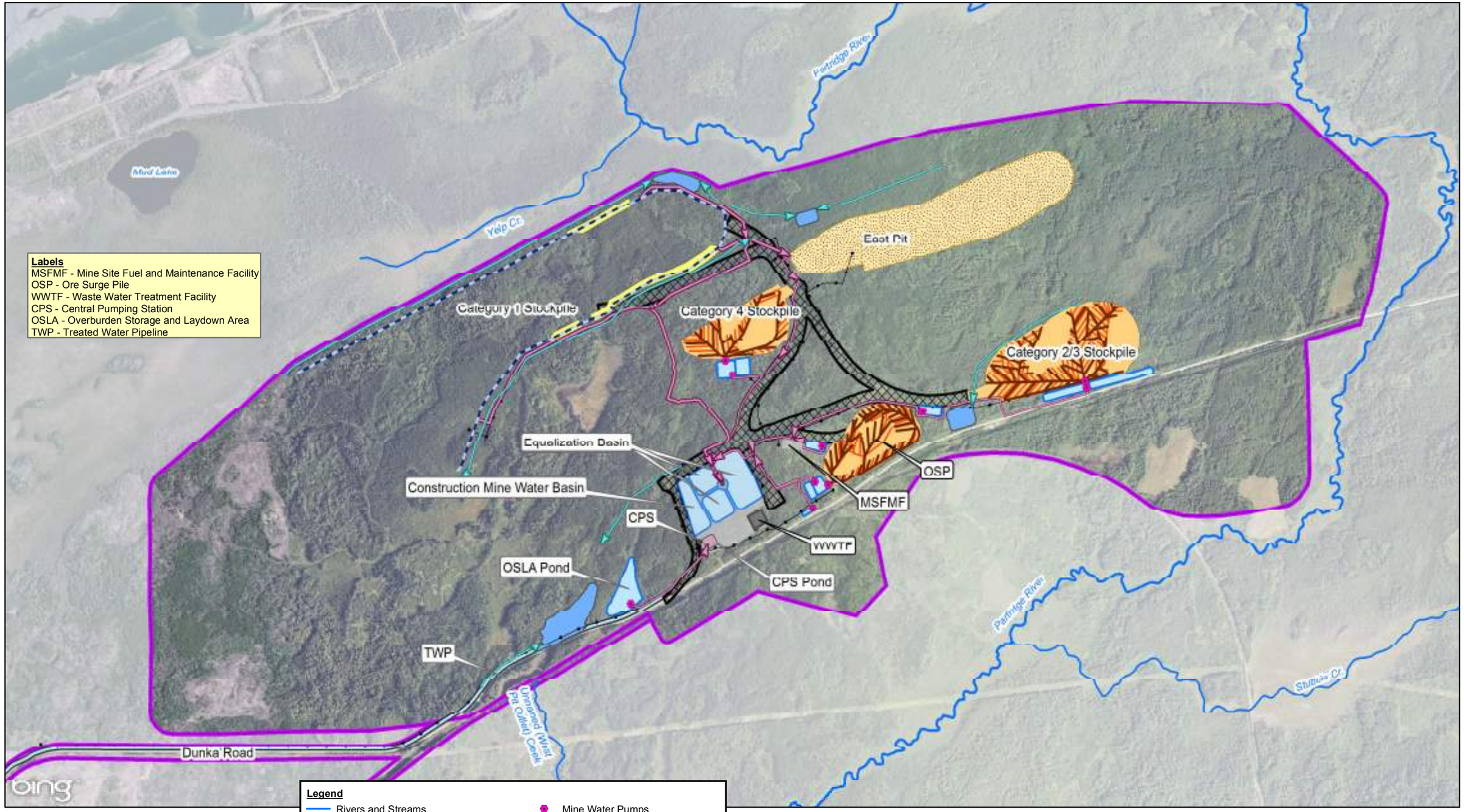
2.6.2 Wetland Restoration

PolyMet would restore wetlands sufficient to replace the wetland functions impacted by the Construction Year 1 activities.

3 CRE and Financial Assurance for Construction Year 1

The Construction Year 1 CRE, and the basis for the estimate, are detailed in Appendix 15.2 of the Application.

PolyMet plans to financially assure the total amount of the CRE for Construction Year 1 at the time of Permit to Mine issuance. The financial assurance instrument will be some combination of surety bond(s) and irrevocable letters of credit (ILOCs). The financial assurance package will also include commercial general liability, pollution liability, and property insurance. Insurance coverage will provide security against unknown, unanticipated, and catastrophic conditions resulting in claims against the property, should they occur.



Labels
MSFMF - Mine Site Fuel and Maintenance Facility
OSP - Ore Surge Pile
WWTF - Waste Water Treatment Facility
CPS - Central Pumping Station
OSLA - Overburden Storage and Laydown Area
TWP - Treated Water Pipeline

Legend
- Rivers and Streams
- Proposed Transmission Lines
- Stockpile Overliner Collection Piping
- Stockpile Underliner Collection Piping
- Treated Water Pipeline
- Stormwater Ditches
- Stormwater Ponds
- Stockpile Liner Footprints
- Category 1 Stockpile Excavation
- Haul Roads
- Mine Water Pumps
- Groundwater Containment System
- Mine Water Piping
- Treated Mine Water Pond (Lined)
- Mine Water Ponds[4]
- WWTF Buildings
- WWTF Graded Footprint
- East Pit Stripping
- Facility Boundary

Notes
1. Basemap from Esri and its data suppliers.
2. Project features supplied by Barr Engineering Company.
3. Minnesota Power Substations and Power Lines supplied by the Minnesota Geospatial Information Office (MnGeo).
4. Mine Water Ponds are lined with the exception of the OSLA Pond and Construction Mine Water Basin.

PolyMet Mining

N

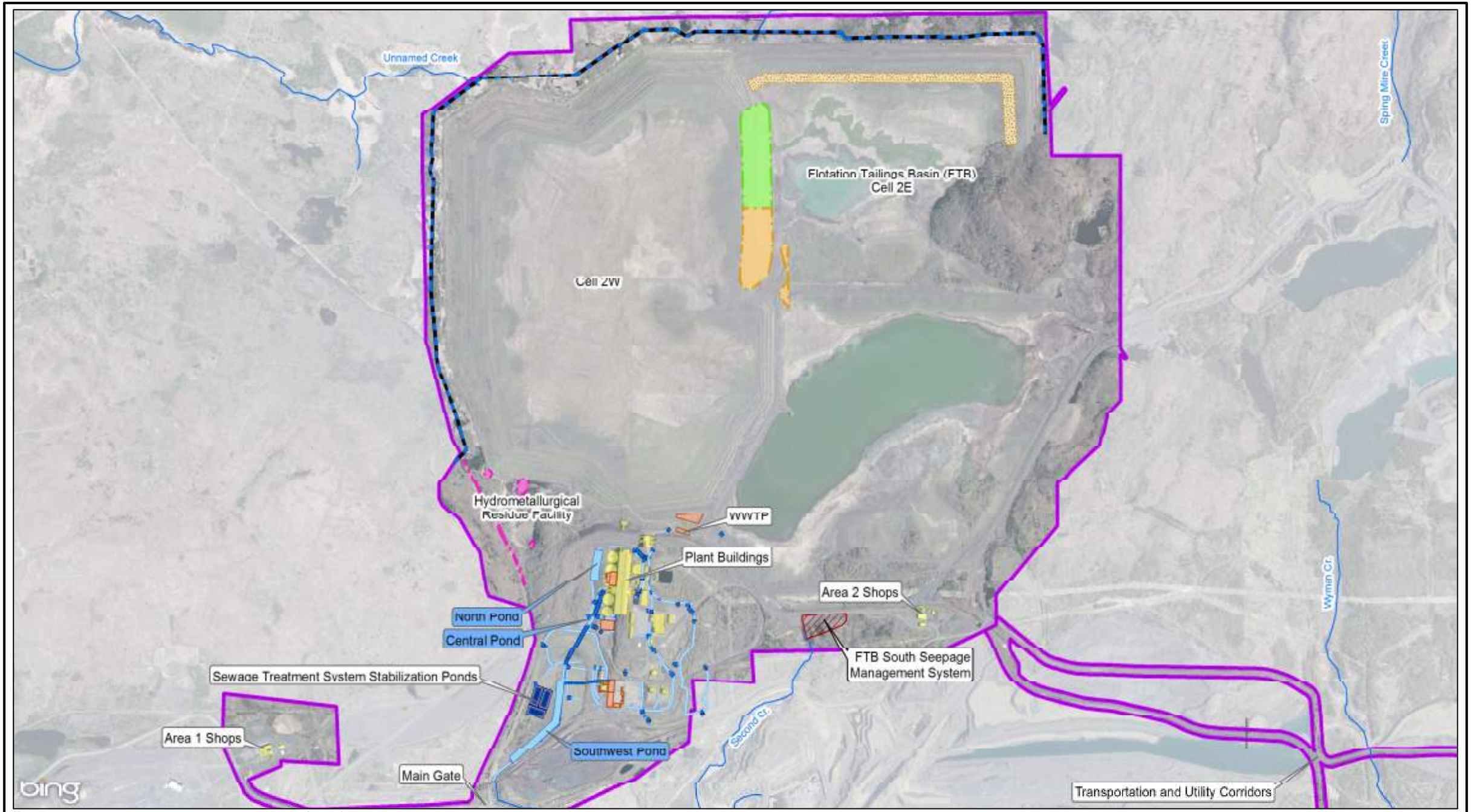
Foth Infrastructure & Environment, LLC				
REVISED	DATE	BY	DESCRIPTION	
PREPARED BY:	DAT		DATE:	SEP. '16
REVIEWED BY:	JSL		DATE:	SEP. '16
APPROVED BY:	JOS1		DATE:	SEP. '16

POLYMET MINING

FIGURE 1
CONSTRUCTION YEAR 1:
MINE SITE DEVELOPMENT
CONTINGENCY RECLAMATION PLAN
HOYT LAKES, MINNESOTA

Scale: 0 750 1,500 Feet
Date: SEPTEMBER 2016
Drafted by: DAT
Project No: 12P778

Path: X:\GB\IE\2012\12P778\GIS\mxd\PMA\Figure 16-1 Construction Year 1 Mine Site Development.mxd Date: 9/8/2016



Notes
1. Basemap from Esri and its data suppliers.
2. Project features supplied by Barr Engineering Company.

Legend
- Rivers, Streams and Ditches
- FTB Seepage Containment System
- Stormwater Culvert
- Stormwater Ditch
- Facility Boundary
- Hydrometallurgical Residue Facility Pre-Load Areas
- Stage 1 Borrow Areas
- Stage 2 Borrow Areas
- FTB Dam Footprint
- Existing Buildings
- Proposed Plant Site Buildings and Related Facilities
- Proposed Industrial Stormwater Ponds
- Sewage Treatment System Stabilization Ponds

N

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

PREPARED BY:	DAT	DATE:	SEP. '16
REVIEWED BY:	JSL	DATE:	SEP. '16
APPROVED BY:	JOS1	DATE:	SEP. '16

POLYMET MINING

FIGURE 2
CONSTRUCTION YEAR 1:
PLANT SITE DEVELOPMENT
CONTINGENCY RECLAMATION PLAN
HOYT LAKES, MINNESOTA

Scale:	0 1,000 2,000 Feet	Date:	SEPTEMBER 2016
Drafted by:	DAT	Project No:	12P778

Path: X:\GB\IE\2012\12P778\GIS\mxd\PMA\Figure 16-2 Construction Year 1 Plant Site Development.mxd Date: 9/8/2016

Appendix 15.2 Construction Year 1 Contingency Reclamation Estimate

Basis of Contingency Reclamation Estimate:
Nonferrous Construction Year 1

1 Introduction

In Minnesota, a permittee must submit, as part of its annual report in the first quarter of each calendar year (and with its initial Permit to Mine application), a contingency reclamation estimate for reclamation activities and/or corrective action in the event that operations cease in that calendar year. The basis for this approach is that the State wants to ensure that a source of funds is available for the State's use if the permittee fails to perform any of its obligations (e.g., if the company goes bankrupt some time during the year). Therefore, the contingency reclamation estimate must include the estimated costs for any reclamation associated with proposed activities in the coming year.

SRK has been retained by PolyMet to compile the contingency reclamation estimates for the NorthMet Project's first year of construction (Construction Year 1). Construction Year 1 starts when any NorthMet construction is initiated, and financial assurance would be due upon issuance of the Permit to Mine.

2 Methodology

The contingency reclamation estimate was prepared using the Standardized Cost Reclamation Estimate (SRCE) model version 1.4.16 available from http://www.nvbond.org. The SRCE was originally developed for the State of Nevada to provide a standardized approach to calculating bond costs for closure.

The purpose of the SRCE is to provide a systematic approach to the development of a closure cost with modules included for the most common closure elements encountered at mining operations. The SRCE does not include closure tasks that are not commonly found at mining operations and provides blank worksheets for the development of custom calculations which can be linked into the model.

The model inputs required are the physical dimensions of the various facilities and calculations are based upon first principles. These calculations and assumptions are demonstrated on each worksheet with diagrams and examples of the calculations performed by the model.

Equipment used in the model is standardized upon Caterpillar because they have the most extensive line of equipment and the most comprehensive technical specifications and productivities available. Equipment productivities are derived from the Caterpillar Performance Handbook (2004). Productivity for other types of equipment is derived from technical specifications where available or on field experience at Nevada mine closure sites.

Crews for various tasks are derived from the RS Means Heavy Construction Data (2006). Crew productivities are also derived from RS Means and used to calculate project specific unit rates utilizing the labor, equipment and material rates as defined for the project.

3 Data Requirements

Data required for SRCE consists of project data and cost data. Project data are dimensions, areas, distances, etc., that are specific to the project facilities. For this project, data consisted of dimensions of the roads, tailings facility, and buildings. The tables below list which worksheets in the model are used for this estimate, and which are not used.

Table 1: SRCE Worksheets Used

Property Information	Table of Contents	Cost Summary	Other User	Human Resources
Reclamation Quantities	Waste Rock Dumps	Tailings	Quarry and borrow areas	Haul Materials
Other Demo and Equipment Removal	Process ponds	Yards, etc	Well Abandonment	Misc Costs
Monitoring	Construction Management	Labor Rates	Equipment Costs	Material Costs
Misc Unit Costs	Fleets	Productivity	Tools	Seed Mixture
User 1	User 2	User 3	User 4	User 5
User 8				

Table 2: SRCE Worksheets Not Used

Cost Schedule	Solution Management	Closure Planning	G & A	Exploration
Exploration roads and pads	Heap Leach	Roads	Pits	Underground openings
Foundations and Buildings	Sediment and Drainage Control	Landfills	Waste Disposal	

Custom calculations are prepared using the “User” worksheets in the back of the model. Wherever possible these calculations are linked back to the model such that the calculations are updated whenever unit rates are updated. Cost totals from the User worksheets are linked into the Other User worksheet.

4 Model Results

The Cost Summary worksheet provides a breakdown of inputs by labor, equipment, and material categories per the headings below to provide the total direct costs per heading:

- Earthwork/Recontouring
- Revegetation/Stabilization
- Detoxification of water/Water Treatment/Disposal of Waste

- Structure, Equipment, Facility Removal (Demolition)
- Monitoring
- Closure Planning, G&A, Human Resources

A discussion is provided below in the Inputs Section under the relevant headings for the worksheets that were used.

5 Basis of Construction Year 1 Contingency Reclamation Estimate

5.1 Assumptions and Summary

During Construction Year 1, there will be no Duluth Complex or Virginia Formation rock blasted, and therefore no pits and no waste rock in stockpiles. Also, no processing will occur at the Plant Site, and therefore no nonferrous tailings will be deposited in the Flotation Tailings Basin (FTB).

- Direct costs
  - Demolition of structures (buildings, railroads, power lines, pipelines, roads and parking lots) at Plant Site and Mine Site built in construction year 1
    - removal of structure to grade
    - off-site disposal of demolition material
    - covering with soil and revegetating of structure footprint
  - Tailings Basin
    - Reshaping and reseeding of first lift
  - Mine Site
    - Replace topsoil stripped off of Mine Site features (Category 1 Waste Rock Stockpile, Category 2/3 Waste Rock Stockpile, Category 4 Waste Rock Stockpile, Ore Surge Pile (OSP), East Pit footprint, Overburden Storage and Laydown Area (OSLA)) and revegetate (no mulch)
  - Water monitoring
  - Well abandonment
  - Piping and liners installed (i.e., foundation of waste rock stockpiles, process water ponds) will be left in place rather than removed (covered and revegetated)
  - 1 site manager; 1 accountant/procurement; 1 site engineer; 1 laborer
- Indirect costs
  - 5% contingency, engineering design/construction

6 Data Inputs and Model Basics

This section provides a discussion of the particular data input into the model to calculate a closure cost.

Data and information used in building the SRCE are provided in the attachments. The SRCE file is provided in Attachment 1 and the Cost data file in Attachment 2. Some costs required for closure planning and permitting are based upon SRK's experience in permitting and closing mine sites.

The below built in worksheet headings discuss the activities and assumptions used in estimating the closure costs in the order they appear in the SRCE spreadsheet.

6.1 Cost Inputs

6.1.1 Labor Rates

Labor rates have been taken from the Minnesota Department of Labor And Industry Prevailing Wages for State Funded Construction Projects for commercial construction in St. Louis County (Attachment 3).

Labor rates are broken down by basic hourly rates and fringe rates as provided in the Minnesota prevailing wages. Following this, unemployment, retirement/SS/Medicare, and workman's compensation are added. The unemployment tax has been included for new employers in a high experience rating industry. Workman's compensation has been taken from RS Means 2015 (R013113-60 MN).

6.1.2 Equipment Costs

Monthly equipment rental rates have been acquired from the local Caterpillar dealer (Attachment 4). Where equipment rates were not readily available, SRK used Nevada standardized monthly rental rates (from Cashman Equipment, Nevada) for nominal costs (Attachment 5). These monthly rental rates are divided by the number of hours worked in a month to obtain hourly rental rates.

Preventive maintenance (PM), ground-engaging tools (GET) consumption, and tire costs have been taken from Nevada standardized costs. PM and GET are provided as hourly add-ons and hourly tire expenditure costs are calculated by dividing tire cost with tire life expectancy.

The SRCE multiplies the fuel unit cost ($/gal) with the fuel use rates in the Caterpillar Handbook, Edition 35, Ch. 20 to estimate the cost of fuel consumption per hour.

All of these components added together provide the total hourly rate per equipment.

6.1.3 Material Costs

6.1.3.1 Seed Mixes

Costs for seed mixes for slope areas and flat areas were provided by D & T Landscaping, Inc. (Attachment 6). A sales tax rate of 6.875% was applied. SRK then split the Mix 1 cost equally into labor, equipment, and materials rates (Table 3). With the assumption that the labor and equipment burdens would be similar, material costs for Mix 2 and Mix 3 were obtained by keeping the labor and equipment rates constant and subtracting them from the cost for that seed mix. The same document also provides mulch costs.

Table 3

		Cost ($/acre)	Labor ($/acre)	Equipment ($/acre)	Materials ($/acre)
Mix 1	Tailings basin flats seed and fertilizer	417	139	139	**139**
Mix 2	Tailings basin slopes seed and fertilizer	577	139	139	**299**
Mix 3	Overburden seed and fertilizer	315	139	139	**37**

6.1.3.2 Cement, Grout

Nevada costs have been used for cement and grout used in well abandonment cost estimates.

6.1.3.3 Water Analysis Cost

Water analysis costs to be used in water quality monitoring cost estimation have been obtained from Attachment 7.

6.1.3.4 Fuel Cost

The fuel cost utilized in the earthworks activities in the SRCE was obtained from Mansfield Oil Company.

6.1.3.5 Electrical Power

The electrical power rate is consistent with based on Minnesota Power's commercial rates (Attachment 8).

6.1.4 Misc Unit Costs

Miscellaneous Unit Costs rely on RSMeans crews utilizing SRCE labor and equipment rates (example: pipe removal crew) as well as those that rely on quotes (revegetation).

6.1.5 Revegetation

The SRCE estimate assumes seeding by mechanical broadcast and it is used here to complement the material cost of revegetation with labor and equipment. Refer to Table 3 for the division of quotes for different seed mixes into components of materials, labor, and equipment costs.

6.2 Fleets

This sheet provides details on the fleets and crews utilized in various activities in the SRCE spreadsheet. Some fleets and/or crews are set while others can be customized. Still others have components that are calculated per item depending on user inputs (such as the number of trucks used in hauling depending on the distances between source and destination). No adjustments or over-rides have been made in this estimate.

6.3 Productivity

This sheet documents the productivities of equipment depending on specifications, work conditions, etc. It is based on the CAT Handbook Edition 35.

7 Closure Cost Estimate

Inputs in the closure cost estimate are based on Attachment 9 unless detailed otherwise.

7.1 Other User

7.1.1 Closure – Vehicles

¾ ton 4WD pick-up trucks will be required for the 2-year closure period. Annual costs based on a 7-year life and a purchase price of $37,521 from a 6/14/16 quote from Lundgren Motors (Attachment 10) divided equally between this estimate and other reclamation activities at the site.

7.1.2 Closure Snow Plowing

Snow plowing for the 2-year closure period will be provided by contractor that is currently providing this service to the site. Annual costs the average of costs for winters of 2013-14 and 2014-15 divided equally between this estimate and other reclamation activities at the site

7.1.3 Post closure vehicles

¾ ton 4WD pick-up trucks will be required for the 28-year post closure period. Annual costs based on a 7-year life and a purchase price of $37,521 from a 6/14/16 quote from Lundgren Motors (Attachment 10) divided equally between this estimate and other reclamation activities at the site.

7.1.4 Post closure snow plow attachment

Snow plowing for the 28-year post closure period will be provided staff labor and equipping one of the site pick-up trucks with a snow plow. Snow plow cost based on current listed price divided equally between this estimate and other reclamation activities at the site.

7.2 Human Resources

7.2.1 Closure – One Site Manager

Annual salary with benefits of $224,640 from an hourly rate of $108 based on Northeast Technical Services (NTS) rate for mid-level professional (Attachment 3). NTS is very familiar with the site and has been providing services at the site since before closure of LTVSMC. Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.4175.

7.2.2 Closure – One Project Engineer

Annual salary with benefits of $223,600 from an hourly rate of $107.50 based on Barr Engineering (Barr) average rate for a mid-level engineer (Attachment 3). Barr is very familiar with the reclamation requirements and designs at the site and has provided design and environmental services for the NorthMet Project since 2004. Annual cost based half full time divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.25.

7.2.3 Closure – One Accountant/Purchaser

Annual salary with benefits of $187,200 from an hourly rate of $90 based on Barr maximum rate for a level 1 support person (Attachment 3). Annual cost based half full time divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.25.

7.2.4 Closure – One Laborer

Annual salary with benefits of $67,038 from an hourly rate of $32.23 based on Express Employment Professionals (Express) rate for Maintenance 1 (Attachment 3). Express is very familiar with the site and has been providing temporary manpower services at the site since 2010. Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.25.

7.2.5 Post Closure – One Site Manager

Annual salary with benefits of $224,640 from an hourly rate of $108 based on Northeast Technical Services (NTS) rate for mid-level professional (Attachment 3). NTS is very familiar with the site and has been providing services at the site since before closure of LTVSMC. Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.4175.

7.2.6 Post Closure – One Laborer

Annual salary with benefits of $67,038 from an hourly rate of $32.23 based on Express Employment Professionals (Express) rate for Maintenance 1 (Attachment 3). Express is very familiar with the site and has been providing temporary manpower services at the site since 2010.

Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.4175.

7.3 Reclamation Quantities

The Reclamation Quantities worksheet sums total earthworks costs and total earthworks amounts (volumes and areas). These data are then used to calculate project-specific unit costs. This worksheet can also be used to easily link calculations to the rest of the SRCE where sums of earthworks-related quantities are utilized.

7.4 Tailings

The legacy tailings storage facility will be scarified and revegetated.

7.5 Quarries and Borrow Areas

Topsoil will be placed on areas of the East pit that are exposed owing to stripping. The source of the topsoil stockpile will be the OSLA (see Figure 1). These exposed areas will then be revegetated. SRCE estimates the volume of growth media based on the disturbed surface area (the sum of slope areas and flat areas) multiplied by the thickness of the growth media layer.

7.6 Haul Materials

The “Generic Material Hauling” sheet cost items are included to account for disturbances related to the Category 2/3, Category 4, and ore surge stockpiles. At this time, there will be no material to backfill into the pit, however the areas will be stripped and disturbed in preparation of the storage of the waste rock and ore material.

These disturbances will be reclaimed by trucking and placing growth media from the material stockpiled at the OSLA. Revegetation will be with Mix 3 (Overburden seed and fertilizer).

The disturbances for the facilities included in this sheet were obtained from Attachment 9.

Replace topsoil and revegetate at category 2/3 and 4 waste rock areas and ore surge pile (SRCE 180, 29 and 31 acres)

7.7 Other Demolition and Equipment Removal

PolyMet prepared a specification (Attachment 11) for all demolition activities required at closure and Lakehead Constructors (Lakehead) submitted a 2016 proposal to execute this work.

PolyMet prepared a specification for asbestos abatement for all buildings to be demoed and Mavo Systems (Mavo) submitted a 6/7/16 proposal to execute this work.

These quotes have been broken down by labor and equipment at a ratio of 1:2 in the model. The sources of these quotes are provided in Attachment 11 and replicated in User 2 .

This cost estimate includes the Phase 1 plant and mine site structure demolition costs.

7.8 Process Ponds

This sheet includes costs for backfilling of ponds with locally available excavation material and revegetation. Backfilling costs are estimated based on the volume of backfill per pond based on the dimensions of the ponds. Lengths and widths of ponds were obtained from the Mine Site Water Management Plan Large Figure 4 and depths calculated based on design volume data in Table 4-1 Sump and Pond Excess Capacity of the Mine Site Water Management Plan.

7.9 Yards, etc.

The “Yards” sheet allows for accounting of costs for regrading and cover and growth media placement as well as revegetation where the disturbance may not fit into any one of the previous categories covered.

Given the quotes for demolition of buildings includes the cost of reclaiming miscellaneous disturbances, the only item covered here is the OSLA Overburden Storage and Laydown Area minus wetland area.

7.10 Well Abandonment

The “Well Abandonment” sheet takes parameters such as well diameter and average depth to estimate the volume of grout, backfill, or a combination thereof and from there the cost of labor and materials as well as, if applicable, equipment. This estimate includes the monitoring wells drilled for Construction Year 1.

7.11 Monitoring

7.11.1 Reclamation Maintenance

For the purpose of covering any revegetation maintenance, 5% rework on all areas revegetated has been included.

7.11.2 Reclamation Monitoring

Professional monitoring services are included in the “Other User” sheet.

7.11.3 Water Quality Monitoring

Water quality monitoring is not included in the scope of the Construction Year 1 non-ferrous project.

7.12 Construction Management

Costs under “Construction Management” include road maintenance. A small grader will be included on site for a day a month during active reclamation and then on average a day a year over the long-term, post-closure period.

8 Conclusions

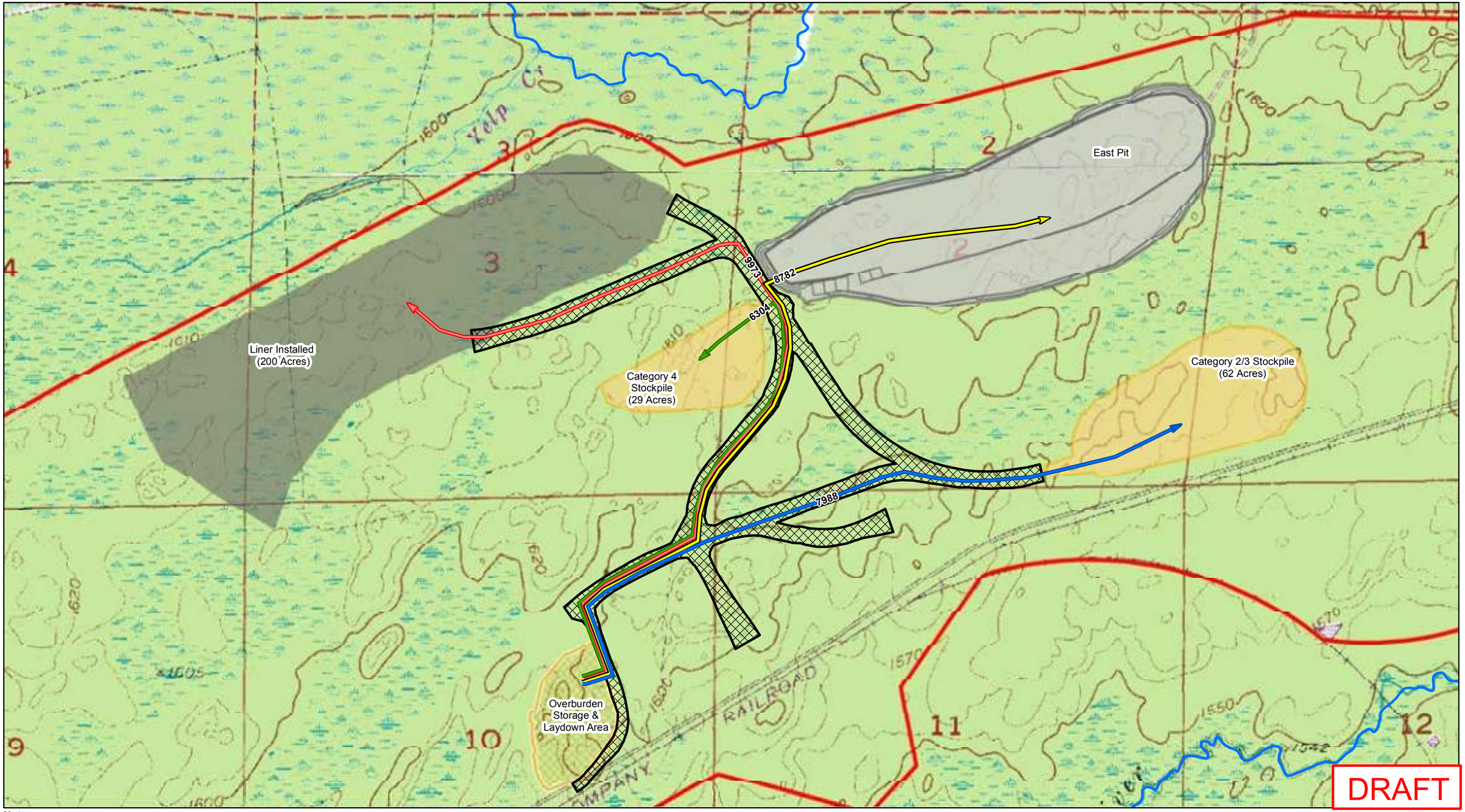
With 1.1% inflation rate and 8% discount rate, the grand total net present value for the NorthMet contingency reclamation estimate is $12,441,852.

Attachments

1. SRCE file
2. Cost Data File
3. Labor rates
4. Caterpillar Equipment Rates
5. Nevada standardized monthly rental rates (from Cashman Equipment, Nevada)
6. DandT Seeding Contingency Reclamation Estimate on Letterhead.doc
7. Water analysis cost
8. MP CommercialRates.pdf
9. Changes over time
10. Lundgren motors truck
11. Demo

Figure 1.

Haul Distances



Notes

1. Basemap from Esri and its data suppliers.
2. Project features supplied by Barr Engineering.
3. Year 1 stockpiles, mine pits and haul roads from map packages received from Barr in April 2014.

Legend

- Overburden to Category 2/3
- Overburden to Category 4
- Overburden to East Pit
- Overburden to Liner
- Partridge River
- Haul Roads
- Active Stockpiles
- Reclaimed Areas
- Installed Liner
- Mine Development
- Proposed Project Area Boundary

PolyMet Mining

Foth

N

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION
PREPARED BY: GMK		DATE: JUN. '16	
REVIEWED BY:		DATE:	
APPROVED BY:		DATE:	

POLYMET MINING

Revised FIGURE 2-1 (Haul Distances)

MINE SITE PERMIT YEAR 01 CONTINGENCY PLAN
PERMIT TO MINE APPLICATION
HOYT LAKES, MINNESOTA

Scale: 0 245 490 980 Feet

Date: JUNE 2016

Drafted by: GMK

Project No: 177900.020

Path: H:\Polymet\177900.020_PolyMet_Reclamation Cost Estimate\040_Drafting\Task_3\Working\GMK\Haul Distances_rev_20160616.mxd Date: 6/16/2016

Attachment 1.

SRCE file

Enter Data Below in Green and Blue Spaces

STANDARDIZED RECLAMATION COST ESTIMATOR

Version 1.4.1
Build 016 (revised 01 Aug 2014)
NOT YET VALIDATED FOR REGULATORY USE IN NEVADA

COST DATA FILE INFORMATION

File Name:	PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Cost Data File:	PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Data Date:	February, 2016
Cost Data Basis:	User Data — Data Cost Units: Imperial
Author/Source:	SRK Consulting, 2016

PROJECT INFORMATION

Property/Mine Name:	NorthMet — Property Code:
Project Name:	PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate
Date of Submittal:	September, 2016 — Average Altitude: 0 ft.
Units of Measure:	○ Metric (m, km, ha, etc.) ◉ Imperial (ft, mi, acres, etc.)
Select One:	○ Notice or Sm Exploration Plan ○ Lg Exploration Plan ◉ Mine Operation
Select One:	○ Private Land ◉ Public or Public/Private
Cost Estimate Type:	Surety
Cost Basis Category:	Polymet

MN prevailing wages, CAT equipment rates

Cost Basis Description:

☐ This project is in the State of Nevada

Closure Cost Estimate
Cost Summary
Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate
Project Date: September, 2016
Model Version: Version 1.4.1
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Data Cost File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Basis: Polymet

A. Earthwork/Recontouring	Labor (1)	Equipment (2)	Materials	Total
Exploration	$0	$0	$0	$0
Exploration Roads & Drill Pads	$0	$0	$0	$0
Roads	$0	$0	$0	$0
Well Abandonment	$10,494	$3,432	$99	$14,025
Pits	$0	$0	N/A	$0
Quarries & Borrow Areas	$171,449	$497,861	$0	$669,310
Underground Openings	$0	$0	$0	$0
Process Ponds	$143,390	$418,699	$0	$562,089
Heaps	$0	$0	$0	$0
Waste Rock Dumps	$0	$0	$0	$0
Landfills	$0	$0	$0	$0
Tailings	$837	$1,371	$0	$2,208
Foundation & Buildings Areas	$0	$0	$0	$0
Yards, Etc.	$38,080	$80,892	$0	$118,972
Drainage & Sediment Control	$0	$0	$0	$0
Generic Material Hauling	$78,491	$224,459	$0	$302,950
Other User Costs (from Other User sheet)	$787,465	$1,574,929	$0	$2,362,394
Other**				$0
Subtotal	**$1,230,206**	**$2,801,643**	**$99**	**$4,031,948**
Mob/Demob if included in Other User sheet	$0	$0	$0	$0
Mob/Demob				$0
Subtotal "A"	**$1,230,206**	**$2,801,643**	**$99**	**$4,031,948**

B. Revegetation/Stabilization	Labor (1)	Equipment (2)	Materials	Total
Exploration	$0	$0	$0	$0
Exploration Roads & Drill Pads	$0	$0	$0	$0
Roads	$0	$0	$0	$0
Well Abandonment				N/A
Pits	$0	$0	$0	$0
Quarries & Borrow Areas	$13,321	$13,321	$3,546	$30,188
Underground Openings				N/A
Process Ponds	$3,962	$3,962	$1,041	$8,965
Heaps	$0	$0	$0	$0
Waste Rock Dumps	$0	$0	$0	$0
Landfills	$0	$0	$0	$0
Tailings	$2,355	$2,355	$5,065	$9,775
Foundation & Buildings Areas	$0	$0	$0	$0
Yards, Etc.	$6,533	$6,533	$6,533	$19,599
Drainage & Sediment Control	$0	$0	$0	$0
Generic Material Hauling	$17,236	$17,236	$4,588	$39,060
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "B"	**$43,407**	**$43,407**	**$20,773**	**$107,587**

C. Detoxification/Water Treatment/Disposal of Wastes**	Labor (1)	Equipment (2)	Materials	Total
Process Ponds/Sludge				$0
Heaps				$0
Dumps (Waste & Landfill)				$0
Tailings				$0
Surplus Water Disposal				$0
Monitoring				$0
Miscellaneous				$0
Solid Waste - On Site	$0	$0	N/A	$0
Solid Waste - Off Site				$0
Hazardous Materials				$0
Hydrocarbon Contaminated Soils	$0	$0	$0	$0
Pumping (from Solution Mgmt sheet)	$0	$0	N/A	$0
Evaporation (from Solution Mgmt sheet)	$0	$0	$0	$0
Treatment (from Solution Mgmt sheet)	$0	$0	$0	$0
Decontamination (from Solution Mgmt sheet)	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$0	$2,950,532	$0	$2,950,532
Other**				$0
Subtotal "C"	**$0**	**$2,950,532**	**$0**	**$2,950,532**

D. Structure, Equipment and Facility Removal, and Misc.	Labor (1)	Equipment (2)	Materials	Total
Foundation & Buildings Areas	$0	$0	$0	$0
Other Demolition	$2,000,718	$4,062,260	$0	$6,062,978
Equipment Removal	$0	$0	$0	$0
Fence Removal	$0	$0		$0
Fence Installation	$0	$0	$0	$0
Culvert Removal	$0	$0	N/A	$0
Pipe Removal	$0	$0	N/A	$0
Powerline Removal	$0			$0
Transformer Removal	$0			$0
Rip-rap, rock lining, gabions	$0	$0	$0	$0
Other Misc. Costs	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "D"	**$2,000,718**	**$4,062,260**	**$0**	**$6,062,978**

E. Monitoring	Labor (1)	Equipment (2)	Materials	Total
Reclamation Monitoring and Maintenance	$2,167	$2,167	$2,167	$6,501
Ground and Surface Water Monitoring	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Subtotal "E"	**$2,167**	**$2,167**	**$2,167**	**$6,501**

F. Construction Management & Support	Labor	Equipment (2)	Materials	Total
Construction Management	$0	$0	N/A	$0
Construction Support	$0	$0	$0	$0
Road Maintenance	$31,564	$48,080	$0	$79,644
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "F"	**$31,564**	**$48,080**	**$0**	**$79,644**

G. Closure Planning, G&A, Human Resources			Include?	Total
Closure Planning				$0
General & Administration				$0
Human Resources				$2,378,900
Other User Costs (from Other User sheet)	$0	$111,351	$0	$111,351
Other**				$0
Subtotal "G"	**$0**	**$111,351**	**$0**	**$2,490,251**

Subtotal Operational & Maintenance Costs	Labor (1)	Equipment (2)	Materials (3)	Total
Subtotal A through G	**$3,308,061**	**$10,019,441**	**$23,039**	**$15,729,441**

** Other Operator supplied costs - additional documentation required.

Closure Cost Estimate
Cost Summary
Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate
Project Date: September, 2016
Model Version: Version 1.4.1
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm

Indirect Costs			Include?	Total
1. Engineering, Design and Construction (ED&C) Plan (7)				
2. Contingency (8)				$786,472
3. Insurance (9)	$0			
4. Performance Bond (10)				
5. Contractor Profit (11)				
6. Contract Administration (12)				
7. Government Indirect Cost (13)				
Subtotal Add-On Costs				**$786,472**
Total Indirect Costs as % of Direct Cost				5%
GRAND TOTAL				**$16,515,913**

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate	0%	0%		0%	0%
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	5%	5%	5%	5%	0%
3. Insurance (9)	0.0%	of labor costs			
4. Bond (10)	0.0%	of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)	0%	of the O&M costs			
	<=	<=	<=	>	
0	$0	$0		$0	
Variable Rate	0%	0%		0%	
0	0%	$0			

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016
First Year of Operation	2018
Operating Period	years
Closure Year 1:	2019
Closure Period:	2 years
Post Closure Period	28 years

Inflation Rate (r) (%):	
Market Risk (MR)(%):	
Discount Rate (i)(%):	
Closure Period:	
Post Closure Period:	

Engineering, Design and Construction Plan (%)	0%
Contingency (%)	5.0%
Contractor OH and Profit (CP)(%):	0%
Contract Administration (%)	0%
Show how many years in schedule (10 to 100)	55 Set Years

	Term (t)(years):	Total From Cost Summary	0	1	2	3	4	5	6	7	8
	Schedule Variance		2016	2017	2018	2019	2020	2021	2022	2023	2024
A. Earthwork/Recontouring											
Exploration	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 14,025				$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310				$ 669,310	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089				$ 562,089	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208				$ 2,208	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972				$ 118,972	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950				$ 302,950	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394				$ 2,362,394	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -									
Mob/Demob if included in Other User sheet	$ -	$ -									
Mob/Demob	$ -	$ -									
Subtotal "A"	$ -	$ 4,031,948	$ -	$ -	$ -	$ 4,017,923	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization											
Exploration	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A				$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188				$ 30,188	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A				$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965				$ 8,965	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775				$ 9,775	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599				$ 19,599	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060				$ 39,060	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**											
Process Ponds/Sludge	$ -	$ -									
Heaps	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -									
Decontamination (from Solution Mgmt sheet)	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532				$ 2,950,532	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -									
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.											
Foundation & Buildings Areas	$ -	$ -									
Other Demolition	$ -	$ 6,062,978				$6,062,978	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -				$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -				$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ -				$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -				$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -				$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -				$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -				$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -				$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -				$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -				$0	$0	$0	$0	$0	$0
Other**	$ -	$ -									
Subtotal "D"	$ -	$ 6,062,978	$ -	$ -	$ -	$ 6,062,978	$ -	$ -	$ -	$ -	$ -
E. Monitoring											
Reclamation Monitoring and Maintenance	$ -	$ 6,501				$6,501	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -				$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -									
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support											
Construction Management	$ -	$ -				$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -				$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644				$14,481	$14,481	$1,810	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -				$0	$0	$0	$0	$0	$0
Other**	$ -	$ -									
Subtotal "F"	$ -	$ 79,644	$ -	$ -	$ -	$ 14,481	$ 14,481	$ 1,810	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources											
Closure Planning	$ -	$ -									
General & Administration	$ -	$ -									
Human Resources	$ -	$ 2,378,900				$168,576	$168,576	$72,920	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351				$38,990	$8,040	$2,680	$2,680	$2,680	$2,680
Other**	$ -	$ -									
Subtotal "G"	$ -	$ 2,490,251	$ -	$ -	$ -	$ 207,565	$ 176,616	$ 75,600	$ 75,600	$ 75,600	$ 75,600
Subtotal Operational & Maintenance Costs											
Subtotal A through G	$ -	$ 15,729,441	$ -	$ -	$ -	$ 13,367,567	$ 191,097	$ 77,410	$ 77,410	$ 77,410	$ 77,410
Indirect Costs											
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A									
2. Contingency (8)		$ 786,472	$ -	$ -	$ -	$ 668,378	$ 9,555	$ 3,870	$ 3,870	$ 3,870	$ 3,870
3. Insurance (9)		N/A									
4. Performance Bond (10)		N/A									
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A									
Subtotal Add-On Costs	$ -	$ 786,472	$ -	$ -	$ -	$ 668,378	$ 9,555	$ 3,870	$ 3,870	$ 3,870	$ 3,870
Grand Total (Undiscounted)	$ -	$ 16,515,913	$ -	$ -	$ -	$ 14,035,945	$ 200,652	$ 81,280	$ 81,280	$ 81,280	$ 81,280

Inflation Adjustment (Future Value = FV)	**$FV = Se^{(rt)}$**		$ -	$ -	$ -	$ 14,035,945	$ 200,652	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Market Risk Adjustment	**(MR x FV)**		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	**$Fv_{adj} = (FV + MR)$**		$ -	$ -	$ -	$ 14,035,945	$ 200,652	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Net Present Value (PV)	**$PV = FV_{adj}/(1+i)^t$**	$ 16,515,913	$ -	$ -	$ -	$ 14,035,945	$ 200,652	$ 81,280	$ 81,280	$ 81,280	$ 81,280

Grand Total (Undiscounted)		$ 16,515,913
Grand Total (Inflation Adjusted) (FV)		$ 16,515,913
Grand Total Market Risk Adjusted (Fv_{adj})		$ 16,515,913
Grand Total Net Present Value (NPV)		$ 16,515,913

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016
First Year of Operation	2018
Operating Period	years
Closure Year 1:	2019
Closure Period:	2 years
Post Closure Period	28 years

Inflation Rate (r) (%):	
Market Risk (MR)(%):	
Discount Rate (i)(%):	

Closure Period:	
Post Closure Period:	<<< Set years and click "Set Years" button

	Term (t)(years):		0	9	10	11	12	13	14	15	16	17
	Schedule Variance	Total From Cost Summary	2016	2025	2026	2027	2028	2029	2030	2031	2032	2033
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 14,025		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ -	$ 4,031,948	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 6,062,978		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 6,062,978	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 6,501		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -										
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644		$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 79,644	$ -	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -										
General & Administration	$ -	$ -										
Human Resources	$ -	$ 2,378,900		$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351		$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680
Other**	$ -	$ -										
Subtotal "G"	$ -	$ 2,490,251	$ -	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ -	$ 15,729,441	$ -	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A										
2. Contingency (8)		$ 786,472	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 786,472	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
Grand Total (Undiscounted)	$ -	$ 16,515,913	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280

Inflation Adjustment (Future Value = FV)	**$FV = Se^{(rt)}$**		$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Market Risk Adjustment	**(MR x FV)**		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	**$Fv_{adj} = (FV + MR)$**		$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Net Present Value (PV)	**$PV = FV_{adj}/(1+i)^t$**	$ 16,515,913	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280

Grand Total (Undiscounted)		$ 16,515,913
Grand Total (Inflation Adjusted) (FV)		$ 16,515,913
Grand Total Market Risk Adjusted (Fv_{adj})		$ 16,515,913
Grand Total Net Present Value (NPV)		$ 16,515,913

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	**2016**		**Inflation Rate (r) (%):**	
First Year of Operation	**2018**		**Market Risk (MR)(%):**	
Operating Period		years	**Discount Rate (i)(%):**	
Closure Year 1:	**2019**			
Closure Period:	**2**	years	**Closure Period:**	
Post Closure Period	**28**	years	**Post Closure Period:**	

	Term (t)(years):		0	18	19	20	21	22	23	24	25	26
	Schedule Variance	Total From Cost Summary	2016	2034	2035	2036	2037	2038	2039	2040	2041	2042
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 14,025		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ -	$ 4,031,948	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 6,062,978		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 6,062,978	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 6,501		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -										
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644		$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 79,644	$ -	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -										
General & Administration	$ -	$ -										
Human Resources	$ -	$ 2,378,900		$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351		$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680
Other**	$ -	$ -										
Subtotal "G"	$ -	$ 2,490,251	$ -	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ -	$ 15,729,441	$ -	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A										
2. Contingency (8)		$ 786,472	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 786,472	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
Grand Total (Undiscounted)	$ -	$ 16,515,913	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Inflation Adjustment (Future Value = FV)	**$FV = Se^{(rt)}$**			$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Market Risk Adjustment	**(MR x FV)**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	**$Fv_{adj} = (FV + MR)$**			$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Net Present Value (PV)	**$PV = FV_{adj}/(1+i)^t$**	$ 16,515,913	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280

Grand Total (Undiscounted)		$ 16,515,913
Grand Total (Inflation Adjusted) (FV)		$ 16,515,913
Grand Total Market Risk Adjusted (Fv_{adj})		$ 16,515,913
Grand Total Net Present Value (NPV)		$ 16,515,913

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	**2016**		**Inflation Rate (r) (%):**	
First Year of Operation	**2018**		**Market Risk (MR)(%):**	
Operating Period		years	**Discount Rate (i)(%):**	
Closure Year 1:	**2019**			
Closure Period:	**2**	years	**Closure Period:**	
Post Closure Period	**28**	years	**Post Closure Period:**	

	Term (t)(years):	Total From Cost Summary	0	27	28	29	30	31	32
	Schedule Variance		2016	2043	2044	2045	2046	2047	2048
A. Earthwork/Recontouring									
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 14,025		$ -	$ -	$ -	$ 14,025	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310		$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208		$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972		$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950		$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394		$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -							
Mob/Demob if included in Other User sheet	$ -	$ -							
Mob/Demob	$ -	$ -							
Subtotal "A"	$ -	$ 4,031,948	$ -	$ -	$ -	$ -	$ 14,025	$ -	$ -
B. Revegetation/Stabilization									
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188		$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775		$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599		$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**									
Process Ponds/Sludge	$ -	$ -							
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -							
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532		$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -							
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.									
Foundation & Buildings Areas	$ -	$ -							
Other Demolition	$ -	$ 6,062,978		$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ -		$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0
Other**	$ -	$ -							
Subtotal "D"	$ -	$ 6,062,978	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring									
Reclamation Monitoring and Maintenance	$ -	$ 6,501		$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -							
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support									
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644		$1,810	$1,810	$1,810	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0
Other**	$ -	$ -							
Subtotal "F"	$ -	$ 79,644	$ -	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources									
Closure Planning	$ -	$ -							
General & Administration	$ -	$ -							
Human Resources	$ -	$ 2,378,900		$72,920	$72,920	$72,920	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351		$2,680	$2,680	$0	$0	$0	$0
Other**	$ -	$ -							
Subtotal "G"	$ -	$ 2,490,251	$ -	$ 75,600	$ 75,600	$ 72,920	$ 72,920	$ 72,920	$ 72,920
Subtotal Operational & Maintenance Costs									
Subtotal A through G	$ -	$ 15,729,441	$ -	$ 77,410	$ 77,410	$ 74,730	$ 88,755	$ 74,730	$ 74,730
Indirect Costs									
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A							
2. Contingency (8)		$ 786,472	$ -	$ 3,870	$ 3,870	$ 3,736	$ 4,438	$ 3,736	$ 3,736
3. Insurance (9)		N/A							
4. Performance Bond (10)		N/A							
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A							
Subtotal Add-On Costs	$ -	$ 786,472	$ -	$ 3,870	$ 3,870	$ 3,736	$ 4,438	$ 3,736	$ 3,736
Grand Total (Undiscounted)	$ -	$ 16,515,913	$ -	$ 81,280	$ 81,280	$ 78,466	$ 93,192	$ 78,466	$ 78,466
Inflation Adjustment (Future Value = FV)	**$FV = Se^{(rt)}$**		$ -	$ 81,280	$ 81,280	$ 78,466	$ 93,192	$ 78,466	$ 78,466
Market Risk Adjustment	**(MR x FV)**		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	**$Fv_{adj} = (FV + MR)$**		$ -	$ 81,280	$ 81,280	$ 78,466	$ 93,192	$ 78,466	$ 78,466
Net Present Value (PV)	**$PV = FV_{adj}/(1+i)^t$**	$ 16,515,913	$ -	$ 81,280	$ 81,280	$ 78,466	$ 93,192	$ 78,466	$ 78,466

Grand Total (Undiscounted)		$ 16,515,913
Grand Total (Inflation Adjusted) (FV)		$ 16,515,913
Grand Total Market Risk Adjusted (Fv_{adj})		$ 16,515,913

Closure Cost Estimate
Other User

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Other Cost Items Calculated Elsewhere

	Description (required)	ID Code	Facility Type	Quantity	Units	Total Capital Cost $	Material Unit Cost $	Labor Unit Cost $	Equipment/ Operating Unit Cost $	Cost Type (select)	Total Cost $	Comments
1	Closure - Pickup Trucks - Closure Year 1		Closure G & A	2	each				$2,680.05	G. Closure Planning, Ga	$5,360	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
2	Closure - Pickup Trucks - Closure Year 2		Closure G & A	2	each				$2,680.05	G. Closure Planning, Ga	$5,360	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
3	Closure - Snow Plowing - Closure Year 1		Closure G & A	1	each				$11,544.64	G. Closure Planning, Ga	$11,545	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs shared with Ferrou
4	Closure - Snow Plowing - Closure Year 2		Closure G & A	1	each				$11,544.64	G. Closure Planning, Ga	$11,545	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs shared with Ferrou
5	Closure - Pickup Trucks - Post-Closure Year 1		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
6	Closure - Pickup Trucks - Post-Closure Year 2		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
7	Closure - Pickup Trucks - Post-Closure Year 3		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
8	Closure - Pickup Trucks - Post-Closure Year 4		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
9	Closure - Pickup Trucks - Post-Closure Year 5		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
10	Closure - Pickup Trucks - Post-Closure Year 6		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
11	Closure - Pickup Trucks - Post-Closure Year 7		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
12	Closure - Pickup Trucks - Post-Closure Year 8		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
13	Closure - Pickup Trucks - Post-Closure Year 9		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
14	Closure - Pickup Trucks - Post-Closure Year 10		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
15	Closure - Pickup Trucks - Post-Closure Year 11		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
16	Closure - Pickup Trucks - Post-Closure Year 12		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
17	Closure - Pickup Trucks - Post-Closure Year 13		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
18	Closure - Pickup Trucks - Post-Closure Year 14		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
19	Closure - Pickup Trucks - Post-Closure Year 15		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
20	Closure - Pickup Trucks - Post-Closure Year 16		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
21	Closure - Pickup Trucks - Post-Closure Year 17		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
22	Closure - Pickup Trucks - Post-Closure Year 18		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
23	Closure - Pickup Trucks - Post-Closure Year 19		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
24	Closure - Pickup Trucks - Post-Closure Year 20		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
25	Closure - Pickup Trucks - Post-Closure Year 21		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
26	Closure - Pickup Trucks - Post-Closure Year 22		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
27	Closure - Pickup Trucks - Post-Closure Year 23		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
28	Closure - Pickup Trucks - Post-Closure Year 24		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
29	Closure - Pickup Trucks - Post-Closure Year 25		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
30	Closure - Pickup Trucks - Post-Closure Year 26		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
31	Closure - Pickup Trucks - Post-Closure Year 27		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
32	Closure - Pickup Trucks - Post-Closure Year 28		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=26
33	Post-Closure - Plow attachment for Vehicles		Closure G & A	1	ea				$5,000.00	G. Closure Planning, Ga	$2,500	
34	Areas of concern, legacy remediation (quote from NTS)		Other Facilities	1	ea				$2,950,532.00	C. Water Management	$2,950,532	User 4
35	SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)		Other Facilities	1	LS			$132,984.83	$265,969.67	A. Earthwork	$398,955	User 11
36	SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)		Other Facilities	1	LS			$14,214.67	$28,429.33	A. Earthwork	$42,644	User 11
37	SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)		Other Facilities	1	LS			$237,850.42	$475,700.83	A. Earthwork	$713,551	User 11
38	SOW 21: Category 1 Groundwater Containment System: Year 0		Other Facilities	1	LS			$402,414.73	$804,829.47	A. Earthwork	$1,207,244	User 11
						$0	$0	$787,465	$4,636,812		$5,424,277	

Notes: Capital cost is lump sum (i.e. not multiplied by the quantity).
Material, Labor and Equipment/Operating costs are unit costs (i.e. multiplied by the quantity).

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	Totals
Salaries & Benefits	$2,378,900
Severance & Relocation	$0
TOTALS	$2,378,900

Human Resources - Salary & Benefits

	Job Description (required)	Avg. Annual Salary (incl. benefits) $	Type	Closure Year 1 #	Closure Year 2 #	Closure Year 3 #	Closure Year 4 #	Closure Year 5 #	Closure Year 6 #	Closure Year 7 #	Closure Year 8 #	Closure Year 9 #	Closure Year 10 #	Closure Year 11 #	Closure Year 12 #	Closure Year 13 #	Closure Year 14 #	Closure Year 15 #	Closure Year 16 #	Closure Year 17 #	Closure Year 18 #	Closure Year 19 #	Closure Year 20 #	Closure Year 21 #	Closure Year 22 #	Closure Year 23 #	Closure Year 24 #	Closure Year 25 #	Closure Year 26 #	Closure Year 27 #	Closure Year 28 #	Closure Year 29 #	Closure Year 30 #
1	Closure - Site Manager	$224,640	Closure G & A	0	0.4175																											
2	Closure - Accountant	$187,200	Closure G & A	0	0.25																											
3	Closure - Utility	$67,038	Closure G & A	0	0.4175																											
4	Post-Closure - Site Manager	$224,640	Closure G & A			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
5	Post-Closure - Utility	$67,038	Closure G & A			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	SUBTOTAL			$ 168,576	$ 168,576	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920

Notes:
Management costs shared with other projects.

Human Resources - Severance & Outplacement Benefits

	Job Description	Severance & Outplacement Cost $		Closure Year 1 #	Closure Year 2 #	Closure Year 3 #	Closure Year 4 #	Closure Year 5 #	Closure Year 6 #	Closure Year 7 #	Closure Year 8 #	Closure Year 9 #	Closure Year 10 #	Closure Year 11 #	Closure Year 12 #	Closure Year 13 #	Closure Year 14 #	Closure Year 15 #	Closure Year 16 #	Closure Year 17 #	Closure Year 18 #	Closure Year 19 #	Closure Year 20 #	Closure Year 21 #	Closure Year 22 #	Closure Year 23 #	Closure Year 24 #	Closure Year 25 #	Closure Year 26 #	Closure Year 27 #	Closure Year 28 #	Closure Year 29 #	Closure Year 30 #
1	Closure - Site Manager				0.4																											
2	Closure - Accountant				0.3																											
3	Closure - Utility				0.4																											
4	Post-Closure - Site Manager																															0.3
5	Post-Closure - Utility																															0.3
			SUBTOTAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Notes:
1. Assumes Severance + Outplacement

Bond Calculation
Tailings

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$837	$1,371	N/A	$2,208
Subtotal Earthworks	**$837**	**$1,371**	**$0**	**$2,208**
Revegetation Cost	$2,355	$2,355	$5,065	$9,775
TOTALS	**$3,192**	**$3,726**	**$5,065**	**$11,983**

Tailings - User Input

You must fill in ALL green cells and relevant blue cells in this section for each tailings impoundment

	Facility Description		Physical - MANDATORY								Cover				Growth Media			
	Description (required)	ID Code	Underlying Ground Slope % Grade	Ungraded Slope _H:1V	Final (Regraded) Embankment Slope _H:1V	Final Embankment Height ft	Final Tailings Surface Area acres	Mid-Embankment or Ripping Length ft	Embankment Regrade Volume (if calculated elsewhere) cy	Surface Regrade Volume (calculated elsewhere) cy	Embankment Cover Thickness in	Tailings Surface Cover Thickness in	Distance from Cover Borrow ft	Slope from Tailings to Borrow % grade	Embankment Growth Media Thickness in	Tailings Surface Growth Media Thickness in	Distance from Growth Material Stockpile ft	Slope from Tailings to Stockpile % grade
1	**Tailings Basin - first lift of embankment constructed**		**0.0**	**4.5**	**4.5**	**20**	**0.00**	**7,974**										

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Tailings - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each tailings impoundment

		Grading				Cover		Growth Media		Revegetation								
	Description (required)	Dozing Material Condition (select)	Embankment Material Type (select)	Grading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Embankment Slope (select)	Seed Mix Tailings Surface (select)	Mulch Embankment Slopes (select)	Mulch Tailings Surface (select)	Fertilizer Embankment Slopes (select)	Fertilizer Tailing Surface (select)	Embankment Slope Scarify/ Rip? (select)	Tailings Surface Scarify/ Rip? (select)	Scarifying/ Ripping Fleet (select)
1	**Tailings Basin - first lift of embankment constructed**									**Mix 2**	**Mix 1**	**Straw Mulch**	**Straw Mulch**			**Yes**	**Yes**	**Small Dozer**

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Bond Calculation
Tailings

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$837	$1,371	N/A	$2,208
Subtotal Earthworks	**$837**	**$1,371**	**$0**	**$2,208**
Revegetation Cost	$2,355	$2,355	$5,065	$9,775
TOTALS	**$3,192**	**$3,726**	**$5,065**	**$11,983**

Tailings - Calculations

Surface Area Calculations

Top Surface Area provided by user

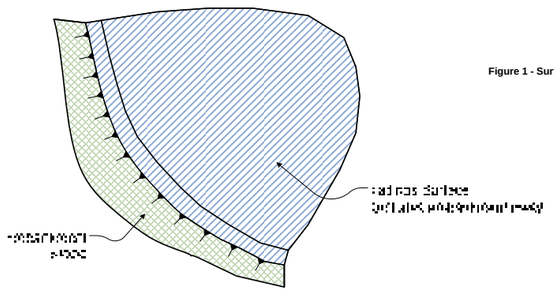


Figure 1 - Surface Areas

Final Slope Area and Footprint Area Calculations

$$\text{Overall slope length} = \frac{\text{Embankment height}}{\cos(\text{Overall slope angle})}$$

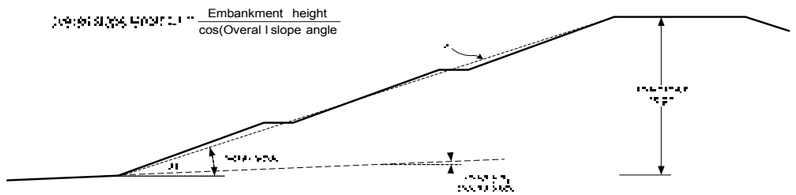


Figure 2 - Final Slope Area and Footprint Area Calculation

Grading Calculations

Grading assumed on impoundment surface only, not embankment
Average push distance assumed to be 2/3 of the 600 feet maximum from Catepillar Handbook or 400 feet
Material assumed to be loose stockile (1.2 productivity factor)
Dozing density correction based on dry sand = 2300/2400 = 0.96
Slope assumed to be 0 to 5% (1.0 productivity factor)

Ripping/Scarifying/Revegetation Calculation

Minimum 1 hr ripping/scarifying per area
Minimum 1 acre revegetation crew time per area

Regrading Volume Calculation

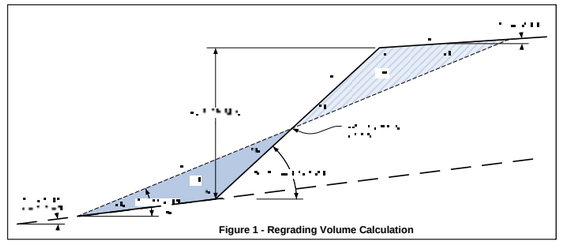


Figure 1 - Regrading Volume Calculation

Regrading Push Distance Calculation

$$\text{Push distance} = \frac{2}{3}(c_1 + c_2)$$

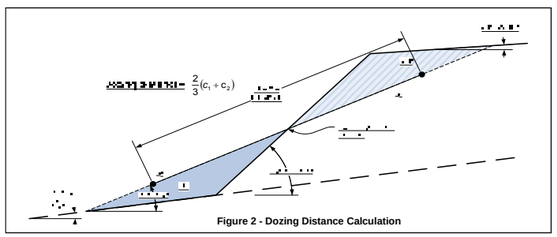


Figure 2 - Dozing Distance Calculation

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$837	$1,371	N/A	$2,208
Subtotal Earthworks	**$837**	**$1,371**	**$0**	**$2,208**
Revegetation Cost	$2,355	$2,355	$5,065	$9,775
TOTALS	**$3,192**	**$3,726**	**$5,065**	**$11,983**

Tailings - Embankment Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material Condition	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	Tailings Basin - first lift of embankment constructed	0		Select Fleet								$0	$0	$0
												$0	**$0**	**$0**

Tailings - Surface Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Density Correction	Dozing Material	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	Tailings Basin - first lift of embankment constructed			Select Fleet								$0	$0	$0
												$0	**$0**	**$0**

Tailings - Cover and Growth Media Costs

		Cover Placement								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Placement Fleet	Cover Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Placement Cost $	Growth Media Volume cy	Growth Media Placement Fleet	Growth Media Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoil Placement Cost $
1	Tailings Basin - first lift of embankment constructed						$0	$0	$0						$0	$0	$0
							$0	**$0**	**$0**						**$0**	**$0**	**$0**

Tailings - Scarifying/Revegetation Costs

	Description (required)	Embankment Slope Area acres	Tailings Surface Area acres	Total Surface Area acres	Final Slope Length ft	Ripping/ Scarifying Fleet	Slope Scarifying/ Ripping Hours hrs	Flat Area Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Cost $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Cost $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	Tailings Basin - first lift of embankment constructed	16.84		16.84	92	D6R	14		$837	$1,371	$2,208	$2,355	$2,355	$5,065	$9,775
		16.84		16.84			14		**$837**	**$1,371**	**$2,208**	**$2,355**	**$2,355**	**$5,065**	**$9,775**

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$171,449	$497,861	N/A	$669,310
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$171,449**	**$497,861**	**$0**	**$669,310**
Revegetation Cost	$13,321	$13,321	$3,546	$30,188
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$13,321	**$13,321**	**$3,546**	**$30,188**
TOTALS	**$184,770**	**$511,182**	**$3,546**	**$699,498**

Quarries & Borrow Pits - User Input

You must fill in ALL green cells in this section for each dump, lift or dump category

	Facility Description			Physical - MANDATORY									Cover				Growth Media			
	Description (required)	ID Code	Type	Underlying Ground Slope % Grade	Ungraded Slope _H:1V	Final Slope _H:1V	Final Top Slope % Grade	Bench or Highwall Height ft	Mid-Bench Length ft	Average Flat Area Long Dimension (ripping distance) ft	Final (Regraded) Footprint acres	Regrade Volume (1) (if calculated elsewhere) cy	Cover Thickness Slopes in	Cover Thickness Flat Areas in	Distance from Cover Borrow ft	Slope from Dump to Cover Borrow % grade	Slope Growth Media Thickness in	Flat Area Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Dump to Stockpile % grade
1	**East pit**		**Quarry**	**0.0**	**2.0**	**2.0**	**1.0**	**14**	**12,100**	**1,000**	**95.00**						**18.0**	**18.0**	**8,782**	**0.0**

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

The footprint consists of initial stripping.

Quarries & Borrow Pits - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each dump, lift or dump category

		Grading				Cover		Growth Media		Revegetation								
	Description (required)	Dozing Material Condition (select)	Highwall Material Type (select)	Grading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Slopes (select)	Seed Mix Flat Areas (select)	Mulch Slopes (select)	Mulch Flat Areas (select)	Fertilizer Slopes (select)	Fertilizer Flat Areas (select)	Slope Scarify/ Rip? (select)	Flat Area Scarify/ Rip? (select)	Scarify/ Ripping Fleet (select)
1	**East pit**	**1**	**LS - broken**	**Med**				**Alluvium**	**Med Truck**	**Mix 3**	**Mix 3**	**None**	**None**					

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Quarries & Borrow Pits - User Input (cont.)

	Facility Description	Highwall Berms					Berm Construction		Excavate or Doze	Hauling (if selected method)				Revegetation		
	Description (required)	Berm (or Highwall) Length ft	Berm Height ft	Berm Base Width ft	Berm Sideslope Angle _H:1V	Volume (if calculated elsewhere) cy	Construction Method (select)	Berm Material Type (select)	Berm Construction Equipment Fleet (select)	Berm Hauling Fleet (select)	Distance to Borrow Source ft	Slope to Borrow Source % grade	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)
1	**East pit**															

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)
3. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$171,449	$497,861	N/A	$669,310
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$171,449**	**$497,861**	**$0**	**$669,310**
Revegetation Cost	$13,321	$13,321	$3,546	$30,188
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$13,321	**$13,321**	**$3,546**	**$30,188**
TOTALS	**$184,770**	**$511,182**	**$3,546**	**$699,498**

Quarries & Borrow Pits - Calculations

Regrading Volume Calculation

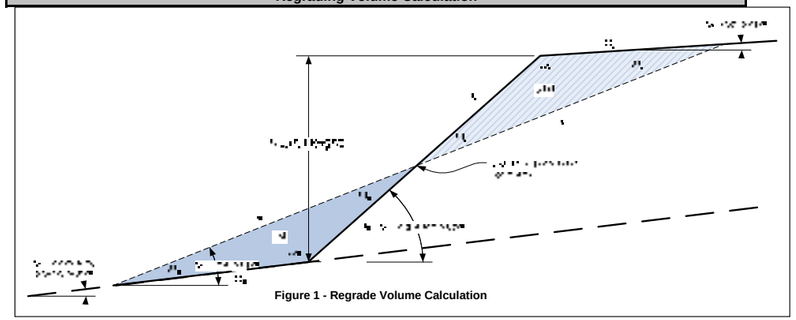


Figure 1 - Regrade Volume Calculation

Final Slope Area and Footprint Area Calculations

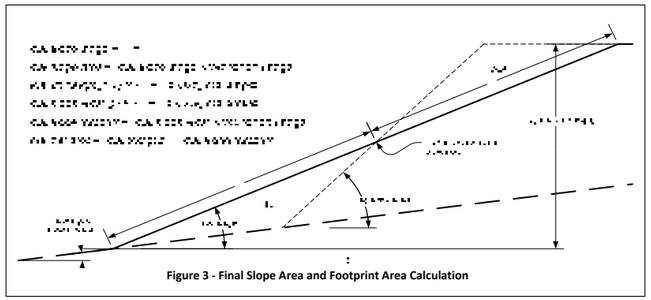


Figure 3 - Final Slope Area and Footprint Area Calculation

Regrading Push Distance Calculation

dozing distance: based on 2/3 final cut slope + 2/3 final fill slope (minimum = 50 ft)

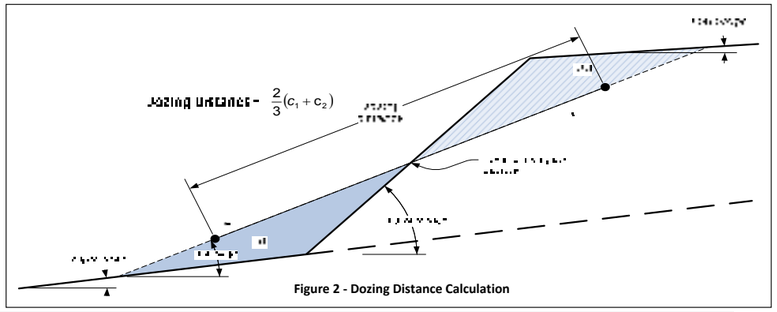
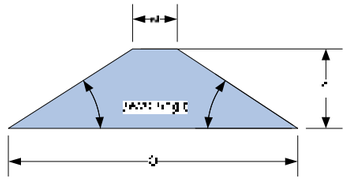


Figure 2 - Dozing Distance Calculation

Safety Berm Volume Calculation

$$\text{Cross Sectional Area} = \frac{(a+b)}{2} \times h$$

$$\text{Berm Volume} = \text{Berm Length} \times \text{Cross Sectional Area}$$



Dozer productivity assumes push distance of:
100 feet

Dozer:
Length x (Berm Base Width + Dozer Push Distance) - accounts for disturbance created in borrow area

Excavator:
Length x (Berm Base Width + (2 x Excavator Track Width) - accounts for disturbance created in borrow area

Haul & Place:
Length x Berm Base Width - if necessary use Yards sheet to account for disturbance created in borrow area

Ripping/Scarifying Calculations

Minimum 1 hr ripping/scarifying time per dump

Slopes:
Number of passes = Final slope length ÷ Grader width
Travel distance = Number of passes x Mid-bench length
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)
Minimum 1 hr

Flat Areas:
Flat area width = Final flat area ÷ Average long dimensions
Number of passes = Flat area width ÷ Grader width
Travel distance = Number of passes x Average long dimensions
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)

Revegetation: Minimum 1 acre revegetation crew time per area

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$171,449	$497,861	N/A	$669,310
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$171,449**	**$497,861**	**$0**	**$669,310**
Revegetation Cost	$13,321	$13,321	$3,546	$30,188
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$13,321	**$13,321**	**$3,546**	**$30,188**
TOTALS	**$184,770**	**$511,182**	**$3,546**	**$699,498**

Quarries & Borrow Pits - Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	**East pit**	0		D8R								$0	$0	$0
												$0	**$0**	**$0**

Quarries & Borrow Pits - Cover and Growth Media Costs

		Cover (lower layer)								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Replacement Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Cover Labor Cost $	Cover Equipment Cost $	Total Cover Cost $	Growth Media Volume cy	Growth Media Replacement Fleet	Fleet Productivity BCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	**East pit**						$0	$0	$0	231,914	740/988G	485	4	478	$171,449	$497,861	$669,310
							$0	**$0**	**$0**	231,914				478	**$171,449**	**$497,861**	**$669,310**

Quarries & Borrow Pits - Scarifying/Revegetation Costs

	Description (required)	Slope Area acres	Flat Area acres	Total Surface Area acres	Final Slope Length ft	Flat Area Long Dimension ft	Ripping/ Scarifying Fleet	Slope Scarifying/ Ripping Hours hrs	Flat Area Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Costs $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Costs $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**East pit**	8.61	87.22	95.83	31					$0	$0	$0	$13,321	$13,321	$3,546	$30,188
		8.61	87.22	95.83							**$0**	**$0**	**$13,321**	**$13,321**	**$3,546**	**$30,188**

Notes: 1) Minimum total ripping hours = 1 (i.e. If total ripping hrs (slope + flat) < 1, then one hour of fleet time is assumed, regardless of acres shown in in scarifying table.)
2) Assumes 50min/hr equipment availability

Closure Cost Estimate
Haul Material

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Generic Material Hauling - Cost Summary

	Labor	Equipment	Materials	Totals
Hauling/Crush/Screen/Compact	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$78,491	$224,459	N/A	$302,950
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$78,491**	**$224,459**	**$0**	**$302,950**
Revegetation Cost	$17,236	$17,236	$4,588	$39,060
TOTALS	**$95,727**	**$241,695**	**$4,588**	**$342,010**

Generic Material Hauling - User Input

	Facility Description			Physical		Hauled Material			Crushing & Screening					Cover			Growth Media		
	Description (required)	ID Code	Type	Final Surface Area acres	Average Ripping Distance ft	Material Volume Required cy	Distance from Borrow Source (1) ft	Slope to Borrow Source % grade	Crush Material	Screen Material	Loss to Crushing/ Screening %	Distance to Placement Location (2) ft	Slope to Placement % grade	Cover Thickness in	Distance to Cover Borrow ft	Slope to Borrow % grade	Growth Media Thickness in	Distance to Growth Material Stockpile ft	Slope to Stockpile % grade
1	Category 2/3 stockpile relocation to East Pit		Stockpile	63.00	2,932												6	7,988	-5.0
2	Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and		Stockpile	29.00	2,003												6	6,304	-5.0
3	Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburd		Ore Stockpile	32.00	6,272												6	6,304	-5.0
4	East pit - assume depth of excavation before bedrock backfilled		Pit																

Notes:
1. Input distance to crusher if material to be crushed
2. Input distance from crusher to placement if material to be crushed
3. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

See User 1 for growth media haul distances

Generic Material Hauling - User Input (cont.)

		Hauling Material				Cover			Growth Media			Revegetation				
	Description (required)	Haul Material Type (select)	Material Hauling Fleet (select)	Each Fleet Size (from/to crusher) (user override)	Compact After Placement?	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch Type (select)	Fertilizer Type (select)	Scarify/ Rip? (select)	Scarifying/ Ripping Fleet (select)
1	Category 2/3 stockpile relocation to East Pit	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
2	Category 4 stockpile relocation to East Pit (quantities in Us	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
3	Ore Surge Stockpile to East Pit (quantities in User 1) - Rock	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
4	East pit - assume depth of excavation before bedrock back	LS - broken	Med Truck													

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Generic Material Hauling - Cost Summary

	Labor	Equipment	Materials	Totals
Hauling/Crush/Screen/Compact	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$78,491	$224,459	N/A	$302,950
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$78,491**	**$224,459**	**$0**	**$302,950**
Revegetation Cost	$17,236	$17,236	$4,588	$39,060
TOTALS	**$95,727**	**$241,695**	**$4,588**	**$342,010**

Generic Material Hauling - Load, Haul, Place and Grade

		Material Haulage								Crush and/or Compact			
	Description (required)	Material Volume to Crusher cy	Final Material Volume cy	Material Haulage Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Hauling Labor Cost $	Hauling Equipment Cost $	Total Crush/ Screen Cost $	Compact Labor Cost $	Compact Equipment Cost $	Total Load/Haul/ Place Cost $
1	**Category 2/3 stockpile relocation to East Pit**							$0	$0	$0	$0	$0	$0
2	**Category 4 stockpile relocation to East Pit (quantities in Us**							$0	$0	$0	$0	$0	$0
3	**Ore Surge Stockpile to East Pit (quantities in User 1) - Rock**							$0	$0	$0	$0	$0	$0
4	**East pit - assume depth of excavation before bedrock back**							$0	$0	$0	$0	$0	$0
								$0	**$0**	**$0**	**$0**	**$0**	**$0**

Notes: Final Material Volume includes allowance for additional material hauled to crushing/screening plant based on Loss to Crushing/Screening input above.

Generic Material Hauling - Cover and Growth Media Costs

		Cover Placement								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Placement Fleet	Cover Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Placement Cost $	Growth Media Volume cy	Growth Media Placement Fleet	Growth Media Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoil Placement Cost $
1	**Category 2/3 stockpile relocation to East Pit**						$0	$0	$0	50,820	740/988G	578	6	88	$42,085	$119,889	$161,974
2	**Category 4 stockpile relocation to East Pit (quantities in Us**						$0	$0	$0	23,393	740/988G	564	5	41	$17,157	$49,280	$66,437
3	**Ore Surge Stockpile to East Pit (quantities in User 1) - Rock**						$0	$0	$0	25,813	740/988G	564	5	46	$19,249	$55,290	$74,539
4	**East pit - assume depth of excavation before bedrock back**						$0	$0	$0	0					$0	$0	$0
							$0	**$0**	**$0**	100,026				175	**$78,491**	**$224,459**	**$302,950**

Generic Material Hauling - Scarifying/Revegetation Costs

	Description (required)	Total Surface Area acres	Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Cost $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Cost $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**Category 2/3 stockpile relocation to East Pit**	63.00		$0	$0	$0	$8,757	$8,757	$2,331	$19,845
2	**Category 4 stockpile relocation to East Pit (quantities in Us**	29.00		$0	$0	$0	$4,031	$4,031	$1,073	$9,135
3	**Ore Surge Stockpile to East Pit (quantities in User 1) - Rock**	32.00		$0	$0	$0	$4,448	$4,448	$1,184	$10,080
4	**East pit - assume depth of excavation before bedrock back**	0.10		$0	$0	$0	$0	$0	$0	$0
		124.10		**$0**	**$0**	**$0**	**$17,236**	**$17,236**	**$4,588**	**$39,060**

Closure Cost Estimate
Other Demo & Equip Removal

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Other Demoltion and Equipment Removal - Cost Summary				
	Labor	Equipment	Materials	Totals
Other Demolition	$2,000,718	$4,062,260	$0	$6,062,978
Equipment Removal	$0	$0	$0	$0
TOTALS	**$2,000,718**	**$4,062,260**	**$0**	**$6,062,978**

Other Demolition

	Facility Description								
	Description (required)	ID Code	Type	Quantity	Units	Labor Unit Cost $	Equipment Unit Cost $	Material Unit Cost $	Total Cost $
1	**Demo and Asbestos Abatement Cost Summary - User 2**		Site Facilities - Structures	**1**	**LS**	**$2,000,717.67**	**$4,001,435.33**		$6,002,153
2	**Above Ground Storage Tanks - User 2**		Site Facilities - Structures	**1**	**LS**	**$0.00**	**$0.00**		$0
3	**Remove & Dispose of Stockpile/Pond Liners - OSP**	**remove_3**	Site Facilities - Structures	**32**	**acres**		**$300.00**		$9,600
4	**Remove & Dispose of Collection pipe - OSP**	**remove_4**	Site Facilities - Structures	**3100**	**LF**		**$2.25**		$6,975
5	**Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile**	**remove_3**	Site Facilities - Structures	**63**	**acres**		**$300.00**		$18,900
6	**Remove & Dispose of Collection pipe - Category 2/3 Stockpile**	**remove_4**	Site Facilities - Structures	**4800**	**LF**		**$2.25**		$10,800
7	**Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile**	**remove_3**	Site Facilities - Structures	**29**	**acres**		**$300.00**		$8,700
8	**Remove & Dispose of Collection pipe - Category 4 Stockpile**	**remove_4**	Site Facilities - Structures	**2600**	**LF**		**$2.25**		$5,850
						$2,000,718	**$4,062,260**	**$0**	**$6,062,978**

Notes: **Quotes are broken down by labor and equipment at a ratio of 1:2.**

Closure Cost Estimate
Process Ponds

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - User Input

You must fill in ALL green cells and relevant blue cells in this section for each pond

	Facility Description		Pond Dimensions (1)					Backfill - (If trucks are used) (1)				Growth Media		
	Description (required)	ID Code	Pond Length ft	Pond Width ft	Pond Depth ft	Pond Sideslope Angle _H:1V	Disturbed Area (if calculated elsewhere) acres	Percent Backfill (100% if blank)	Distance from Backfill Borrow ft	Slope from Facility to Borrow Area % grade	Pond Volume (if calculated elsewhere) cy	Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Facility to Stockpile % grade
1	**Mine Site WWTF Pond - 1**		**230**	**180**	**10.0**	**3.0**			**1,000**	**0%**				
2	**Mine Site WWTF Pond - 2**		**340**	**340**	**10.0**	**3.0**			**1,000**	**0%**				
3	**Mine Site WWTF Pond - 3**		**670**	**320**	**10.0**	**3.0**			**1,000**	**0%**				
4	**Mine Site CPS Pond**		**240**	**240**	**10.0**	**3.0**			**1,000**	**0%**				
5	**Mine Site PW-OSLA**		**450**	**200**	**8.5**	**3.0**			**1,000**	**0%**				
6	**Mine Site PW-HRE**		**380**	**170**	**9.3**	**3.0**			**1,000**	**0%**				
7	**Mine Site PW-RTH**		**320**	**80**	**1.3**	**3.0**			**1,000**	**0%**				
8	**Mine Site Temporary pond**		**340**	**140**	**10.0**	**3.0**			**1,000**	**0%**				
9	**Mine Site S4, PW-S4**		**560**	**320**	**6.0**	**3.0**			**1,000**	**0%**				
10	**Mine Site SOSP, PW-SOSP**		**380**	**310**	**5.7**	**3.0**			**1,000**	**0%**				
11	**Mine Site PW-HRC**		**340**	**130**	**9.5**	**3.0**			**1,000**	**0%**				
12	**Mine Site S23-1**		**830**	**110**	**10.6**	**3.0**			**1,000**	**0%**				
13	**Mine Site PW-S23-1**		**1180**	**110**	**10.7**	**3.0**			**1,000**	**0%**				

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Dimensions from "Ponds_ml_20150723.xlsx" and "Ponds_ml_20150723.dwg" per "Water_Management_Plan_-_Mine_v4_MAR2015.pdf" Large Figure 4

Process Ponds - User Input (cont.)

		Liner	Backfill			Growth Media			Revegetation		
	Description (required)	Crew Cut & Fold Time (2) hrs	Backfill Material Type (select)	Backfill Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)
1	**Mine Site WWTF Pond - 1**	**1.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
2	**Mine Site WWTF Pond - 2**	**2.7**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
3	**Mine Site WWTF Pond - 3**	**4.0**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
4	**Mine Site CPS Pond**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
5	**Mine Site PW-OSLA**	**2.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
6	**Mine Site PW-HRE**	**2.2**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
7	**Mine Site PW-RTH**	**1.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
8	**Mine Site Temporary pond**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
9	**Mine Site S4, PW-S4**	**3.5**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
10	**Mine Site SOSP, PW-SOSP**	**2.8**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
11	**Mine Site PW-HRC**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
12	**Mine Site S23-1**	**3.8**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
13	**Mine Site PW-S23-1**	**5.2**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table
(2) Pond liner removal crew (2Clab + excavator) = 2 General Laborers + 325C Excavator

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

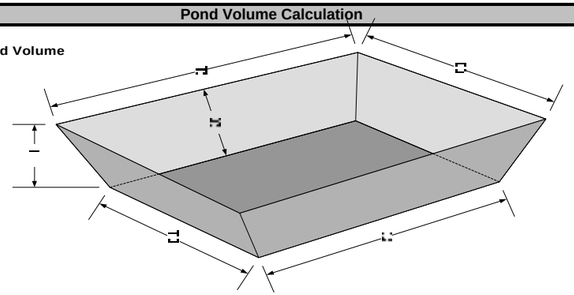
Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - Calculations

Pond Volume Calculation

Figure 1 - Pond Volume



Area and Volume of the Frustrum of a Pyramid

$$\text{Surface Area} = ab + ac + (a+c)\sqrt{(a-c)^2 + h^2}$$

$$\text{Volume} = \frac{h(ab + ac + \sqrt{abac})}{3}$$

Revegetation Calculations

Minimum 1 acre revegetation crew time per area

Process Ponds - Liner Cutting and Folding

	Description (required)	Crew Hours hrs	Total Labor Cost $	Total Equipment Cost $	Total Cover Cost $
1	**Mine Site WWTF Pond - 1**	2	$249	$131	$380
2	**Mine Site WWTF Pond - 2**	3	$413	$217	$630
3	**Mine Site WWTF Pond - 3**	4	$602	$315	$917
4	**Mine Site CPS Pond**	2	$292	$153	$445
5	**Mine Site PW-OSLA**	3	$395	$207	$602
6	**Mine Site PW-HRE**	2	$334	$175	$509
7	**Mine Site PW-RTH**	2	$243	$127	$370
8	**Mine Site Temporary pond**	2	$292	$153	$445
9	**Mine Site S4, PW-S4**	4	$535	$280	$815
10	**Mine Site SOSP, PW-SOSP**	3	$420	$220	$640
11	**Mine Site PW-HRC**	2	$286	$150	$436
12	**Mine Site S23-1**	4	$572	$300	$872
13	**Mine Site PW-S23-1**	5	$784	$411	$1,195
		36	**$5,417**	**$2,839**	**$8,256**

Closure Cost Estimate
Process Ponds

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - Backfill and Growth Media Costs

		Pond Backfill								Growth Media							
	Description (required)	Backfill Volume cy	Backfill Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours hrs	Total Labor Cost $	Total Equipment Cost $	Total Backfill Cost $	Growth Media Volume cy	Growth Media Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	**Mine Site WWTF Pond - 1**	11,217	740/988G	546	2	21	$5,022	$15,135	$20,157						$0	$0	$0
2	**Mine Site WWTF Pond - 2**	35,704	740/988G	546	2	65	$15,543	$46,847	$62,390						$0	$0	$0
3	**Mine Site WWTF Pond - 3**	68,815	740/988G	546	2	126	$30,129	$90,812	$120,941						$0	$0	$0
4	**Mine Site CPS Pond**	16,444	740/988G	546	2	30	$7,174	$21,622	$28,796						$0	$0	$0
5	**Mine Site PW-OSLA**	23,393	740/988G	546	2	43	$10,282	$30,991	$41,273						$0	$0	$0
6	**Mine Site PW-HRE**	17,263	740/988G	546	2	32	$7,652	$23,063	$30,715						$0	$0	$0
7	**Mine Site PW-RTH**	1,129	740/988G	546	2	2	$478	$1,441	$1,919						$0	$0	$0
8	**Mine Site Temporary pond**	12,673	740/988G	546	2	23	$5,500	$16,577	$22,077						$0	$0	$0
9	**Mine Site S4, PW-S4**	36,139	740/988G	546	2	66	$15,782	$47,568	$63,350						$0	$0	$0
10	**Mine Site SOSP, PW-SOSP**	22,587	740/988G	546	2	41	$9,804	$29,550	$39,354						$0	$0	$0
11	**Mine Site PW-HRC**	11,132	740/988G	546	2	20	$4,782	$14,415	$19,197						$0	$0	$0
12	**Mine Site S23-1**	24,039	740/988G	546	2	44	$10,521	$31,712	$42,233						$0	$0	$0
13	**Mine Site PW-S23-1**	34,687	740/988G	546	2	64	$15,304	$46,127	$61,431						$0	$0	$0
		315,222				577	**$137,973**	**$415,860**	**$553,833**						**$0**	**$0**	**$0**

Process Ponds - Revegetation Costs

	Description (required)	Surface Area acres	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**Mine Site WWTF Pond - 1**	1.00	$139	$139	$37	$315
2	**Mine Site WWTF Pond - 2**	2.70	$375	$375	$100	$850
3	**Mine Site WWTF Pond - 3**	4.90	$681	$681	$181	$1,543
4	**Mine Site CPS Pond**	1.30	$181	$181	$48	$410
5	**Mine Site PW-OSLA**	2.10	$292	$292	$78	$662
6	**Mine Site PW-HRE**	1.50	$209	$209	$56	$474
7	**Mine Site PW-RTH**	0.60	$139	$139	$22	$300
8	**Mine Site Temporary pond**	1.10	$153	$153	$41	$347
9	**Mine Site S4, PW-S4**	4.10	$570	$570	$152	$1,292
10	**Mine Site SOSP, PW-SOSP**	2.70	$375	$375	$100	$850
11	**Mine Site PW-HRC**	1.00	$139	$139	$37	$315
12	**Mine Site S23-1**	2.10	$292	$292	$78	$662
13	**Mine Site PW-S23-1**	3.00	$417	$417	$111	$945
		28.10	**$3,962**	**$3,962**	**$1,041**	**$8,965**

Closure Cost Estimate
Yards, Etc.

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$38,080	$80,892	N/A	$118,972
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$38,080**	**$80,892**		**$118,972**
Revegetation Cost	$6,533	$6,533	$6,533	$19,599
TOTALS	**$44,613**	**$87,425**	**$6,533**	**$138,571**

Yards, Etc. - User Input

You must fill in ALL green cells and relevant blue cells in this section for each building or facility

	Facility Description			Physical			Cover			Growth Media		
	Description (required)	ID Code	Type	Area acres	Average Flat Area Long Dimension (ripping distance) ft	Regrade Volume (calculated elsewhere) cy	Cover Thickness in	Distance from Cover Borrow Area ft	Slope from Facility to Borrow Area % grade	Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Facility to Stockpile % grade
1	OSLA Overburden Storage and Laydown Area minus wetland area		Yard	34.00	1,220	54,853						
2	Category 1 Footprint to Reclaim(acres)		Yard	13.00	750	20,973						

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Assume average __ ft regrade over area: **1**

Yards, Etc. - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each building or facility

		Grading			Cover			Growth Media			Revegetation				
	Description (required)	Dozing Material Condition (select)	Dozing Material Type (select)	Grading Equipment Fleet (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)	Scarify/ Rip? (select)	Ripping Fleet (select)
1	OSLA Overburden Storage and Laydown Area minus wetlan	1	Gravel	Small							Mix 1				
2	Category 1 Footprint to Reclaim(acres)	1	Gravel	Small							Mix 1				

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Yards, Etc. - Calculations

Grading Calculations

Average push distance assumed to be 2/3 of the 600 feet maximum from Catepillar Handbook or 400 feet
Material assumed to be loose stockile (1.2 productivity factor)
Slope assumed to be 0 to 5% (1.0 productivity factor)

Cover Volume Calculation

Yard area x cover thickness

Ripping/Scarifying Calculations

Flat area width = Final flat area ÷ Average long dimensions
Number of passes = Flat area width ÷ Grader width
Travel distance = Number of passes x Average long dimensions
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)
Minimum 1 hr ripping/scarifying per area

Revegetation

Minimum 1 acre revegetation crew time per area

Closure Cost Estimate
Yards, Etc.

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$38,080	$80,892	N/A	$118,972
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$38,080**	**$80,892**		**$118,972**
Revegetation Cost	$6,533	$6,533	$6,533	$19,599
TOTALS	**$44,613**	**$87,425**	**$6,533**	**$138,571**

Yards, Etc. - Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	OSLA Overburden Storage and Laydown Area minus wetlar	54,853	400	213	1.0	1.0	0.90	119	461	$27,559	$58,542	$86,101
2	Category 1 Footprint to Reclaim(acres)	20,973	400	213	1.0	1.0	0.90	119	176	$10,521	$22,350	$32,871
		75,827							637	**$38,080**	**$80,892**	**$118,972**

Yards, Etc. - Cover and Growth Media Costs

		Cover								Growth Media							
	Description (required)	Cover Volume cy	Topsoil Repacement Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Cost $	Growth Media Volume cy	Growth Media Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	OSLA Overburden Storage and Laydown Area minus wetlar						$0	$0	$0						$0	$0	$0
2	Category 1 Footprint to Reclaim(acres)						$0	$0	$0						$0	$0	$0
							$0	**$0**	**$0**						**$0**	**$0**	**$0**

Yards, Etc. - Scarifying/Revegetation Costs

	Description (required)	Surface Area acres	Area Long Dimension ft	Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Costs $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Costs $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	OSLA Overburden Storage and Laydown Area minus wetlar	34.00	1,220		$0	$0	$0	$4,726	$4,726	$4,726	$14,178
2	Category 1 Footprint to Reclaim(acres)	13.00	750		$0	$0	$0	$1,807	$1,807	$1,807	$5,421
		47.00			**$0**	**$0**	**$0**	**$6,533**	**$6,533**	**$6,533**	**$19,599**

Closure Cost Estimate
Well Abandonment

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$0	$0	$0	$0
Monitoring Wells	$10,494	$3,432	$99	$14,025
TOTALS	**$10,494**	**$3,432**	**$99**	**$14,025**

Production, Dewatering and Infiltration Well Closure

	Description (required)	ID Code	Number of Holes	Casing Diam in	Average Depth[1] ft bgs	Depth to First Water ft bgs	Original Static Water Level ft bgs	Top of Slotted Casing[2] ft bgs	Blank Casing Below Top of Screen[2] ft	Type of Pump (if any) (select)	Depth to Pump ft bgs	Hole Plug Method (select)	Casing Volume per ft cf	Perforation Length[3,4] ft	Grout Volume per Hole[4,5] cy	Cement Volume per Hole[6] cy	Inert Media Volume per Hole[7] cy	Pump Removal Labor Cost $	Pump Removal Equip Cost $	Perf Labor Cost $	Perf Equip Cost[8] $	Grout + Cement Labor Cost[9] $	Grout + Cement Equip Cost[9] $	Grout + Cement Material Cost $	Inert Media Labor Cost[10] $	Inert Media Equip Cost[9] $
																		$0	$0	$0	$0	$0	$0	$0	$0	$0

(1) For previously abandoned holes enter "0" for depth
(2) Wells abandoned per Nevada Administrative Code (NAC 534.420). Hole grouted and perforated from bottom to 50 feet (15.24m) above the top of the screen, or first water encountered or original static water level, depending on vertical hydraulic gradient and well construction parameters. Inert media (cuttings or alluvium) used from top of grout to top seal.
(3) Perforation length = amount of blank casing below first water (for confined aquifers) or predicted recovered water table (unconfined aquifers) + 50 feet (15.24m) of blank casing above water table
(4) Assumes 50' (15.24m) sanitary seal at top of hole. Therefore, perforation and grouting only required to bottom of sanitary seal.
(5) Assumes 100% loss to formation for grout (abandonite) for screened and perforated sections.
(6) Assumes 10' (3m) top seal of cement in casing only. See note 4.
(7) Inert material is cuttings or alluvium sourced locally.
(8) Includes perforation tool wear cost/ft of perforation (see Productivty Sheet).
(9) See Productivity Sheet for hourly production. Minimum 1 hr per hole + fixed hours per hole for move and setup. If no perforation required, use standard drill rig.
(10) See Productivity Sheet for hourly production. Minimum 1 hr per hole.

Notes:

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment

	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$0	$0	$0	$0
Monitoring Wells	$10,494	$3,432	$99	$14,025
TOTALS	**$10,494**	**$3,432**	**$99**	**$14,025**

Monitoring Well Closure

	Description (required)	ID Code	Number of Holes	Casing Diam in	Average Depth ft bgs	Top of Screen[1] ft bgs	Hole Plug Method (select)	Casing Volume per ft ft3	Grout Volume/ Well[2,3] cy	Cement Volume per Hole[4] cy	Inert Backfill Volume per Hole[5] cy	Total Grouting Hours/ Hole hr	Total Inert Media Hours/ Hole hr	Grout + Cement Labor Cost[6] $	Grout + Cement Equip Cost[6] $	Grout + Cement Material Cost $	Inert Material Labor Cost[7] $	Inert Material Equip Cost[7] $	Total Cost $
1	Mine site - MW-05-02		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
2	Mine site - MW-05-08		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
3	Mine site - MW-05-09		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
4	Mine site - MW-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
5	Mine site - MW-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
6	Mine site - MW-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
7	Mine site - MW-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
8	Mine site - MW-5		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
9	Mine site - MW-6S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
10	Mine site - MW-6D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
11	Mine site - MW-7		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
12	Mine site - MW-8S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
13	Mine site - MW-8D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
14	Mine site - MW-9		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
15	Mine site - MW-10S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
16	Mine site - MW-10D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
17	Mine site - MW-11		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
18	Mine site - MW-12		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
19	Mine site - MW-13		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
20	Mine site - MW-14		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
21	Mine site - MW-15		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
22	Mine site - MW-16		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
23	Mine site - MW-17		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
24	Mine site - MW-18		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
25	Mine site - OB-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
26	Mine site - OB-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
27	Mine site - OB-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
28	Mine site - OB-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
29	Mine site - OB-5		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
30	Mine site - P-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
31	Mine site - P-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
32	Mine site - P-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
33	Mine site - P-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
														$0	**$0**	**$99**	**$10,494**	**$3,432**	**$14,025**

Wells abandoned per NAC 534.420 with bentonite grout placed to 50 feet above the top of the screen (see note 1).
(1) Assumes top of screen is at or above the static water level (in unconfined aquifers) or the depth of first water encountered (in confined aquifers).
(2) Assumes 25% loss to formation for grouting
(3) Grouting only required to 50' (15.24m) above the top of screen because monitor wells are constructed with a seal in the annular space.
(4) Assumes top 10' (3m) plugged with cement.
(5) Assumes hole plugged with inert material (cuttings or alluvium) above grout up to cement surface plug.
(6) See Productivity Sheet for hourly production. Minimum 1 hr per hole + fixed hours per hole for move and setup (see Productivty Sheet).
(7) See Productivity Sheet for hourly production. Minimum 1 hr per hole.

Notes:
Well ID's from
Large Table 10 of Water Management Plan - Mine
Well parameters assumed

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$0	$0	$0	$0
Monitoring Wells	$10,494	$3,432	$99	$14,025
TOTALS	**$10,494**	**$3,432**	**$99**	**$14,025**

Well Construction

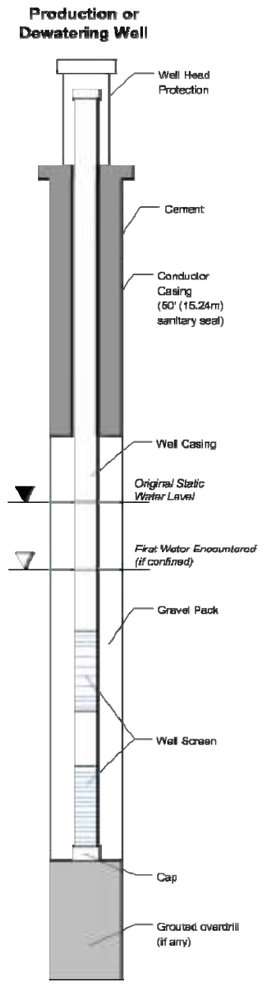


Figure 1 - Production Well

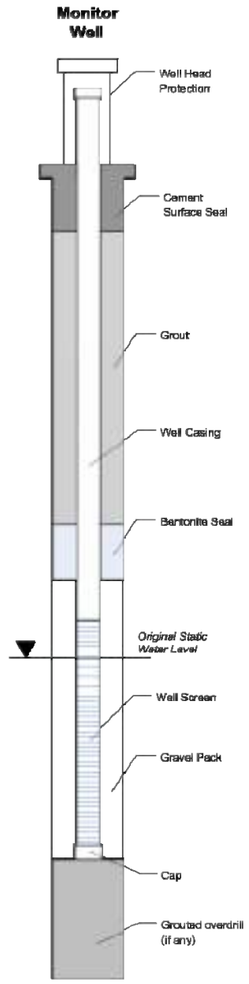


Figure 2 - Monitor Well

Closure Cost Estimate
Misc. Costs

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Miscellaneous Cost Summary

	Labor	Equipment	Materials	Totals
Fence Removal	$0	$0	N/A	$0
Fence Installation	$0	$0	$0	$0
Culvert & Buried Pipe Removal	$0	$0	N/A	$0
Surface Pipe Removal	$0	$0	N/A	$0
Power Lines	$0	N/A	N/A	$0
Substations/Transformers	$0	N/A	N/A	$0
Rip-rap, rock lining, gabions	$0	$0	$0	$0
Other Costs	$0	$0	$0	$0
TOTALS	**$0**	**$0**	**$0**	**$0**

Fence Removal — You must fill in ALL green and blue cells

	Description (required)	ID Code	Length ft	Type (select type)	Costs: Labor Cost $	Equipment Cost $	Total Cost $
					$0	**$0**	**$0**

Notes:

Fence Installation — You must fill in ALL green and blue cells

	Description (required)	ID Code	Input: Length ft	Type (select type)	Costs: Labor Cost $	Equipment Cost $	Material Cost ($)
					$0	**$0**	**$0**

Notes:

Culvert & Buried Pipe Removal — You must fill in ALL green and blue cells

	Description (required)	ID Code	Input: Length ft	Type (select type)	Location (select)	Costs: Labor Cost $	Equipment Cost $
						$0	**$0**

Notes:

Closure Cost Estimate
Misc. Costs

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Miscellaneous Cost Summary

	Labor	Equipment	Materials	Totals
Fence Removal	$0	$0	N/A	$0
Fence Installation	$0	$0	$0	$0
Culvert & Buried Pipe Removal	$0	$0	N/A	$0
Surface Pipe Removal	$0	$0	N/A	$0
Power Lines	$0	N/A	N/A	$0
Substations/Transformers	$0	N/A	N/A	$0
Rip-rap, rock lining, gabions	$0	$0	$0	$0
Other Costs	$0	$0	$0	$0
TOTALS	**$0**	**$0**	**$0**	**$0**

Surface Pipe Removal

You must fill in ALL green and blue cells

			Input			Costs	
	Description (required)	ID Code	Length ft	Type (select type)	Location (select)	Labor Cost $	Equipment Cost $
1							
2							
3							
						$0	**$0**

Notes:

Power Line and Substation Removal

You must fill in ALL green and blue cells

			Input				
	Description (required)	ID Code	Power Line Length miles	Power Line Type (select)	Number of Substations #	Location (select)	Power Line Removal $
							$0

Notes: If substation owned by operator, use Other Demo & Equipment Removal sheet
User may need to add line items in Foundations & Buildings for substation slab demolition and fence removal
Labor/Equipment costs assume approximately 80% of cost are equipment and 20% are labor related costs

Rip-Rap & Rock Lining

You must fill in ALL green and blue cells

			Input		Costs		
	Description (required)	ID Code	Area S.Y.	Type (select type)	Labor Cost $	Equipment Cost $	Material Cost $
					$0	**$0**	**$0**

Notes:

Closure Cost Estimate
Monitoring

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Reclamation Monitoring & Maintenance - Cost Summary

	Labor	Equipment	Lab & Materials	Totals
Revegetation Maintenance	$2,167	$2,167	$2,167	$6,501
Erosion Maintenance	$0	$0	N/A	$0
Reclamation Monitoring	$0	$0	N/A	$0
Subtotal Reclamation Monitoring	**$2,167**	**$2,167**	**$2,167**	**$6,501**
Water Quality Monitoring	$0	$0	$0	$0
TOTAL MONITORING	**$2,167**	**$2,167**	**$2,167**	**$6,501**

Clear Sheet

Reclamation Maintenance

Description	Total Revegetation Surface Area (1,2) acres	% Area Requiring Reseeding	Seed Mix (select)	Area Requiring Reseeding acres	Seed $/acres	Labor $/acres	Equipment $/acres	Totals $
Revegetation Maintenance	312	**5%**	**Mix 1**	15.6	$139.00	$139.00	$139.00	
Labor								$2,167
Equipment								$2,167
Materials								$2,167
Cost/Acre								$417
							Subtotal	**$6,501**

Notes: 1) Surface area is NOT the same as footprint disturbance area typically used for permitting purposes.
2) If BRCE model, revegetation surface area determined by area included in PER, LOM or Surety estimate

	Total Volume Growth Media cy	% Volume Requiring Maintenance	Average Growth Media Placement Cost $/CY	Volume Requiring Replacement cy		Labor (assume: 25%) $/acres	Equipment (assume: 75%) $/acres	Total $
Erosion Maintenance	331,940		$2.93	0		$0.00	$0.00	$0

Notes:

Reclamation Monitoring

Description	Hrs/Day	Days/Year	Number of Years	Rate $/hr		
Field Work						
Field Geologist/Engineer				$75.15		$0
Range Scientist				$75.15		$0
Reporting						
Field Geologist/Engineer				$75.15		$0
Range Scientist				$75.15		$0
					Subtotal	**$0**
Travel						
	Hrs/Trip hr	**Trips/Year**	**Years**	**Truck Cost** $/hr		
Travel				$37.66		$0
					Subtotal	**$0**
					Total Reclamation Monitoring	**$0**

Notes: **Monitoring costs are included in the "Other User" sheet**

Closure Cost Estimate
Constr. Mgmt

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Construction Management & Road Maintenance - Cost Summary				
	Labor	Equipment	Materials	Totals
Construction Management	$0	$0	N/A	$0
Construction Support		$0		$0
Road Maintenance	$31,564	$48,080	$0	$79,644
TOTAL CONSTRUCTION MANAGEMENT	**$31,564**	**$48,080**	**$0**	**$79,644**

Clear Sheet

Construction Management

Construction Management Staff

Description	Duration mo.	Hours/ Month hr.	Number of Supervisors	Supervisor Rate $/hr	Labor Cost $	Equipment Cost[1] $	Totals $
Active Reclamation					$0	$0	$0
Monitoring & Maintenance					$0	$0	$0
				Total Staff	**$0**	**$0**	**$0**

Construction Management Support

Description	Duration mo.	Number of Units		Rental Rate $/mo	Generator Cost $/mo	Equipment Cost[1] $	Totals $
Temporary Office Rental						$0	$0
Temporary Toilets						$0	$0
					Total Support	**$0**	**$0**

Notes: Office rental assumes only 1 generator required for every 4 trailers

Total Construction Management **$0**

Road Maintenance

Description	Fleet Size (select)	Number	Duration mo.	Hours/ Month hr.	Labor Cost $	Equipment Cost $	Totals $
Active Reclamation							
Water Truck	**Small**	**0**	**24**	**8**	$0	$0	$0
Grader	**Small**	**1**	**24**	**8**	$11,478	$17,484	$28,962
Monitoring & Maintenance							
Water Truck	**Small**	**0**	**336**	**1**	$0	$0	$0
Grader	**Small**	**1**	**336**	**1**	$20,086	$30,596	$50,682

Description	Gallons/ Day	Days/ Month	Duration mo.	Cost/ Gallon $			Totals $
Water Fees							
Water Fees							$0
				Total Project Maintenance	**$31,564**	**$48,080**	**$79,644**

Notes: 1) Supervisor equipment = pickup truck

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	**Direct Input**
User Input - Pull Down List	**Pull Down Selection**
Program Constant (can override)	**Alternate Input**
Program Calculated Value	**Locked Cell - Formula or Reference**

ZONE ADJUSTMENTS

Cost Basis/Project Region	**Polymet**	MN prevailing wages, CAT equipment rates	
Power Equipment Operators	**none**	$0.00	
Truck Drivers	**none**	$0.00	
Laborers	**none**	$0.00	

INDIRECT COSTS

Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Labor Group	Base Rate ($/hr)	Zone Adjustment ($/hr)	Hourly Wage ($/hr)	Fringe ($/hr)	Retirement/ Medicare ($/hr)	Unemployment Insurance ($/hr)	Workman's Compensation ($/hr)	Other Indirect Costs ($/hr)	Additional User Markups to Base Rate† ($/hr)	Additional User Markups to Base Rate† %	Additional User Markups to Base Rate† ($/hr)	Total ($/hr)
Equipment Operators ($/hr) (2)													
Bulldozers													
D6R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D6R w/ Winch	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D7R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D8R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D9R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D10R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D11R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Wheeled Dozers													
824G					$17.15							$0	
834G					$17.15							$0	
844					$17.15							$0	
854G					$17.15							$0	
Motor Graders													
120H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
14G/H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
16G/H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
24M	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Track Excavators													
312C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
320C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
325C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
330C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
345B	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
365BL	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
385BL	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Scrapers													
631G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
637G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Wheeled Loaders													
924G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
928G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
950G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
966G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
972G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
980G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
988G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
990	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
992G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
994D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
L2350	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Shovels													
PC2000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC3000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC4000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC5500	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC8000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Hydraulic Hammers													
H-120 (fits 325)													
H-160 (fits 345)													
H-180 (fits 365/385)													
Demolition Shears													
S340 (fits 322/325/330)													
S365 (fits 330/345)													
S390 (fits 365/385)													
Demolition Grapples													
G315 (fits 322/325)													
G320 (fits 325/330)													
G330 (fits 345/365)													

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	**Direct Input**
User Input - Pull Down List	**Pull Down Selection**
Program Constant (can override)	**Alternate Input**
Program Calculated Value	**Locked Cell - Formula or Reference**

ZONE ADJUSTMENTS

Cost Basis/Project Region	**Polymet**	MN prevailing wages, CAT equipment rates
Power Equipment Operators	**none**	$0.00
Truck Drivers	**none**	$0.00
Laborers	**none**	$0.00

INDIRECT COSTS

Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%

Other Indirects

Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

Other Equipment													
420D 4WD Backhoe	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
428D 4WD Backhoe	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CS533E Vibratory Roller	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CS633E Vibratory Roller	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CP533E Sheepsfoot Compactor	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CP633E Sheepsfoot Compactor	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Light Truck - 1.5 Ton	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Supervisor's Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Flatbed Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Air Compressor + tools	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Welding Equipment	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Heavy Duty Drill Rig	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Pump (plugging) Drill Rig	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Concrete Pump					$17.15							$0	
Gas Engine Vibrator	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Generator 5KW					$17.15							$0	
HDEP Welder (pipe or liner)					$17.15							$0	
5 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
20 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
50 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
120 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78

NOTES:

(1) Equipment Type:	Catepillar model or equivalent, LeTourneau
(2) Equipment Operator Source:	
(3) Zone Basis:	

Truck Drivers ($/hr) (4)

725	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
730	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
735	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
740	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
769D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
773E	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
777D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
785C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
793C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
797B	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
613E (5,000 gal) Water Wagon	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
621E (8,000 gal) Water Wagon	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
777D Water Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
785C Water Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Dump Truck (10-12 yd3)	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78

NOTES:

(4) Truck Driver Source:	
(5) Zone Basis:	

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	Direct Input
User Input - Pull Down List	Pull Down Selection
Program Constant (can override)	Alternate Input
Program Calculated Value	Locked Cell - Formula or Reference

ZONE ADJUSTMENTS		
Cost Basis/Project Region	Polymet	MN prevailing wages, CAT equipment rates
Power Equipment Operators	none	$0.00
Truck Drivers	none	$0.00
Laborers	none	$0.00

INDIRECT COSTS	
Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

Laborers ($/hr) (6,7)

General Laborer	69-101	$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Skilled Laborer	69-102	$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Driller's Helper		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Rodmen (reinforcing concrete)		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Cement finisher		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Carpenter	69-704	$30.85	$0.00	$30.85	$16.08	$0.46	$2.36	$3.39	$0.00			$0	$53.14

NOTES:

(6) Laborer Source:	
(7) Carpenter Source:	
(8) Zone Basis:	

Project Management and Technical Labor ($/hr) (9)

Project Manager		$76.25	$0.00	$76.25	$16.87	$1.14	$5.83	$8.39	$0.00			$0	$108.47
Foreman		$78.04	$0.00	$78.04	$16.87	$1.16	$5.97	$8.58	$0.00			$0	$110.62
Field Geologist/Engineer		$48.51	$0.00	$48.51	$16.87	$0.72	$3.71	$5.34	$0.00			$0	$75.15
Field Tech/Sampler		$36.37	$0.00	$36.37	$16.87	$0.54	$2.78	$4.00	$0.00			$0	$60.56
Range Scientist		$48.51	$0.00	$48.51	$16.87	$0.72	$3.71	$5.34	$0.00			$0	$75.15
Senior Planning Engineer					$16.87								
Project Engineer					$16.87								
Mechanic/Fitter					$16.87								
Surveyor		$39.96	$0.00	$39.96	$16.87	$0.60	$3.06	$4.40	$0.00			$0	$64.88
Electrician		$56.28	$0.00	$56.28	$16.87	$0.84	$4.31	$6.19	$0.00			$0	$84.48
					$16.87								
					$16.87								

NOTES:

(9) Project Manager:	
(9) Foreman Source:	
(9) Techical Labor Source:	
Other Labor Source:	
Other Labor Source:	
†Additional User Markups	
(These are added by the user to the	
base rate to account for site-specific	
conditions or corporate requirements)	

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation P
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Monthly Rental Basis: 176 hrs month

EQUIPMENT RENTAL RATE TABLE

EQUIPMENT TYPE (1)	Monthly Owner/Rental Rate	Equipment Hourly Rate	Fuel/Lube/ Wear	Total Rate
Bulldozers				
D6R	$12,220.00	$69.43	$28.50	$97.93
D6R w/ Winch	$13,060.00	$74.20	$18.66	$92.86
D7R	$16,640.00	$94.55	$32.45	$126.99
D8R	$19,890.00	$113.01	$43.79	$156.81
D9R	$27,500.00	$156.25	$64.43	$220.68
D10R	$33,340.00	$189.43	$83.01	$272.44
D11R	$62,000.00	$352.27	$120.50	$472.78
Wheeled Dozers				
824G			$32.09	$32.09
834G			$37.61	$37.61
844			$44.78	$44.78
854G			$56.72	$56.72
Motor Graders				
120H	$10,430.00	$59.26	$31.80	$91.06
14G/H	$16,910.00	$96.08	$44.88	$140.96
16G/H	$23,530.00	$133.69	$54.39	$188.08
24M			$46.27	$46.27
Track Excavators				
312C	$6,250.00	$35.51	$13.12	$48.63
320C	$7,490.00	$42.56	$22.96	$65.51
325C	$8,920.00	$50.68	$28.99	$79.67
330C	$10,730.00	$60.97	$35.48	$96.44
345B	$17,110.00	$97.22	$45.40	$142.62
365BL	$26,050.00	$148.01	$39.40	$187.41
385BL	$32,700.00	$185.80	$70.50	$256.29
Scrapers				
631G	$33,930.00	$192.78	$69.23	$262.01
637G	$34,500.00	$196.02	$101.88	$297.91
Wheeled Loaders				
924G	$5,730.00	$32.56	$18.96	$51.51
928G	$6,840.00	$38.86	$21.66	$60.53
950G	$9,690.00	$55.06	$29.02	$84.08
966G	$13,890.00	$78.92	$40.67	$119.59
972G	$15,060.00	$85.57	$43.25	$128.82
980G	$19,260.00	$109.43	$47.36	$156.79
988G	$30,340.00	$172.39	$70.71	$243.10
990	$47,670.00	$270.85	$50.75	$321.60
992G	$65,000.00	$369.32	$136.54	$505.86
994D	$71,500.00	$406.25	$107.46	$513.71
L2350	$78,650.00	$446.88	$197.01	$643.89
Shovels				
PC2000			$110.45	$110.45
PC3000			$149.25	$149.25
PC4000			$208.95	$208.95
PC5500			$355.22	$355.22
PC8000			$444.77	$444.77
Hydraulic Hammers				
H-120 (fits 325)	$3,120.00	$17.73	$5.29	$23.02
H-160 (fits 345)	$4,140.00	$23.52	$10.35	$33.87
H-180 (fits 365/385)	$4,060.00	$23.07	$12.02	$35.09
Demolition Shears				
S340 (fits 322/325/330)				$0.00
S365 (fits 330/345)				$0.00
S390 (fits 365/385)				$0.00
Demolition Grapples				
G315 (fits 322/325)				$0.00
G320 (fits 325/330)				$0.00
G330 (fits 345/365)				$0.00
Other Equipment				
420D 4WD Backhoe	$3,220.00	$18.30	$16.30	$34.59
428D 4WD Backhoe	$5,220.00	$29.66	$16.41	$46.07
CS533E Vibratory Roller	$7,220.00	$41.02	$11.19	$52.22
CS633E Vibratory Roller			$14.18	$14.18
CP533E Sheepsfoot Compactor			$11.19	$11.19
CP633E Sheepsfoot Compactor			$14.18	$14.18
Light Truck - 1.5 Ton	$5,803.60	$32.98	$4.68	$37.66
Supervisor's Truck	$3,586.00	$20.38	$3.19	$23.57
Flatbed Truck	$5,803.60	$32.98	$15.16	$48.13
Air Compressor + tools	$4,642.88	$26.38	$2.99	$29.37
Welding Equipment	$3,025.00	$17.19	$5.97	$23.16
Heavy Duty Drill Rig	$61,380.00	$348.75	$35.82	$384.57
Pump (plugging) Drill Rig	$61,380.00	$348.75	$29.85	$378.60
Concrete Pump	$15,224.00	$86.50	$29.85	$116.35
Gas Engine Vibrator	$703.56	$4.00	$2.99	$6.98
Generator 5KW	$1,065.24	$6.05	$4.48	$10.53
HDEP Welder (pipe or liner)	$8,162.00	$46.38	$5.97	$52.35
5 Ton Crane	$5,975.20	$33.95	$8.96	$42.91
20 Ton Crane	$4,220.00	$23.98	$11.94	$35.92
50 Ton Crane	$15,884.00	$90.25	$14.03	$104.28
120 Ton Crane			$15.52	$15.52
Trucks				
725	$11,000.00	$62.50	$39.30	$101.80
730	$13,460.00	$76.48	$40.80	$117.27
735	$16,970.00	$96.42	$56.15	$152.57
740	$18,110.00	$102.90	$57.51	$160.41
769D	$21,000.00	$119.32	$43.90	$163.22
773E	$27,000.00	$153.41	$55.52	$208.93
777D	$54,000.00	$306.82	$81.74	$388.56
785C			$72.39	$72.39
793C			$124.62	$124.62
797B			$175.37	$175.37
613E (5,000 gal) Water Wagon	$7,700.00	$43.75	$27.68	$71.43
621E (8,000 gal) Water Wagon	$13,000.00	$73.86	$46.53	$120.40
777D Water Truck			$50.00	$50.00
785C Water Truck			$72.39	$72.39
Dump Truck (10-12 yd^3)	$14,762.00	$83.88	$16.43	$100.31

NOTES:

(1) Power Equipment Source:	
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	
(4) Other Equipment Source:	
(5) Drill rig includes support (pipe) truck	

Closure Cost Estimate
Equipment Costs

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm

FUEL, LUBE AND WEAR CALCULATIONS

EQUIPMENT TYPE	PM Cost Per Hour (1)	Under carriage or Tires (2)	G.E.T Consumption (3)	Fuel Use Rate gal/hr (4)	Cost@ 2.99/gal	Total Hourly Equipment Cost
Bulldozers						
D6R	$5.21		$4.63	6.25	$18.66	$28.50
D6R w/ Winch				6.25	$18.66	$18.66
D7R	$3.18		$6.88	7.50	$22.39	$32.45
D8R	$5.75		$8.94	9.75	$29.10	$43.79
D9R	$7.99		$13.90	14.25	$42.54	$64.43
D10R	$9.82		$19.46	18.00	$53.73	$83.01
D11R	$12.48		$28.92	26.50	$79.10	$120.50
Wheeled Dozers						
824G		$0.00		10.75	$32.09	$32.09
834G		$0.00		12.60	$37.61	$37.61
844		$0.00		15.00	$44.78	$44.78
854G		$0.00		19.00	$56.72	$56.72
Motor Graders						
120H	$6.11	$4.15	$9.60	4.00	$11.94	$31.80
14G/H	$6.68	$5.68	$13.87	6.25	$18.66	$44.88
16G/H	$5.37	$7.68	$18.95	7.50	$22.39	$54.39
24M				15.50	$46.27	$46.27
Track Excavators						
312C	$3.89		$3.62	1.88	$5.61	$13.12
320C	$4.15		$4.18	4.90	$14.63	$22.96
325C	$4.02		$5.27	6.60	$19.70	$28.99
330C	$5.19		$5.81	8.20	$24.48	$35.48
345B	$7.08		$6.68	10.60	$31.64	$45.40
365BL				13.20	$39.40	$39.40
385BL	$6.11		$12.15	17.50	$52.24	$70.50
Scrapers						
631G	$7.02	$9.84	$7.59	15.00	$44.78	$69.23
637G	$11.61	$9.84	$9.54	23.75	$70.89	$101.88
Wheeled Loaders						
924G	$3.79	$2.97	$3.99	2.75	$8.21	$18.96
928G	$4.12	$2.97	$4.13	3.50	$10.45	$21.66
950G	$4.93	$4.47	$7.68	4.00	$11.94	$29.02
966G	$6.75	$7.12	$9.64	5.75	$17.16	$40.67
972G	$5.27	$7.12	$12.21	6.25	$18.66	$43.25
980G	$5.27	$7.49	$12.21	7.50	$22.39	$47.36
988G	$9.76	$11.76	$13.07	12.10	$36.12	$70.71
990				17.00	$50.75	$50.75
992G	$11.62	$26.23	$30.03	23.00	$68.66	$136.54
994D				36.00	$107.46	$107.46
L2350				66.00	$197.01	$197.01
Shovels						
PC2000				37.00	$110.45	$110.45
PC3000				50.00	$149.25	$149.25
PC4000				70.00	$208.95	$208.95
PC5500				119.00	$355.22	$355.22
PC8000				149.00	$444.77	$444.77
Hydraulic Hammers						
H-120 (fits 325)	N/A		$5.29			$5.29
H-160 (fits 345)	N/A		$10.35			$10.35
H-180 (fits 365/385)	N/A		$12.02			$12.02
Demolition Shears						
S340 (fits 322/325/330)	N/A					$0.00
S365 (fits 330/345)	N/A					$0.00
S390 (fits 365/385)	N/A					$0.00
Demolition Grapples						
G315 (fits 322/325)	N/A					$0.00
G320 (fits 325/330)	N/A					$0.00
G330 (fits 345/365)	N/A					$0.00
Other Equipment						
420D 4WD Backhoe	$3.36	$0.76	$3.22	3.00	$8.96	$16.30
428D 4WD Backhoe	$3.37	$0.76	$3.32	3.00	$8.96	$16.41
CS533E Vibratory Roller				3.75	$11.19	$11.19
CS633E Vibratory Roller				4.75	$14.18	$14.18
CP533E Sheepsfoot Compactor				3.75	$11.19	$11.19
CP633E Sheepsfoot Compactor				4.75	$14.18	$14.18
Light Truck - 1.5 Ton		$0.21		1.50	$4.48	$4.68
Supervisor's Truck		$0.21		1.00	$2.99	$3.19
Flatbed Truck		$1.13		4.70	$14.03	$15.16
Air Compressor + tools			N/A	1.00	$2.99	$2.99
Welding Equipment			N/A	2.00	$5.97	$5.97
Heavy Duty Drill Rig				12.00	$35.82	$35.82
Pump (plugging) Drill Rig				10.00	$29.85	$29.85
Concrete Pump			N/A	10.00	$29.85	$29.85
Gas Engine Vibrator			N/A	1.00	$2.99	$2.99
Generator 5KW			N/A	1.50	$4.48	$4.48
HDEP Welder (pipe or liner)			N/A	2.00	$5.97	$5.97
5 Ton Crane				3.00	$8.96	$8.96
20 Ton Crane				4.00	$11.94	$11.94
50 Ton Crane				4.70	$14.03	$14.03
120 Ton Crane				5.20	$15.52	$15.52
Trucks						
725	$7.32	$15.08	$2.87	4.70	$14.03	$39.30
730	$7.32	$15.08	$2.87	5.20	$15.52	$40.80
735	$7.32	$24.02	$2.87	7.35	$21.94	$56.15
740	$7.32	$25.28	$2.97	7.35	$21.94	$57.51
769D	$8.46	$4.61	$3.22	9.25	$27.61	$43.90
773E	$7.23	$9.61	$3.61	11.75	$35.07	$55.52
777D	$10.48	$17.22	$4.04	16.75	$50.00	$81.74
785C				24.25	$72.39	$72.39
793C				41.75	$124.62	$124.62
797B				58.75	$175.37	$175.37
613E (5,000 gal) Water Wagon	$5.79	$3.98		6.00	$17.91	$27.68
621E (8,000 gal) Water Wagon	$6.76	$7.69		10.75	$32.09	$46.53
777D Water Truck				16.75	$50.00	$50.00
785C Water Truck				24.25	$72.39	$72.39
Dump Truck (10-12 yd3) (5)	N/A	$0.91	N/A	5.20	$15.52	$16.43

Notes:

(1) PM Source:	
(2) Undercarriage Source:	NV costs
(3) G.E.T. Source:	NV costs
(4) Fuel Use Source:	Caterpillar Handbook, Edition 35, Ch. 20; or estimated average for smaller vehicles
(5) Dump Truck Oper. Cost Source:	Means Heavy Construction (2008)

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm

TIRE COST TABLES

Equipment	Tire Size	# of Tires Per Piece of Equipment	Cost Per Tire	Tire Cost (1)(2)	Life Expectency Hours (Low/Zone A) (3)	Tire Cost per Hour
Bulldozers						
D6R			N/A			
D6R w/ Winch			N/A			
D7R			N/A			
D8R			N/A			
D9R			N/A			
D10R			N/A			
D11R			N/A			
Wheeled Dozers						
824G	29.5R25	4		$0.00	3,500	$0.00
834G	35/65-R33	4		$0.00	3,500	$0.00
844	45/65-R39	4		$0.00	3,500	$0.00
854G	45/65-R45	4		$0.00	3,500	$0.00
Motor Graders						
120H	13PR24	6	$2,419.20	$14,515.20	3,500	$4.15
14G/H	20.5R25	6	$3,311.84	$19,871.04	3,500	$5.68
16G/H	23.5R25	6	$4,480.00	$26,880.00	3,500	$7.68
24M	23.5R25	6		$0.00	3,500	
Track Excavators						
312C			N/A			
320C			N/A			
325C			N/A			
330C			N/A			
345B			N/A			
365BL			N/A			
385BL			N/A			
Scrapers						
631G	37.25R35	4	$9,840.32	$39,361.28	4,000	$9.84
637G	37.25R35	4	$9,840.32	$39,361.28	4,000	$9.84
Wheeled Loaders						
924G	17.5R25	4	$3,337.60	$13,350.40	4,500	$2.97
928G	17.5R25	4	$3,337.60	$13,350.40	4,500	$2.97
950G	26.5R25	4	$5,028.24	$20,112.96	4,500	$4.47
966G	26.5R25	4	$8,005.76	$32,023.04	4,500	$7.12
972G	26.5R25	4	$8,005.76	$32,023.04	4,500	$7.12
980G	29.5R25	4	$8,428.00	$33,712.00	4,500	$7.49
988G	35/65-33	4	$13,235.60	$52,942.40	4,500	$11.76
990	41.25/70-39	4		$0.00	4,500	
992G	45/65R45	4	$29,513.12	$118,052.48	4,500	$26.23
994D	55/85R57	4		$0.00	4,500	
L2350	55/85R57	4		$0.00	4,500	
Shovels						
PC2000			N/A			
PC3000			N/A			
PC4000			N/A			
PC5500			N/A			
PC8000			N/A			
Hydraulic Hammers						
H-120 (fits 325)			N/A			
H-160 (fits 345)			N/A			
H-180 (fits 365/385)			N/A			
Demolition Shears						
S340 (fits 322/325/330)			N/A			
S365 (fits 330/345)			N/A			
S390 (fits 365/385)			N/A			
Demolition Grapples						
G315 (fits 322/325)			N/A			
G320 (fits 325/330)			N/A			
G330 (fits 345/365)			N/A			
Other Equipment						
420D 4WD Backhoe	340/80R18-19.5LR24	2	$1,145.03	$2,290.06	3,000	$0.76
428D 4WD Backhoe	340/80R18-16.9R28	2	$1,145.03	$2,290.06	3,000	$0.76
CS533E Vibratory Roller			N/A			
CS633E Vibratory Roller			N/A			
CP533E Sheepsfoot Compactor			N/A			
CP633E Sheepsfoot Compactor			N/A			
Light Truck - 1.5 Ton		4	154	$616.00	3,000	$0.21
Supervisor's Truck		4	154	$616.00	3,000	$0.21
Flatbed Truck		22	154	$3,388.00	3,000	$1.13
Air Compressor + tools			N/A			
Welding Equipment			N/A			
Heavy Duty Drill Rig		4		$0.00	3,000	
Pump (plugging) Drill Rig		4		$0.00	3,000	
Concrete Pump			N/A			
Gas Engine Vibrator			N/A			
Generator 5KW			N/A			
HDEP Welder (pipe or liner)			N/A			
5 Ton Crane		4		$0.00	3,000	
20 Ton Crane		4		$0.00	3,000	
50 Ton Crane		6		$0.00	3,000	
120 Ton Crane		6		$0.00	3,000	
Trucks						
725	23.5R25	6	$5,028.24	$30,169.44	2,000	$15.08
730	23.5R25	6	$5,028.24	$30,169.44	2,000	$15.08
735	26.5R25	6	$8,005.76	$48,034.56	2,000	$24.02
740	29.5R25	6	$8,428.00	$50,568.00	2,000	$25.28
769D	18.00R33	6	$4,607.46	$27,644.76	6,000	$4.61
773E	24.00R35	6	$8,005.76	$48,034.56	5,000	$9.61
777D	27.00R49	6	$14,348.96	$86,093.76	5,000	$17.22
785C	33.00R51	6		$0.00	4,000	
793C	40.00R57	6		$0.00	4,000	
797B	40.00R57	6		$0.00	4,000	
613E (5,000 gal) Water Wagon	23.5R25	6	$3,979.50	$23,877.00	6,000	$3.98
621E (8,000 gal) Water Wagon	33.25R29	6	$10,247.83	$61,486.98	8,000	$7.69
777D Water Truck	27.00R49	6		$0.00	5,000	
785C Water Truck	33.00R51	6		$0.00	4,000	
Dump Truck (10-12 yd3)		10	$544.88	$5,448.80	6,000	$0.91

Notes:

(1) Unit Cost Basis:	NV costs
(2) Cost Basis:	NV costs
(3) Tire Cost Source:	NV costs
(4) Tire Wear Source:	NV costs

Closure Cost Estimate
Material Costs

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estim
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Revegetation Materials

Seed Mixes

Seed Mix	Description		Cost/Acre
None			
Mix 1	Basins		$139.00
Mix 2	Low Hills		$299.00
Mix 3	Uplands		$37.00
Mix 4	Riparian or Custom		
User Mix 1			
User Mix 2			
User Mix 3			
User Mix 4			
	Cost/lb	lbs/Acre	Cost/Acre
User Mix 5 (from Seed Mix sheet)	$9.94	$27.21	$270.48
Notes:			

Mulch

Item	Cost/lb	lbs/Acre	Cost/Acre
None			
Straw Mulch	$0.18	10	$1.80
Hydro Mulch		10	
Timber Mulch		10	
		10	
Notes:			

Amendments

Item	Cost/lb	lbs/Acre	Cost/Acre
None			
Organic Matter		10	
Treated Sludge		10	
Chemical		10	
		10	
Notes:			

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estim
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment Materials

Description	Cost/50lb bag	Units	Cost/unit*
Cement	$7.18	cy	$34.19
Grout (Low Grade Bentonite)	$9.96	cy	$47.43
Inert Material/Cuttings		cy	
		cy	
		cy	

* Assumes 1 bag mixes with water to make 0.21 y3 or 0.16 m3 of grout/cement slurry.

Monitoring Costs

Description	Units	Cost/unit
Monitor Well Pump	ea.	$2,140.00
Sampling Supplies	ea.	$0.00
Water Analysis	ea.	$331.00
Water treatment analyses	ea.	$100.00
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	

(1) WET Labs, Reno, Nevada (May 2014)

Fuel, Etc.

Description	Units	Cost/unit	User Overrides
Off-road Diesel - delivered (1)	$/gal	$2.985	
Pickup Truck Mileage	$/mi	$0.560	
Electical Power	$/kWh	$0.055	

Closure Cost Estimate
Material Costs

Revegetation Method				
Slopes				
Disturbance Type	**Seed Application Method**	**Labor** Cost/Acre	**Equipment** Cost/Acre	**Total** Cost/Acre
Waste Rock Dumps	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Heap Leach	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Tailings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Quarries & Borrow Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Flat Areas and Undifferentiated				
Disturbance Type	**Seed Application Method**	**Labor** Cost/Acre	**Equipment** Cost/Acre	**Total** Cost/Acre
Exploration Trenches	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Exploration Roads	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Waste Rock Dumps	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Heap Leach	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Tailings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Quarries & Borrow Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Roads	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Haul Material	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Foundations & Buildings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Sediment & Drainge Control	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Process Ponds	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Landfills	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Yards, Etc.	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Revegetation Maintenance	**Mechanical Broadcast**	$139.00	$139.00	$278.00

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Revegetation

	Means Number	Unit	Crew	Daily Output	Daily Output User	Materials	Labor	Equipment	Total	Notes
Seeding - Broadcast Hand (1)		acres							$0.00	
Seeding - Broadcast Mechanical (1)		acres					$139.00	$139.00	$278.00	
Seeding - Drill (1)		acres		365					$0.00	
Seeding - Hydroseeding (1)				365					$0.00	
Shrub Planting - bare root 6-10 in (150- 250mm) (2)	02910-400-0561	ea.	1 Clab	365			$1.01	$0.00	$1.01	
Tree Planting - bare root 11-16 in (270- 400mm) (3)	02910-400-0562	ea.	1 Clab	260			$1.42	$0.00	$1.42	
Cactus Planting (4)		ea.	1 Clab						$0.00	
NOTES:										
(1) Seeding Source:										
(2) Shrub Source:										
(3) Tree Source:										
(4) Cactus Source:										

Building and Wall Demolition

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Daily Output User	Labor	Equipment	Premium	Total	Notes
Building Demolition										
Lg. steel	02220-110-0012	C.F.	B-8	21500		$0.16	$0.11		$0.27	
Lg. concrete	02220-110-0050	C.F.	B-8	15300		$0.23	$0.16		$0.39	
Lg. masonry	02220-110-0080	C.F.	B-8	20100		$0.18	$0.12		$0.30	
Lg. mixed	02220-110-0100	C.F.	B-8	20100		$0.18	$0.12		$0.30	
Sm. steel	02220-110-0500	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Sm. concrete	02220-110-0600	C.F.	B-3	11300		$0.27	$0.18		$0.45	
Sm. masonry	02220-110-0650	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Sm. wood	02220-110-0700	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Wall Demolition										
Block 4 in (100 mm) thick	02220-130-2000	S.F.	1 Clab	180		$2.05	$0.00	20%	$2.46	
Block 6 in (150 mm) thick	02220-130-2040	S.F.	1 Clab	170		$2.17	$0.00	20%	$2.60	
Block 8 in (200 mm) thick	02220-130-2080	S.F.	1 Clab	150		$2.46	$0.00	20%	$2.95	
Block 12 in (300 mm) thick	02220-130-2100	S.F.	1 Clab	150		$2.46	$0.00	20%	$2.95	
Conc 6 in (150 mm) thick	02220-130-2400	S.F.	B-9	160		$17.74	$1.47	10%	$21.13	
Conc 8 in (200 mm) thick	02220-130-2420	S.F.	B-9	140		$20.28	$1.68	10%	$24.16	
Conc 10 in (250 mm) thick	02220-130-2440	S.F.	B-9	120		$23.66	$1.96	10%	$28.18	
Conc 12 in (300 mm) thick	02220-130-2500	S.F.	B-9	100		$28.39	$2.35	10%	$33.81	

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Waste Disposal

Unit rates from Means Heavy Construction 2006 Edition by permission of R.S.Means/Reed Construction Data .

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment		Total	Notes
Rubbish Handling										
Dumpster delivery (average for all sizes)	02220-350-0910	ea.			$47.50				$47.50	
Haul (average for all sizes)	02220-350-0920	ea.			$149.00				$149.00	
Rent per month (average for all sizes)	02220-350-0940	ea.			$51.00				$51.00	
Disposal fee per ton (tonne) (average for all sizes)	02220-350-0950	ton			$56.00				$56.00	
NOTES:										
Dumpster Cost Source										
Dumpster Disposal Fee Source:										
Hazardous Material Handling - Solids (+ Liquids in drums)										
Pickup fees 55 gal (200 L). drums	02110-300-1100	ea.			$247.00				$247.00	
Bulk material (average)	02110-300-1220/1230	ton			$403.00				$403.00	
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	02110-300-1260/1270	mile			$5.50				$5.50	
Dump site solid disposal fee	02110-300-6000/6020	ton			$285.00				$285.00	
NOTES:										
Solid Handling Cost Source										
Solid Disposal Fee Source:										
Hazardous Material Handling - Liquids										
Vacuum Truck Pickup (2200 gal/8300 L)	02110-300-3110	hr.			$145.00				$145.00	
Vacuum Truck Pickup (5000 gal/19000 L)	02110-300-3120	hr.			$210.00				$210.00	
Dump site liquid disposal fee	02110-300-6000/6020	ton			$285.00				$285.00	
NOTES:										
Liquid Handling Cost Source										
Liquid Disposal Fee Source:										
Hydrocarbon Contaminated Soils (HCS)										
Insitu Biotreatment	02115-200-2020/2021	C.Y.			$8.00				$8.00	
HCS disposal fee	02115-200-2050/2055	C.Y.			$8.00				$8.00	
NOTES:										
Insitu Treatment Cost Source										
HCS Disposal Fee Source:										

Concrete Structure Installation

Weekly dumpster rental rates from Means Heavy Construction 2005 Edition with permission by R.S.Means/Reed Construction Data .
Weekly dumpster rental rates include haul to off-site disposal site and disposal fees

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Reinforced Concrete Bulkheads and Shaft Covers										
Grade walls - 15 in (400mm) thick, 8 ft (2.5m) high	03310-240-4300	C.Y.	C-14D	80.02	$139.00	$141.69	$14.69		$295.38	includes reinforcing
Grade walls - 15 in (400mm) thick, 12 ft (3.7m) high	03310-240-4350	C.Y.	C-14D	26.2	$139.00	$432.75	$44.85		$616.60	includes reinforcing
Elevated conc, 1-way beam & slab - 15ft (4.6m) span	03310-240-2700	C.Y.	C-14B	20.59	$257.00	$563.11	$57.08		$877.19	includes reinforcing
Elevated conc, 1-way beam & slab - 25ft (7.5m) span	03310-240-2750	C.Y.	C-14B	28.36	$245.00	$408.83	$41.44		$695.27	includes reinforcing
Bat Gate/Foam Plug Installation										
Bat Gate (5)		ea.			$2,870.42					materials $/ea. Installed
Culvert Gate (5)		ea.			$5,740.85					materials $/ea. Installed
Adit Foam Plug (6)		ea./C.Y.			$287.04					materials $/cy placed
Production Opening Foam Plug (6)		ea./C.Y.			$287.04					materials $/cy placed
NOTES:										
(5) Bat Gate Source:										
(6) Foam Plug Source:										

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Misc. Linear Projects

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Fencing Installation										
Barbed 3-strand	02820-170-1650	L.F.	B-80A	760	$0.39	$2.09	$0.40		$2.88	
Barbed 4-strand	extrapolated	L.F.	B-80A	570	$0.52	$2.78	$0.53		$3.83	
Barbed 5-strand	02820-130-0920	L.F.	B-80A	456	$0.65	$3.48	$0.66		$4.79	
Chain link 8-10ft (2.5-3m) Install	02820-130-0920	L.F.	B-80C	180	$33.00	$8.80	$1.67		$43.47	
Wood stockade fence 6 ft (2 m) high - Install	02820-510-1240	L.F.	B-80C	150	$12.70	$10.57	$2.01		$25.28	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
Fencing Removal										
Barbed 3-strand Removal	02220-220-1600	L.F.	2 Clab	430		$2.83	$0.70		$3.53	
Barbed 4-strand Removal	extrapolated	L.F.	2 Clab	355		$3.43	$0.85		$4.28	
Barbed 5-strand Removal	02220-220-1650	L.F.	2 Clab	280		$4.34	$1.08		$5.42	
Chain link 8-10 ft (2.5-3 m) Removal	02220-220-1700	L.F.	B-6	445		$2.73	$1.09		$3.82	
Wood, all types 4-6 ft (*1.5-2 m) high - Removal	02220-220-1775	L.F.	2 Clab	430		$2.83	$0.70		$3.53	
	user	L.F.								
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
Culvert Removal										
12 in (300 mm) Diameter	02220-220-2900	L.F.	B-6	175		$6.95	$2.77		$9.72	
18 in (450 mm) Diameter	02220-220-2930	L.F.	B-6	150		$8.11	$3.23		$11.34	
24 in (600 mm) Diameter	02220-220-2960	L.F.	B-6	120		$10.13	$4.04		$14.17	
36 in (1m) Diameter	02220-220-3000	L.F.	B-6	90		$13.51	$5.38		$18.89	
Pipeline Removal										
0.75 in (20mm) - 4 in (100 mm) diameter	02220-381-1600	L.F.	B-20	700		$3.00	$0.43		$3.43	
6 in (150 mm) - 8 in (200 mm)	02220-381-1700	L.F.	B-20	500		$4.20	$0.60		$4.80	
10 in (250 mm) - 18 in (450 mm)	02220-381-1800	L.F.	B-20	300		$7.00	$1.00		$8.00	
20 in (500 mm) - 36 in (1 m)	02220-381-1900	L.F.	B-20	200		$10.50	$1.51		$12.01	
Pipe and Drainpipe Installation										
Water 4in (100mm) 40ft (12m) length, welded HDPE	02510-760-0100	L.F.	B-22A	400	$3.74	$6.35	$5.24		$15.33	
Water 6in (150mm) 40ft (12m) length, welded HDPE	02510-760-0200	L.F.	B-22A	380	$7.45	$6.69	$5.52		$19.66	
Water 12in (300mm) 40ft (12m) length, welded HDPE	02510-760-0500	L.F.	B-22A	260		$9.77	$8.07		$17.84	
Drain 4in (100mm) perforated PVC	02620-630-2100	L.F.	B-14	315	$1.32	$10.53	$1.83		$13.68	
Drain 6in (150mm) perforated PVC	02620-630-2110	L.F.	B-14	300	$2.98	$11.06	$1.93		$15.97	
Drain 4in (100mm) corrugated, perf or plain	02620-660-0040	L.F.	2 Clab	1200	$0.46	$1.01	$0.25		$1.72	
Drain 6in (150mm) corrugated., perf or plain	02620-660-0060	L.F.	2 Clab	900	$1.33	$1.35	$0.33		$3.01	

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Drain Rock Preparation										
Crushing		C.Y.							$0.50	
Screening		C.Y.							$0.50	
TOTAL									$1.00	
Misc.										
Backhoe work	02210-700-0120	C.Y.	B-11M	28		$17.08	$9.88		$26.96	
Powerline and Transformer Removal										
Single Pole		mile							$39,894.00	
Double Pole		mile							$45,593.00	
Transformer (9)		ea.							$5,000.00	
NOTES:										
(7) Single Pole Source:										
(8) Double Pole Source:										
(9) Transformer Source:										

Erosion and Sedimentation Control

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Rip-Rap & Rock Lining										
Rip-Rap 3/8 to 1/4 CY (m3) pieces, grouted	02370-450-0110	S.Y.	B-13	80	$17.70	$35.48	$10.43		$63.61	assumes on-site source of rip-rap
Rip-Rap 18 in (450 mm) min thick, no grout	02370-450-0200	S.Y.	B-13	53	$5.85	$53.56	$15.74		$75.15	assumes on-site source of rip-rap
Gabions, 6 in (150 mm) deep	02370-450-0400	S.Y.	B-13	200	$8.35	$14.19	$4.17		$26.71	assumes on-site source rock fill for gabions
Gabions, 9 in (250 mm) deep	02370-450-0500	S.Y.	B-13	163	$12.15	$17.42	$5.12		$34.69	assumes on-site source rock fill for gabions
Gabions, 12 in (300 mm) deep	02370-450-0200	S.Y.	B-13	153	$16.45	$18.55	$5.45		$40.45	assumes on-site source rock fill for gabions
Gabions, 18 in (450 mm) deep	02370-450-0200	S.Y.	B-13	102	$23.00	$27.83	$8.18		$59.01	assumes on-site source rock fill for gabions
Gabions, 36 in (1m) deep	02370-450-0200	S.Y.	B-13	60	$31.00	$47.31	$13.90		$92.21	assumes on-site source rock fill for gabions
HDEP Liner Installation										
Finish grading large area	2310-100-0100	S.F.	B-11L	54000		$0.02	$0.02		$0.04	
Compaction-riding, vibrating roller - 12in (300mm) lifts	2315-310-5100	C.Y.	B-10Y	2600		$0.33	$0.16		$0.49	
60 mil HDPE	2660-610-0010	S.F.	3 Skwk	1600	$0.53	$0.99	$0.43	10%	$2.15	
40 mil LDPE geomembran	user	S.F.	3 Skwk	5000	$0.55	$0.32	$0.14		$1.01	HRF Cover Sys UC
Non-woven geotextile	user	S.F.	3 Skwk	9000	$0.25	$0.18	$0.08		$0.51	HRF Cover Sys UC
Geogrid	user	S.F.	3 Skwk	9000	$0.20	$0.18	$0.08		$0.46	HRF Cover Sys UC
	user	S.F.	3 Skwk						$0.00	
Geogrid	user	S.F.	3 Skwk	9000	$0.20	$0.18	$0.08		$0.46	HRF Cover Sys UC
	user	S.F.	3 Skwk						$0.00	
Construction Management Support										
Office Trailer, Furnished, no hook-ups	0150-500-0250	mo.			$167.00				$167.00	
Toilet Portable, chemical	1590-400-6410	mo.			$132.00				$132.00	
TOTAL					$299.00				$299.00	

Pump and Casing Removal										
	Pump Type	Measurement	Unit				Labor	Equipment		Total	Notes
Pump Removal											
Submersible		ft to pump	L.F.				$2.51	$5.45		$7.96	
Line Shaft		ft to pump	L.F.				$5.85	$12.72		$18.57	
NOTES:											
(10) Pump Removal Source:											

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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Model Version: Version 1.4.1
Cost Data: User Data
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Cost Estimate Type: Surety Cost Basis: Polymet

EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
RIPPING						
Rip road						
Waste rock dumps, heaps, tails - rip flat surfaces						
Surface preparation						
Scarify						
Small Dozer w/ multi-shank						
D6R				$97.93	$59.78	$157.71
Totals				$97.93	$59.78	$157.71
Medium Dozer w/ multi-shank						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer w/ multi-shank						
D10R				$272.44	$59.78	$332.22
Totals				$272.44	$59.78	$332.22
Grader w/ multi-shank						
16G/H				$188.08	$59.78	$247.86
Totals				$188.08	$59.78	$247.86
GRADING						
Grading storage and structure areas						
Grading waste rock dumps and heaps						
Grading landfills						
Constructing pit safety berms						
Small Dozer Fleet						
D7R				$126.99	$59.78	$186.77
Totals				$126.99	$59.78	$186.77
Medium Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer Fleet						
D10R				$272.44	$59.78	$332.22
Totals				$272.44	$59.78	$332.22
EXPLORATION GRADING						
Backfilling and grading exploration trenches						
Grading flat exploration roads						
Small Dozer Fleet						
D7R				$126.99	$59.78	$186.77
Totals				$126.99	$59.78	$186.77
Medium Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
EXCAVATING						
Earthen Berms						
Diversion ditch excavation and backfill						
Underground openings backfill - excavate and place						
Pit berm construction (excavator option)						
Small Excavator						
325C				$79.67	$59.78	$139.45
Totals				$79.67	$59.78	$139.45
Medium Excavator						
330C				$96.44	$59.78	$156.22
Totals				$96.44	$59.78	$156.22
Large Excavator						
385BL				$256.29	$59.78	$316.07
Totals				$256.29	$59.78	$316.07
EXCAVATE AND RECONTOUR						
Recontour large roads (haul roads, access roads, etc.)						
Ponds - Excavate and pull liner and bury						
Small Excavator + Dozer						
325C				$79.67	$59.78	$139.45
D7R				$126.99	$59.78	$186.77
Total Equipment				$206.66	$119.56	$326.22
Medium Excavator + Dozer						
330C				$96.44	$59.78	$156.22
D9R				$220.68	$59.78	$280.46
Totals				$317.12	$119.56	$436.68
Large Excavator + Dozer						
385BL				$256.29	$59.78	$316.07
D10R				$272.44	$59.78	$332.22
Totals				$528.73	$119.56	$648.29
EXPLORATION ROAD/PAD RECONTOUR						
Recontour small roads (exploration roads, service roads, etc.)						
Cut and Fill reclamation on slopes						
Drill pad recountour						
Drill sump backfill						
Small Dozer						
D6R				$97.93	$59.78	$157.71
Totals				$97.93	$59.78	$157.71
Large Dozer						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Grader						
14G/H				$140.96	$59.78	$200.74
Totals				$140.96	$59.78	$200.74
Small Excavator						
320C				$65.51	$59.78	$125.29
Totals				$65.51	$59.78	$125.29
Medium Excavator						
345B				$142.62	$59.78	$202.40
Totals				$142.62	$59.78	$202.40

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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Cost Estimate Type: Surety Cost Basis: Polymet

EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
LOAD, HAUL AND PLACE MATERIAL						
Rock placement						
Haul overburden for backfill						
Haul borrow for backfill						
Haul cover or growth media						
Small Truck/Loader Fleet						
725				$101.80	$59.78	$161.58
966G	**Loader**			$119.59	$59.78	$179.37
D7R		1		$126.99	$59.78	$186.77
Totals				$348.38	$179.34	$527.72
Medium Truck/Loader Fleet						
740				$160.41	$59.78	$220.19
988G	**Loader**			$243.10	$59.78	$302.88
D8R		1		$156.81	$59.78	$216.59
Totals				$560.32	$179.34	$739.66
Large Truck/Loader Fleet						
777D				$388.56	$59.78	$448.34
992G	**Loader**			$505.86	$59.78	$565.64
D10R		1		$272.44	$59.78	$332.22
Totals				$1,166.86	$179.34	$1,346.20
Extra Large Truck/Loader Fleet						
785C				$72.39	$59.78	$132.17
992G	**Loader**			$505.86	$59.78	$565.64
D11R		1		$472.78	$59.78	$532.56
Totals				$1,051.03	$179.34	$1,230.37
Scraper/Dozer Fleet						
631G				$262.01	$59.78	$321.79
D10R				$272.44	$59.78	$332.22
D7R		1		$126.99	$59.78	$186.77
Totals				$661.44	$179.34	$840.78
Tandem Scraper Fleet						
637G				$297.91	$59.78	$357.69
D7R		1		$126.99	$59.78	$186.77
Totals				$424.90	$119.56	$544.46
MISC. LOAD AND HAUL AND EARTHWORKS						
Sludge removal						
Drainage controls						
Misc. - Cat 325B Excavator / 10-12 yd3 Truck						
325C				$79.67	$59.78	$139.45
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$179.98	$119.56	$299.54
Misc. - Cat D9R Dozer/ Loader (5 yd3) / 10-12 yd3 Truck						
D9R				$220.68	$59.78	$280.46
966G				$119.59	$59.78	$179.37
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$440.58	$179.34	$619.92
Misc. - Cat D6 Dozer / Cat 966 Loader / 10-12 yd3 Truck						
D6R				$97.93	$59.78	$157.71
966G				$119.59	$59.78	$179.37
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$317.83	$179.34	$497.17

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
CONCRETE BREAKING						
Slab demolition Footing demolition Wall demolition						
Small - Cat 325B Excavator w/ H140D s Hammer						
325C				$79.67	$59.78	$139.45
H-120 (fits 325)				$23.02	$0.00	$23.02
D9R				$220.68	$59.78	$280.46
Totals				$323.37	$119.56	$442.93
Medium - Cat 345B Excavator w/ H180D s Hammer						
345B				$142.62	$59.78	$202.40
H-160 (fits 345)				$33.87	$0.00	$33.87
D9R				$220.68	$59.78	$280.46
Totals				$397.17	$119.56	$516.73
Large - Cat 385B Excavator w/ H180D s Hammer						
385BL				$256.29	$59.78	$316.07
H-180 (fits 365/385)				$35.09	$0.00	$35.09
D9R				$220.68	$59.78	$280.46
Totals				$512.06	$119.56	$631.62
DRILL HOLE ABANDONMENT						
Drill Hole - Grout or Cement						
Pump (plugging) Drill Rig				$378.60	$59.78	$438.38
Driller's Helper		2		$0.00	$92.22	$92.22
Totals				$378.60	$152.00	$530.60
Drill Hole - Inert Media (Means Crew B-11M+ 1 Laborer)						
420D 4WD Backhoe				$34.59	$59.78	$94.37
General Laborer		1		$0.00	$46.11	$46.11
Totals				$34.59	$105.89	$140.48
Drill Hole - Casing Perforation or Removal						
Heavy Duty Drill Rig				$384.57	$59.78	$444.35
Driller's Helper		2		$0.00	$92.22	$92.22
Totals				$384.57	$152.00	$536.57
MAINTENANCE FLEET						
Road Grading, Dust Suppression, Clean Up						
Maintenance - Small Water Truck and Cat 14G Grader						
613E (5,000 gal) Water Wagon				$71.43	$59.78	$131.21
120H				$91.06	$59.78	$150.84
Totals				$162.49	$119.56	$282.05
Maintenance - Medium Water Truck and Cat 16G Grader						
613E (5,000 gal) Water Wagon				$71.43	$59.78	$131.21
14G/H				$140.96	$59.78	$200.74
Totals				$212.39	$119.56	$331.95
Maintenance - Large Water Truck and Cat 16G Grader						
777D Water Truck				$50.00	$59.78	$109.78
16G/H				$188.08	$59.78	$247.86
Totals				$238.08	$119.56	$357.64
PROJECT SUPERVISION						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Totals				$23.57	$170.40	$193.97

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
MEANS CREW DEFINITIONS						
Crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data . For use with misc. unit costs where Means is the source for productivity						
1 Clab - Seedling Planting/Block Wall Demolition						
General Laborer		1		$0.00	$46.11	$46.11
Totals				$0.00	$46.11	$46.11
2 Clab - Barbed Wire/Wood Fence Removal, Drainpipe Installation, Pumping, Evaporation						
General Laborer		2		$0.00	$92.22	$92.22
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$152.00	$189.66
2 Clab + Excavator - Pond Liner Cut and Fold						
General Laborer		2		$0.00	$92.22	$92.22
325C				$79.67	$59.78	$139.45
Totals				$79.67	$152.00	$231.67
2 Clab + Welder - Bat Gates						
General Laborer		2		$0.00	$92.22	$92.22
Welding Equipment				$23.16	$59.78	$82.94
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$60.82	$211.78	$272.60
3 Clab - Foam Adit Plugs						
General Laborer		2		$0.00	$92.22	$92.22
420D 4WD Backhoe				$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$72.25	$211.78	$284.03
3 Clab + Welder - Culvert Bat Gate						
General Laborer		2		$0.00	$92.22	$92.22
Welding Equipment				$23.16	$59.78	$82.94
420D 4WD Backhoe				$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$95.41	$271.56	$366.97
3 Clab D - 3 Laborers + Foreman - Decontamination						
General Laborer		3		$0.00	$138.33	$138.33
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$61.23	$368.51	$429.74
3 SKWK - Liner Installation						
Skilled Laborer		3		$0.00	$138.33	$138.33
HDEP Welder (pipe or liner)		1		$52.35	$0.00	$52.35
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$86.94	$198.11	$285.05

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-3 - Small Building Demoltion						
LABOR						
General Laborer		2		$0.00	$92.22	$92.22
Foreman		1		$0.00	$110.62	$110.62
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
EQUIPMENT						
928G		1		$60.53	$59.78	$120.31
Dump Truck (10-12 yd3)		2		$200.62	$119.56	$320.18
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$261.15	$382.18	$643.33
B-6 - Chain Link Fence/Culvert Removal						
General Laborer		2		$0.00	$92.22	$92.22
928G		1		$60.53	$59.78	$120.31
Totals				$60.53	$152.00	$212.53
B-8 - Large Building Demolition						
LABOR						
General Laborer		2		$0.00	$92.22	$92.22
Foreman		1		$0.00	$110.62	$110.62
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
EQUIPMENT						
928G		1		$60.53	$59.78	$120.31
20 Ton Crane		1		$35.92	$59.78	$95.70
Dump Truck (10-12 yd3)		2		$200.62	$119.56	$320.18
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$297.07	$441.96	$739.03
B-9 - Concrete Wall Demolition						
General Laborer		4		$0.00	$184.44	$184.44
Foreman		1		$0.00	$110.62	$110.62
Air Compressor + tools				$29.37	$59.78	$89.15
Totals				$29.37	$354.84	$384.21

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-10Y - General Compaction						
General Laborer		1		$0.00	$46.11	$46.11
CS533E Vibratory Roller		1		$52.22	$59.78	$112.00
Totals				$52.22	$105.89	$158.11
B-11L - Fine Grading for Evaporation Pond Liner Base						
General Laborer		1		$0.00	$46.11	$46.11
14G/H		1		$140.96	$59.78	$200.74
Totals				$140.96	$105.89	$246.85
B-11M - Backhoe Work						
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Totals				$34.59	$59.78	$94.37
B-12G - Rip-Rap Machine Placed (Modified)						
966G		1		$119.59	$59.78	$179.37
325C		1		$79.67	$59.78	$139.45
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$236.92	$179.34	$416.26
B-13 - Grouted Rip-Rap & Gabion Baskets						
General Laborer		4		$0.00	$184.44	$184.44
Foreman		1		$0.00	$110.62	$110.62
50 Ton Crane		1		$104.28	$59.78	$164.06
Totals				$104.28	$354.84	$459.12
B-14 PVC Drain Pipe Installation						
Foreman		1		$0.00	$110.62	$110.62
General Laborer		4		$0.00	$184.44	$184.44
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$72.25	$414.62	$486.87
B-20 - Remove Pipelines						
Foreman		1		$0.00	$110.62	$110.62
Skilled Laborer		1		$0.00	$46.11	$46.11
General Laborer		1		$0.00	$46.11	$46.11
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$262.62	$300.28
B-22A - HDEP Installation - Pipe or Liner						
Skilled Laborer		1		$0.00	$46.11	$46.11
General Laborer		2		$0.00	$92.22	$92.22
D7R		1		$126.99	$59.78	$186.77
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Generator 5KW		1		$10.53	$0.00	$10.53
HDEP Welder (pipe or liner)		1		$52.35	$0.00	$52.35
Totals				$262.12	$317.67	$579.79
B-80A - Install Barbed Wire Fence						
General Laborer		3		$0.00	$138.33	$138.33
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$198.11	$235.77

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-80C - Install Chain Link Fence (Flatbed truck has small crane)						
General Laborer		3		$0.00	$138.33	$138.33
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$198.11	$235.77
C-14B - Elevated Concrete Slabs (Reinforced Concrete Shaft Covers)						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Carpenter		16		$0.00	$850.24	$850.24
General Laborer		2		$0.00	$92.22	$92.22
Rodmen (reinforcing concrete)		4		$0.00	$184.44	$184.44
Cement finisher		2		$0.00	$92.22	$92.22
Gas Engine Vibrator		1		$6.98	$59.78	$66.76
Concrete Pump		1		$116.35	$0.00	$116.35
Totals				$146.90	$1,449.30	$1,596.20
C-14D - Concrete Walls Formed in Place (Reinforced Concrete Adit Bulkheads)						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Carpenter		18		$0.00	$956.52	$956.52
General Laborer		2		$0.00	$92.22	$92.22
Rodmen (reinforcing concrete)		2		$0.00	$92.22	$92.22
Cement finisher		1		$0.00	$46.11	$46.11
Gas Engine Vibrator		1		$6.98	$59.78	$66.76
Concrete Pump		1		$116.35	$0.00	$116.35
Totals				$146.90	$1,417.25	$1,564.15

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Bulldozers

Dozer Specifications

Description	D11R	D10R	D9R	D8R	D7R	D6R
Blade Width (SU) (ft)	18.33	15.92	14.17	12.92	12.08	10.67
Shank Guage (3 shanks) (ft)	9.83	8.67	7.67	7.08	6.5	6.5
Pocket Spacing (ft)	4.75	4.33	3.87	3.58	3.25	3.25
Ripping Width (Ripper + 1 Pocket) (ft)	14.58	13	11.54	10.66	9.75	9.75
Ripping Speed (mph)	1	1	1	1	1	1
Ripping Maneuver (turn) Time (min)	0.25	0.25	0.25	0.25	0.25	0.25
Altitude Deration Factor	1	1	1	1	1	1
Ripping Hourly Production (excluding maneuvering time) (ft)	5,280	5,280	5,280	5,280	5,280	5,280

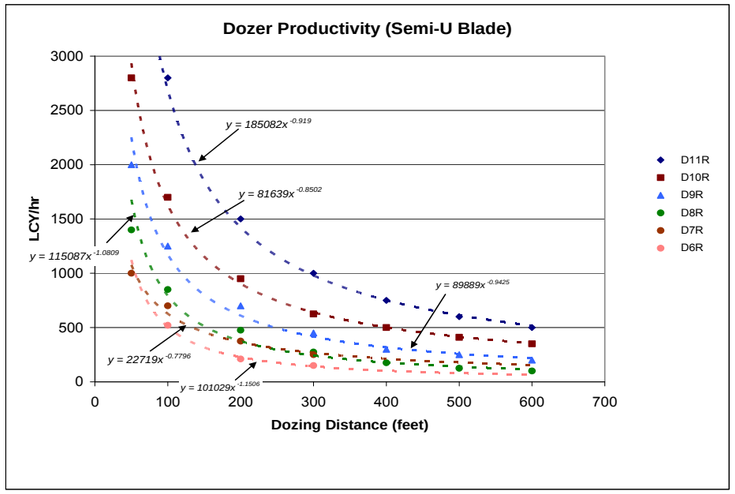
Source: Caterpillar Performance Handbook Edition 35

Dozer Productivity vs. Grading Distance

Average Dozing Distance (feet)	Production (LCY/hr) D11R	D10R	D9R	D8R	D7R	D6R
50	4,800	2,800	2,000	1,400	1,000	
100	2,800	1,700	1,250	850	700	520
200	1,500	950	700	475	375	210
300	1,000	625	450	275	250	150
400	750	500	300	175		
500	600	410	250	125		
600	500	350	200	100		

Source: Caterpillar Performance Handbook Edition 35

dozer productivity = k x Dozing Distance^{p} (see graph)						
k =	185082	81639	89889	115087	22719	101029
p =	-0.919	-0.8502	-0.9425	-1.0809	-0.7796	-1.1506



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

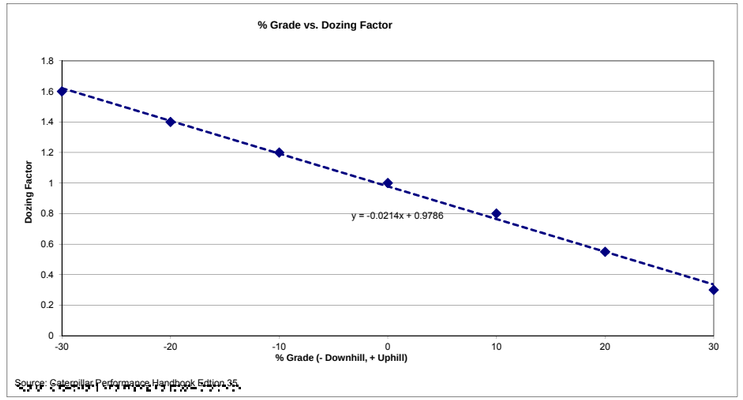
Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Bulldozers (cont.)

% Grade vs. Dozing Factor

% Grade	Dozing Factor
-30	1.6
-20	1.4
-10	1.2
0	1
10	0.8
20	0.55
30	0.3

Source: Caterpillar Performance Handbook Edition 35
% Grade Dozing Factor = -0.0214x + 0.9786
(see graph)



Job Condition Correction Factors - Bulldozers

OPERATOR	
Average	0.75
MATERIAL (1)	
Loose stockpile	1.2
Normal	1
Hard to cut; frozen — with tilt cylinder	0.8
Hard to drift; "dead" (dry,non-cohesive material) or very sticky material	0.8
Rock, ripped or blasted	0.6
SLOT DOZING OR SIDE BY SIDE (1)	1.2
VISIBILITY	
Good conditions	1
JOB EFFICIENCY	
50 min/hr	0.83

(1) Selected in facility worksheets.
Other factors included as standard factors.
Source: Caterpillar Performance Handbook Edition 35

Material Densities(1)

Material	lb/cy	kg/m³
Alluvium	2,900	1,720
Basalt	3,300	1,960
Clay - Dry	2,500	1,480
Granite - broken	2,800	1,660
Gravel	2,550	1,510
LS - broken	2,600	1,540
LS - crushed	2,600	1,540
Sandstone	2,550	1,510
Shale	2,100	1,250
Stone - crushed	2,700	1,600
Tailings - Coarse (dry, loose sand)	2,400	1,420
Tailings - Slimes (loose sand & clay)	2,700	1,600
Topsoil	1,600	950

(1) Source: Caterpillar Performance Handbook Edition 35

Note: uses Sand & Gravel - Dry from Caterpillar Handbook

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
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File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Scrapers

Scraper Specifications

Description	631G	637G
Empty Weight	100,600	112,760
Payload Capacity (cy)		
Struck	24	24
Heaped	34	34
Average	29	29
Loaded by	One D10R	Self*
Load Time (min)	1	1
Maneuver and Spread (min)	1	1
Job Efficiency	1	1
Rolling Resistance**	3	3
Altitude Deration Factor	1	1

* Requires pair

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials			Downhill Scraper Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)											
			631G						637G PP					
Material	lb/cy	Scraper Load lb	Loaded Weight (lbs)	22	16	10	5	1	Loaded Weight (lbs)	25	15	10	5	1
Alluvium	2,900	84,100	184,700	7.5	10	13	33	33	196,860	7	10	18.5	34	34
Basalt	3,300	95,700	196,300	7.5	10	13	24.5	33	208,460	7	10	18.5	25	34
Clay - Dry	2,500	72,500	173,100	7.5	10	13	33	33	185,260	7	10	18.5	34	34
Granite - broken	2,800	81,200	181,800	7.5	10	13	33	33	193,960	7	10	18.5	34	34
Gravel	2,550	73,950	174,550	7.5	10	13	33	33	186,710	7	10	18.5	34	34
LS - broken	2,600	75,400	176,000	7.5	10	13	33	33	188,160	7	10	18.5	34	34
LS - crushed	2,600	75,400	176,000	7.5	10	13	33	33	188,160	7	10	18.5	34	34
Sandstone	2,550	73,950	174,550	7.5	10	13	33	33	186,710	7	10	18.5	34	34
Shale	2,100	60,900	161,500	7.5	10	18	33	33	173,660	10	13.5	18.5	34	34
Stone - crushed	2,700	78,300	178,900	7.5	10	13	33	33	191,060	7	10	18.5	34	34
Tailings - Coarse (dry, loose sand)	2,400	69,600	170,200	7.5	10	13	33	33	182,360	7	10	18.5	34	34
Tailings - Slimes (loose sand & clay)	2,700	78,300	178,900	7.5	10	13	33	33	191,060	7	10	18.5	34	34
Topsoil	1,600	46,400	147,000	7.5	10	18	33	33	159,160	10	13.5	18.5	34	34
			Empty	10	18	24.5	33	33	Empty	10	13.5	18.5	34	34

Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

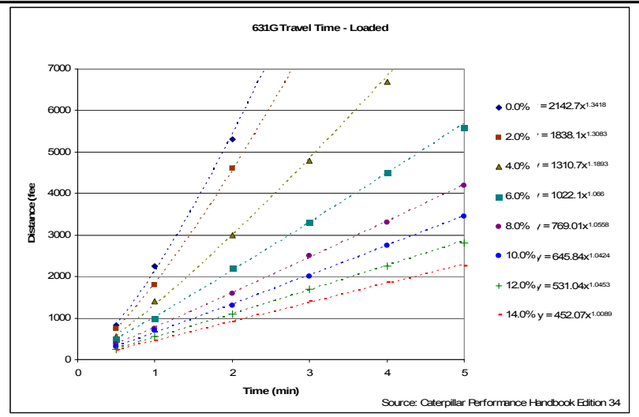
Productivity - Scrapers (cont.)

631G Scraper Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	825	2,250	5,300				2142.7	1.3418
2	750	1,800	4,600				1838.1	1.3083
4	550	1,400	3,000	4,800	6,700		1310.7	1.1893
6	490	1,000	2,200	3,300	4,500	5,600	1022.1	1.066
8	375	750	1,600	2,500	3,300	4,200	769.01	1.0558
10	300	700	1,300	2,000	2,750	3,450	645.84	1.0424
12	250	550	1,100	1,700	2,250	2,800	531.04	1.0453
14	225	450	900	1,400	1,850	2,250	452.07	1.0089

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



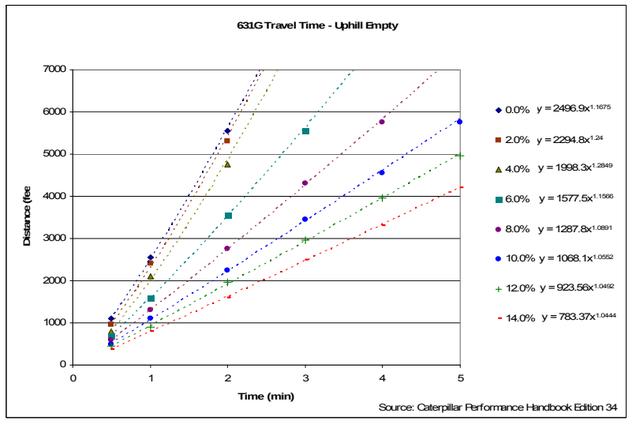
Source: Caterpillar Performance Handbook Edition 34

631G Scraper Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,100	2,550	5,550				2496.9	1.1675
2	950	2,400	5,300				2294.8	1.24
4	800	2,100	4,750				1998.3	1.2849
6	700	1,600	3,550	5,550			1557.5	1.1566
8	600	1,300	2,750	4,300	5,750		1287.8	1.0891
10	500	1,100	2,250	3,450	4,550	5,750	1068.1	1.0552
12	450	900	1,950	2,950	3,950	4,950	923.56	1.0492
14	375	800	1,600	2,500	3,300	4,200	783.37	1.0444

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

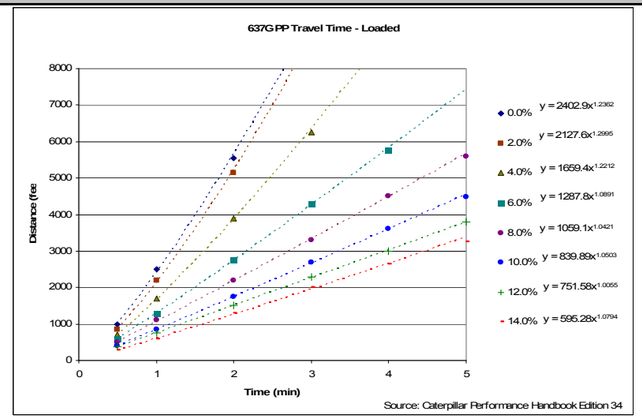
Productivity - Scrapers (cont.)

637G Push-Pull Scraper Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,000	2,500	5,550				2402.9	1.2362
2	850	2,200	5,150				2127.6	1.2995
4	700	1,700	3,900	6,250			1659.4	1.2212
6	600	1,300	2,750	4,300	5,750		1287.8	1.0891
8	500	1,100	2,200	3,300	4,500	5,600	1059.1	1.0421
10	400	850	1,750	2,700	3,600	4,475	839.89	1.0503
12	375	750	1,500	2,300	3,000	3,800	751.58	1.0055
14	275	600	1,300	2,000	2,650	3,250	595.28	1.0794

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



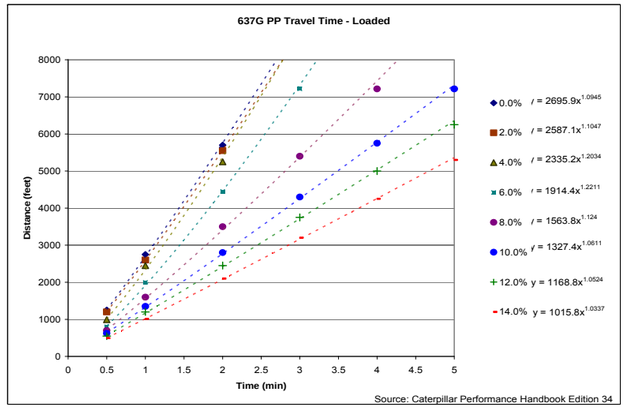
Source: Caterpillar Performance Handbook Edition 34

637G Push-Pull Scraper Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,250	2,750	5,700				2695.9	1.0945
2	1,200	2,600	5,550				2587.1	1.1047
4	990	2,450	5,250				2335.2	1.0234
6	800	2,000	4,450	7,216			1914.4	1.2211
8	700	1,600	3,500	5,400	7,216		1563.8	1.124
10	625	1,350	2,800	4,300	5,750	7,216	1327.4	1.0611
12	550	1,200	2,450	3,750	5,000	6,250	1168.8	1.0524
14	495	1,010	2,100	3,200	4,250	5,300	1015.8	1.0337

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Haul Trucks

Haul Truck Specifications

Description	769D	773E	777D	785C	793C	797B
Chassis Weight (lb)	53,506	70,330	113,160	170,000	259,500	473,600
Body Weight (lb)	17,350	20,300	34,785	36,788	70,785	104,200
Standard Liner Weight (lb)	7,000	8,600	12,040	16,846	24,418	8,800
Total Truck Weight (lb)	77,856	99,230	159,985	223,634	354,703	586,600
Payload Capacity (cy)						
Struck	21.6	34.8	55	78.5	126	228
Heaped	31.7	46	78.6	102	169	290
Average	26.65	40.4	66.8	90.25	147.5	259
Maneuver to Load Time (min)	0.7	0.7	0.7	0.7	0.7	0.7
Maneuver and Dump Time (min)	1.1	1.1	1.1	1.1	1.1	1.1
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5	2.5
Altitude Deration Factor	1	1	1	1	1	1

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials

Material	lb/cy	Truck (769D) Load lb	Truck (773E) Load lb	Truck (777D) Load lb
Alluvium	2,900	77,285	117,160	193,720
Basalt	3,300	87,945	133,320	220,440
Clay - Dry	2,500	66,625	101,000	167,000
Granite - broken	2,800	74,620	113,120	187,040
Gravel	2,550	67,958	103,020	170,340
LS - broken	2,600	69,290	105,040	173,680
LS - crushed	2,600	69,290	105,040	173,680
Sandstone	2,550	67,958	103,020	170,340
Shale	2,100	55,965	84,840	140,280
Stone - crushed	2,700	71,955	109,080	180,360
Tailings - Coarse (dry, loose sand)	2,400	63,960	96,960	160,320
Tailings - Slimes (loose sand & clay)	2,700	71,955	109,080	180,360
Topsoil	1,600	42,640	64,640	106,880

Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)

	769D					773E					777D				
Material	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	155,141	11	11	15	26	216,390	7	7	13	23	353,705	7	9	12	29
Basalt	165,801	11	11	11	20	232,550	7	7	13	23	380,425	7	7	12	21
Clay - Dry	144,481	11	11	15	26	200,230	7	9	13	23	326,985	7	9	16	29
Granite - broken	152,476	11	11	15	26	212,350	7	7	13	23	347,025	7	9	12	29
Gravel	145,814	11	11	15	26	202,250	7	9	13	23	330,325	7	9	16	29
LS - broken	147,146	11	11	15	26	204,270	7	9	13	23	333,665	7	9	12	29
LS - crushed	147,146	11	11	15	26	204,270	7	9	13	23	333,665	7	9	12	29
Sandstone	145,814	11	11	15	26	202,250	7	9	13	23	330,325	7	9	16	29
Shale	133,821	11	11	15	26	184,070	7	9	13	31	300,265	7	9	16	29
Stone - crushed	149,811	11	11	15	26	208,310	7	7	13	23	340,345	7	9	12	29
Tailings - Coarse (dry, loose sand)	141,816	11	11	15	26	196,190	7	9	13	23	320,305	7	9	16	29
Tailings - Slimes (loose sand & clay)	149,811	11	11	15	26	208,310	7	7	13	23	340,345	7	9	12	29
Topsoil	120,496	11	11	15	26	163,870	7	9	17	31	266,865	9	12	16	29
	Empty	15	15	26	36	Empty	13	17	23	42	Empty	16	16	29	39

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials

Material	lb/cy	Truck (785C) Load lb	Truck (793C) Load lb	Truck (797B) Load lb
Alluvium	2,900	261,725	427,750	751,100
Basalt	3,300	297,825	486,750	854,700
Clay - Dry	2,500	225,625	368,750	647,500
Granite - broken	2,800	252,700	413,000	725,200
Gravel	2,550	230,138	376,125	660,450
LS - broken	2,600	234,650	383,500	673,400
LS - crushed	2,600	234,650	383,500	673,400
Sandstone	2,550	230,138	376,125	660,450
Shale	2,100	189,525	309,750	543,900
Stone - crushed	2,700	243,675	398,250	699,300
Tailings - Coarse (dry, loose sand)	2,400	216,600	354,000	621,600
Tailings - Slimes (loose sand & clay)	2,700	243,675	398,250	699,300
Topsoil	1,600	144,400	236,000	414,400

Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)

	785C					793C					797B				
Material	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	485,359	8	8	14	27	782,453	7	7	10	17	1,337,700	7	7	9	17
Basalt	521,459	8	8	14	27	841,453	7	7	10	17	1,441,300	7	7	9	17
Clay - Dry	449,259	8	11	14	36	723,453	7	7	10	25	1,234,100	7	7	9	23
Granite - broken	476,334	8	8	14	27	767,703	7	7	10	17	1,311,800	7	7	9	17
Gravel	453,772	8	8	14	36	730,828	7	7	10	25	1,247,050	7	7	9	23
LS - broken	458,284	8	8	14	27	738,203	7	7	10	25	1,260,000	7	7	9	23
LS - crushed	458,284	8	8	14	27	738,203	7	7	10	25	1,260,000	7	7	9	23
Sandstone	453,772	8	8	14	36	730,828	7	7	10	25	1,247,050	7	7	9	23
Shale	413,159	8	11	14	36	664,453	7	7	10	25	1,130,500	7	7	13	23
Stone - crushed	467,309	8	8	14	27	752,953	7	7	10	17	1,285,900	7	7	9	23
Tailings - Coarse (dry, loose sand)	440,234	8	11	14	36	708,703	7	7	10	25	1,208,200	7	7	9	23
Tailings - Slimes (loose sand & clay)	467,309	8	8	14	27	752,953	7	7	10	17	1,285,900	7	7	9	23
Topsoil	368,034	8	11	19	36	590,703	7	10	13	25	1,001,000	7	9	13	23
	Empty	14	19	36	36	Empty	10	13	17	33	Empty	13	17	23	42

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

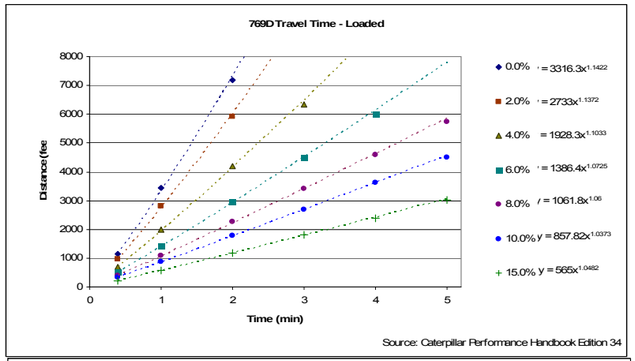
Productivity - Haul Trucks (cont.)

769D Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.4	1	2	3	4	5		
0	1,148	3,428	7,183				3316.3	1.1422
4	689	1,984	4,198	6,330			1928.3	1.1033
6	508	1,427	2,952	4,510	6,002		1386.4	1.0725
8	394	1,082	2,263	3,411	4,592	5,740	1061.8	1.06
10	328	869	1,771	2,690	3,608	4,510	857.82	1.0373
15	213	574	1,181	1,804	2,394	3,018	565	1.0482

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



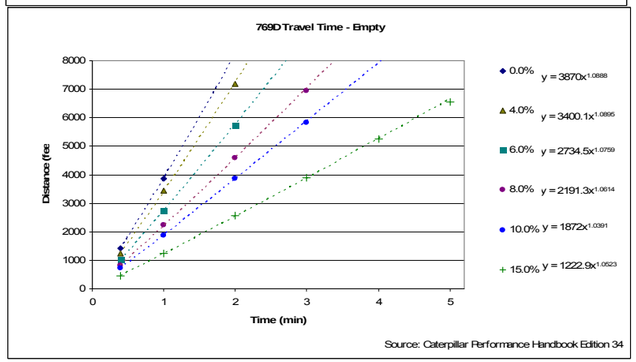
Source: Caterpillar Performance Handbook Edition 34

769D Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.4	1	2	3	4	5		
0	1,427	3,870					3870	1.0888
4	1,246	3,444	7,183				3400.1	1.0895
6	1,017	2,755	5,740				2734.5	1.0759
8	820	2,230	4,592	6,954			2191.3	1.0614
10	722	1,870	3,870	5,838			1872	1.0391
15	459	1,246	2,558	3,903	5,248	6,560	1222.9	1.0523

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

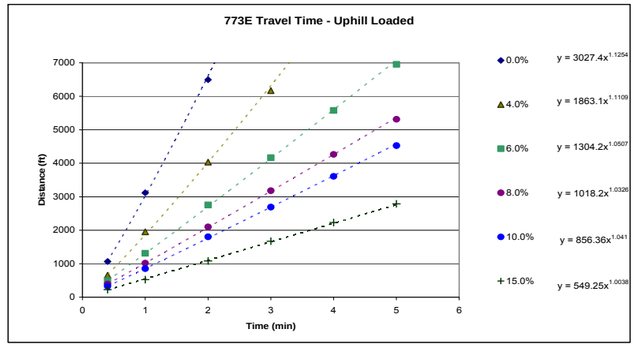
Productivity - Haul Trucks (cont.)

773E Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.4	1	2	3	4	5		
0	1,066	3,117	6,496				3027.4	1.1254
4	656	1,952	4,035	6,168			1863.1	1.1109
6	492	1,312	2,756	4,167	5,577	6,955	1304.2	1.0507
8	394	1,017	2,100	3,182	4,265	5,315	1018.2	1.0326
10	328	853	1,804	2,690	3,609	4,528	856.36	1.041
15	226	525	1,083	1,673	2,231	2,789	549.25	1.0038

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

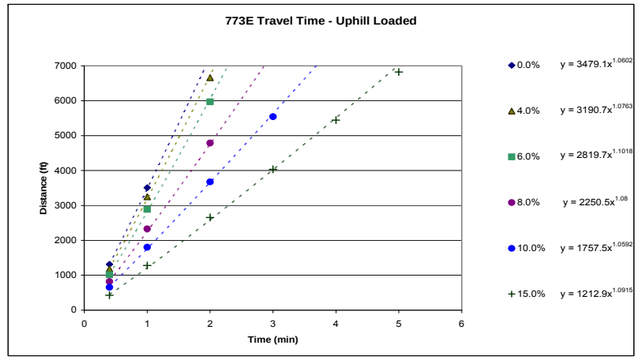


773E Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.4	1	2	3	4	5		
0	1,312	3,510	7,218				3479.1	1.0602
4	1,181	3,248	6,660				3190.7	1.0763
6	1,017	2,887	5,971				2819.7	1.1018
8	820	2,329	4,790	7,218			2250.5	1.08
10	656	1,804	3,675	5,545			1757.5	1.0592
15	427	1,280	2,657	4,035	5,446	6,824	1212.9	1.0915

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

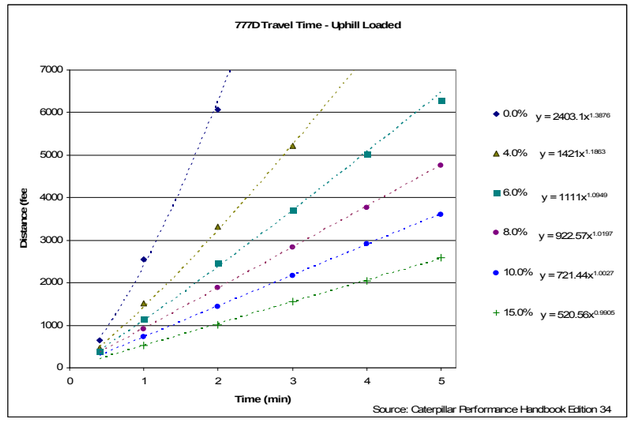
Productivity - Haul Trucks (cont.)

777D Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.4	1	2	3	4	5		
0	656	2,558	6,068				2403.1	1.3876
4	459	1,509	3,313	5,215	7,085		1412	1.1863
6	394	1,148	2,460	3,706	5,018	6,298	1111	1.0949
8		918	1,886	2,837	3,772	4,756	922.57	1.0197
10		722	1,443	2,165	2,919	3,608	721.44	1.0027
15		525	1,017	1,558	2,034	2,591	520.56	0.9905

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



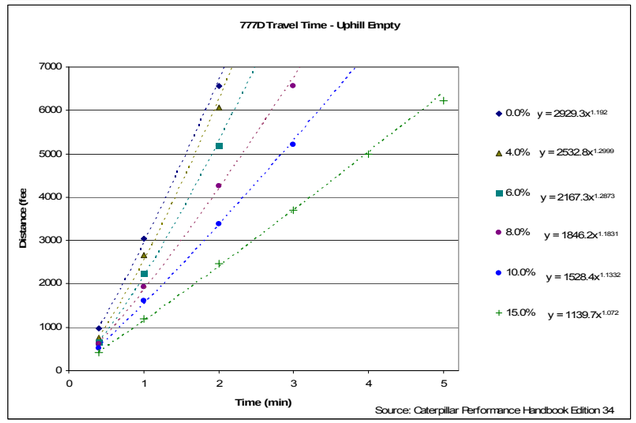
Source: Caterpillar Performance Handbook Edition 34

777D Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.4	1	2	3	4	5		
0	968	3,034	6,560				2929.3	1.192
4	754	2,657	6,068				2532.8	1.2999
6	656	2,247	5,182				2167.3	1.2873
8	607	1,935	4,248	6,560			1846.2	1.1831
10	525	1,607	3,378	5,215	7,282		1528.4	1.1332
15	410	1,197	2,460	3,706	4,986	6,232	1139.7	1.072

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

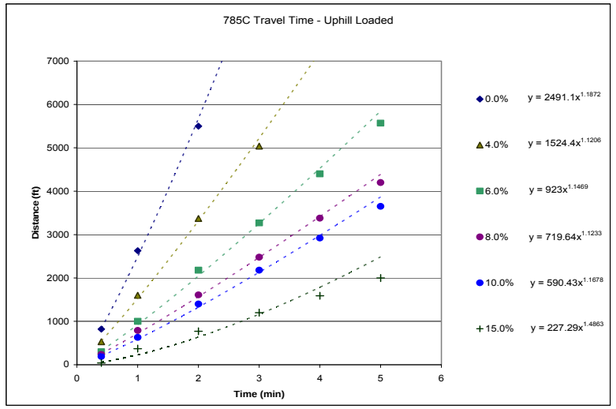
Productivity - Haul Trucks (cont.)

785C Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	820	2,630	5,500				2491.1	1.1872
4	530	1,600	3,370	5,040			1524.4	1.1206
6	300	1,000	2,180	3,270	4,400	5,570	923	1.1469
8	240	790	1,610	2,480	3,380	4,200	719.64	1.1233
10	190	630	1,400	2,180	2,920	3,650	590.43	1.1678
15	40	370	770	1,200	1,590	2,000	227.29	1.4863

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

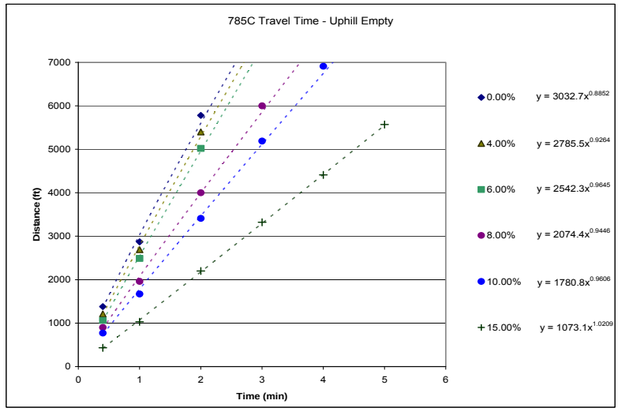


785C Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,380	2,870	5,780				3032.7	0.8852
4	1,210	2,690	5,400				2785.5	0.9264
6	1,060	2,490	5,020				2542.3	0.9645
8	900	1,960	4,000	6,000			2074.4	0.9446
10	770	1,670	3,410	5,190	6,910		1780.8	0.9606
15	430	1,030	2,200	3,320	4,410	5,570	1073.1	1.0209

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

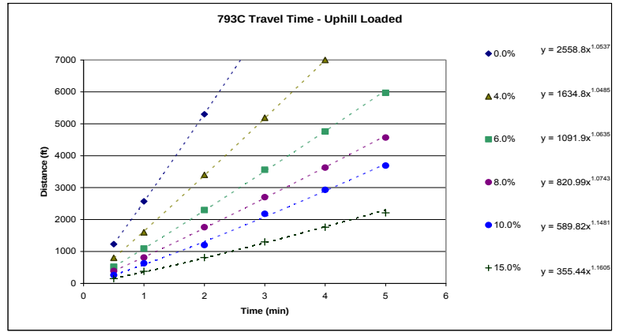
Productivity - Haul Trucks (cont.)

793C Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,230	2,570	5,300				2558.8	1.0537
4	800	1,600	3,400	5,190	7,000		1634.8	1.0485
6	520	1,090	2,300	3,560	4,760	5,970	1091.9	1.0635
8	390	810	1,760	2,700	3,630	4,570	820.99	1.0743
10	260	630	1,200	2,180	2,930	3,690	589.82	1.1481
15	150	380	810	1,300	1,760	2,210	355.44	1.1605

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

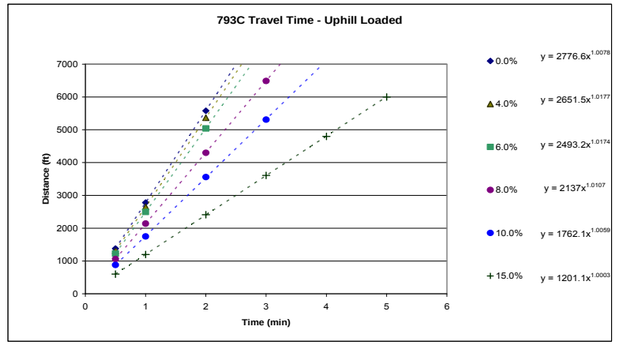


793C Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,380	2,780	5,580				2776.6	1.0078
4	1,310	2,650	5,370				2651.5	1.0177
6	1,230	2,500	5,040				2493.2	1.0174
8	1,060	2,140	4,300	6,490			2137	1.0107
10	880	1,750	3,560	5,310			1762.1	1.0059
15	600	1,200	2,410	3,610	4,800	6,000	1201.1	1.0003

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

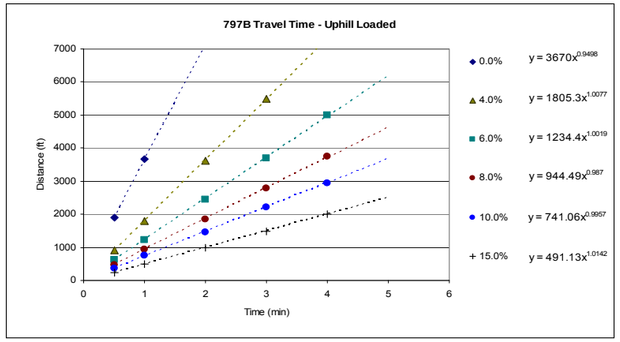
Productivity - Haul Trucks (cont.)

797B Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,900	3,670					3670	0.9498
4	900	1,800	3,620	5,480			1805.3	1.0077
6	620	1,230	2,450	3,700	5,000		1234.4	1.0019
8	480	940	1,850	2,790	3,750		944.49	0.987
10	370	750	1,460	2,220	2,950		741.06	0.9957
15	240	500	1,000	1,480	2,000		491.13	1.0142

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

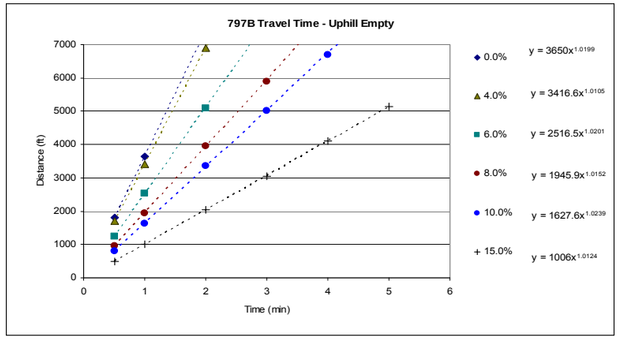


797B Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,800	3,650					3650	1.0199
4	1,700	3,400	6,900				3416.6	1.0105
6	1,240	2,520	5,100				2516.5	1.0201
8	960	1,950	3,960	5,900			1945.9	1.0152
10	800	1,620	3,350	5,000	6,700		1627.6	1.0239
15	500	1,000	2,040	3,050	4,100	5,130	1006	1.0124

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Articulated Trucks

Articulated Truck Specifications

Description	725	730	735	740
Chassis Weight (lb)				
Body Weight (lb)				
Standard Liner Weight (lb)				
Operating Weight (Empty) (lb)	50,120	51,220	65,830	72,070
Payload Capacity (cy)				
Struck	14.5	17.1	19.3	23.3
Heaped	18.8	22.1	31.8	30.2
Average	16.65	19.6	25.55	26.75
Maneuver to Load Time (min)	0.7	0.7	0.7	0.7
Maneuver and Dump Time (min)	1.1	1.1	1.1	1.1
Job Efficiency	0.83	0.83	0.83	0.83
Rolling Resistance**	2.5	2.5	2.5	2.5
Altitude Deration Factor	1	1	1	1

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials				Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)									
				725					730				
Material	lb/cy	Truck (725) Load lb	Truck (730) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	2,900	48,285	56,840	98,405	9	9	13	30	108,060	5	8	13	29
Basalt	3,300	54,945	64,680	105,065	5	9	13	22	115,900	5	8	13	29
Clay - Dry	2,500	41,625	49,000	91,745	9	13	13	30	100,220	8	8	13	29
Granite - broken	2,800	46,620	54,880	96,740	9	13	13	30	106,100	5	8	13	29
Gravel	2,550	42,458	49,980	92,578	9	13	13	30	101,200	8	8	13	29
LS - broken	2,600	43,290	50,960	93,410	9	13	13	30	102,180	8	8	13	29
LS - crushed	2,600	43,290	50,960	93,410	9	13	13	30	102,180	8	8	13	29
Sandstone	2,550	42,458	49,980	92,578	9	13	13	30	101,200	8	8	13	29
Shale	2,100	34,965	41,160	85,085	9	13	22	30	92,380	8	13	13	29
Stone - crushed	2,700	44,955	52,920	95,075	9	13	13	30	104,140	8	8	13	29
Tailings - Coarse (dry, loose sand)	2,400	39,960	47,040	90,080	9	13	13	30	98,260	8	8	13	29
Tailings - Slimes (loose sand & clay)	2,700	44,955	52,920	95,075	9	13	13	30	104,140	8	8	13	29
Topsoil	1,600	26,640	31,360	76,760	9	13	22	30	82,580	8	13	22	35
				Empty	13	13	22	30	Empty	13	13	22	35

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials				Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)									
				735					740				
Material	lb/cy	Truck (735) Load lb	Truck (740) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	2,900	74,095	77,575	139,925	7	9	13	27	149,645	7	9	17	23
Basalt	3,300	84,315	88,275	150,145	7	9	13	27	160,345	7	9	13	23
Clay - Dry	2,500	63,875	66,875	129,705	7	9	13	27	138,945	9	13	17	31
Granite - broken	2,800	71,540	74,900	137,370	7	9	13	27	146,970	7	9	17	23
Gravel	2,550	65,153	68,213	130,983	7	9	13	27	140,283	7	9	17	31
LS - broken	2,600	66,430	69,550	132,260	7	9	13	27	141,620	7	9	17	31
LS - crushed	2,600	66,430	69,550	132,260	7	9	13	27	141,620	7	9	17	31
Sandstone	2,550	65,153	68,213	130,983	7	9	13	27	140,283	7	9	17	31
Shale	2,100	53,655	56,175	119,485	9	9	18	27	128,245	7	13	17	31
Stone - crushed	2,700	68,985	72,225	134,815	7	9	13	27	144,295	7	9	17	23
Tailings - Coarse (dry, loose sand)	2,400	61,320	64,200	127,150	7	9	13	27	136,270	9	13	17	31
Tailings - Slimes (loose sand & clay)	2,700	68,985	72,225	134,815	7	9	13	27	144,295	7	9	17	23
Topsoil	1,600	40,880	42,800	106,710	9	13	18	36	114,870	9	13	17	31
				Empty	13	18	27	42	Empty	17	17	23	31

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

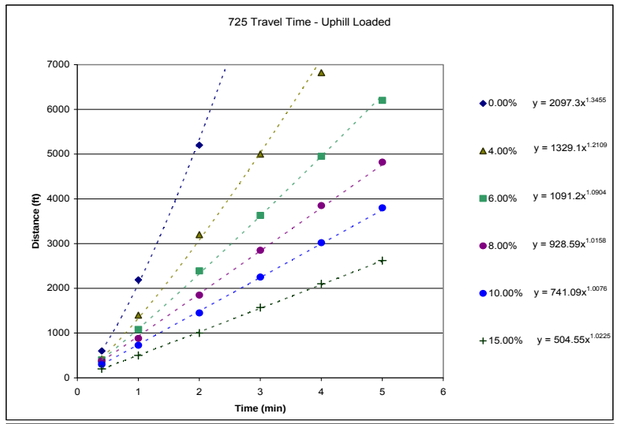
Productivity - Articulated Trucks (cont.)

725 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	600	2,190	5,200				2097.3	1.3455
4	420	1,400	3,200	5,000	6,820		1329.1	1.2109
6	400	1,080	2,390	3,630	4,950	6,200	1091.2	1.0904
8	380	880	1,850	2,850	3,850	4,820	928.59	1.0158
10	300	729	1,450	2,250	3,020	3,800	741.09	1.0076
15	200	500	1,000	1,570	2,100	2,620	504.55	1.0225

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

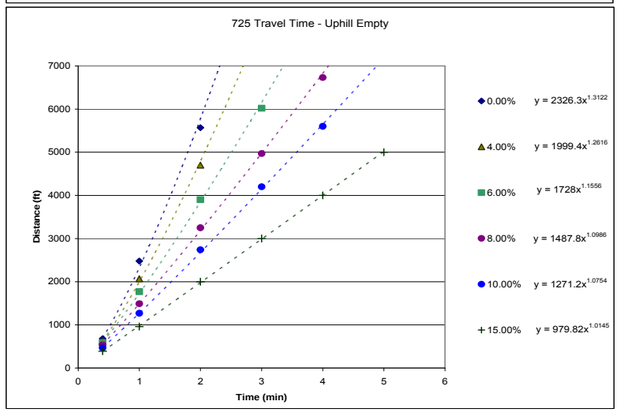


725 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	680	2,480	5,570				2326.3	1.3122
4	620	2,070	4,700				1999.4	1.2616
6	590	1,770	3,900	6,020			1728	1.1556
8	540	1,490	3,250	4,970	6,730		1487.8	1.0986
10	470	1,270	2,740	4,200	5,600	7,050	1271.2	1.0754
15	390	960	2,000	3,000	4,000	5,000	979.82	1.0145

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

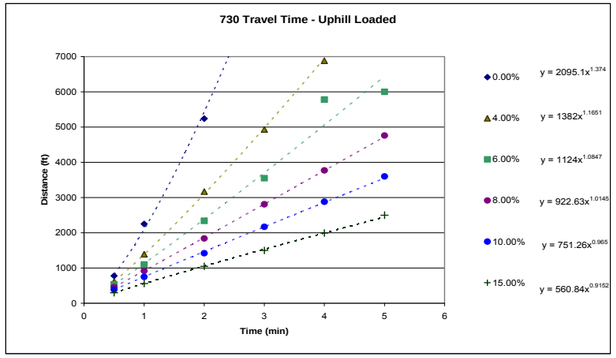
Productivity - Articulated Trucks (cont.)

730 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	780	2,250	5,240				2095	1.374
4	610	1,390	3,170	4,930	6,880		1382	1.1651
6	540	1,100	2,340	3,550	5,780	6,000	112	1.0847
8	460	920	1,840	2,810	3,770	4,760	922.63	1.0145
10	390	750	1,420	2,170	2,880	3,600	751.26	0.965
15	300	560	1,050	1,500	1,995	2,500	560.84	0.9152

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

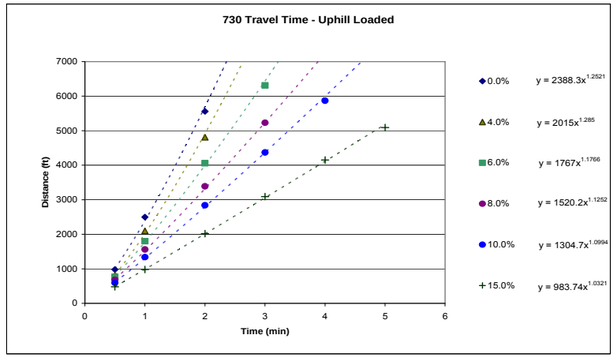


730 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	980	2,500	5,560				2388	1.25621
4	810	2,100	4,810				2015	1.285
6	770	1,800	4,060	6,310			1767	1.1766
8	680	1,560	3,390	5,230	7,070		1520.2	1.1252
10	595	1,340	2,840	4,370	5,870		1304.7	1.0994
15	480	980	2,020	3,090	4,150	5,090	983.74	1.0321

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

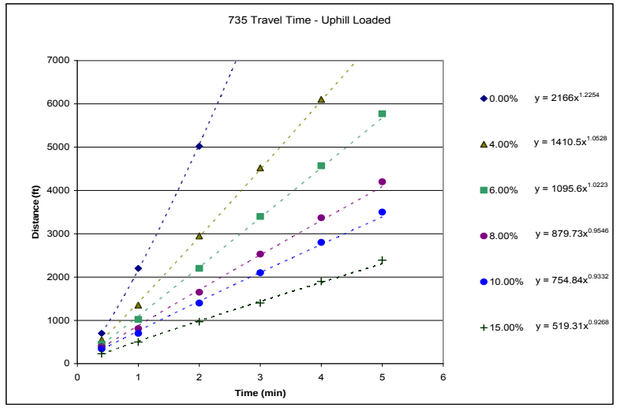
Productivity - Articulated Trucks (cont.)

735 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	700	2,200	5,020				2166	1.2254
4	550	1,350	2,950	4,520	6,100		1410.5	1.0528
6	450	1,020	2,200	3,400	4,570	5,770	1095.6	1.0223
8	390	810	1,650	2,530	3,370	4,200	879.73	0.9546
10	340	700	1,400	2,100	2,800	3,500	754.84	0.9332
15	230	500	970	1,400	1,900	2,390	519.31	0.9268

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

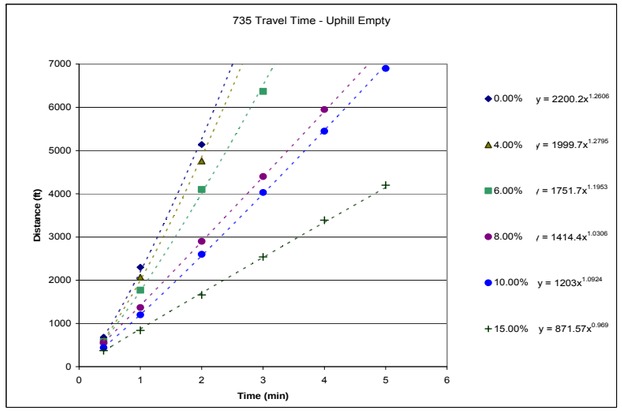


735 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	680	2,300	5,140				2200.2	1.2606
4	610	2,070	4,760				1999.7	1.2795
6	580	1,770	4,100	6,370			1751.7	1.1953
8	560	1,370	2,900	4,400	5,950		1414.4	1.0306
10	440	1,200	2,600	4,030	5,450	6,900	1203	1.0924
15	370	840	1,660	2,540	3,390	4,200	871.57	0.969

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

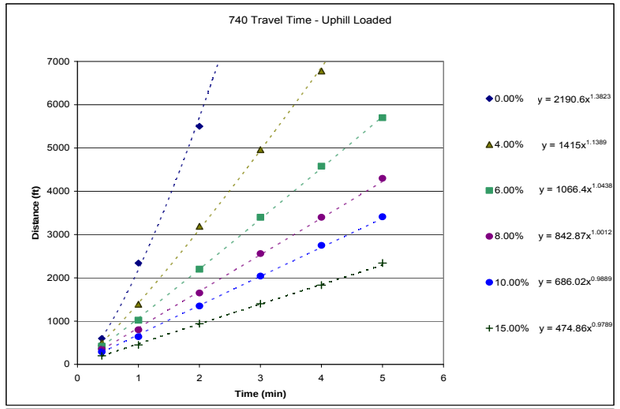
Productivity - Articulated Trucks (cont.)

740 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	600	2,340	5,500				2190.6	1.3823
4	500	1,390	3,190	4,960	6,780		1415	1.1389
6	420	1,020	2,200	3,400	4,580	5,700	1066.4	1.0438
8	350	800	1,650	2,560	3,400	4,300	842.87	1.0012
10	290	640	1,350	2,040	2,750	3,410	686.02	0.9889
15	200	450	940	1,400	1,830	2,340	474.86	0.9789

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

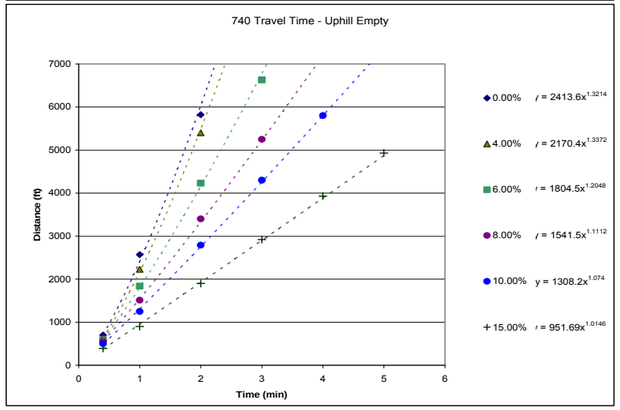


740 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	700	2,570	5,820				2413.6	1.3214
4	630	2,230	5,400				2170.4	1.3372
6	590	1,840	4,230	6,630			1804.5	1.2048
8	560	1,510	3,400	5,250	7,120		1541.5	1.1112
10	500	1,250	2,790	4,300	5,800		1308.2	1.074
15	390	900	1,900	2,920	3,930	4,930	951.69	1.0146

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Wheel Loaders

Wheel Loader Specifications

Description	924G	928G	950G	966G	972G	972G (2)	980G	988G	988G(2)	990	992G	992G(2)	994D	L2350
Payload Capacity (cy)														
Struck	2.2	2.5	3.46	4.46	4.71	4.71	6.34	6.9	6.9	9.5	13.2	13.2	18	
Heaped	2.7	3.25	4	5.25	5.5	5.5	7.25	8.33	8.33	11.25	16	16	22.5	
Average	2.45	2.875	3.73	4.855	5.105	5.105	6.795	7.615	7.615	10.375	14.6	14.6	20.25	53
Matched Truck	N/A	N/A	N/A	725	730	735	N/A	740	769D	773D	777D	785C	793C	797B
Average Cycle Time (min)	0.45	0.45	0.5	0.5	0.5	0.5	0.55	0.55	0.55	0.55	0.6	0.6	0.6	0.75
Passes to Fill Truck	N/A	N/A	N/A	3	4	5	N/A	4	3	4	5	6	7	5
Altitude Deration Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Operator Efficiency	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Time to Fill Truck	N/A	N/A	N/A	1.5	2	2.5	N/A	2.2	1.65	2.2	3	3.6	4.2	3.75
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Loader matched to small truck fleet
Loader matched to medium truck fleet
Loader matched to large truck fleet
Loader matched to extra large truck fleet

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered
992G (2) - can be used to load 785 with 6 passes

Source: Caterpillar Performance Handbook Edition 35; LeTourneau/actual Chilean mine operating data for L2350.

Wheeled Loaders	General Purpose	Spade Nose-Rock
928G	3.25 cubic yard	not available
966G	5.0 cubic yard	not available
972G	5.5 cubic yard	not available
988G	not available	8.3 cubic yard
992G	not available	16.0 cubic yard

note: capacities are 2:1 heaped, SAE standards
NOTES: Buckets for both Track Excavators and Wheel Loaders are offered by CECo & available for the rental rates quoted. Bucket sizes and capacities obtained from CATERPILLAR PERFORMANCE HANDBOOK, ED 34; Section 12, Wheel Loader and Section 4, Excavators

Bucket capacity and width dictated by material weight and configuration, ie., shot, loose, tight bank, stockpile, rock, etc. Typical Nevada applications were used to determine above bucket capacities as related to materials & densities. Job site specifics may alter specific bucket requirements. (Cashman Equipment, Elko, Nevada - February 21, 2005)

Productivity - Shovels

Shovel Specifications (Komatsu equivalent)

Description	PC2000	PC3000	PC4000	PC5500	PC8000
Payload Capacity (cy)					
Struck	10.46	18.84	26.16	33.48	47.09
Heaped	14.39	25.9	35.97	46.04	64.75
Average	12.43	22.37	31.07	39.76	55.92
Matched Truck	740	777D	785C	793C	797B
Average Cycle Time (min)	0.49	0.49	0.59	0.59	0.69
Passes to Fill Truck	2.05	2.84	3.38	4.69	5.11
Altitude Deration Factor	1	1	0.9	1	1
Operator Efficiency	1	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83	0.83
Time to Fill Truck	1.68	2.33	3.32	4.61	5.86
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5

Shovel matched to small truck fleet
Shovel matched to medium truck fleet
Shovel matched to large truck fleet
Shovel matched to extra large truck fleet

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered
992G (2) - can be used to load 785 with 6 passes

Source: Caterpillar Performance Handbook Edition 35; Komatsu actual Peruvian mine (Lagunas Norte) operating data for PC4000.

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Motor Graders

Motor Grader Specifications

Description	120H	14G/H	16G/H	24M
Grader Width (ft)	8	9.25	10.08	14.04
Blade Width (ft)	12	14	16	16
Ripper Width (7 shanks) (ft)	7.6	8.5	9.75	12.83
Road Maintence Speed (mph)				
Minimum	3	3	3	3
Maximum	9.5	9.5	9.5	9.5
Average	6.25	6.25	6.25	6.25
Hourly Production	33,000	33,000	33,000	33,000
Ripping Speed (mph)	1	1	1	1
Minimum	0	0	0	0
Maximum	3	3	3	3
Average	1.5	1.5	1.5	1.5
Altitude Deration Factor	1	1	1	1
Hourly Production (with job efficiency correction & altitude deration factors) (excluding manuever time)	6,574	6,574	6,574	6,574
Maneuver time per pass (min)	0.5	0.5	0.5	0.5
Operator Efficiency	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83

Source: Caterpillar Performance Handbook Edition 35

Productivity - Excavators

Track Excavator Specifications

Description	312C	320C	325C	330C	345B	365BL	385BL
Bucket Capacity (cy)	0.68	1.57	2.22	2.22	3	4.6	7.3
Fill Factor	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Average Bucket Load (cy)	0.612	1.413	1.998	1.998	2.7	4.14	6.57
Soil Type	packed earth	hard clay	hard clay	hard clay	hard clay	hard clay	hard clay
Job Condition	med-hard	med-hard	med-hard	med-hard	med-hard	med-hard	med-hard
Cycle Times (minutes) - based on hard clay							
Load Bucket	0.07	0.09	0.09	0.09	0.13	0.1	0.19
Swing Loaded	0.06	0.06	0.06	0.07	0.07	0.09	0.06
Dump Bucket	0.03	0.03	0.04	0.04	0.02	0.04	0.03
Swing Empty	0.05	0.05	0.06	0.07	0.06	0.07	0.07
Total Cycle Time	0.21	0.23	0.25	0.27	0.28	0.3	0.35
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Operator Efficiency	1	1	1	1	1	1	1
Altitude Deration Factor	1	1	1	1	1	1	1
Corrected Productivity (LCY/hr)	145	306	398	369	480	687	935
Exploration Road Cycle Time (1) (min)	N/A	0.38	0.4	N/A	0.42	N/A	N/A
Exploration Road Corr Prod (LCY/hr)	N/A	185	249	N/A	320	N/A	N/A
Track Width (ft)	8.17	9.17	9.83	10.5	11.42	11.5	11.5
Ditch/Trench Excavation							
Bucket Capacity (cy)	0.42	0.58	0.88	0.89	2.09	3.27	2.75
Fill Factor	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Corrected Productivity (LCY/hr)	50	63	88	82	186	271	196

Source: Caterpillar Performance Handbook Edition 35

Track Excavators	Hvy Duty Rock	Extreme Service Exc (e.g. haulroad recontour)	Hvy Duty Trench
312C	30", 0.68 cubic yd	47", 0.94 cubic yd	22", .42 cubic yd
320C	30", 0.90 cubic yd	55.1", 1.57 cubic yd	23.6", .58 cubic yd
325C	36", 1.25 cubic yd	60", 2.22 cubic yd	30", .88 cubic yd
330C	36", 1.25 cubic yd	60", 2.22 cubic yd	30", .89 cubic yd
345B	43.2", 1.69 cubic yd	65", 3.0 cubic yd	48", 2.09 cubic yd
365BL	60", 3.25 cubic yd	82", 4.6 cubic yd	59", 3.27 cubic yd
385BL	85", 6.30 cubic yd.	96.0, 7.30 cubic yd	57", 2.75 cubic yd

Note: capacities are 2:1 heaped, SAE standards
NOTES: Buckets for both Track Excavators and Wheel Loaders are offered by CECo &

available for the rental rates quoted. Bucket sizes and capacities obtained from CATERPILLAR PERFORMANCE HANDBOOK, ED 34; Section 12, Wheel Loader and Section 4, Excavators
Bucket capacity and width dictated by material weight and configuration, ie., shot, loose, tight bank, stockpile, rock, etc. Typical Nevada applications were used to determine above bucket capacities as related to materials & densities. Job site specifics may alter specific bucket requirements (Cashman Equipment, Elko, Nevada - February 21, 2005)

(1) Exploration cycle time assumes feathering/smoothing performed by excavator

Closure Cost Estimate
Productivity

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
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Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Concrete Breaking Production

Track Excavator w/Hammer Specifications

Description	325C	345B	385BL
Hydraulic Hammer	H120D s	H160D s	H180D s
Material	reinforced concrete		
Min Shift Production (yd3/8hr)	160	300	350
Max Shift Production (yd3/8hr)	300	850	1,550
Avg Shift Production (8hr)	230	575	950
Job Efficiency	0.83	0.83	0.83
Altitude Deration Factor	1	1	1

Source: Caterpillar Performance Handbook Edition 35

Drill Hole Plugging Productivity

Drill Hole Plugging Productivity

Description	Drill Rig	Pump Rig
Move-to-hole, set-up, tear-down [1]	2	2
Trip in tremmie pipe [1]	500	
Pulling casing (threaded, not cemented)	200	
Single-pass perforating (water wells)	Productivity(all p	Passes
4	60	4
6	60	4
8	50	4
12	45	6
18	40	9
24	28	12
Perforation setup,trip in/out,tear-down	2	
Perforation tool cost (wear cost)[3]	2.5	
Inert Material Placement (backfill)		
Grouting/Cement [4] (cy/hr)		5.33
Cuttings (see below) (cy/hr)		3.5

Sources:
1. Drillers daily logs from Newmont, Barrick, New West Gold, Agnico Eagle, Idaho General Mines Inc.
2. Drillers daily logs from Newmont, Barrick, Target Minerals
3. Drillers daily logs from Newmont
4. WDC Exploration, Dec 2005

Sournce: WDC Exploration, Dec 2005

Cuttings Placement Productivity

Shift productivity (Means 02210-700-0120; Crew B11M)	28	cy / shift
Shift length	8	hours
Estimated Hourly Productivity	3.5	cy / hour

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Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Altitude Deration Table

	Elevation											
	0-760 m (0-2500')		760-1500 m (2500-5000')		1500-2300 m (5000-7000')		2300-3000 m (7500-10,000')		3000-3800 m (10,000-12,000')		3800-4600 m (12,500-15,000')	
MODEL	CAT	User	CAT	User	CAT	User	CAT	User	CAT	User	CAT	User
Bulldozers												
D6R	100		100		100		100		92		84	
D6R w/ Winch	100		100		100		100		92		84	
D7R	100		100		100		100		100		96	
D8R	100		100		100		93		85		77	
D9R	100		100		100		93		85		77	
D10R	100		100		100		100		97		89	
D11R	100		100		100		93		85		77	
Wheeled Dozers												
824G	100		100		100		100		92		84	
834G	100		100		100		100		92		84	
844	100		100		100		100		100		96	
854G	100		100		100		93		85		77	
Graders												
120H	100		100		100		100		96		93	
14G/H	100		100		100		100		98		96	
16G/H	100		100		100		100		98		96	
24M	100		100		100		100		98		96	
Excavators												
312C	100		100		100		83		78		73	
320C	100		100		90		87		83		76	
325C	100		100		100		100		100		100	
330C	100		100		100		100		100		100	
345B	100		100		100		100		93		93	
365BL	100		100		100		86		86		86	
385BL	100		100		100		93		85		78	
Scrapers												
631G	100		100		100		100		97		90	
637G	100		100		100		95		87		80	
Loaders												
924G	100		100		100		100		97		89	
928G	100		100		100		100		92		85	
950G	100		100		100		100		100		100	
966G	100		100		100		100		96		88	
972G	100		100		92		84		77		70	
980G	100		100		100		100		96		88	
988G	100		100		100		95		85		75	
990	100		100		100		100		92		85	
992G	100		100		100		100		93		87	
994D	100		100		100		100		96		88	
L2350	100		100		100		100		96		90	
Shovels												
PC2000	100		100		100		100		96		90	
PC3000	100		100		100		100		96		90	
PC4000	100		100		100		100		96		90	
PC5500	100		100		100		100		96		90	
PC8000	100		100		100		100		96		90	

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Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Other Equipment												
420D 4WD Backhoe	99		97		95		91		91		91	
428D 4WD Backhoe	99		97		95		91		91		91	
CS533E Vibratory Roller	100		100		98		95		91		86	
CS633E Vibratory Roller	100		100		100		100		91		86	
CP533E Sheepsfoot Compactor	100		100		98		95		91		100	
CP633E Sheepsfoot Compactor	100		100		100		100		91		86	
Light Truck - 1.5 Ton												
Supervisor's Truck												
Flatbed Truck												
Air Compressor + tools												
Welding Equipment												
Heavy Duty Drill Rig												
Pump (plugging) Drill Rig												
Concrete Pump												
Gas Engine Vibrator												
Generator 5KW												
HDEP Welder (pipe or liner)												
5 Ton Crane												
20 Ton Crane												
50 Ton Crane												
120 Ton Crane												
Trucks												
725	100		100		100		100		100		95	
730	100		100		100		100		100		95	
735	100		100		100		100		99		91	
740	100		100		100		100		99		91	
769D	100		100		100		93		88		82	
773E	100		100		100		100		93		85	
777D	100		100		100		100		93		87	
785C	100		100		100		93		86		80	
793C	100		100		100		100		100		93	
797B	100		100		100		100		100		93	
613E (5,000 gal) Water Wagon	100		100		100		100		95		87	
621E (8,000 gal) Water Wagon	100		100		100		100		97		90	
777D Water Truck	100		100		100		100		93		87	
785C Water Truck	100		100		100		93		86		80	
Dump Truck (10-12 yd^3) (5)												

Notes:
User entered deration value will override values from CAT Performance Handbook, except L2350 Loader: data from actual mine performance in Chile.
Komatsu altitude deration assumed from LeTourneau L2350

Closure Cost Estimate
User 1

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Haul distances	
OSLA stockpile to:	ft
Cat 1 stockpile	9,973
East pit	8,782
Cat 2/3 stockpile	7,988
Cat 4 stockpile	6,304
Source: Haul Distances_rev_20160616.pdf	

From	Starting Elevation	To	End	Total Length
Liner	1610	East Pit	1620	7554
Cat. 4	1610	East Pit	1620	4611
Cat. 2/3	1600	East Pit	1620	9039

Closure Cost Estimate
User 2

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Submittal: September, 2016
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/ersion: Version 1.4.1
ata: User Data
ata File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
stimate Type: Surety Cost Basis: Polymet

Structure Demolition
Demo Data Needed rev 15 Universal Waste Cost Updates.xlsx

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates					Mavo	Arrowhead Consulting & Testing		Construction Year 1
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Site Restoration**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**	**Subtotal**	
Pre-Demolition Services			$54,400								
Legacy - demoed as part of construction											
Additive Building & Heating Plant						$1,593,300.00		Included in Lakehead's total demo		$1,593,300	
Bentonite silos	8.1.14					inc in above		n/a		$0	
Area 2 Water Tower (price separate from Heating & Additives buildings)	8.1.29					$30,000.00	$2,500.00	n/a		$32,500	
Legacy Tailings Basin Buildings - Demoed as part of construction										$0	
Foreman's Office (Bldg. 718)	8.1.28	No ACT report				$9,350	$400	$6,500	$1,100	$17,350	
Reporting Building (Bldg. 719)	8.1.28	No ACT report				$9,900	$400	$6,500	$1,100	$17,900	
Lube House (Bldg. 720)	8.1.28	No ACT report				$2,500	$400	$2,500	$850	$6,250	
Reporting Building (Bldg. 724)	8.1.28	No ACT report				$3,300	$400	$2,500	$900	$7,100	
Lube Oil Building (Bldg. 725)	8.1.28	No ACT report				$2,500	$400	$2,500	$850	$6,250	
										$0	
										$0	
Legacy Area 1 - used by project											
Area 1 Shop and Truck Storage (Bldg. 220)	8.1.6	ACT Report Zone H		$2,900.00	$106,900	$103,332	$74,669	$82,500		$370,301	
Area 1 Cold Storage. (Bldg. 221)	8.1.6	ACT Report Zone H		$400.00	$48,970	$10,860	$13,400	$5,000		$78,630	
Area 1 Reporting Building (Bldg. 231)	8.1.6	No ACT report				$9,900		$5,000	$850	$15,750	
Area 1 Boiler House (Bldg. 226)	8.1.6	ACT Report Zone H		$200.00	$13,500	$9,875	$3,000	$2,500		$29,075	
Area 1 Fire Pump House & Water Tank (Bldg. 228)	8.1.6	TE-8-142 and TE-8-144, ACT Report Zone H		$410.00		$11,250		$2,500		$14,160	
Area 1 Locomotive Fueling	8.1.6	ACT Report Zone H		$500.00	$22,500	$10,100	$6,250	n/a		$39,350	
										$0	
Legacy Area 2 - used by project											
Area 2 Service Shop (Bldg. 201)	8.1.7	ACT Report Zone I		$2,200.00	$160,900	$38,990	$37,334	$93,050		$332,474	
Area 2 Truck Storage (Bldg. 202)	8.1.7	ACT Report Zone I		$2,000.00	$63,190	$9,175	$13,988	$3,000		$91,353	
Area 2 Cold Storage (204)	8.1.7	ACT Report Zone I		$697.00	$42,560	$13,080	$14,100	$3,000		$73,437	
Area 2 Shop Locomotive Service Shop (Bldg. 203)	8.1.7	ACT Report Zone I		$3,400.00	$20,500	$12,300	$11,113	$52,150		$99,463	
Area 2 Locomotive Fueling	8.1.7	ACT Report Zone I		$2,000.00	$20,900	$11,800	$6,250	$2,500		$43,450	
Hose House (Bldg. 209) Not to be used in project	8.1.7	No ACT report			$3,000	$9,150		$2,500	$850	$15,500	
Sample House (Bldg. 208) Not to be used in project	8.1.7	No ACT report			$25,400	$20,300		$5,000	$950	$51,650	
Reporting Building (Bldg. 425) Not to be used in project	8.1.7	No ACT report			$3,300	$9,200		$3,500	$850	$16,850	
Legacy Plant Area - used by project											
Rebuild Shop (Bldg 602)	8.1.9	ACT Report Zone A		$3,000.00		$70,200	$125,600	$27,560	$85,000		$311,360
General Shop (Bldg. 601) Includes Acetylene Building (Bldg.604)	8.1.8	ACT Report Zone A		$15,000.00		$199,190	$353,600	$182,300	$480,800		$1,230,890
Carpenter Shop (Bldg. 603)	8.1.21	ACT Report Zone A		$2,000.00		$10,200	$13,250	$3,300	$2,500		$31,250
Coarse Crusher	8.1.1			$10,000.00		$313,345	$1,551,800	$593,890	$1,070,618		$3,539,653
Drive House 1 conv and housings	8.1.2	Drive Houses 1 & 2 and conveyors are all considered	$133,200	$7,500.00		$165,569	$141,540	$46,900	incl. in above		$494,709
Drive House 2 inc conv and housings	8.1.3	to be one structure for demo purposes.	inc in above			inc in above	inc in above	inc in above	incl. in Fines Crusher		$0
Fine Crusher	8.1.4			$45,000.00		$302,430	$1,373,460	$203,400	$439,686		$2,363,976
Warehouse 49 (Bldg. 920)	8.1.16	ACT Report Zone A		$6,500.00		$27,586	$82,800	$15,947	$49,000		$181,833
Warehouse 45 (Bldg. 921, Electrical)	8.1.15	ACT Report Zone A		$2,500.00		$35,159	$72,700	$15,947	$13,500		$139,806
Lube House (Bldg. 926)	8.1.10	ACT Report Lubricant Storage Building		$578.00		$17,000	$20,550	$7,385	$52,000		$97,513
Rubber Shop (Bldg. 605)	8.1.26	ACT Report Rubber Storage Building		$1,000.00		$30,464	$36,550	$11,269	$24,000		$103,283
Concentrator Building and Thickeners	8.1.5 AND 8.1.25			$100,000.00		$1,248,260	$5,895,850	$1,145,998	$1,535,236		$9,925,344
A-Lab	8.1.11			$500.00		$9,400	$14,560	$2,940	included in Concentrator		$27,400

Closure Cost Estimate
User 2

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Structure Demolition
Demo Data Needed rev 15 Universal Waste Cost Updates.xlsx

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates					Mavo	Arrowhead Consulting & Testing		Construction Year 1
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Site Restoration**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**	**Subtotal**	
Hinsdale Bridge	8.1.24			$0.00	$16,700	$616,300	$15,200	n/a		$648,200	
Water Reservoir	8.1.12			$5,000.00		$98,100	$914,400	n/a		$1,017,500	
Plant Site Water Tower	8.1.12	TG-7-005, Similar to Area 2 water tower				$30,000	$2,500	n/a		$32,500	
Water Treatment Plant & Storage Tanks	8.1.27	TG-6-021		$1,000.00	$20,000	$72,600	$2,250	$45,000		$140,850	
Colby Pump House	8.1.13				$41,000	$8,260	$1,500	$2,500	$1,000	$54,260	
Administration Building	8.1.17			$3,900.00		$157,935	$18,200	$850,000		$1,030,035	
Main Gate	8.1.18			$100.00		$11,400	$875	$5,000	$900	$18,275	
Booster Pump House #1	8.1.19			$300.00		$23,500	$9,200	included in Concentrator		$33,000	
Sewage Treatment Plant	8.1.20	No ACT report		$0.00		$62,700	$19,520	$5,000	$900	$88,120	
Portable Pump Houses	8.1.22	No ACM materials - See Dwg. TB-7-095		$0.00		$9,890	$3,400	n/a		$13,290	
Return Water Barge	8.1.23	No ACT report		$0.00		$44,900		$5,000	$1,300	$51,200	
General Infrastructure (railroads, tunnels, roadways, etc)						$4,988,921	$1,504,000			$6,492,921	
Railroads	8.2.5	Figure 7 and Krech & Ojard Dwg. C1		$0.00		$380,000				$380,000	
Tunnels (Service & Electrical)	8.2.2	TJ-63		$0.00		$1,856,000		$2,127,767		$3,983,767	
Galleries	8.2.2	Was estimated as a portion of the concentrator						included in Concentrator		$0	
Sanitary Systems and Wells	8.2.1					$17,500	included in associated areas			$17,500	
Pipelines				$0.00		$2,190,000	$591,000			$2,781,000	
Colby Lake water supply	8.2.2					$900,000	$98,000			$998,000	
Inter pit pipeline	8.2.2					$562,000				$562,000	
Natural Gas line	8.2.2					$150,000				$150,000	
Tailings management above ground	8.2.2					$378,000				$378,000	
Tailings management underground						$200,000				$200,000	
Power Lines	8.2.3	Figures 5 & 5.1		$0.00		$97,810.00				$97,810	
Roads and Parking Lots	8.2.6	Figure 9		$0.00		$465,000	$195,000			$660,000	
New - Phase 1 - Plant Site											
Flotation Plant and Reagent Building	9.1.1			$75,000		$621,800	$147,600			$844,400	x
Concentrate Storage and Loadout Facility	9.1.2			$12,000		$273,760	$48,100			$333,860	x
Plant Site Sewage Treatment Plant	9.1.3	See Barr SOW 23 & Dwg. TL-2		$1,000.00		$118,000	$30,000			$149,000	x
Railroads	9.3.3	See Barr SOW 19		$0.00		$185,000	$111,000			$296,000	x
Pipelines	9.3.1	SOW 12 and 14		$0.00		$1,555,000	$375,000			$1,930,000	x
Power Lines	9.3.2	SK-11-255		$0.00						$0	x
Roads and Parking Lots	9.3.4			$0.00						$0	x
Plant Site Wastewater Treatment Plant (WWTP)	9.5.2	See Barr SOW 20		$0.00		$245,000				$245,000	x
New - Phase 1 - Mine Site											
Maintenance Service and Fueling Facility	9.2.1			$1,100		$19,210	$7,300			$27,610	x
Rail Transfer Hopper	9.2.2	See Barr SOW 15		$1,100.00		$40,000	$45,000			$86,100	x
Rail Transfer Hopper Control Bldg	9.2.2	See Barr SOW 15		$100.00		$18,600				$18,700	x
Rail Transfer Hopper Platform	9.2.2	See Barr SOW 15				$60,000				$60,000	x
Central Pumping Station	9.2.3	See Barr SOW 7		$500.00		$14,000	$1,200			$15,700	x
Railroads	9.2.4	See Barr SOW's 16, 17, 18		$0.00		$45,000	$33,750			$78,750	x
Pipelines	9.3.1	See Barr SOW'S 05, 06, and 08		$0.00		$580,133	$217,000			$797,133	x
Power Lines	9.3.2	See Barr SOW 13		$0.00		$83,900				$83,900	x
Roads and Parking Lots	9.3.4	See Barr SOW 1		$0.00		$392,000	$132,000			$524,000	x
Mine Site Wastewater Treatment Facility (WWTF)	9.5.1	See Barr SOW 06		$0		$498,000	$14,000			$512,000	x
New - Phase 2											
Reagent Building	9.4.1	Bldg. Dims: 270' x 85' x 75' tall		$15,000.00		$820,000	$4,100			$839,100	
Oxygen Plant	9.4.1	310' x 310' x 75' tall		$65,000.00		$4,238,600	$16,600			$4,320,200	
Limestone Preparation	9.4.1	125' x 70' x 60' tall		$7,500.00		$345,000	$1,750			$354,250	
Hydrometallurgical Plant	9.4.1	525' x 144' x 90' tall		$49,000.00		$4,365,000	$13,500			$4,427,500	
Hydrometallurgical Reagents	9.4.1	144' x 90' x 90' tall		$15,000.00		$815,000	$2,200			$832,200	
Railroads	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00						$0	
Pipelines	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$1,450,000				$1,450,000	
Power Lines	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00						$0	
Roads and Parking Lots	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$156,000	$59,225			$215,225	
									subtotal	$	6,002,153

Closure Cost Estimate
User 2

NorthMet Contingency Reclamation Estimate

9/4/2014

Above Ground Storage Tanks

Name	Tank #	Fluid	Gallons	Location	Fluid Removal/ Disposal	Demolition/ Removal	Asbestos Lead Paint	Site Restoration	~~Assets Recovery~~	Notes	Subtotal Construction Year 1
Legacy - Area 1 Shop					$0	$24,100	$0	$3,000		**to Demo tab**	
Portable tank on skids (silver)	048	Fuel Oil	1,800	E of Area 1 Shop		$600				Out of Service - Disconnected, Labeled lube oil, Silver tank	$ 600.00
Storage Tank	080		20,000	Area 1 - South of Rail Road Grade		$1,000				BASIS: Costs based on conceptual plan, site experience and historical knowledge.	$ 1,000.00
Storage Tank	358	Used Anti-freeze		N. Side Area 1 Shop		$0				Included as part of Area 1 Shop demo	$ -
Storage Tank	420	Used Anti-freeze		N. Side Area 1 Shop		$0				Included as part of Area 1 Shop demo	$ -
Black Tank	n/a		20,000	N of Area 1 Shop		$7,500		$1,000.00			$ 8,500.00
Black Tank	n/a		20,000	N of Area 1 Shop		$7,500		$1,000.00			$ 8,500.00
3 Blue			20,000	N of Area 1 Shop		$7,500		$1,000.00		Out of Service. Disconnected, Labeled "save for conc."	$ 8,500.00
~~Locomotive Fueling~~		~~# 1,2 Fuel Oil~~		~~West end of Panel Yard~~	-					This tank is no longer on site.	$ -
Legacy - Area 2 Shop					$0	$0	$0	$0		**to Demo tab**	$ -
Locomotive Fueling		# 1,2 Fuel Oil									$ -
Legacy - Plant Area					$0	$199,525	$0	$25,700		**to Demo tab**	$225,225.00
Storage Tank	015	# 1,2 Fuel Oil	12,000	E. Side Concentrator		$600					$ 600.00
Storage Tank	032	# 2, 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00
Storage Tank	033	# 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00
Storage Tank	034	# 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00
Storage Tank	304	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00
Storage Tank	305	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00
Storage Tank	306	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00
Storage Tank	408	Lube oil	20,000	SW of Tailings Basin Reporting Area		$0				Out of Service, but piping still in place and no signs are posted	$ -
Storage Tank	421	Alcohol	10,000	E side Concentrator		$500					$ 500.00
Storage Tank	506	Fuel Oil	500	Heating Plant		$25					$ 25.00
WTP Backwash (green)			16,000	NE of Drivehouse 1		$5,000		$700.00			$ 5,700.00
Tank (white)			14,000	SE of Tailings Basin Reporting Area		$5,000		$700.00		Out of Service. Disconnected, no visible labels	$ 5,700.00
Dispensing Tanks at Main Gate	121	Gasoline	6,000	See gas station dwg's for reference		$600					$ 600.00
Dispensing Tanks at Main Gate	122	Gasoline	6,000	See gas station dwg's for reference		$600					$ 600.00
New - Phase 1 - Plant Site					$0	$0	$0	$0		**to Demo tab**	$ -
Storage Tank	TBD	CuSO4				$0				tanks provided by supplier	$ -
Storage Tank	TBD	Magnafloc 10	10,600			$0				tanks provided by supplier	$ -
Storage Tank	TBD	PAX	3,000			$0				tanks provided by supplier	$ -
Storage Tank	TBD	Lime	22,500			$0				tanks provided by supplier	$ -
New - Phase 1 - Mine Site					$0	$0	$0	$0		**to Demo tab**	$ -
Mine Site Truck Fueling	TBD	# 1,2 Fuel Oil		Fueling and Maintenance Facility		$0					$ -
New - Phase 2 - Plant Site					$0	$0	$0	$0		**to Demo tab**	$ -
Storage Tank	TBD	H2SO4	40,000			$0				tanks provided by supplier	$ -
Storage Tank	TBD	HCl	60,000			$0				tanks provided by supplier	$ -
Storage Tank	TBD	Liquid SO2	21,000			$0				tanks provided by supplier	$ -
Storage Tank	TBD	Magnafloc 342/351				$0				tanks provided by supplier	$ -
Storage Tank	TBD	Mg(OH)	80,000			$0				tanks provided by supplier	$ -
Storage Tank	TBD	NaHS	13,200			$0				tanks provided by supplier	$ -
Storage Tank	TBD	NaOH	40,000			$0				tanks provided by supplier	$ -
Removed											$ -
Day Tanks	083	# 6 Fuel Oil	20,000	Tank Farm							$ -
Day Tanks	084	# 6 Fuel Oil	20,000	Tank Farm							$ -
Day Tanks	085	# 6 Fuel Oil	20,000	Tank Farm							$ -
Blue		Waste oil		W side of Coarse Crusher							$ -
Blue		Lube oil		NE cor. Fine Crusher							$ -
White		Anti-Freeze		NW cor. Fine Crusher							$ -
											$ -

Closure Cost Estimate
User 4

Project Name: PolyMet NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

AOCs - Cost Per Phase/Task (see separate sheet for details and assumptions)

AoC No.	Site Name	Phase I ESA/ SAP	Implement SAP	Complete Phase II	Remediation	Total Cost	Updated	Used by Project
01	Area 1 Shops	$7,500	$208,615	$235,615	$380,000	$831,730	06/10/14	Y
06	Oily Waste Disposal Area	$7,500	$53,190	$100,450	$73,270	$234,410	06/10/14	N
07	Bull Gear Disposal	$7,500	$35,600	$0	$0	$43,100	06/10/14	N
09	Railroad Panel Yard	$0	$0	$23,010	$1,352,397	$1,375,407	06/10/14	N
10	Airport	$7,500	$29,180	$57,580	$60,240	$154,500	06/10/14	N
11	Stoker Coal Ash Disposal	$7,500	$30,180	$38,868	$245,120	$321,668	06/10/14	N
13	2001 Storage Area	$7,500	$29,180	$57,580	$0	$94,260	06/10/14	N
14	Sandblasting and large Equipment Painitng Area	$7,500	$57,796	$29,460	$43,570	$138,326	06/10/14	N
35	Dunka Water Treatment Plant Sludge	$4,000	$20,800	$37,800	$0	$62,600	06/10/14	N
37	Line 9 Area 5 Petroleum Contaminated Soil	$7,500	$0	$0	$0	$7,500	03/23/16	N
38	Area 2 Shops	$0	$0	$242,110	$179,796	$421,906	06/10/14	Y
40	Heavy Duty Garage	$7,500	$21,000	$40,000	$0	$68,500	06/10/14	N
42	Bunker C Tank Farm	$415,000	$276,667	$0	$138,333	$830,000	3/1/2016	N
43	Administration Building	$7,500	$20,600	$0	$0	$28,100	06/10/14	Y
44	Main Gate Vehicle Fueling Area	$7,500	$17,000	$34,900	$24,200	$83,600	06/10/14	Y
46	Plant Site and General Shops	$7,500	$59,344	$189,760	$644,690	$901,294	06/10/14	Y
47	Tailings Basin Reporting	$7,500	$0	$0	$0	$7,500	06/10/14	Y
48	Booster Pump House with Transformer	$7,500	$20,900	$38,700	$0	$67,100	06/10/14	Y
49	Coarse Crusher Petroleum Contaminated Soil	$7,500	$16,700	$35,100	$0	$59,300	06/10/14	Y
51	Tailings Basin Salvage and Scrap Areas	$7,500	$83,308	$22,450	$408,244	$521,502	06/10/14	Y
52	Cell 2W Salvage Area	$7,500	$21,000	$0	$0	$28,500	06/10/14	N
53	Hornfels Burial	$7,500	$0	$0	$0	$7,500	06/10/14	N
59	Colby Lake Pumping Station	$7,500	$21,000	$0	$0	$28,500	06/10/14	Y
61	Pellet Plant	$7,500	$98,926	$58,425	$258,546	$423,397	06/10/14	N
		$569,000	$1,120,986	$1,241,808	$3,808,406	$6,740,200		

Used/Impacted by NorthMet Project $2,950,532
Not Used/Impacted by NorthMet Project $3,789,668

Source: Stage 1 Construction.xlsx

Closure Cost Estimate
User 11

t NorthMet Mine, Construction Year 1 Bond Cost Estimate - Reclamation Plan
otember, 2016
onstYr1_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
n 1.4.1

t_cost_data_file_177900.020_ft_v7.xlsm
urety Cost Basis: Polymet
NorthMet Project Feature Changes Over Time v1.7 SEPT2016.pdf

	Units that Vary by Closure Year																					
Year of Closure	0 - Stage 1	0 - Stage 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Category 2/3 Stockpile Liner (acres)	63	63	63	63	119	119	119	181	181	181	181	181	181	181	181	181	150	120	90	60	30	0
Category 2/3 Stockpile Piping (LF)	8,000	8,000	8,000	8,000	10,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0	0
Category 2/3 Stockpile Sump/Pond (acres)	6.7	6.7	6.7	6.7	9.2	9.2	9.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	9.2	9.2	6.7	6.7	6.7	0.0
Category 2/3 Stockpile Pumps	2	2	2	2	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Category 2/3 Stockpile Overliner and Underdrain Piping (LF)	45,300	45,300	45,300	45,300	76,500	76,500	76,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	94,800	71,100	47,400	23,700	0
Category 2/3 Stockpile Relocation (tons)	0	0	5,238,766	9,671,631	13,968,736	17,624,295	20,039,335	24,388,312	26,954,315	31,286,526	35,946,676	40,017,183	44,021,108	44,021,108	38,281,584	32,542,061	26,802,537	21,063,014	15,323,491	9,583,967	3,844,444	0
Category 4 Stockpile Liner (acres)	29	29	29	29	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Piping (LF)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Sump/Pond (acres)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Overliner and Underdrain Piping (LF)	21,590	21,590	21,590	21,590	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Relocation (tons)	0	0	1,489,201	2,251,698	3,379,412	4,206,959	4,648,816	5,314,412	5,863,428	5,974,068	6,107,575	6,184,408	6,206,813	0	0	0	0	0	0	0	0	0
OSP Liner (acres)	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
OSP Piping (LF)	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
OSP Sump/Pond (acres)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
OSP Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OSP Overliner and Underdrain Piping (LF)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
OSP Relocation (tons)	0	0	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Footprint to Reclaim (acres)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Cover (acres)	0	0	205	205	369	369	458	526	526	526	526	526	526	526	526	460	394	328	262	196	130	64
Category 1 Stockpile Containment System Completion (LF)	0	0	2,800	2,800	2,800	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Containment System Breach & Reclaim (acres)	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Exposed/Unblasted Rock to Reclaim (Acres)	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Wall Unreclaimed (Acres)	0	0.0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
West Pit Exposed/Unblasted Rock to Reclaim (Acres)	0	0	0	0	0	4	40	0	0	0	0	52	65	0	0	0	0	0	0	0	0	0
West Pit Wall Unreclaimed (Acres)	0	0	0	8.7	8.7	8.7	8.9	8.9	8.9	11.0	11.0	16.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Central Pit Wall Unreclaimed (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Fence - 4 strand barb wire (LF)	0	0	1,100	1,400	1,400	1,400	1,400	1,400	1,400	1,700	1,700	1,600	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	1,400
Fence - non climbable (LF)	0	0	11,000	19,900	19,900	21,200	20,700	20,700	20,700	22,100	22,100	30,100	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	33,700
Pit Access Gates	0	0	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Mine Drainage Pond (acres)	19.4	19.4	19.4	19.4	21.6	21.6	21.6	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Mine Drainage Pond Liner (acres)	12.4	12.4	12.4	12.4	14.6	14.6	14.6	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Mine Drainage Pond Pumps	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Mine Drainage Pond Pipe (LF)	9,000	9,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Mine Drainage Pond Underdrains	4,500	4,500	4,500	5,200	6,000	6,000	6,000	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
Stormwater Pond (acres)	17.4	17.4	17.4	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
Stormwater Ditch (LF)	5,200	5,200	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	8,300	8,300
Unreclaimed Haul Road (LF)	22,000	22,000	22,000	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	31,500	31,500	31,500	29,500	27,500	27,500	27,500	27,500	21,500	21,500
FTB Beach to Reclaim (acres)	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTB Beach to Amend with Bentonite (acres)	0	0	95	95	93	92	91	89	87	203	207	211	212	212	212	212	216	219	222	225	420	428
FTB Pond Bottom to Amend with Bentonite (acres)	0	0	421	424	427	430	432	434	443	1068	1093	1118	1124	1130	1136	1142	1136	1129	1122	1116	905	905
FTB Borrow Area to Reclaim (acres)	31.6	31.6	44.7	16.9	16.5	16.5	15.9	15.9	12.0	12.0	12.0	12.0	18.0	22.4	22.4	22.4	26.8	26.8	26.8	26.8	21.5	19.5
HRF Disturbed Acres to Reclaim (acres)	5	5	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HRF cover (acres)	0	0	0	0	49	49	49	49	49	49	49	49	49	54	60	65	71	76	82	87	93	98
HRF drainage (years)	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9

Closure Cost Estimate
User 11

SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization/Demobilization	LS	1	See Comments and Notes		$ 25,000	$ 25,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Assume Environmental Protection Measures from Year 0 Site Work Remain In Place and Are Effective
3	Construction QA/QC	LS	1	See Comments and Notes		$ 5,000	$ 5,000	See Note 1.
4	Final Sloping of Category 1 Stockpile	AC	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Final Sloping
5	Furnish and Install 6-inch Geomembrane Bedding Layer	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geomembrane Bedding Layer
6	Furnish and Install 1-foot Granular Soil Cover above Geomembrane	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Granular Soil Cover above Geomembrane
7	Furnish and Install 1.5-foot Rooting Zone above Granular Cover	CY	32,000	See Comments and Notes		$ 5.5	$ 176,000	Year 0 - 13 acre Area of Disturbance; assume 25% of 127,000 Cubic Yards Excavated is Replaced/Regraded to Facilitate Vegetation Establishment.
8	Furnish and Install 6-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
9	Furnish and Install 9-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
10	Furnish and Install 12-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
11	Furnish and Install 18-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
12	Furnish and Install Vegetation (grass) on Stockpile Cover Systems	Acre	13	See Comments and Notes		$ 635	$ 8,255	Year 0 - Assume Furnish and Install Vegetation on 13-acre Disturbed Area [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
	Cat 1 Stockpile Footprint Restoration		13			**$ 14,173**	$ 184,255	
13	Reseeding 5% of Vegetation on Stockpile Cover Systems	Acre	1	See Comments and Notes		$ 635	$ 445	Year 0 - Assume Furnish and Install Vegetation on 1-acre of 13-acre Restored Area for Vegetation that Does Not Establish Initially [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
14	Procure and Install 40-mil Geomembrane - Textured	SF	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geomembrane Cover
15	Furnish and Install Geotextile above and below Geomembrane	SF	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geotextile Required
							$ 398,955	

Notes:
1) Limited QA/QC required. Assume limited amount of surveying for grade confirmation and site review and submittal review to confirm compliance of site restoration activities with specifications.

Closure Cost Estimate
User 11

SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 5,000.00	$ 5,000	To Be Determined By Contractor - Mob for General Earthwork and Vegetation Establishment
2	Environmental Protection Measures	LS	1	See Comments and Notes		$ 5,000.00	$ 5,000	Assume Environmental Protection Measures for Year 0 Construction Remain In Place and Are Effective
3	Construction QA/QC	LS	1	See Comments and Notes		$ 2,000.00	$ 2,000	See Note 2
4	General Site Grading	CY	2,000	See Comments and Notes		$ 7.75	$ 15,500	Assume General Grading (not soil import) of 6" Surface in Isolated Areas (assume 2.5 acres) in Prep. for Vegetion Establishment.
5	Furnish and Install Vegetation on Disturbed Areas	Acre	5	See Comments and Notes		$ 2,524.00	$ 12,620	Year 0 - Assume Furnsih and Install Vegetation on 5-acre Disturbed Area
6	Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	1	See Comments and Notes		$ 2,524.00	$ 2,524	Rounded Up to Nearest Acre
							$ 42,644	

Notes:
1) Per Hydrometallurgical Residue Management Plan v4 DEC2014 Figure 4-1; Year 0 Activities Include Removal of Various Structures, Rock and Soil from the HRF Footprint Prior Initiation of Year 1 - Lift 1 Pre-Load. Some limited tree clearing and grubbing also anticipated. Assume 20-percent of 25-acre Pre-Load Footprint is Disturbed in Year 0 in Preparation for Access and Delivery of Preload Materials in Year 1.1

2) Limited QA/QC required. Assume limited amount of site review and submittal review to confirm compliance of site restoration activities with specifications.

Closure Cost Estimate
User 11

SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 52,000.00	$ 52,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment Construction is within FTB Footprint. Assume Dust Control is Ancillary to Earthwork Items and no Additional Environmental Protection Measures are Required.
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	
3	LTVSMC Coarse Tailings Borrow Area Regrading Quantity	CY	105,000	See Comments and Notes		$ 2.50	$ 262,500	See Note 1 See Note 2 [$1985 replaced by $730 D&T]
4	LTVSMC Coarse Tailings Borrow Area - Seed, Mulch and Fertilize	Acre	65	See Comments and Notes		$ 730.00	$ 47,450	
	Borrow Area Restoration Unit Cost		65			**$ 4,768.46**	$ 309,950	
5	LTVSMC Coarse Tailings Borrow Area - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	3.25	See Comments and Notes		$ 1,985.00	$ 6,451	
6	Dam - Exterior Face Bentonite Augmentation	Acre	-	See Comments and Notes		$ -	$ -	Performed Incrementally as Routine Construction Item Through-out Year 0; Already Complete - No Additional Action Required
7	Dam - Exterior Face Seed, Mulch and Fertilize	Acre	-	See Comments and Notes		$ -	$ -	Performed Incrementally as Routine Construction Item Through-out Year 0; Already Complete - No Additional Action Required
8	Beach Area and Dam Crest - Remove and Replace 30" Tailings Cover Layer to Facilitate Bentonite Augmentation of Soil Layer 30" Below Beach Surface	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required
9	Beach Area and Dam Crest - Till Bentonite to 18" Depth	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required
10	Beach Area and Dam Crest - Compact 18" Layer of Bentonite Amended Soil	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required
11	Beach Area and Dam Crest - Lightly Compact Upper Cover Layer	Acre	-	See Comments and Notes		$ -	$ -	
12	Beach Area and Dam Crest - Seed, Fertilize and Mulch	Acre	40	See Comments and Notes		$ 880.00	$ 35,200	Establish Vegetation on New Dam Construction Areas (Lift 1 Crest and Interior Slope) Only - Vegetation Already In Place Elsewhere. Estimated Restoration Length is 7,000' and Estimated Restoration Width is 250'. [$2524 replaced by D&T $880]
13	Beach Area and Dam Crest - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	2	See Comments and Notes		$ 2,524.00	`	Establish Vegetation on New Dam Construction Areas (Lift 1 Crest and Interior Slope) Only - Vegetation Already In Place Elsewhere. Estimated Restoration Length is 7,000' and Estimated Restoration Width is 250'.
14	Pond Bottom - Bentonite Amended Pond Bottom	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required
							$ 713,551	

Notes:
1) Tailings Borrow Area Regrading Quantity Based on Assumed Borrow Area Disturbance times Average 1.0-foot Re-Grading Thickness Through-out to Facilitate Turf Establishment.
2) LTVSMC Coarse Tailings Borrow Area Disturbance Estimated from Permit Support Drawings - Flotation Tailings Basin Sheet FTB-003 and Assumed Year 0 Borrow Areas of 25% of Cell 1E/2E Splitter Dam Borrow Area and 25% of Cell 2W/2E Splitter Dam Borrow Area.

Closure Cost Estimate
User 11

SOW 21: Category 1 Groundwater Containment System: Year 0
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 15,000.00	$ 15,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Assume Environmental Protection Measures from Year 0 Construction Remain in Place and Are Effective. Assume Dust Control is Ancillary to Earthwork Activities.
3	Construction QA/QC	LS	1	See Comments and Notes		$ 3,000.00	$ 3,000	Includes General Confirmatory Survey and Periodic Reclamation Review
4	Cutoff Wall Breach for CRE	CY	3,400	See Comments and Notes		$ 10.00	$ 34,000	Assume 5' Thick Cutoff Wall - 8' Wide Breach at 200-Foot Spacing with Average Breach Depth of 10' and Average Trench Excavation Slopes of 1H:1V [8'x{(10'x10')+(5'x10')}] /27 Breach = 45 CY/Breach for 15,000'
5	Cutoff Wall Breach Backfill for CRE	CY	3,400	See Comments and Notes		$ 10.00	$ 34,000	Assume 5' Thick Cutoff Wall - 8' Wide Breach at 200-Foot Spacing with Average Breach Depth of 10' and Average Trench Excavation Slopes of 1H:1V [8'x{(10'x10')+(5'x10')}] /27 Breach = 45 CY/Breach for 15,000'
6	Seepage Collection Pipe Modifications for CRE	LF	-	See Comments and Notes		$ -	$ -	No Seepage Collection Pipe Modifications Anticipated
7	Riser Pipe Modifications for CRE	LS	75	See Comments and Notes		$ 400.00	$ 30,000	Quantity Unconfirmed - Assume 200' Riser Pipe Spacing. Assume Risers are Cut Off Below Ground Surface, Filled with Granular Soil, and Capped with Solid Cap
8	Mine Drainage Ditch Modifications for CRE	CY	21,000	See Comments and Notes		$ 10.00	$ 210,000	Assume Ditch is Backfilled Using Adjacent Berm and Roadway Soil. Quantity is [(2.5'x3') + (10'x3')]/27 Per Foot of Trench = 1.4 CY/LF for 15,000 LF
9	Berm Modifications for CRE	CY	-	See Comments and Notes		$ -	$ -	Ancillary to Mine Drainage Ditch Modifications
10	Stormwater Ditch Modifications for CRE	CY	25,500	See Comments and Notes		$ 10.00	$ 255,000	Assume Ditch is Backfilled Using Adjacent Berm and Roadway Soil. Quantity is [(3'x3') + (12'x3')]/27 Per Foot of Trench = 1.7 CY/LF for 15,000 LF
11	Perimeter Dike Modifications for CRE	CY	-	See Comments and Notes		$ -	$ -	Ancillary to Perimeter Ditch Modifications
12	Sump/Manhole Modifications	LS	3	See Comments and Notes		$ 1,000.00	$ 3,000	Remove and Salvage Manhole Internals, Remove and Recycle Upper Manhole Riser Section, Fill Manhole with Granular Material and Restore to Surrounding Grade
13	Furnish and Install Vegetation on Disturbed Areas	AC	41	See Comments and Notes		$ 635.00	$ 26,035	Assume Average Width of Restoration Zone is 100' and add 20% Additional for Misc. Restoration Areas; 100'x15,000' +20% = 1,800,000 SF = 41 Acre [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
	Cat 1 Cont Sys Breach and Restore Variable Unit Cost		41			**$ 14,439.88**	$ 592,035	
14	Reseeding 5% of Vegetation to Correct for Limited Growth	AC	2.05	See Comments and Notes		$ 2,524.00	$ 5,174	

Closure Cost Estimate
User 12

			Quantity	Units	Productivity (unit	Fleet/crew hours	Duration (years)	# fleets	Effective Duratio	Output unit/year	$/year	Unit Cost	Activity Group	Activity Group Year	Add Year Before	Activity Beginning Year	Check	2016	2017	2018
A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals																		
Exploration	$ -	$ -																		
Exploration Roads & Drill Pads	$ -	$ -																		
Roads	$ -	$ -																		
Grading Costs		$ -	-	cy		-	-	1	-				MMJ	1	-	1	PASS			
Cover Placement Cost		$ -	-	cy		-	-	1	-				MMJ	1	1	2	PASS			
Ripping/Scarifying Cost		$ -	-	acres		-	-	1	-				MMJ	1	2	3	PASS			
Well Abandonment	$ -	$ 14,025																		
Production, Dewatering, Infiltration Wells		$ -	-	ct	0.25	-	-	1	-	528			CCC	1	1	2	PASS			
Monitoring Wells		$ 14,025	32	ct	0.25	128	0.06	1	0.06	528	$ 231,413	$ 438.28	CPC	3	27	30	PASS			
Pits	$ -	$ -																		
Quarries & Borrow Areas	$ -	$ 669,310																		
Grading Costs		$ -		cy			-	1	-				MMA	1	1	2	PASS			
Cover Placement Cost		$ -		cy			-	1	-				MMA	1	-	1	PASS			
Topsoil Placement Cost		$ 669,310	231,914	cy	485	478	0.23	1	0.23	1,024,691	$ 2,957,286	$ 2.89	MMA	1	-	1	PASS			
Ripping/Scarifying Cost		$ -	96	acres			-	1	-			$ -	MMA	1	2	3	PASS			
Safety Berm Construction Cost		$ -		cy			-	1	-				MMA	1	3	4	PASS			
Underground Openings	$ -	$ -																		
Process Ponds	$ -	$ 562,089																		
Backfilling - Mine Site WWTF Pond - 1		$ 20,157	11,217	LCY	546	21	0.01	1	0.01	1,153,152	$ 2,072,219	$ 1.80	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site WWTF Pond - 1		$ 380	820	ft	500	1.6	0.00	1	0.00	1,056,000	$ 489,366	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site WWTF Pond - 2		$ 62,390	35,704	LCY	546	65	0.03	1	0.03	1,153,152	$ 2,015,045	$ 1.75	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site WWTF Pond - 2		$ 630	1360	ft	500	2.7	0.00	1	0.00	1,056,000	$ 489,176	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site WWTF Pond - 3		$ 120,941	68,815	LCY	546	126	0.06	1	0.06	1,153,152	$ 2,026,642	$ 1.76	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site WWTF Pond - 3		$ 917	1980	ft	500	4.0	0.00	1	0.00	1,056,000	$ 489,067	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site CPS Pond		$ 28,796	16,444	LCY	546	30	0.01	1	0.01	1,153,152	$ 2,019,348	$ 1.75	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site CPS Pond		$ 445	960	ft	500	1.9	0.00	1	0.00	1,056,000	$ 489,500	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site PW-OSLA		$ 41,273	23,393	LCY	546	43	0.02	1	0.02	1,153,152	$ 2,034,542	$ 1.76	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site PW-OSLA		$ 602	1300	ft	500	2.6	0.00	1	0.00	1,056,000	$ 489,009	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site PW-HRE		$ 30,715	17,263	LCY	546	32	0.02	1	0.02	1,153,152	$ 2,051,733	$ 1.78	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site PW-HRE		$ 509	1100	ft	500	2.2	0.00	1	0.00	1,056,000	$ 488,640	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site PW-RTH		$ 1,919	1,129	LCY	546	2	0.00	1	0.00	1,153,152	$ 1,960,052	$ 1.70	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site PW-RTH		$ 370	800	ft	500	1.6	0.00	1	0.00	1,056,000	$ 488,400	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site Temporary pond		$ 22,077	12,673	LCY	546	23	0.01	1	0.01	1,153,152	$ 2,008,848	$ 1.74	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site Temporary pond		$ 445	960	ft	500	1.9	0.00	1	0.00	1,056,000	$ 489,500	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site S4, PW-S4		$ 63,350	36,139	LCY	546	66	0.03	1	0.03	1,153,152	$ 2,021,422	$ 1.75	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site S4, PW-S4		$ 815	1760	ft	500	3.5	0.00	1	0.00	1,056,000	$ 489,000	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site SOSP, PW-SOSP		$ 39,354	22,587	LCY	546	41	0.02	1	0.02	1,153,152	$ 2,009,171	$ 1.74	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site SOSP, PW-SOSP		$ 640	1380	ft	500	2.8	0.00	1	0.00	1,056,000	$ 489,739	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site PW-HRC		$ 19,197	11,132	LCY	546	20	0.01	1	0.01	1,153,152	$ 1,988,597	$ 1.72	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site PW-HRC		$ 436	940	ft	500	1.9	0.00	1	0.00	1,056,000	$ 489,804	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site S23-1		$ 42,233	24,039	LCY	546	44	0.02	1	0.02	1,153,152	$ 2,025,919	$ 1.76	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site S23-1		$ 872	1880	ft	500	3.8	0.00	1	0.00	1,056,000	$ 489,804	$ 0.46	MMF	1	-	1	PASS			
Backfilling - Mine Site PW-S23-1		$ 61,431	34,687	LCY	546	64	0.03	1	0.03	1,153,152	$ 2,042,243	$ 1.77	MMF	1	-	1	PASS			
Liner Cut & Fold - Mine Site PW-S23-1		$ 1,195	2580	ft	500	5.2	0.00	1	0.00	1,056,000	$ 489,116	$ 0.46	MMF	1	-	1	PASS			
check:		PASS																		
Heaps	$ -	$ -																		
Waste Rock Dumps	$ -	$ -																		
Grading Costs		$ -	-	cy	-	-	-	1	-	-			MMD	1	-	1	PASS			
Cover Placement Cost		$ -	-	cy	0	-	-	1	-	-			MMD	1	1	2	PASS			
Topsoil Placement Cost		$ -	-	cy	-	-	-	1	-	-			MMD	1	2	3	PASS			
Ripping/Scarifying Cost		$ -	-	acres		-	-	1	-	-			MMD	1	3	4	PASS			
Landfills	$ -	$ -																		
Tailings	$ -	$ 2,208																		
Embankment Regrading Cost		$ -		cy			-	1	-	-			PFA	1	-	1	PASS			
Tailings Surface Grading Cost		$ -		cy			-	1	-	-			PFA	1	-	1	PASS			
Cover Placement Cost		$ -		cy			-	1	-	-			PFA	1	-	1	PASS			
Topsoil Placement Cost		$ -		cy			-	1	-	-			PFA	1	-	1	PASS			
Ripping/Scarifying Cost		$ 2,208	17	acres	1.2	14	0.01	1	0.01	2,540	$ 333,093	$ 131.12	PFA	1	-	1	PASS			
Foundation & Buildings Areas	$ -	$ -																		
Yards, Etc.	$ -	$ 118,972																		
Regrading Cost		$ 118,972	75,827	cy	119	637	0.30	1	0.30	251,406	$ 394,457	$ 1.57	MMK	1	-	1	PASS			
Cover Placement Cost		$ -		cy			-	1	-	-			MMK	1	-	1	PASS			
Growth Media Placement Cost		$ -		cy			-	1	-	-			MMK	1	-	1	PASS			
Ripping/Scarifying Cost		$ -		acres			-	1	-	-			MMK	1	-	1	PASS			
Drainage & Sediment Control	$ -	$ -																		
0		$ -		LCY			-	1	-				MMA	1	-	1	PASS			
0		$ -		LCY			-	1	-				MMA	1	-	1	PASS			
Generic Material Hauling	$ -	$ 302,950																		
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to East Pit				cy			-	1	-	-			MMD	1		1	PASS			
Cover Placement Cost - Category 2/3 stockpile relocation to East Pit				cy			-	1	-	-			MMD	1	1	2	PASS			
Topsoil Placement Cost - Category 2/3 stockpile relocation to East Pit		$ 161,974	50,820	cy	578	88	0.04	1	0.04	1,220,736	$ 3,890,742	$ 3.19	MMD	1	1	2	PASS			
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)				cy			-	1	-	-			MMD	1		1	PASS			
Cover Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)				cy			-	1	-	-			MMD	1	3	4	PASS			
Topsoil Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)		$ 66,437	23,393	cy	564	41	0.02	1	0.02	1,191,168	$ 3,382,962	$ 2.84	MMD	1	3	3	PASS			
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2				cy			-	1	-	-			MMD	1		1	PASS			
Cover Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2				cy			-	1	-	-			MMD	1		1	PASS			
Topsoil Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2		$ 74,539	25,813	cy	564	46	0.02	1	0.02	1,191,168	$ 3,439,680	$ 2.89	MMD			-	PASS			
Hauling/Crush/Screen/Compact - East pit - assume depth of excavation before bedrock backfilled				cy			-	1	-	-			MMD	1		1	PASS			
Cover Placement Cost - East pit - assume depth of excavation before bedrock backfilled				cy			-	1	-	-			MMD	1		1	PASS			
Topsoil Placement Cost - East pit - assume depth of excavation before bedrock backfilled		$ -	-	cy			-	1	-	-			MMD			-	PASS			
check:		PASS																		
Other User Costs (from Other User sheet)	$ -	$ 2,362,394																		
SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)		$ 398,955															PASS			
SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)		$ 42,644															PASS			
SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)		$ 713,551															PASS			
SOW 21: Category 1 Groundwater Containment System: Year 0		$ 1,207,244															PASS			
check:		PASS																		
Other**	$ -	$ -					-	1	-	-			MMD	1	-	1	PASS			
Mob/Demob if included in Other User sheet	$ -	$ -																		
Mob/Demob	$ -	$ -																		

Closure Cost Estimate
User 12

			Quantity	Units	Productivity (unit	Fleet/crew hours	Duration (years)	# fleets	Effective Duratio	Output unit/year	$/year	Unit Cost	Activity Group	Activity Group Year	Add Year Before	Activity Beginning Year	Check	2016	2017	2018
Subtotal "A"	$ -	$ 4,031,948																		
B. Revegetation/Stabilization	"Cost Schedule" sheet variance	Subtotals																		
Exploration	$ -	$ -																		
Exploration Roads & Drill Pads	$ -	$ -																		
Roads	$ -	$ -																		
Well Abandonment																				
Pits	$ -	$ -																		
Quarries & Borrow Areas	$ -	$ 30,188	96	acres	1.0	96	0.05	1	0.05	2,112	$ 665,299	$ 315.01	MMA	1	-	1	PASS			
Underground Openings																	PASS			
Process Ponds	$ -	$ 8,965	28	acres	1	28	0.01	1	0.01	2,112	$ 673,811	$ 319.04	MMA	1			PASS			
Heaps	$ -	$ -															PASS			
Waste Rock Dumps	$ -	$ -											MMD	1	-	1	PASS			
Landfills	$ -	$ -															PASS			
Tailings	$ -	$ 9,775	17	acres	1.0	17	0.01	1	0.01	2,112	$ 1,225,938	$ 580.46	PFA	1	-	1	PASS			
Foundation & Buildings Areas	$ -	$ -															PASS			
Yards, Etc.	$ -	$ 19,599	47	acres	1.0	47	0.02	1	0.02	2,112	$ 880,704	$ 417.00	MMK	1	-	1	PASS			
Drainage & Sediment Control															-	-	PASS			
Generic Material Hauling	$ -	$ 39,060	124	acres	1.0	124	0.06	1	0.06	2,112	$ 664,744	$ 314.75	MMD	1	-	1	PASS			
Other User Costs (from Other User sheet)	$ -	$ -													-	-	PASS			
Other**	$ -	$ -					-	1	-	-					-	-	PASS			
Subtotal "B"	$ -	$ 107,587																		
	check:	PASS																		
C. Detoxification/Water Treatment/Disposal of Wastes**	"Cost Schedule" sheet variance	Subtotals																		
Process Ponds/Sludge	$ -	$ -											CCC	1	-	1	PASS			
Heaps	$ -	$ -											CCC	1	-	1	PASS			
Dumps (Waste & Landfill)	$ -	$ -											CCC	1	-	1	PASS			
Tailings	$ -	$ -											CCC	1	-	1	PASS			
Surplus Water Disposal	$ -	$ -											CCC	1	-	1	PASS			
Monitoring	$ -	$ -											CCC	1	-	1	PASS			
Miscellaneous	$ -	$ -											CCC	1	-	1	PASS			
Solid Waste - On Site	$ -	$ -											CCC	1	2	3	PASS			
Solid Waste - Off Site	$ -	$ -											CCC	1	-	1	PASS			
Hazardous Materials	$ -	$ -											CCC	1	-	1	PASS			
Hydrocarbon Contaminated Soils	$ -	$ -											CCC	1	-	1	PASS			
Pumping (from Solution Mgmt sheet)	$ -	$ -																		
	check:	PASS																		
Evaporation (from Solution Mgmt sheet)	$ -	$ -																		
Treatment (from Solution Mgmt sheet)	$ -	$ -																		
	check:	PASS																		
Decontamination (from Solution Mgmt sheet)	$ -	$ -																		
Other User Costs (from Other User sheet)	$ -	$ 2,950,532																		
Areas of concern, legacy remediation (quote from NTS)		$ 2,950,532	1	ea			1	1	1.00	1	$ 2,950,532	$ 2,950,532.00	MMD	1	-	1	PASS			
	check:	PASS																		
Other**	$ -	$ -																		
Subtotal "C"	$ -	$ 2,950,532																		
D. Structure, Equipment and Facility Removal, and Misc.	"Cost Schedule" sheet variance	Subtotals																		
Foundation & Buildings Areas	$ -	$ -																		
Other Demolition	$ -	$ 6,062,978																		
Demo and Asbestos Abatement Cost Summary - User 2		$ 6,002,153	1	LS			1	1	1.00	1	$ 6,002,153	$ 6,002,153.00	PPA	1	-	1	PASS			
Above Ground Storage Tanks - User 2		$ -	1	LS			1	1	1.00	1	$ -	$ -	PPA	1	-	1	PASS			
Remove & Dispose of Stockpile/Pond Liners - OSP		$ 9,600	32	acres			1	1	1.00	32	$ 9,600	$ 300.00	PPA	1	-	1	PASS			
Remove & Dispose of Collection pipe - OSP		$ 6,975	3,100	LF			1	1	1.00	3,100	$ 6,975	$ 2.25	PPA	1	-	1	PASS			
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile		$ 18,900	63	acres			1	1	1.00	63	$ 18,900	$ 300.00	PPA	1	-	1	PASS			
Remove & Dispose of Collection pipe - Category 2/3 Stockpile		$ 10,800	4,800	LF			1	1	1.00	4,800	$ 10,800	$ 2.25	PPA	1	-	1	PASS			
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile		$ 8,700	29	acres			1	1	1.00	29	$ 8,700	$ 300.00	PPA	1	-	1	PASS			
Remove & Dispose of Collection pipe - Category 4 Stockpile		$ 5,850	2,600	LF			1	1	1.00	2,600	$ 5,850	$ 2.25	PPA	1	-	1	PASS			
	check:	PASS																		
Equipment Removal	$ -	$ -																		
	check:	PASS																		
Fence Removal	$ -	$ -																		
Fence Installation	$ -	$ -																		

Closure Cost Estimate
User 12

			Quantity	Units	Productivity (unit	Fleet/crew hours	Duration (years)	# fleets	Effective Duratio	Output unit/year	$/year	Unit Cost	Activity Group	Activity Group Year	Add Year Before	Activity Beginning Year	Check	2016	2017	2018
Culvert Removal	$ -	$ -																		
Pipe Removal	$ -	$ -																		
check:		PASS																		
Powerline Removal	$ -	$ -																		
check:		PASS																		
Transformer Removal	$ -	$ -																		
check:		PASS																		
Rip-rap, rock lining, gabions	$ -	$ -																		
Other Misc. Costs	$ -	$ -																		
Other User Costs (from Other User sheet)	$ -	$ -																		
check:		PASS																		
Other**	$ -	$ -																		
Subtotal "D"	$ -	$ 6,062,978																		
E. Monitoring	"Cost Schedule" sheet variance	Subtotals																		
Reclamation Monitoring and Maintenance	$ -	$ 6,501																		
Revegetation Maintenance		$ 6,501	1	time	0.0200	50	0.02	1	0.02	42	$ 274,602	$ 6,501.00	CCC	1	-	1	PASS			
Erosion Maintenance		$ -	-	cy	-		-	1	-	-			CCC	1	-	1	PASS			
Reclamation Monitoring		$ -					-	1	-	-			CCC	1	-	1	PASS			
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet) (this one schedules automatically)	$ -	$ -																		
Other User Costs (from Other User sheet)	$ -	$ -																		
check:		PASS																		
Subtotal "E"	$ -	$ 6,501																		
F. Construction Management & Support	"Cost Schedule" sheet variance	Subtotals																		
Construction Management	$ -	$ -															PASS			
Construction Support	$ -	$ -																		
Road Maintenance	$ -	$ 79,644																		
Active Reclamation		$ 28,962															PASS			
Monitoring & Maintenance		$ 50,682																		
Other User Costs (from Other User sheet)	$ -	$ -																		
Other**	$ -	$ -																		
Subtotal "F"	$ -	$ 79,644																		
G. Closure Planning, G&A, Human Resources	"Cost Schedule" sheet variance	Subtotals																		
Closure Planning	$ -	$ -																		
General & Administration	$ -	$ -																		
Human Resources	$ -	$ 2,378,900																		
Other User Costs (from Other User sheet)	$ -	$ 111,351																		
Closure - Pickup Trucks - Closure Year 1		$ 5,360	2	each	0	4,224	2.00	1	2.00	1	$ 2,680	2,680	MMD	1	-	1	PASS			
Closure - Pickup Trucks - Closure Year 2		$ 5,360	2	each	0	4,224	2.00	1	2.00	1	$ 2,680	2,680	MMD	1	1	2	PASS			
Closure - Snow Plowing - Closure Year 1		$ 11,545	1	each	0	2,112	1.00	1	1.00	1	$ 11,545	11,545	MMD	1	-	1	PASS			
Closure - Snow Plowing - Closure Year 2		$ 11,545	1	each	0	2,112	1.00	1	1.00	1	$ 11,545	11,545	MMD	1	1	2	PASS			
Closure - Pickup Trucks - Post-Closure Year 1		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	-	1	PASS			
Closure - Pickup Trucks - Post-Closure Year 2		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	1	2	PASS			
Closure - Pickup Trucks - Post-Closure Year 3		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	2	3	PASS			
Closure - Pickup Trucks - Post-Closure Year 4		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	3	4	PASS			
Closure - Pickup Trucks - Post-Closure Year 5		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	4	5	PASS			
Closure - Pickup Trucks - Post-Closure Year 6		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	5	6	PASS			
Closure - Pickup Trucks - Post-Closure Year 7		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	6	7	PASS			
Closure - Pickup Trucks - Post-Closure Year 8		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	7	8	PASS			
Closure - Pickup Trucks - Post-Closure Year 9		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	8	9	PASS			
Closure - Pickup Trucks - Post-Closure Year 10		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	9	10	PASS			
Closure - Pickup Trucks - Post-Closure Year 11		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	10	11	PASS			
Closure - Pickup Trucks - Post-Closure Year 12		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	11	12	PASS			
Closure - Pickup Trucks - Post-Closure Year 13		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	12	13	PASS			
Closure - Pickup Trucks - Post-Closure Year 14		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	13	14	PASS			
Closure - Pickup Trucks - Post-Closure Year 15		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	14	15	PASS			
Closure - Pickup Trucks - Post-Closure Year 16		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	15	16	PASS			
Closure - Pickup Trucks - Post-Closure Year 17		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	16	17	PASS			
Closure - Pickup Trucks - Post-Closure Year 18		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	17	18	PASS			
Closure - Pickup Trucks - Post-Closure Year 19		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	18	19	PASS			
Closure - Pickup Trucks - Post-Closure Year 20		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	19	20	PASS			
Closure - Pickup Trucks - Post-Closure Year 21		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	20	21	PASS			
Closure - Pickup Trucks - Post-Closure Year 22		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	21	22	PASS			
Closure - Pickup Trucks - Post-Closure Year 23		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	22	23	PASS			
Closure - Pickup Trucks - Post-Closure Year 24		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	23	24	PASS			
Closure - Pickup Trucks - Post-Closure Year 25		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	24	25	PASS			
Closure - Pickup Trucks - Post-Closure Year 26		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	25	26	PASS			
Closure - Pickup Trucks - Post-Closure Year 27		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	26	27	PASS			
Closure - Pickup Trucks - Post-Closure Year 28		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05	MMD	1	27	28	PASS			
Post-Closure - Plow attachment for Vehicles		$ 2,500	1	ea	9,000	0	0.00	1	0.00	19,008,000	###########	$ 5,000.00	MMD	1	-	1	PASS			
check:		PASS																		
Other**	$ -	$ -																		
Subtotal "G"	$ -	$ 2,490,251																		
Subtotal Operational & Maintenance Costs Subtotal A through G	$ -	$ 15,729,441																		

Inflation Rate (r) (%):	**1.1%**
Discount Rate (i)(%):	**8%**

			1	2
		2016	2017	2018
Grand total	**$ 16,515,913**	$ -	$ -	$ -
Grand Total (Inflation Adjusted) (FV)	**$ 17,521,771**	$ -	$ -	$ -
Grand Total Net Present Value (NPV)	**$ 12,441,852**		$ -	$ -

Closure Cost Estimate
User 12

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
A. Earthwork/Recontouring																					
Exploration																					
Exploration Roads & Drill Pads																					
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Wells																					
Pits																					
Quarries & Borrow Areas	$ 669,310	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ 669,310	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings																					
Process Ponds	$ 562,089	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1	$ 20,157	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1	$ 380	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2	$ 62,390	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2	$ 630	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3	$ 120,941	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3	$ 917	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond	$ 28,796	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond	$ 445	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA	$ 41,273	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA	$ 602	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE	$ 30,715	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE	$ 509	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH	$ 1,919	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH	$ 370	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond	$ 22,077	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond	$ 445	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4	$ 63,350	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4	$ 815	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP	$ 39,354	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$ 640	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC	$ 19,197	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC	$ 436	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1	$ 42,233	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1	$ 872	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1	$ 61,431	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1	$ 1,195	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Heaps																					
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills																					
Tailings	$ 2,208.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ 2,208	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas																					
Yards, Etc.	$ 118,972.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regrading Cost	$ 118,972	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ 302,950	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to East Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile relocation to East Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile relocation to East Pit	$ 161,974	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)	$ 66,437	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2	$ 74,539	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - East pit - assume depth of excavation before bedrock backfilled	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - East pit - assume depth of excavation before bedrock backfilled	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - East pit - assume depth of excavation before bedrock backfilled	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Other User Costs (from Other User sheet)	$ 2,362,393.95	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)	$ 398,954.50																				
SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)	$ 42,644.00																				
SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)	$ 713,551.25																				
SOW 21: Category 1 Groundwater Containment System: Year 0	$ 1,207,244.20																				
check:																					
Other**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet	$ -			$ -																	
Mob/Demob																					

Closure Cost Estimate
User 12

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Subtotal "A"																						
B. Revegetation/Stabilization																						
Exploration																						
Exploration Roads & Drill Pads																						
Roads																						
Well Abandonment																						
Pits																						
Quarries & Borrow Areas	$	30,188																				
Underground Openings																						
Process Ponds	$	8,965																				
Heaps																						
Waste Rock Dumps																						
Landfills																						
Tailings	$	9,775																				
Foundation & Buildings Areas																						
Yards, Etc.	$	19,599	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control																						
Generic Material Hauling	$	39,060	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**																						
Subtotal "B"																						
	check:																					
C. Detoxification/Water Treatment/Disposal of Wastes**																						
Process Ponds/Sludge	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)																						
	check:																					
Evaporation (from Solution Mgmt sheet)																						
Treatment (from Solution Mgmt sheet)	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																					
Decontamination (from Solution Mgmt sheet)																						
Other User Costs (from Other User sheet)	$	2,950,532.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Areas of concern, legacy remediation (quote from NTS)	$	2,950,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																					
Other**																						
Subtotal "C"																						
D. Structure, Equipment and Facility Removal, and Misc.																						
Foundation & Buildings Areas																						
Other Demolition	$	6,062,978	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - User 2	$	6,002,153	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP	$	9,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP	$	6,975	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile	$	18,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 Stockpile	$	10,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile	$	8,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Stockpile	$	5,850	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																					
Equipment Removal	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																					
Fence Removal																						
Fence Installation	$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Culvert Removal																					
Pipe Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Powerline Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Transformer Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Rip-rap, rock lining, gabions	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs																					
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Other**																					
Subtotal "D"																					
E. Monitoring																					
Reclamation Monitoring and Maintenance	$ 6,501.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance	$ 6,501	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet) (this one schedules automatically)																					
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Subtotal "E"																					
F. Construction Management & Support																					
Construction Management																					
Construction Support																					
Road Maintenance	$ 14,481	$ 14,481.00	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07
Active Reclamation	$ 14,481	$ 14,481																			
Monitoring & Maintenance			$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
Other User Costs (from Other User sheet)	0																				
Other**																					
Subtotal "F"																					
G. Closure Planning, G&A, Human Resources																					
Closure Planning																					
General & Administration																					
Human Resources	$ 168,576	$ 168,576	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920
Other User Costs (from Other User sheet)	$ 38,989.53	$ 8,040.15	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05
Closure - Pickup Trucks - Closure Year 1	2680.05	2680.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Closure Year 2	2680.05	2680.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 1	11544.6375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 2	11544.6375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Post-Closure Year 1	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 2	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 3	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 4	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 5	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 6	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 7	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 8	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 9	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 10	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 11	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 12	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 13	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 14	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 15	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 16	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 17	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 18	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 19	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 20	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 21	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 22	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 23	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 24																					
Closure - Pickup Trucks - Post-Closure Year 25																					
Closure - Pickup Trucks - Post-Closure Year 26																					
Closure - Pickup Trucks - Post-Closure Year 27																					
Closure - Pickup Trucks - Post-Closure Year 28																					
Post-Closure - Plow attachment for Vehicles	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																					
Other**																					
Subtotal "G"																					
Subtotal Operational & Maintenance Costs																					
Subtotal A through G																					

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	$ 14,035,945	$ 200,652	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
	$ 14,506,859	$ 209,677	$ 85,876	$ 86,826	$ 87,786	$ 88,757	$ 89,739	$ 90,731	$ 91,735	$ 92,750	$ 93,775	$ 94,813	$ 95,861	$ 96,922	$ 97,994	$ 99,078	$ 100,173	$ 101,281	$ 102,402	$ 103,534	$ 104,679
	$ 11,516,012	$ 154,119	$ 58,446	$ 54,715	$ 51,222	$ 47,953	$ 44,892	$ 42,026	$ 39,344	$ 36,832	$ 34,481	$ 32,280	$ 30,219	$ 28,290	$ 26,485	$ 24,794	$ 23,211	$ 21,730	$ 20,343	$ 19,044	$ 17,829

Closure Cost Estimate
User 12

		2040	2041	2042	2043	2044	2045	2046	2047	2048
A. Earthwork/Recontouring										
Exploration										
Exploration Roads & Drill Pads										
Roads	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$	- $ -	$ -	$ -	$ -	$ -	$ 14,025.00	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Wells							$ 14,025	$ -	$ -	$ -
Pits										
Quarries & Borrow Areas	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings										
Process Ponds	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Heaps										
Waste Rock Dumps	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills										
Tailings	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas										
Yards, Etc.	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regrading Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
0	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
0	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to East Pit	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile relocation to East Pit	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile relocation to East Pit	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - East pit - assume depth of excavation before bedrock backfilled	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - East pit - assume depth of excavation before bedrock backfilled	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - East pit - assume depth of excavation before bedrock backfilled	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Other User Costs (from Other User sheet)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)										
SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)										
SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)										
SOW 21: Category 1 Groundwater Containment System: Year 0										
	check:									
Other**	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet										
Mob/Demob										

Closure Cost Estimate
User 12

		2040	2041	2042	2043	2044	2045	2046	2047	2048
Subtotal "A"										
B. Revegetation/Stabilization										
Exploration										
Exploration Roads & Drill Pads										
Roads										
Well Abandonment										
Pits										
Quarries & Borrow Areas										
Underground Openings										
Process Ponds										
Heaps										
Waste Rock Dumps										
Landfills										
Tailings										
Foundation & Buildings Areas										
Yards, Etc.	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control										
Generic Material Hauling	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**										
Subtotal "B"										
	check:									
C. Detoxification/Water Treatment/Disposal of Wastes**										
Process Ponds/Sludge	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)										
	check:									
Evaporation (from Solution Mgmt sheet)										
Treatment (from Solution Mgmt sheet)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Decontamination (from Solution Mgmt sheet)										
Other User Costs (from Other User sheet)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Areas of concern, legacy remediation (quote from NTS)	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Other**										
Subtotal "C"										
D. Structure, Equipment and Facility Removal, and Misc.										
Foundation & Buildings Areas										
Other Demolition	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - User 2	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 Stockpile	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Stockpile	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Equipment Removal	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Fence Removal										
Fence Installation	$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

		2040	2041	2042	2043	2044	2045	2046	2047	2048
Culvert Removal										
Pipe Removal		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Powerline Removal		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Transformer Removal		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Rip-rap, rock lining, gabions		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs										
Other User Costs (from Other User sheet)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Other**										
Subtotal "D"										
E. Monitoring										
Reclamation Monitoring and Maintenance		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet) (this one schedules automatically)										
Other User Costs (from Other User sheet)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Subtotal "E"										
F. Construction Management & Support										
Construction Management										
Construction Support										
Road Maintenance		$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07
Active Reclamation										
Monitoring & Maintenance		$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
Other User Costs (from Other User sheet)										
Other**										
Subtotal "F"										
G. Closure Planning, G&A, Human Resources										
Closure Planning										
General & Administration										
Human Resources		$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920
Other User Costs (from Other User sheet)		$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 1		0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Closure Year 2		0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 1		0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 2		0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Post-Closure Year 1		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 2		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 3		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 4		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 5		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 6		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 7		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 8		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 9		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 10		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 11		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 12		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 13		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 14		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 15		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 16		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 17		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 18		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 19		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 20		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 21		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 22		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 23		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 24		$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 25			$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 26				$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 27					$ 2,680	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 28						$ 2,680	$ -	$ -	$ -	$ -
Post-Closure - Plow attachment for Vehicles		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:									
Other**										
Subtotal "G"										
Subtotal Operational & Maintenance Costs										
Subtotal A through G										

	24	25	26	27	28	29	30	31	32
	2040	2041	2042	2043	2044	2045	2046	2047	2048
	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 78,466	$ 93,192	$ 78,466	$ 78,466
	$ 105,837	$ 107,008	$ 108,191	$ 109,388	$ 110,598	$ 107,950	$ 129,628	$ 110,351	$ 111,572
	$ 16,690	$ 15,625	$ 14,628	$ 13,694	$ 12,820	$ 11,586	$ 12,882	$ 10,154	$ 9,506

Attachment 2.

Cost Data File

Format Version:	***SRCE Data File v1.12***
File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Type:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Units of Measure:	**Imperial**

No. of Bases/Regions:	4

Basis/Region	Basis/Region Name	Basis/Region Description
Basis 1	***Northern Nevada***	Churchill, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 2	***Southern Nevada***	Clark, Esmeralda, Lincoln and Nye Counties
Basis 3	***do not use***	From 2014 NDEP Cost Data file and labor from InfoMine 2013 Labor Survey of non-union Surface metal and industrial mines in Western US.
Basis 4	***Polymet***	MN prevailing wages, CAT equipment rates
Basis 5		
Basis 6		
Basis 7		
Basis 8		
Basis 9		
Basis 10		
Basis 11		
Basis 12		
Basis 13		
Basis 14		
Basis 15		

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

MONTHLY EQUIPMENT RATE TABLE [Cost Per Month] (1)

EQUIPMENT TYPE (2)	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$10,800	$10,800	$10,800	$12,220	Caterpillar rental rates
D6R w/ Winch				$13,060	Caterpillar rental rates
D7R	$13,500	$13,500	$13,500	$16,640	Caterpillar rental rates
D8R	$19,000	$19,000	$19,000	$19,890	Caterpillar rental rates
D9R	$22,900	$22,900	$22,900	$27,500	Caterpillar rental rates
D10R	$31,000	$31,000	$31,000	$33,340	Caterpillar rental rates
D11R	$62,000	$62,000	$62,000	$62,000	NV cost
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$9,600	$9,600	$9,600	$10,430	Caterpillar rental rates
14G/H	$14,500	$14,500	$14,500	$16,910	Caterpillar rental rates
16G/H	$21,600	$21,600	$21,600	$23,530	Caterpillar rental rates
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$5,700	$5,700	$5,700	$6,250	Caterpillar rental rates
320C	$7,000	$7,000	$7,000	$7,490	Caterpillar rental rates
325C	$8,200	$8,200	$8,200	$8,920	Caterpillar rental rates
330C	$10,800	$10,800	$10,800	$10,730	Caterpillar rental rates
345B	$9,500	$9,500	$9,500	$17,110	Caterpillar rental rates
365BL				$26,050	Caterpillar rental rates
385BL	$22,500	$22,500	$22,500	$32,700	Caterpillar rental rates
Scrapers					
631G	$16,500	$16,500	$16,500	$33,930	Caterpillar rental rates
637G PP	$34,500	$34,500	$34,500	$34,500.00	NV cost
Wheeled Loaders					
924G	$5,100	$5,100	$5,100	$5,730	Caterpillar rental rates
928G	$5,400	$5,400	$5,400	$6,840	Caterpillar rental rates
950G	$7,600	$7,600	$7,600	$9,690	Caterpillar rental rates
966G	$10,900	$10,900	$10,900	$13,890	Caterpillar rental rates
972G	$13,000	$13,000	$13,000	$15,060	Caterpillar rental rates
980G	$13,000	$13,000	$13,000	$19,260	Caterpillar rental rates
988G	$21,000	$21,000	$21,000	$30,340	Caterpillar rental rates
990				$47,670	average
992G	$65,000	$65,000	$65,000	$65,000	NV cost
994D				$71,500	extrapolated
L-2350				$78,650	extrapolated

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	$7,000	$7,000	$7,000	$3,120	Caterpillar rental rates
H-160 (fits 345)	$8,600	$8,600	$8,600	$4,140	Caterpillar rental rates
H-180 (fits 365/385)	$12,400	$12,400	$12,400	$4,060	Caterpillar rental rates
Demolition Shears					
S340 (fits 322/325/330)					
S365 (fits 330/345)					
S390 (fits 365/385)					
Demolition Grapples					
G315 (fits 322/325)					
G320 (fits 325/330)					
G330 (fits 345/365)					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$3,600	$3,600	$3,600	$3,220	Caterpillar rental rates
428D 4WD Backhoe	$4,200	$4,200	$4,200	$5,220	average
CS533E Vibratory Roller	$7,590	$7,590	$7,590	$7,220	Caterpillar rental rates
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton	$5,804	$5,804	$5,804	$5,804	NV cost
Supervisor's Truck	$3,586	$3,586	$3,586	$3,586	NV cost
Flatbed Truck	$5,804	$5,804	$5,804	$5,804	NV cost
Air Compressor + tools	$4,643	$4,643	$4,643	$4,643	NV cost
Welding Equipment	$3,025	$3,025	$3,025	$3,025	NV cost
Heavy Duty Drill Rig	$61,380	$61,380	$61,380	$61,380	NV cost
Pump (plugging) Drill Rig	$61,380	$61,380	$61,380	$61,380	NV cost
Concrete Pump	$15,224	$15,224	$15,224	$15,224	NV cost
Gas Engine Vibrator	$704	$704	$704	$704	NV cost
Generator 5KW	$1,065	$1,065	$1,065	$1,065	NV cost
HDEP Welder (pipe or liner)	$8,162	$8,162	$8,162	$8,162	NV cost
5 Ton Crane	$5,975	$5,975	$5,975	$5,975	NV cost
20 Ton Crane	$15,884	$15,884	$15,884	$4,220	Caterpillar rental rates
50 Ton Crane	$15,884	$15,884	$15,884	$15,884	NV cost
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$9,900	$9,900	$9,900	$11,000	Caterpillar rental rates
730 (articulated)	$9,900	$9,900	$9,900	$13,460	Caterpillar rental rates
735 (articulated)	$9,900	$9,900	$9,900	$16,970	Caterpillar rental rates
740 (articulated)	$15,000	$15,000	$15,000	$18,110	Caterpillar rental rates
769D	$21,000	$21,000	$21,000	$21,000	NV cost
773E	$27,000	$27,000	$27,000	$27,000	NV cost
777D	$54,000	$54,000	$54,000	$54,000	NV cost
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$7,700	$7,700	$7,700	$7,700	NV cost
621E (8,000 gal) Water Wagon	$13,000	$13,000	$13,000	$13,000	NV cost
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd^3) (5)	$14,762	$14,762	$14,762	$14,762	NV cost

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

NOTES:

(1) Power Equipment Source:	Cashman Equipment Company (July 2014) unless noted	Cashman Equipment Company (July 2014) unless noted	Cashman Equipment Company (July 2014) unless noted		
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)		
(4) Other Equipment Source:	Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)		

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

PREVENTATIVE MAINTENANCE COST [Cost Per Hour] (1)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$5.21	$5.21	$5.21	$5.21	
D6R w/ Winch					
D7R	$3.18	$3.18	$3.18	$3.18	
D8R	$5.75	$5.75	$5.75	$5.75	
D9R	$7.99	$7.99	$7.99	$7.99	
D10R	$9.82	$9.82	$9.82	$9.82	
D11R	$12.48	$12.48	$12.48	$12.48	
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$6.11	$6.11	$6.11	$6.11	
14G/H	$6.68	$6.68	$6.68	$6.68	
16G/H	$5.37	$5.37	$5.37	$5.37	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$3.89	$3.89	$3.89	$3.89	
320C	$4.15	$4.15	$4.15	$4.15	
325C	$4.02	$4.02	$4.02	$4.02	
330C	$5.19	$5.19	$5.19	$5.19	
345B	$7.08	$7.08	$7.08	$7.08	
365BL					
385BL	$6.11	$6.11	$6.11	$6.11	
Scrapers					
631G	$7.02	$7.02	$7.02	$7.02	
637G PP	$11.61	$11.61	$11.61	$11.61	
Wheeled Loaders					
924G	$3.79	$3.79	$3.79	$3.79	
928G	$4.12	$4.12	$4.12	$4.12	
950G	$4.93	$4.93	$4.93	$4.93	
966G	$6.75	$6.75	$6.75	$6.75	
972G	$5.27	$5.27	$5.27	$5.27	
980G	$5.27	$5.27	$5.27	$5.27	
988G	$9.76	$9.76	$9.76	$9.76	
990					
992G	$11.62	$11.62	$11.62	$11.62	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	N/A	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Shears					
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Grapples					
G315 (fits 322/325)	N/A	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A	N/A

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

Other Equipment					
420D 4WD Backhoe	$3.36	$3.36	$3.36	$3.36	
428D 4WD Backhoe	$3.37	$3.37	$3.37	$3.37	
CS533E Vibratory Roller					
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton					
Supervisor's Truck					
Flatbed Truck					
Air Compressor + tools					
Welding Equipment					
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump					
Gas Engine Vibrator					
Generator 5KW					
HDEP Welder (pipe or liner)					
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$7.32	$7.32	$7.32	$7.32	
730 (articulated)	$7.32	$7.32	$7.32	$7.32	
735 (articulated)	$7.32	$7.32	$7.32	$7.32	
740 (articulated)	$7.32	$7.32	$7.32	$7.32	
769D	$8.46	$8.46	$8.46	$8.46	
773E	$7.23	$7.23	$7.23	$7.23	
777D	$10.48	$10.48	$10.48	$10.48	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$5.79	$5.79	$5.79	$5.79	
621E (8,000 gal) Water Wagon	$6.76	$6.76	$6.76	$6.76	
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$7.32	$7.32	$7.32	$7.32	
(1) PM Source:	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)		

G.E.T CONSUMPTION [Cost Per Hour] (1) (Wear Items)

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$4.63	$4.63	$4.63	$4.63	
D6R w/ Winch					
D7R	$6.88	$6.88	$6.88	$6.88	
D8R	$8.94	$8.94	$8.94	$8.94	
D9R	$13.90	$13.90	$13.90	$13.90	
D10R	$19.46	$19.46	$19.46	$19.46	
D11R	$28.92	$28.92	$28.92	$28.92	
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$9.60	$9.60	$9.60	$9.60	
14G/H	$13.87	$13.87	$13.87	$13.87	
16G/H	$18.95	$18.95	$18.95	$18.95	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$3.62	$3.62	$3.62	$3.62	
320C	$4.18	$4.18	$4.18	$4.18	
325C	$5.27	$5.27	$5.27	$5.27	
330C	$5.81	$5.81	$5.81	$5.81	
345B	$6.68	$6.68	$6.68	$6.68	
365BL					
385BL	$12.15	$12.15	$12.15	$12.15	
Scrapers					
631G	$7.59	$7.59	$7.59	$7.59	
637G PP	$9.54	$9.54	$9.54	$9.54	
Wheeled Loaders					
924G	$3.99	$3.99	$3.99	$3.99	
928G	$4.13	$4.13	$4.13	$4.13	
950G	$7.68	$7.68	$7.68	$7.68	
966G	$9.64	$9.64	$9.64	$9.64	
972G	$12.21	$12.21	$12.21	$12.21	
980G	$12.21	$12.21	$12.21	$12.21	
988G	$13.07	$13.07	$13.07	$13.07	
990					
992G	$30.03	$30.03	$30.03	$30.03	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	$5.29	$5.29	$5.29	$5.29	
H-160 (fits 345)	$10.35	$10.35	$10.35	$10.35	
H-180 (fits 365/385)	$12.02	$12.02	$12.02	$12.02	
Demolition Shears					
S340 (fits 322/325/330)					
S365 (fits 330/345)					
S390 (fits 365/385)					
Demolition Grapples					
G315 (fits 322/325)					
G320 (fits 325/330)					
G330 (fits 345/365)					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$3.22	$3.22	$3.22	$3.22	
428D 4WD Backhoe	$3.32	$3.32	$3.32	$3.32	
CS533E Vibratory Roller					
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton					
Supervisor's Truck					
Flatbed Truck					
Air Compressor + tools	N/A	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump	N/A	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A	N/A
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$2.87	$2.87	$2.87	$2.87	
730 (articulated)	$2.87	$2.87	$2.87	$2.87	
735 (articulated)	$2.87	$2.87	$2.87	$2.87	
740 (articulated)	$2.97	$2.97	$2.97	$2.97	
769D	$3.22	$3.22	$3.22	$3.22	
773E	$3.61	$3.61	$3.61	$3.61	
777D	$4.04	$4.04	$4.04	$4.04	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon					
621E (8,000 gal) Water Wagon					
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$2.91	$2.91	$2.91	$2.91	
Notes:					
(1) G.E.T. Source:	Cashman Equipment Compan (July 2014) unless noted	Cashman Equipment Compan (July 2014) unless noted	Cashman Equipment Compan (July 2014) unless noted	NV costs	

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

TIRE COST TABLE [Cost Per Tire[1,2,3]]

EQUIPMENT TYPE	Basis 1 *Northern Nevada*	Basis 2 *Southern Nevada*	Basis 3 *do not use*	Basis 4 *Polymet*	Basis 5
Bulldozers					
D6R	N/A	N/A	N/A	N/A	N/A
D6R w/ Winch	N/A	N/A	N/A	N/A	N/A
D7R	N/A	N/A	N/A	N/A	N/A
D8R	N/A	N/A	N/A	N/A	N/A
D9R	N/A	N/A	N/A	N/A	N/A
D10R	N/A	N/A	N/A	N/A	N/A
D11R	N/A	N/A	N/A	N/A	N/A
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$2,419.20	$2,419.20	$2,419.20	$2,419.20	
14G/H	$3,311.84	$3,311.84	$3,311.84	$3,311.84	
16G/H	$4,480.00	$4,480.00	$4,480.00	$4,480.00	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	N/A	N/A	N/A	N/A	N/A
320C	N/A	N/A	N/A	N/A	N/A
325C	N/A	N/A	N/A	N/A	N/A
330C	N/A	N/A	N/A	N/A	N/A
345B	N/A	N/A	N/A	N/A	N/A
365BL	N/A	N/A	N/A	N/A	N/A
385BL	N/A	N/A	N/A	N/A	N/A
Scrapers					
631G	$9,840.32	$9,840.32	$9,840.32	$9,840.32	
637G PP	$9,840.32	$9,840.32	$9,840.32	$9,840.32	
Wheeled Loaders					
924G	$3,337.60	$3,337.60	$3,337.60	$3,337.60	
928G	$3,337.60	$3,337.60	$3,337.60	$3,337.60	
950G	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
966G	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
972G	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
980G	$8,428.00	$8,428.00	$8,428.00	$8,428.00	
988G	$13,235.60	$13,235.60	$13,235.60	$13,235.60	
990					
992G	$29,513.12	$29,513.12	$29,513.12	$29,513.12	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000	N/A	N/A	N/A	N/A	N/A
KOM PC3000	N/A	N/A	N/A	N/A	N/A
KOM PC4000	N/A	N/A	N/A	N/A	N/A
KOM PC5500	N/A	N/A	N/A	N/A	N/A
KOM PC8000	N/A	N/A	N/A	N/A	N/A
Hydraulic Hammers					
H-120 (fits 325)	N/A	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Shears					
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Grapples					
G315 (fits 322/325)	N/A	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A	N/A

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$1,145.03	$1,145.03	$1,145.03	$1,145.03	
428D 4WD Backhoe	$1,145.03	$1,145.03	$1,145.03	$1,145.03	
CS533E Vibratory Roller	N/A	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	$154.00	$154.00	$154.00	$154.00	
Supervisor's Truck	$154.00	$154.00	$154.00	$154.00	
Flatbed Truck	$154.00	$154.00	$154.00	$154.00	
Air Compressor + tools	N/A	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump	N/A	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A	N/A
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
730 (articulated)	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
735 (articulated)	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
740 (articulated)	$8,428.00	$8,428.00	$8,428.00	$8,428.00	
769D	$4,607.46	$4,607.46	$4,607.46	$4,607.46	
773E	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
777D	$14,348.96	$14,348.96	$14,348.96	$14,348.96	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$3,979.50	$3,979.50	$3,979.50	$3,979.50	
621E (8,000 gal) Water Wagon	$10,247.83	$10,247.83	$10,247.83	$10,247.83	
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$544.88	$544.88	$544.88	$544.88	
Notes:					
(1) Unit Cost Basis:	Cost per tire	Cost per tire	Cost per tire	NV costs	
(2) Cost Basis:	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.	NV costs	
(3) Tire Cost Source:	Purcell Tire Quote 07/28/2014	Purcell Tire Quote 07/28/2014	Purcell Tire Quote 07/28/2014	NV costs	
(4) Tire Wear Source (defined in model):	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	NV costs	

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
EQUIPMENT OPERATORS - Labor Groups and Base Pay Rate ($/hr) (2)								
Bulldozers								
D6R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D6R w/ Winch					Heavy equip op	$23.78	69-201	$35.48
D7R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D8R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D9R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D10R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D11R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Wheeled Dozers								
824G								
834G								
844								
854G								
Motor Graders								
120H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
14G/H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
16G/H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
24M					Heavy equip op	$23.78	69-201	$35.48
Track Excavators								
312C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
320C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
325C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
330C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
345B	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
365BL					Heavy equip op	$23.78	69-201	$35.48
385BL	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
Scrapers								
631G	Group 10	$49.36	Group 15	$59.23	Heavy equip op	$23.78	69-201	$35.48
637G PP	Group 11	$49.79	Group 15	$59.23	Heavy equip op	$23.78	69-201	$35.48
Wheeled Loaders								
924G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
928G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
950G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
966G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
972G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
980G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
988G	Group 11	$49.79	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
990					Heavy equip op	$23.78	69-201	$35.48
992G	Group 11A	$51.43	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
994D							69-201	$35.48
L-2350							69-201	$35.48

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Shovels								
KOM PC2000							69-201	$35.48
KOM PC3000							69-201	$35.48
KOM PC4000							69-201	$35.48
KOM PC5500							69-201	$35.48
KOM PC8000							69-201	$35.48
Hydrauilc Hammers								
H-120 (fits 325)								
H-160 (fits 345)								
H-180 (fits 365/385)								
Demolition Shears								
S340 (fits 322/325/330)								
S365 (fits 330/345)								
S390 (fits 365/385)								
Demolition Grapples								
G315 (fits 322/325)								
G320 (fits 325/330)								
G330 (fits 345/365)								

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Other Equipment								
420D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
428D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
CS533E Vibratory Roller	Group 6	$47.85	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
CS663E Vibratory Roller					Heavy equip op	$23.78	69-201	$35.48
CP533E Sheepsfoot Compactor					Heavy equip op	$23.78	69-201	$35.48
CP663E Sheepsfoot Compactor					Heavy equip op	$23.78	69-201	$35.48
Light Truck - 1.5 Ton					Heavy equip op	$23.78	69-201	$35.48
Supervisor's Truck					Heavy equip op	$23.78	69-201	$35.48
Flatbed Truck					Heavy equip op	$23.78	69-201	$35.48
Air Compressor + tools	Group 3	$46.64	Group 1	$55.67	Heavy equip op	$23.78	69-201	$35.48
Welding Equipment	Group 9	$49.01	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Heavy Duty Drill Rig	Group 10	$49.36	Group 2	$56.62	Driller	$27.01	69-201	$35.48
Pump (plugging) Drill Rig	Group 10	$49.36	Group 2	$56.62	Driller	$27.01	69-201	$35.48
Concrete Pump								
Gas Engine Vibrator	Group 6	$47.85	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Generator 5KW								
HDEP Welder (pipe or liner)								
5 Ton Crane	Group 10A	$49.55	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
20 Ton Crane	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
50 Ton Crane	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
120 Ton Crane					Heavy equip op	$23.78	69-201	$35.48
Fringe Benefits								
Equip Op Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$17.15
Zone and Area Adjustments - Miles and Rates ($/hr) (3)								
Equipment Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Equipment Zone 2	< 50 miles	$0.00	< 20 Miles	$0.00				
Equipment Zone 3	50 to 150 miles	$2.00	20 to 40 miles	$2.00				
Equipment Zone 4	151 to 300 miles	$3.00	40 to 60 miles	$3.00				
Equipment Zone 5	> 300 miles	$4.00	> 60 miles	$3.50				
Equipment Zone 6								
Equipment Zone 7								
NOTES:								
(1) Equipment Type:	Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent	
(2) Equipment Operator Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010					
(3) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE [1] OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
TRUCK DRIVERS - Labor Groups and Base Pay Rate ($/hr) [4]								
725 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
730 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
735 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
740 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
769D	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
773E					Truck operator	$20.01	69-201	$35.48
777D	Dump Truck	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
785C					Truck operator	$20.01	69-201	$35.48
793C					Truck operator	$20.01	69-201	$35.48
797B					Truck operator	$20.01	69-201	$35.48
613E (5,000 gal) Water Wagon	Water Truck > 2,500 gallons	$28.61	Group 3	$46.44	Truck operator	$20.01	69-201	$35.48
621E (8,000 gal) Water Wagon	Water Truck > 2,500 gallons	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
777D Water Truck					Truck operator	$20.01	69-201	$35.48
785C Water Truck					Truck operator	$20.01	69-201	$35.48
Dump Truck (10-12 yd3)	Dump Truck Driver > 8 yds < 18 yds	$29.04	Group 2	$46.23	Truck operator	$20.01	69-201	$35.48
Fringe Benefits								
Truck Driver Fringe Benefits ($/hr)		$13.64		$0.00		$0.00		$17.15

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Zone and Area Adjustments (5)								
Truck Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Truck Zone 2	< 50 miles	$0.00	< 30 miles	$0.00				
Truck Zone 3	50 to 150 miles	$2.00	30-50 miles	$1.50				
Truck Zone 4	151 to 300 miles	$3.00	50-70 miles	$2.50				
Truck Zone 5	> 300 miles	$4.00	>70 miles	$3.50				
Truck Zone 6								
Truck Zone 7								
NOTES:								
(4) Truck Driver Source:	D-B TEAM0533-002		D-B NV20100064 10/01/2010					
(5) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					
LABORERS - Labor Groups and Base Pay Rate ($/hr) (6,7)								
General Laborer	Group 1	$30.82	Group 1	$42.94	Mill laborer	$17.62	69-101	$24.34
Skilled Laborer	Group 4	$31.32	Group 3	$43.25	Mine laborer	$17.77	69-102	$24.34
Driller's Helper	Group 3	$31.07	Group 2	$43.15	Driller	$27.01		$24.34
Rodmen (reinforcing concrete)	Group 2	$30.92	Group 3A	$43.34	Electrician	$28.83		$24.34
Cement finisher	Group 3	$31.07	Group 3A	$43.34	Electrician	$28.83		$24.34
Carpenter		$38.80		$37.76	Electrician	$28.83	69-704	$30.85
Fringe Benefits								
Laborer Fringe Benefits ($/hr)		$0.00		$0.00				$16.87
Carpenter Fringe Benefits ($/hr)		$0.00		$13.35				$16.08
Zone and Area Adjustments (8)								
Laborer Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Laborer Zone 2	< 50 miles	$0.00	< 30 miles	$0.00				
Laborer Zone 3	50 to 150 miles	$2.00	30-50 miles	$1.50				
Laborer Zone 4	151 to 300 miles	$3.00	50-70 miles	$2.50				
Laborer Zone 5	> 300 miles	$4.00	>70 miles	$3.50				
Laborer Zone 6			Laughlin	$2.25				
Laborer Zone 7								
NOTES:								
(6) Laborer Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010					
(7) Carpenter Source:	D-B NV120038 1/6/2012		D-B CARP1780-011					
(8) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
PROJECT MANAGEMENT AND TECHNICAL LABOR - Base Pay Rate ($/hr) (9)								
Project Manager		$66.38		$66.38		$51.87		$76.25
Foreman		$61.88		$61.88		$53.09		$78.04
Field Geologist/Engineer		$96.31		$96.31		$33.00		$48.51
Field Tech/Sampler		$83.75		$83.75		$24.74		$36.37
Range Scientist		$96.31		$96.31		$33.00		$48.51
Senior Planning Engineer								
Project Engineer								
Mechanic/Fitter								
Surveyor								$39.96
Electrician								$56.28
NOTES:								
(9) Project Manager:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31					
(9) Foreman Source:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31					
(9) Techical Labor Source:	SRK Consulting 2012 (Total		SRK Consulting 2012 (Total					
INDIRECT COSTS								
SOCIAL SECURITY, WORKMAN'S COMP, INSURANCE, ETC.								
Unemployment (%)		3.00%		3.00%				1.49%
Retirement/SS/Medicare (%)		7.65%		7.65%				7.65%
Workman's Compensation (%)		8.75%		8.75%				11.00%
Total cost of benefits						40.00%		
NOTES:								
(10) Workman's Comp Source:	RS Means R013113-60 NV		RS Means R013113-60 NV				RS Means R013113-60 MN	
Unemployment tax	NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606				experience rating industry	

File Name:	***PolyMet_cost_data_file_177900.***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4	Basis 5	Basis 6
		Northern Nevada	*Southern Nevada*	*do not use*	*Polymet*		
Revegetation Materials							
Seed Mixes							
Seed Mix	Units						
None							
Mix 1	Cost/Acre	$302.50	$302.50	$475.00	$139.00	atrix_20160511.xlsx	
Mix 2	Cost/Acre	$332.75	$332.75	$570.00	$299.00	atrix_20160511.xlsx	
Mix 3	Cost/Acre	$363.00	$363.00	$275.00	$37.00	atrix_20160511.xlsx	
Mix 4	Cost/Acre	$393.25	$393.25	$812.50			
User Mix 1	Cost/Acre						
User Mix 2	Cost/Acre						
User Mix 3	Cost/Acre						
User Mix 4	Cost/Acre						
User Mix 5 (see Seed Mix sheet)	Cost/Acre						
	Notes:						
Mulch							
Item	Units						
None							
Straw Mulch	Cost/lb	$0.15	$0.15	$0.15	$0.18	atrix_20160511.xlsx	
Hydro Mulch	Cost/lb	$0.25	$0.25	$0.25			
Timber Mulch	Cost/lb						
	Cost/lb						
	Cost/lb						
	Notes:	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)			
		Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)			
Amendments							
Item	Units						
None							
Organic Matter	Cost/lb	$0.70	$0.70	$0.70			
Treated Sludge	Cost/lb						
Chemical	Cost/lb	$0.54	$0.54	$0.54			
	Cost/lb						
	Cost/lb						
	Cost/lb						
	Notes:	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)			
		Western Nevada Supply $27.11 per 50 # bag (July 2014)	Western Nevada Supply $27.11 per 50 # bag (July 2014)	Western Nevada Supply $27.11 per 50 # bag (July 2014)			

Well Abandonment Materials

Description	Units						
Cement	50lb bag	$7.18	$7.18	$7.18	$7.18		
Grout (Low Grade Bentonite)	50lb bag	$9.96	$9.96	$9.96	$9.96		
Inert Material/Cuttings	cy						
Notes:		(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)			
		(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added	(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added	(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added			

Monitoring Costs

Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Monitor Well Pump	ea.	$2,140.00	$2,140.00	$2,140.00	$2,140.00		
Sampling Supplies	ea.	$5.00	$5.00	$5.00	$0.00		
Water Analysis	ea.	$380.00	$380.00	$380.00	$331.00	s draft 050316.docx	
Water treatment analyses	ea.	$450.00	$450.00	$450.00	$100.00		
	ea.	$150.00	$150.00	$150.00			
	ea.	$50.00	$50.00	$50.00			
	ea.	$430.00	$430.00	$430.00			
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
Notes:		(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)		

Fuel, Etc.

Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Off-road Diesel - delivered [1]	$/gal	$3.39	$3.39	$3.39	$2.99	y 12, 2015 9:48 AM	
Pickup Truck Travel	$/mi	$0.56	$0.56	$0.56	$0.56	NV costs	
Electical Power	$/kWh	$0.0853	$0.0853	$0.0853	$0.0780	MP CommercialRates.pdf	
Notes:		(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)			
		Source: Federal Government Vehicle Allowance Rate January 1, 2014	Source: Federal Government Vehicle Allowance Rate January 1, 2014	Source: Federal Government Vehicle Allowance Rate January 1, 2014			
		Source: NVEnergy (July 2014)	Source: NVEnergy (July 2014)	Source: NVEnergy (July 2014)			

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
REVEGETATION									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Seeding - Broadcast Manual [1]	$/acres	$270.00	$0.00	$270.00	$0.00				
Seeding - Broadcast Mechanical [1]	$/acres	$70.00	$30.00	$70.00	$30.00			$139.00	$139.00
Seeding - Drill [1]	$/acres	$140.00	$83.00	$140.00	$83.00				
Seeding - Hydroseeding [1]	$/acres	$250.00	$125.00	$250.00	$125.00				
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Shrub Planting - bare root 6-10 in (150- 250mm) [2]	ea.								
Tree Planting - bare root 11-16 in (270- 400mm) [3]	ea.								
Cactus Planting [4]	ea.								
NOTES:									
(1) Seeding Source:		Kelley Erosion Control (July 2014)		Kelley Erosion Control (July 2014)		Kelley Erosion Control (July 2014)			
(2) Shrub Source:									
(3) Tree Source:									
(4) Cactus Source:									
BUILDING and WALL DEMOLITION									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Building Demolition									
Lg. steel	C.F.								
Lg. concrete	C.F.								
Lg. masonry	C.F.								
Lg. mixed	C.F.								
Sm. steel	C.F.								
Sm. concrete	C.F.								
Sm. masonry	C.F.								
Sm. wood	C.F.								
Wall Demolition									
Block 4 in thick	S.F.		20%		20%		20%		20%
Block 6 in thick	S.F.		20%		20%		20%		20%
Block 8 in thick	S.F.		20%		20%		20%		20%
Block 12 in thick	S.F.		20%		20%		20%		20%
Conc 6 in thick	S.F.		10%		10%		10%		10%
Conc 8 in thick	S.F.		10%		10%		10%		10%
Conc 10 in thick	S.F.		10%		10%		10%		10%
Conc 12 in thick	S.F.		10%		10%		10%		10%
WASTE DISPOSAL									

Nevada Standardized Bond Calculation
Misc. Unit Costs

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Date:	***February, 2016***
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Author/Source:	***SRK Consulting, 2016***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	*Southern Nevada*	*do not use*	*Polymet*
Item	**Units**	**Materials**	**Materials**	**Materials**	**Materials**
Rubbish and Waste Handling					
Dumpster delivery (average for all sizes)	ea.	$47.50	$47.50	$47.50	$47.50
Haul (average for all sizes)	ea.	$149.00	$149.00	$149.00	$149.00
Rent per month (average for all sizes)	ea.	$51.00	$51.00	$51.00	$51.00
Disposal fee per ton (tonne) (average for all sizes)	ton	$56.00	$56.00	$56.00	$56.00
NOTES:					
Dumpster Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Disposal Fee Source:		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Hazardous Material Handling - Solids					
Pickup fees 55 gal. drums	ea.	$247.00	$247.00	$247.00	$247.00
Bulk material (average)	ton	$403.00	$403.00	$403.00	$403.00
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	mile	$5.50	$5.50	$5.50	$5.50
Dump site disposal fee	ton	$285.00	$285.00	$285.00	$285.00
NOTES:					
Solid Handling Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Solid Disposal Fee Source:		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Hazardous Material Handling - Liquids					
Vacuum Truck Pickup (2200 gal or 9,700 litres)	hr.	$145.00	$145.00	$145.00	$145.00
Vacuum Truck Pickup (5000 gal or 2,000 litres)	hr.	$210.00	$210.00	$210.00	$210.00
Dump site disposal fee	ton	$285.00	$285.00	$285.00	$285.00
NOTES:					
Liquid Handling Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Liquid Disposal Fee Source:		2014 Means Heavy Construction, ave. 02 11	2014 Means Heavy Construction, ave. 02 11	2014 Means Heavy Construction, ave. 02 11	
Hydrocarbon Contaminated Soils (HCS)					
Insitu Biotreatment	C.Y	$18.32	$18.32	$18.32	$8.00
HCS disposal fee	C.Y	$275.00	$275.00	$275.00	$8.00
NOTES:					
Insitu Treatement Cost Source		2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	
HCS Disposal Fee Source:		2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
UNDERGROUND OPENING CLOSURE									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Reinforced Concrete Bulkheads and Shaft Covers									
Grade walls - 15 in thick, 8 ft high	C.Y	$139.00		$139.00		$139.00		$139.00	
Grade walls - 15 in thick, 12 ft high	C.Y	$139.00		$139.00		$139.00		$139.00	
Elevated conc, 1-way beam & slab - 15ft span	C.Y	$257.00		$257.00		$257.00		$257.00	
Elevated conc, 1-way beam & slab - 25ft span	C.Y	$245.00		$245.00		$245.00		$245.00	
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Small Adit Plugging									
Bat Gate [5]	ea.	$2,870.42		$2,870.42		$2,870.42		$2,870.42	
Culvert Gate [5]	C.Y	$5,740.85		$5,740.85		$5,740.85		$5,740.85	
Adit Foam Plug [6]	C.Y	$287.04		$287.04		$287.04		$287.04	
Production Opening Foam Plug [6]	C.Y	$287.04		$287.04		$287.04		$287.04	
NOTES:									
(5) Bat Gate Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)			
(6) Foam Plug Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)			
MISC. LINEAR PROJECTS									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Fencing Installation									
Barbed 3-strand	ft	$0.39		$0.39		$0.39		$0.39	
Barbed 4-strand	ft	$0.52		$0.52		$0.52		$0.52	
Barbed 5-strand	ft	$0.65		$0.65		$0.65		$0.65	
Chain link 8 ft -10 ft Install	ft	$33.00		$33.00		$33.00		$33.00	
Wood stockade fence 6 ft high - Install	ft	$12.70		$12.70		$12.70		$12.70	
	ft								
	ft								
Fencing Removal									
Barbed 3-strand Removal	ft								
Barbed 4-strand Removal	ft								
Barbed 5-strand Removal	ft								
Chain link 8 ft -10 ft Removal	ft								
Wood, all types 4 ft -6 ft high Removal	ft								
	ft								
	ft								
Culvert Removal									
12 in (300 mm) Diameter	ft								
18 in (450 mm) Diameter	ft								
24 in (600 mm) Diameter	ft								
36 in (1m) Diameter	ft								
Pipeline Removal									
Plastic Pipe 3/4 in (mm) - 4 in (100 mm) diameter	ft								
6 in (150 mm) - 8 in (200 mm)	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
10 in (250 mm) - 18 in (450 mm)	ft								
20 in (500 mm) - 36 in (1 m)	ft								
Pipe and Drainpipe Installation									
Water 4in (100mm) 40ft (12m) length, welded HDPE	ft	$3.74		$3.74		$3.74		$3.74	
Water 6in (150mm) 40ft (12m) length, welded HDPE	ft	$7.45		$7.45		$7.45		$7.45	
Water 12in (300mm) 40ft (12m) length, welded HDPE	ft								
Drain 4in (100mm) perforated PVC	ft	$1.32		$1.32		$1.32		$1.32	
Drain 6in (150mm) perforated PVC	ft	$2.98		$2.98		$2.98		$2.98	
Drain 4in (100mm) corrugated, perf or plain	ft	$0.46		$0.46		$0.46		$0.46	
Drain 6in (150mm) corrugated., perf or plain	ft	$1.33		$1.33		$1.33		$1.33	
Drain Rock Preparation									
Item	**Units**		**Total**		**Total**		**Total**		**Total**
Crushing	C.Y		$0.50		$0.50		$0.50		$0.50
Screening	C.Y		$0.50		$0.50		$0.50		$0.50
Misc.									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Backhoe work	C.Y								
Powerline and Transformer Removal			**Total**		**Total**		**Total**		**Total**
Single Pole Powerlines [7]	mile		$39,894		$39,894		$39,894		$39,894
Double Pole Powerlines [8]	mile		$45,593		$45,593		$45,593		$45,593
Substation [9]	unit		$28,591		$28,591		$5,000		$5,000
NOTES:									
(7) Single Pole Source:		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014			
(8) Double Pole Source:		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014			
(9) Transformer Source:		Sierra Pacific Power Co. estimate (2004) Adjusted to 2013		Sierra Pacific Power Co. estimate (2004) Adjusted to 2013		PolyMet AOC Schedule #63			

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
EROSION, EVAPORATION and SEDIMENTATION CONTROL									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Rip-Rap & Rock Lining									
Rip-Rap 3/8 to 1/4 C.Y. pieces, grouted	S.Y.	$17.70		$17.70		$17.70		$17.70	
Rip-Rap 18 in min thick, no grout	S.Y.	$5.85		$5.85		$5.85		$5.85	
Gabions, 6 in deep	S.Y.	$8.35		$8.35		$8.35		$8.35	
Gabions, 9 in deep	S.Y.	$12.15		$12.15		$12.15		$12.15	
Gabions, 12 in deep	S.Y.	$16.45		$16.45		$16.45		$16.45	
Gabions, 18 in deep	S.Y.	$23.00		$23.00		$23.00		$23.00	
Gabions, 36 in deep	S.Y.	$31.00		$31.00		$31.00		$31.00	
Liner Installation									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Site grading	S.F.								
Compaction	S.F.								
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
60 mil HDPE Liner	S.F.		$0.53		$0.53		$0.53		$0.53
Construction Management Support									
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
Office Trailer, Furnished, no hook-ups	month		$167.00		$167.00		$167.00		$167.00
Toilet Portable, chemical	month		$132.00		$132.00		$132.00		$132.00
PRODUCTION OR DEWATERING WELL PUMP REMOVAL									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Pump Type									
Submersible [10]	ft to pump	$2.51	$5.45	$2.51	$5.45	$2.51	$5.45	$2.51	$5.45
Line Shaft [10]	ft to pump	$5.85	$12.72	$5.85	$12.72	$5.85	$12.72	$5.85	$12.72
NOTES:									
(10) Pump Removal Source:		WDC Exploration 12/2005 (adjusted to 2014)		WDC Exploration 12/2005 (adjusted to 2014)		WDC Exploration 12/2005 (adjusted to 2014)			

File Name:	***CostData STD 3.xls***
Date:	***December 1, 2005***
Cost Basis:	***Standardized Data***
Author/Source:	***SRK Consulting, 2016***

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate					
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	5%	5%	5%	5%	
3. Insurance (9)		of labor costs			
4. Bond (10)		of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)		of the O&M costs			
	<=	<=	<=	>	
Variable Rate					

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

Attachment 3.

Labor rates

MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY PREVAILING WAGES FOR STATE FUNDED CONSTRUCTION PROJECTS

THIS NOTICE MUST BE POSTED ON THE JOBSITE IN A CONSPICUOUS PLACE

Construction Type: Commercial

County Number: 69

County Name: ST. LOUIS

Effective: 2015-12-21 Revised: 2016-04-25

This project is covered by Minnesota prevailing wage statutes. Wage rates listed below are the minimum hourly rates to be paid on this project.

All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at a rate of one and one half (1 1/2) times the basic hourly rate.

Violations should be reported to:

Department of Labor and Industry
Prevailing Wage Section
443 Lafayette Road N
St Paul, MN 55155
(651) 284-5091
DLI.PrevWage@state.mn.us

* Indicates that adjacent county rates were used for the labor class listed.

County: ST. LOUIS (69)

LABOR CODE AND CLASS		EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
LABORERS (101 - 112) (SPECIAL CRAFTS 701 - 730)					
101	LABORER, COMMON (GENERAL LABOR WORK)	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
102	LABORER, SKILLED (ASSISTING SKILLED CRAFT JOURNEYMAN)	2015-12-21	23.54	16.42	39.96

		2016-05-01	24.34	16.87	41.21
103	LABORER, LANDSCAPING (GARDENER, SOD LAYER AND NURSERY OPERATOR)	2015-12-21	11.00	0.00	11.00
104*	FLAG PERSON	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
105*	WATCH PERSON	2015-12-21	21.19	16.42	37.61
		2016-05-01	21.99	16.87	38.86
106	BLASTER	2015-12-21	24.24	16.42	40.66
		2016-05-01	25.04	16.87	41.91
107	PIPELAYER (WATER, SEWER AND GAS)	2015-12-21	30.61	16.57	47.18
		2016-05-01	31.73	17.02	48.75
108	TUNNEL MINER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
109	UNDERGROUND AND OPEN DITCH LABORER (EIGHT FEET BELOW STARTING GRADE LEVEL)	2015-12-21	28.81	16.57	45.38
		2016-05-01	29.93	17.02	46.95
110	SURVEY FIELD TECHNICIAN (OPERATE TOTAL STATION, GPS RECEIVER, LEVEL, ROD OR RANGE POLES, STEEL TAPE MEASUREMENT; MARK AND DRIVE STAKES; HAND OR POWER DIGGING FOR AND IDENTIFICATION OF MARKERS OR MONUMENTS; PERFORM AND CHECK CALCULATIONS; REVIEW AND UNDERSTAND CONSTRUCTION PLANS AND LAND SURVEY MATERIALS). THIS CLASSIFICATION DOES NOT APPLY TO THE WORK PERFORMED ON A PREVAILING WAGE PROJECT BY A LAND SURVEYOR WHO IS LICENSED PURSUANT TO MINNESOTA STATUTES, SECTIONS 326.02 TO 326.15.	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
111		2015-12-21	23.54	16.42	39.96

	TRAFFIC CONTROL PERSON (TEMPORARY SIGNAGE)				
		2016-05-01	24.34	16.87	41.21
SPECIAL EQUIPMENT (201 - 204)					
201	ARTICULATED HAULER	2015-12-21	35.48	17.15	52.63
202	BOOM TRUCK	2015-12-21	35.48	17.15	52.63
203*	LANDSCAPING EQUIPMENT, INCLUDES HYDRO SEEDER OR MULCHER, SOD ROLLER, FARM TRACTOR WITH ATTACHMENT SPECIFICALLY SEEDING, SODDING, OR PLANT, AND TWO-FRAMED FORKLIFT (EXCLUDING FRONT, POSIT-TRACK, AND SKID STEER LOADERS), NO EARTHWORK OR GRADING FOR ELEVATIONS	2015-12-21	33.97	17.15	51.12
204	OFF-ROAD TRUCK	2015-12-21	35.48	17.15	52.63
205	PAVEMENT MARKING OR MARKING REMOVAL EQUIPMENT (ONE OR TWO PERSON OPERATORS); SELF-PROPELLED TRUCK OR TRAILER MOUNTED UNITS.	2015-12-21	26.66	18.77	45.43
		2016-05-02	28.01	18.77	46.78
HIGHWAY/HEAVY POWER EQUIPMENT OPERATOR					
GROUP 2		2015-12-21	32.92	17.20	50.12
306	GRADER OR MOTOR PATROL				
308	TUGBOAT 100 H.P. AND OVER WHEN LICENSE REQUIRED (HIGHWAY AND HEAVY ONLY)				
GROUP 3		2015-12-21	33.23	17.90	51.13
		2016-05-01	33.84	18.90	52.74
309	ASPHALT BITUMINOUS STABILIZER PLANT				
310	CABLEWAY				
312	DERRICK (GUY OR STIFFLEG)(POWER)(SKIDS OR STATIONARY) (HIGHWAY AND HEAVY ONLY)				

314 DREDGE OR ENGINEERS, DREDGE (POWER) AND ENGINEER

316 LOCOMOTIVE CRANE OPERATOR

320 TANDEM SCRAPER

322 TUGBOAT 100 H.P AND OVER (HIGHWAY AND HEAVY ONLY)

GROUP 4	2015-12-21	32.93	17.90	50.83
	2016-05-01	33.54	18.90	52.44

323 AIR TRACK ROCK DRILL

324 AUTOMATIC ROAD MACHINE (CMI OR SIMILAR) (HIGHWAY AND HEAVY ONLY)

325 BACKFILLER OPERATOR

327 BITUMINOUS ROLLERS, RUBBER TIRED OR STEEL DRUMMED (EIGHT TONS AND OVER)

328 BITUMINOUS SPREADER AND FINISHING MACHINES (POWER), INCLUDING PAVERS, MACRO SURFACING AND MICRO SURFACING, OR SIMILAR TYPES (OPERATOR AND SCREED PERSON)

329 BROKK OR R.T.C. REMOTE CONTROL OR SIMILAR TYPE WITH ALL ATTACHMENTS

330 CAT CHALLENGER TRACTORS OR SIMILAR TYPES PULLING ROCK WAGONS, BULLDOZERS AND SCRAPERS

331 CHIP HARVESTER AND TREE CUTTER

332 CONCRETE DISTRIBUTOR AND SPREADER FINISHING MACHINE, LONGITUDINAL FLOAT, JOINT MACHINE, AND SPRAY MACHINE

334 CONCRETE MOBIL (HIGHWAY AND HEAVY ONLY)

335 CRUSHING PLANT (GRAVEL AND STONE) OR GRAVEL WASHING, CRUSHING AND SCREENING PLANT

336 CURB MACHINE

337 DIRECTIONAL BORING MACHINE

338 DOPE MACHINE (PIPELINE)

340 DUAL TRACTOR

341 ELEVATING GRADER

345 GPS REMOTE OPERATING OF EQUIPMENT

347 HYDRAULIC TREE PLANTER

348 LAUNCHER PERSON (TANKER PERSON OR PILOT LICENSE)

349 LOCOMOTIVE (HIGHWAY AND HEAVY ONLY)

350 MILLING, GRINDING, PLANNING, FINE GRADE, OR TRIMMER MACHINE

352 PAVEMENT BREAKER OR TAMPING MACHINE (POWER DRIVEN) MIGHTY MITE OR SIMILAR TYPE

354 PIPELINE WRAPPING, CLEANING OR BENDING MACHINE

356 POWER ACTUATED HORIZONTAL BORING MACHINE, OVER SIX INCHES

357 PUGMILL

359 RUBBER-TIRED FARM TRACTOR WITH BACKHOE INCLUDING ATTACHMENTS (HIGHWAY AND HEAVY ONLY)

360 SCRAPER

361 SELF-PROPELLED SOIL STABILIZER

362 SLIP FORM (POWER DRIVEN) (PAVING)

363 TIE TAMPER AND BALLAST MACHINE

365 TRACTOR, WHEEL TYPE, OVER 50 H.P. WITH PTO UNRELATED TO LANDSCAPING (HIGHWAY AND HEAVY ONLY)

367 TUB GRINDER, MORBARK, OR SIMILAR TYPE

GROUP 5 *	2015-12-21	18.77	8.18	26.95

370 BITUMINOUS ROLLER (UNDER EIGHT TONS)

371 CONCRETE SAW (MULTIPLE BLADE) (POWER OPERATED)

372 FORM TRENCH DIGGER (POWER)

375 HYDRAULIC LOG SPLITTER

376 LOADER (BARBER GREENE OR SIMILAR TYPE)

377 POST HOLE DRIVING MACHINE/POST HOLE AUGER

379 POWER ACTUATED JACK

381 SELF-PROPELLED CHIP SPREADER (FLAHERTY OR SIMILAR)

382 SHEEP FOOT COMPACTOR WITH BLADE . 200 H.P. AND OVER

383 SHOULDERING MACHINE (POWER) APSCO OR SIMILAR TYPE INCLUDING SELF-PROPELLED SAND AND CHIP SPREADER

384 STUMP CHIPPER AND TREE CHIPPER

385 TREE FARMER (MACHINE)

GROUP 6	2015-12-21	28.68	17.90	46.58
	2016-05-01	29.29	18.90	48.19

387 CAT, CHALLENGER, OR SIMILAR TYPE OF TRACTORS, WHEN PULLING DISK OR ROLLER

389 DREDGE DECK HAND

391 GRAVEL SCREENING PLANT (PORTABLE NOT CRUSHING OR WASHING)

393 LEVER PERSON

395 POWER SWEEPER

396 SHEEP FOOT ROLLER AND ROLLERS ON GRAVEL COMPACTION, INCLUDING VIBRATING ROLLERS

397 TRACTOR, WHEEL TYPE, OVER 50 H.P., UNRELATED TO LANDSCAPING

COMMERCIAL POWER EQUIPMENT OPERATOR

GROUP 1		2015-12-21	37.74	17.15	54.89
501	HELICOPTER PILOT (COMMERCIAL CONSTRUCTION ONLY)				
502	TOWER CRANE 250 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
503	TRUCK CRAWLER CRANE WITH 200 FEET OF BOOM AND OVER, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 2		2015-12-21	37.40	17.15	54.55
504	CONCRETE PUMP WITH 50 METERS/164 FEET OF BOOM AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
505	PILE DRIVING WHEN THREE DRUMS IN USE (COMMERCIAL CONSTRUCTION ONLY)				
506	TOWER CRANE 200 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
507	TRUCK OR CRAWLER CRANE WITH 150 FEET OF BOOM UP TO AND NOT INCLUDING 200 FEET, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 3		2015-12-21	35.99	17.15	53.14
508	ALL-TERRAIN VEHICLE CRANES (COMMERCIAL CONSTRUCTION ONLY)				
509	CONCRETE PUMP 32-49 METERS/102-164 FEET (COMMERCIAL CONSTRUCTION ONLY)				
510	DERRICK (GUY & STIFFLEG) (COMMERCIAL CONSTRUCTION ONLY)				
511	STATIONARY TOWER CRANE UP TO 200 FEET				
512	SELF-ERECTING TOWER CRANE 100 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)				
513	TRAVELING TOWER CRANE (COMMERCIAL CONSTRUCTION ONLY)				
514	TRUCK OR CRAWLER CRANE UP TO AND NOT INCLUDING 150 FEET OF BOOM, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 4		2015-12-21	35.65	17.15	52.80
515	CRAWLER BACKHOE INCLUDING ATTACHMENTS (COMMERCIAL CONSTRUCTION ONLY)				
516	FIREPERSON, CHIEF BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
517	HOIST ENGINEER (THREE DRUMS OR MORE) (COMMERCIAL CONSTRUCTION ONLY)				
518	LOCOMOTIVE (COMMERCIAL CONSTRUCTION ONLY)				
519	OVERHEAD CRANE (INSIDE BUILDING PERIMETER) (COMMERCIAL CONSTRUCTION ONLY)				
520	TRACTOR . BOOM TYPE (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 5		2015-12-21	35.48	17.15	52.63
521	AIR COMPRESSOR 450 CFM OR OVER (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)				

522 CONCRETE MIXER (COMMERCIAL CONSTRUCTION ONLY)

523 CONCRETE PUMP UP TO 31 METERS/101 FEET OF BOOM

524 DRILL RIGS, HEAVY ROTARY OR CHURN OR CABLE DRILL WHEN USED FOR CAISSON FOR ELEVATOR OR BUILDING CONSTRUCTION (COMMERCIAL CONSTRUCTION ONLY)

525 FORKLIFT (COMMERCIAL CONSTRUCTION ONLY)

526 FRONT END, SKID STEER 1 C YD AND OVER

527 HOIST ENGINEER (ONE OR TWO DRUMS) (COMMERCIAL CONSTRUCTION ONLY)

528 MECHANIC-WELDER (ON POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)

529 POWER PLANT (100 KW AND OVER OR MULTIPLES EQUAL TO 100KW AND OVER) (COMMERCIAL CONSTRUCTION ONLY)

530 PUMP OPERATOR AND/OR CONVEYOR (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)

531 SELF-ERECTING TOWER CRANE UNDER 100 FEET MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)

532 STRADDLE CARRIER (COMMERCIAL CONSTRUCTION ONLY)

533 TRACTOR OVER D2 (COMMERCIAL CONSTRUCTION ONLY)

534 WELL POINT PUMP (COMMERCIAL CONSTRUCTION ONLY)

GROUP 6	2015-12-21	33.97	17.15	51.12

535 CONCRETE BATCH PLANT (COMMERCIAL CONSTRUCTION ONLY)

536 FIREPERSON, FIRST CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)

537 FRONT END, SKID STEER UP TO 1 C YD

538 GUNITE MACHINE (COMMERCIAL CONSTRUCTION ONLY)

539 TRACTOR OPERATOR D2 OR SIMILAR SIZE (COMMERCIAL CONSTRUCTION ONLY)

540 TRENCHING MACHINE (SEWER, WATER, GAS) EXCLUDES WALK BEHIND TRENCHER

GROUP 7	2015-12-21	32.85	17.15	50.00

541 AIR COMPRESSOR 600 CFM OR OVER (COMMERCIAL CONSTRUCTION ONLY)

542 BRAKEPERSON (COMMERCIAL CONSTRUCTION ONLY)

543 CONCRETE PUMP/PUMPCRETE OR COMPLACO TYPE (COMMERCIAL CONSTRUCTION ONLY)

544 FIREPERSON, TEMPORARY HEAT SECOND CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)

545 OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS AND MILLING MACHINES, OR OTHER SIMILAR POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)

546 PICK UP SWEEPER (ONE CUBIC YARD HOPPER CAPACITY) (COMMERCIAL CONSTRUCTION ONLY)

547 PUMP AND/OR CONVEYOR (COMMERCIAL CONSTRUCTION ONLY)

GROUP 8 *		2015-12-21	30.84	17.15	47.99
548	ELEVATOR OPERATOR (COMMERCIAL CONSTRUCTION ONLY)				
549	GREASER (COMMERCIAL CONSTRUCTION ONLY)				
550	MECHANICAL SPACE HEATER (TEMPORARY HEAT NO BOILER LICENSE REQUIRED) (COMMERCIAL CONSTRUCTION ONLY)				

TRUCK DRIVERS

GROUP 1		2015-12-21	28.70	15.20	43.90
		2016-05-01	30.15	15.20	45.35
601	MECHANIC . WELDER				
602	TRACTOR TRAILER DRIVER				
603	TRUCK DRIVER (HAULING MACHINERY INCLUDING OPERATION OF HAND AND POWER OPERATED WINCHES)				
GROUP 2		2015-12-21	28.15	15.20	43.35
		2016-05-01	29.60	15.20	44.80
604	FOUR OR MORE AXLE UNIT, STRAIGHT BODY TRUCK				
GROUP 3		2015-12-21	28.15	15.20	43.35
		2016-05-01	29.60	15.20	44.80
605	BITUMINOUS DISTRIBUTOR DRIVER				
606	BITUMINOUS DISTRIBUTOR (ONE PERSON OPERATION)				
607	THREE AXLE UNITS				
GROUP 4 *		2015-12-21	27.80	15.20	43.00
		2016-05-01	29.25	15.20	44.45
608	BITUMINOUS DISTRIBUTOR SPRAY OPERATOR (REAR AND OILER)				
609	DUMP PERSON				
610	GREASER				
611	PILOT CAR DRIVER				
612	RUBBER-TIRED, SELF-PROPELLED PACKER UNDER 8 TONS				
613	TWO AXLE UNIT				
614	SLURRY OPERATOR				
615	TANK TRUCK HELPER (GAS, OIL, ROAD OIL, AND WATER)				
616	TRACTOR OPERATOR, UNDER 50 H.P.				

SPECIAL CRAFTS

701	HEATING AND FROST INSULATORS	2015-12-21	39.31	16.20	55.51
		2016-06-06	41.26	15.80	57.06
702	BOILERMAKERS	2015-12-21	34.15	26.37	60.52
		2016-01-01	35.55	26.52	62.07
703	BRICKLAYERS	2015-12-21	32.87	20.96	53.83
704	CARPENTERS	2015-12-21	29.55	16.08	45.63
		2016-05-01	30.85	16.08	46.93
705	CARPET LAYERS (LINOLEUM)	2015-12-21	32.74	13.25	45.99
706	CEMENT MASONS	2015-12-21	30.61	16.88	47.49
		2016-05-01	31.11	16.88	47.99
707	ELECTRICIANS	2015-12-21	33.90	24.13	58.03
		2016-05-29	35.01	24.62	59.63
708	ELEVATOR CONSTRUCTORS	2015-12-21	44.93	33.36	78.29
		2016-01-01	45.87	35.07	80.94
709	GLAZIERS	2015-12-21	27.37	19.02	46.39
		2016-05-02	28.72	19.02	47.74
710*	LATHERS	2015-12-21	29.55	16.08	45.63
		2016-04-30	30.85	16.08	46.93
712	IRONWORKERS	2015-12-21	31.04	23.45	54.49
714	MILLWRIGHT	2015-12-21	32.57	14.73	47.30
		2016-05-01	34.42	14.73	49.15

715	PAINTERS (INCLUDING HAND BRUSHED, HAND SPRAYED, AND THE TAPING OF PAVEMENT MARKINGS)	2015-12-21	26.66	18.77	45.43
		2016-05-02	28.01	18.77	46.78
716	PILEDRIVER (INCLUDING VIBRATORY DRIVER OR EXTRACTOR FOR PILING AND SHEETING OPERATIONS)	2015-12-21	34.11	17.08	51.19
		2016-05-01	35.65	17.08	52.73
717	PIPEFITTERS . STEAMFITTERS	2015-12-21	38.17	18.13	56.30
		2016-05-02	39.67	18.13	57.80
718	PLASTERERS	2015-12-21	31.24	17.63	48.87
		2016-05-01	31.74	17.63	49.37
719	PLUMBERS	2015-12-21	38.17	18.13	56.30
		2016-05-02	39.67	18.13	57.80
720	ROOFER	2015-12-21	29.65	17.14	46.79
721	SHEET METAL WORKERS	2015-12-21	29.56	26.32	55.88
722	SPRINKLER FITTERS	2015-12-21	33.83	17.37	51.20
		2016-01-01	33.83	17.77	51.60
723	TERRAZZO WORKERS	2015-12-21	30.77	19.74	50.51
724	TILE SETTERS	2015-12-21	24.09	21.94	46.03
725	TILE FINISHERS	2015-12-21	17.09	17.44	34.53
726	DRYWALL TAPER	2015-12-21	30.66	15.37	46.03
727	WIRING SYSTEM TECHNICIAN	2015-12-21	36.00	14.43	50.43
		2016-07-01	36.90	14.43	51.33

728	WIRING SYSTEMS INSTALLER	2015-12-21	25.21	12.02	37.23
		2016-07-01	25.84	12.02	37.86
729	ASBESTOS ABATEMENT WORKER	2015-12-21	28.50	16.88	45.38
		2016-01-01	29.30	17.33	46.63
730	SIGN ERECTOR	2015-12-21	26.44	12.93	39.37
		2016-05-01	27.59	12.93	40.52

Fee Schedule—2016

Rev. 01/01/16

Description	Rate* (U.S. dollars)
Principal	$145-295
Consultant/Advisor	$155-250
Engineer/Scientist/Specialist III	$125-150
Engineer/Scientist/Specialist II	$95-120
Engineer/Scientist/Specialist I	$65-90
Technician III	$125-150
Technician II	$95-120
Technician I	$50-90
Support Personnel II	$95-150
Support Personnel I	$50-90

Rates for litigation support services will include a 30% surcharge.

A ten percent (10%) markup will be added to subcontracts for professional support and construction services to cover overhead and insurance surcharge expenses.

Invoices are payable within 30 days of the date of the invoice. Any amount not paid within 30 days shall bear interest from the date 10 days after the date of the invoice at a rate equal to the lesser of 18 percent per annum or the highest rate allowed by applicable law.

Reimbursable expenses including, but not limited to, the actual and reasonable costs of transportation, meals, lodging, parking costs, postage, and shipping charges will be billed at actual cost. Materials and supplies charges, printing charges, and equipment rental charges will be billed in accordance with Barr's standard rate schedules. Mileage will be billed at the IRS-allowable rate.

Principal category includes consultants, advisors, engineers, scientists, and specialists who are officers of the company.

Consultant/Advisor category includes experienced personnel in a variety of fields. These professionals typically have advanced background in their areas of practice and include engineers, engineering specialists, scientists, related technical professionals, and professionals in complementary service areas such as communications and public affairs.

Engineer/Scientist/Specialist categories include registered professionals and professionals in training (e.g. engineers, geologists, and landscape architects), and graduates of engineering and science degree programs.

Technician category includes CADD operators, construction observers, cost estimators, data management technicians, designers, drafters, engineering technicians, interns, safety technicians, surveyors, and water, air, and waste samplers.

Support Personnel category includes information management, project accounting, report production, word processing, and other project support personnel.

*Rates do not include sales tax on services that may be required in some jurisdictions.

April 22, 2016

PolyMet Mining, Inc.
Attn. Steve DeVaney
Via Email
sdevaney@polymetmining.com

Environmental Science & Engineering

RE: Cost Estimates on Several Items

Attached are the cost estimates that will be used in the Contingency Reclamation Estimate (CRE) as part of the application for the permit to mine with the State of Minnesota. Included are the following items:

1. Hourly labor rates by staff type
2. Hourly rate for surveying
3. Wetland data collection, data entry and quality assurance, per annum cost estimate
4. DMR data collection, data entry, quality assurance and report preparation, per annum cost estimate
5. Water quality report preparation, per annum cost estimate
6. SW-619 industrial landfill monitoring and maintenance, per annum cost estimate (closed state)
7. Tailings basin instrumentation inspection and data collection, per annum cost estimate (current activity)
8. Tailings basin instrumentation report preparation, per annum cost estimate (current activity)
9. Tailings basin instrumentation inspection and data collection, per annum cost estimate (operating activity)
10. Tailings basin instrumentation report preparation, per annum cost estimate (operating activity)
11. Reverse osmosis treatment plants operation, per annum cost estimate

The cost estimates for items 3-8 are based on our experience performing these duties in years past. We have a high degree of certainty in terms of level of effort and unit rates for these items. For items 9 and 10 we lack detail as to how operating conditions would affect the level of effort, therefore we roughly estimated double the level of effort of current, non-operating conditions. For Item 11 we based our cost estimate on our experience elsewhere, however with the absence of design criteria and operating requirements, we estimated what typical plants of this size may cost to operate.

Please note that all pricing is valid for the remainder of calendar year 2016. Pricing is subject to an increase not to exceed 2.5% each year thereafter, effective on Jan 1st, for a period of 10 years. If you should have any questions, please feel free to contact Mr. Bruce Trebnick at 218-742-1051 (office) or 218-780-2006 (cell).

Sincerely,

Richard H. Crum, P[illegible]
NTS, President

PRICING REQUEST FOR SEVERAL ITEMS FOR THE CONTINGENCY RECLAMATION ESTIMATE (CRE)

AS PART OF THE APPLICATION FOR THE PERMIT TO MINE WITH THE STATE OF MINNESOTA

Prepared For

Steve DeVaney

PolyMet Mining, Inc.

Prepared By

Northeast Technical Services, Inc. (NTS)

526 Chestnut Street

Virginia, Minnesota 55792

218.741.4290

April 21, 2016

Environmental Science & Engineering

Table of Contents

1. Hourly labor rates by staff type

Staff Type	Hourly Rate
Entry Level Professional (I)	88
Middle Level Professional (II)	108
Senior Level Professional (III)	128
Principal Level Professional (IV)	148
WWTP Operator, Class B, C & D	58
WWTP Operator, Class A	128
Field Scientist	78
Project Support (Clerical)	58
Laborer/Intern	48

2. Hourly rate for surveying

$98/hour; includes Professional Engineer or EIT along with survey equipment. NTS is not permitted to survey property boundaries at this time.

3. Wetland data collection, data entry and quality assurance, per annum cost estimate

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	2220.00	/lump	1	2220
Misc. Consumable Items	504.00	/lump	1	504
Pickup Truck 4x4	0.70	/mile	2000	1,400
Staff, Data Collection (Avg Rate)	83.00	/hour	520	43,160
			Total:	$47,284

Per annum cost estimate *per monitoring point* (21 points): $2,252

4. **DMR data collection, data entry, quality assurance and report preparation, per annum cost estimate**

Facility #1) Hoyt Lakes Tailings Basin

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	7,276.00	/lump	1	7,276
Misc. Consumable Items	3,000.00	/lump	1	3,000
Pickup Truck 4x4	0.70	/mile	3400	2,380
Staff, Data Collection (Avg Rate)	83.00	/hour	560	46,480
Staff, Reporting (Avg Rate)	92.00	/hour	240	22,080
			Total:	$81,216

Facility #2) Hoyt Lakes Mining Area

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	4,957.00	/lump	1	4,957
Misc. Consumable Items	648.00	/lump	1	648
Pickup Truck 4x4	0.70	/mile	1600	1,120
Staff, Data Collection (Avg Rate)	83.00	/hour	260	21,580
Staff, Reporting (Avg Rate)	92.00	/hour	264	24,288
			Total:	$52,593

Per Annum Cost Estimate, Total for *Both Facilities*: $133,809

5. **Water quality report preparation, per annum cost estimate**

Item	Rate	Unit	Quantity	Subtotal
Staff, Reporting (Avg Rate)	97.00	/hour	36	3,492
			Total:	$3,492

6. **SW-619 industrial landfill monitoring and maintenance, per annum cost estimate (closed state)**

Item	Rate	Unit	Quantity	Subtotal
Landfill Inspection	400.00	/ea	3	1,200
Cover Mowing	5327.00	/lump	1	5,327
Groundwater Monitoring	850.00	/well	7	5,950
Gas Vent Monitoring	600.00	/vent	7	4,200
Staff, Reporting (Avg Rate)	88.00	/day	60	5,280
			Total:	$21,957

Actual cost for maintenance will vary year-to-year. Costs shown are 3 year average.

NTS recommends that if the landfill leachate plume is proven to be stable, the number of groundwater sampling events/locations be reduced after five years.

7. **Tailings basin instrumentation inspection and data collection, per annum cost estimate (current activity)**

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	2360.00	/lump	1	2360
Misc. Consumable Items	76.00	/lump	1	76
Pickup Truck 4x4	0.70	/mile	400	280
Staff, Data Collection (Average Rate)	113.00	/hour	112	12,656
			Total:	$15,372

Per Annum Cost Estimate, *per event* (2 events): $7,686

8. **Tailings basin instrumentation report preparation, per annum cost estimate (current activity)**

Item	Rate	Unit	Quantity	Subtotal
Staff, Reporting (Average Rate)	114.00	/hour	50	5,700
			Total:	$5,700

Per Annum Cost Estimate, *per event* (2 events): $2,850

9. **Tailings basin instrumentation inspection and data collection, per annum cost estimate (operating activity)**

Assumed Double Effort of Current Activity (Item #7)

Per Annum Cost Estimate, *per event* (2 events): $15,372

10. **Tailings basin instrumentation report preparation, per annum cost estimate (operating activity)**

Assumed Double Effort of Current Activity (Item #8)

Per Annum Cost Estimate, *per event* (2 events): $5,700

11. **Reverse osmosis treatment plants operation, per annum cost estimate**

Operation of RO treatment systems is dependent upon numerous variables. Proposed cost estimates are subject to the following variables and qualifying statements:

- Typical hours of plant operation required, assuming not continuous.
- Typical level of capacity required, assuming not maximum.
- Typical influent water quality and expected variability.
- Treatment objectives.
- Operational Strategies and SCADA Capabilities: Automation, remote monitoring, remote control capabilities, etc
- Are we to include membrane filter replacement in the estimate?
- How will reject water be stored or otherwise handled?

The following per annum cost estimate is based on this set of assumptions:

- Plants are operational 24/7 at 50% of capacity.
- Two RO plants (500gpm and 2000gpm) are both in operation; the cost estimate below is for combined operation and maintenance.
- Operator required 1 site visit per day.
- Operator scheduled 8 hours per day, 7 days a week.
- Operators are paid flat rate $40 per 8 hours "on-call".
- Not charging travel time for routine operation.
- Class A operator oversight 8 hours per week on average.
- Initial water quality is moderately impaired and moderately variable.
- Membrane filter replacement is not included.
- Potential reject water handling costs are not included.
- See Appendix A for detailed assumed design parameters.

Wastewater Treatment:

Item	Rate	Unit	Quantity	Subtotal
Energy Costs*	112,000.00	/lump	1	112,000
Chemical Costs*	599,000.00	/lump	1	599,000
Maintenance Costs*	124,000.00	/lump	1	124,000
Pickup Truck 4x4	0.70	/mi	32,000	22,400
Operator "on-call" charge	40.00	/8 hours	730	29,200
Operator, Class B, C or D	58.00	/hour	3,800	220,400
Operator, Class A	128.00	/hour	416	53,248
			Total:	$1,160,248

*See Appendix B for detailed breakdown of costs.

Wastewater Pretreatment:

Item	Rate	Unit	Quantity	Subtotal
Coagulation/Flocculation/Settling	245,000.00	/lump	1	245,000
Ultrafiltration	105,000.00	/lump	1	105,000
			Total:	$350,000

Pretreatment may be optional depending on influent water quality and effluent objectives.

Treatment costs may increase/decrease dependent on pretreatment options.

Appendix A: Assumed design parameters for WWTP's

Design Parameters:		
Percent Recovery	75%	
Design Feed Flow (Max)	3.6	mgd
Design Permeate Flow (Max)	2.70	mgd
Design Concentrate Flow (Max)	0.90	mgd
Average Feed Flow	1.80	mgd
Average Permeate Flow	1.35	mgd
Average Concentrate Flow	0.45	mgd
No. of Skids	3	skids
Size of RO Skids	0.90	mgd
RO Flux Rate	10	gfd
RO Area per Element	400	ft/elements
Number of Pressure Vessels per Skid	7	PV/skid
Number of RO Elements per Skid	231.00	elements/skid
Number of Cartridge Filters	157.00	

Appendix B: Detailed operation & maintenance costs for WWTP's

Annual Energy Cost	$112,000.00	$/year
Annual Energy Rate	$0.08	/kwh
Annual Feed Energy Cost	$97,700.24	$/year
Feed Pressure	200	psi
Interstage Boost Pressure	0	psi
Pump Motor Efficiency	78%	
Energy Consumption	3,345.90	kwh/day
Annual Concentrate Pump Energy Cost	14,000.00	$/year
Head	150.00	
Pump Horsepower	25.00	hp
Hours in Operation	24.00	hours/day
Energy Consumption	447.60	kwh/day

Annual Chemical Costs	$599,000.00	$/year
Antiscalant	$102,738.38	$/year
Dose	5.00	mg/L
Unit Cost	$3.75	$/lb
CIP Chemicals	$395,416.67	$/year
Acid CIP Frequency	30.00	days
Acid CIP Cost (2011 Cost)	$6,500.00	$/CIP
Caustic CIP Frequency	45.00	days
Caustic CIP Cost (2011 Cost)	$6,500.00	$/CIP
Miscellaneous Chemical	$99,631.01	$/year
Percentage of Non-CIP Chemicals	20%	
Final pH adjustment	$616.43	$/year
NaOH	0.25	mg/L
Strength	50%	% Concentration
Cost	$0.30	$/lb

Annual Maintenance Cost	$124,000.00	$/year
Annual Cartridge Filter Replacement Cost	$4,775.42	$/year
Filters to be Replaced	78.50	filters
Filter Replacement Frequency	90.00	days
Filter Cost	$15.00	$/filter
Annual RO Element Replacement Cost	$103,950.00	$/year
RO Elements to be Replaced	346.50	elements
RO Element Replacement Frequency	2.00	years
RO Element Cost	$600.00	$/element
Annual Maintenance Cost	$15,000.00	$/year
RO Capital Cost	$3,000,000	$
Maintenance Cost Percentage	0.50%	of capital cost/year

NorthMet CRE – Staff and Services Basis

August 4, 2016

The CRE is being developed for Stage 1 and Stage 2 of construction and Mine Year 1. The Stage 1 CRE will cover legacy liabilities plus liabilities due to NorthMet construction up to the point where Duluth Complex rock is blasted at the Mine Site. The Stage 2 CRE will cover Stage 1 plus Mine Year 1 NorthMet operating liabilities at the Mine Site but not NorthMet operating liabilities at the Plant Site. The Mine Year 1 CRE will cover legacy, NorthMet construction and NorthMet Mine Year 1 operating liabilities.

Staff - Closure

During the Closure period the large one time activities of structure removal and cover system construction will be done and contracts established for longer term, ongoing Closure and Post Closure activities. The State Project Manager would hire Reclamation, Demolition, Accounting/Purchasing and Site Managers. These managers would be sourced from local firms with personnel familiar with the site (Lakehead, NTS or Barr or former PolyMet employees). Security provided by limited access via manned gate and patrol of active working areas. See Attachment A for Staff Schedule and Attachment B for annual cost development for Stage 1, Stage 2 and Mine Year 1.

1. State Project Manager (State price)
    a. Manage funds and overall process
    b. Hire Site Manager, Project Engineer and Accountant/Purchaser
2. Site Manager (cost from Barr price list)
    a. Manage initial reclamation and initiate and plan for post closure
    b. Manage water treatment/utility personnel
    c. Manage water quality monitoring and water treatment facilities
    d. Manage dam safety monitoring
    e. Provide required water quality, dam safety and permit to mine reporting
    f. Manage site services – security, snow plowing
3. Project Engineer (cost from Barr price list)
    a. Manage structure demolition and AOC remediation
    b. Manage construction of the Tailings Basin Non Mechanical Treatment System (Stage 1 and Stage 2 only)
    c. Manage construction of Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only), FTB Beach Cover System (Mine Year 1 only)
    d. Develop plans for FTB Pond Bottom Cover System (Mine Year 1 only) to be implemented later
    e. Provide required reclamation and closure reporting
4. Accountant /Purchaser (cost from Barr price list)
    a. Initiate contracts for reclamation and demolition work
    b. Initiate contractors for dam safety monitoring and site services
    c. Set up process for post closure activities
    d. Manage purchase/payment process
5. Security (cost from NorthTek Security)
    a. Man the Main Gate 24/7
    b. Patrol the site on day shift

6. Water Treatment/Utility (cost from Express Employment)
    a. Operate and provide routine maintenance for tailings basin non mechanical treatment system (Stage 1 and Stage 2 only)
    b. Operate and provide routine maintenance for Mine Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Stage 2 and Mine Year 1 only)
    c. Operate and provide routine maintenance for Plant Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Mine Year 1 only)
    d. Collect Mine Site water quality samples (Stage 2 and Mine Year 1 only)
    e. Collect Plant Site water quality samples
    f. Inspect and provide routine maintenance for Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only)
    g. Inspect and provide routine maintenance for FTB Beach and Pond Bottom Cover Systems (Mine Year 1 only)
    h. Inspect and provide routine maintenance for storm water systems (ditches, culverts)
    i. Inspect and provide routine maintenance for reclamation vegetation (pit walls, stockpile/pond footprints, structure footprints, roads, railroads)
    j. Inspect and repair pit perimeter barrier fence and gates (Stage 2 and Mine Year 1 only)

Staff – Post Closure

During the Post Closure period the one remaining one time construction activity (FTB Pond Bottom Cover System which was designed and planned during the Closure period) will be initiated and completed. Security provided by locked gates at FTB and Mine Site. See Attachment A for Staff Schedule and Attachment B for annual cost development for Stage 1, Stage 2 and Mine Year 1..

1. Site Manager (cost from NTS price list)
    a. Manage water treatment/utility personnel
    b. Manage water quality monitoring and water treatment facilities
    c. Manage dam safety monitoring
    d. Provide required water quality, dam safety and permit to mine reporting
    e. Manage site services – snow plowing
2. Water Treatment/Utility (cost from Express Employment)
    a. Operate and provide routine maintenance for tailings basin non mechanical treatment system (Stage 1 and Stage 2 only)
    b. Operate and provide routine maintenance for Mine Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Stage 2 and Mine Year 1 only)
    c. Operate and provide routine maintenance for Plant Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Mine Year 1 only)
    d. Collect Mine Site water quality samples (Stage 2 and Mine Year 1 only)

e. Collect Plant Site water quality samples
f. Inspect and provide routine maintenance for Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only)
g. Inspect and provide routine maintenance for FTB Beach and Pond Bottom Cover Systems (Mine Year 1 only)
h. Inspect and provide routine maintenance for storm water systems (ditches, culverts)
i. Inspect and provide routine maintenance for reclamation vegetation (pit walls, stockpile/pond footprints, structure footprints, roads, railroads)
j. Inspect and repair pit perimeter barrier fence and gates (Stage 2 and Mine Year 1 only)
k. Snow plowing

Vehicles

Staff will require vehicles to accomplish their activities. See Attachment C for Vehicle Schedule for Closure and Post Closure with annual cost development for Stage 1, Stage 2 and Mine Year 1.

Services – Closure and Post Closure

There are ongoing activities that will be performed by a combination of Utility Staff and specialized consultant. These activities have been ongoing at this site since 2001 and, in general, decrease over time as conditions stabilize, which include:

1. Water Monitoring (b and d below assumed to decrease over time to reflect transition from monthly surface water sampling to quarterly and quarterly groundwater sampling to annual – first 10 years is full monitoring, next 5 years at 50% full and then 25% of full on an ongoing basis)
    a. water quality (surface and well) samples collected by Water treatment/Utility Staff
    b. water quality analysis by local laboratory (cost from Pace Analytical)
    c. wetland water level data from loggers collected by Water Treatment/Utility Staff
    d. periodic water data review, QA/QC and required NPDES reporting by Site Manager
    e. annual NPDES report (cost from NTS)
2. Dam Safety Monitoring
    a. dam instrumentation data collection and exception report (cost from NTS)
    b. dam instrument annual report (cost from NTS)
    c. geotechnical inspection (cost from Barr)
    d. annual dam safety report (cost from Barr)
3. SW-619 Private Landfill Monitoring for 30 years from closure as required by Minnesota Solid Waste Landfill (assume closed in 2017)
    a. Inspection by Water treatment/Utility Staff
    b. Annual Water Quality and Gas Monitoring (from NTS)
    c. Annual Report (from NTS)
4. Coal Ash Disposal Site Monitoring for 30 years from closure as required by Minnesota Solid Waste Landfill (closed in 2000)
    a. Inspection by Water Treatment/Utility Staff
    b. Annual Report (from NTS)

5. Snowplowing (Closure Only – Utility via snow plow equipped 4WD pick up for Post Closure)
    a. Annual snow plowing to provide access to areas active during closure (based on current annual)

Reclamation Vegetation Establishment and Long Term Care

Initial reclamation seeding is done with a seed mix and fertilizer mix that will typically develop into a permanent self-sustaining vegetation cover. Because there will be some seeding failures and some erosion due to storm events before the permanent self-sustaining vegetation cover develops, an allowance of cost for all seeding is included.

Once a permanent self-sustaining vegetation cover is established Site Water treatment/Utility Staff will inspect, make minor repairs and arrange for erosion repairs using small earth moving equipment.

Open channel water conveyance systems (ditches, channels, etc.) will need to be kept clear and flowing. Site Water treatment/Utility Staff will inspect, clear minor blockages and arrange for removal of major blockages using small earth moving equipment.

Cover systems will need to be kept free of woody vegetation and borrowing animal/erosion damage will need to be repaired. Site Water treatment/Utility Staff will inspect, make minor repairs and arrange for major erosion repairs using small earth moving equipment as wells as arrange for herbicide spraying as needed.

Water Treatment Facility Repair/Replacement

The major wear component of the water treatment plants is the filter membranes. Because the annual cost of replacement membranes is a function of the degree of water treatment and the amount of water treated, replacement membrane cost is included in the water treatment unit cost ($/1000 gal). The Water Treatment/Utility Staff will change membranes and perform other routine maintenance.

Long term facility and equipment replacement cost has been developed by using EPA equipment life values and NorthMet Project capital equipment cost to calculate an annual cost (cost/life). The sum of all of the annual costs for the water treatment plants and pumps and pipe to move water to and from the treatment plants is the total annual cost for facility and equipment repair/replacement. This is fully explained in another document.

List of sources for costs (see Attachment B)

1. NTS Letter of 4/22/16 (site manager, water quality reporting, land fill monitoring and reporting, tailings basin instrumentation)
2. Barr Engineering 2016 Fee Schedule (demo/reclamation/accounting managers)
3. NorthTek Security Services letter of 4/5/16 (security staff)
4. Express Employment Professionals letter of 4/4/16 (utility staff)
5. Pace Analytical 2016 Price List (water quality sample analysis) – Attachment D
6. Barr Engineering letter of 4/1/16 (dam safety)
7. Snow Plowing Analysis spreadsheet (snow plowing)

Attachment A – Staff Schedules

Staff Schedule - Closure												
	FTE											
	Stage 1	Stage 2	Mine Year 1	shift	M	T	W	Th	F	S	S	Notes
State Project Manager	1	1	1	day	1	1	1	1	1			
Site Manager	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Project Engineer	0.5	0.75	1	day	1	1	1	1	1			Stage 1 1/2 time, Stage 2 3/4 time, MY 1 FT
Accountant/Purchaser	0.5	0.75	1	day	1	1	1	1	1			Stage 1 1/2 time, Stage 2 3/4 time, MY 1 FT
Security Chief	1	1	1	day	1	1	1	1	1	0	0	
Security Officer	1.4	1.4	1.4	day	1	1	1	1	1	1	1	
Security Officer	1.4	1.4	1.4	aft	1	1	1	1	1	1	1	
Security Officer	1.4	1.4	1.4	nite	1	1	1	1	1	1	1	
Security Officer Total	4.2	4.2	4.2									
Water Treatment	0	0.7	1.4	day	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	aft	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	nite	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Utility	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment/Utility Total	0.835	2.935	5.035									

Staff Schedule - Post Closure												
	FTE											
	Stage 1	Stage 2	Mine Year 1	shift	M	T	W	Th	F	S	S	Notes
Site Manager	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment	0	0.7	1.4	day	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	aft	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	nite	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Utility	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment/Utility Total	0.835	2.935	5.035									

Attachment B – Sources and Annual Cost Development

List of Sources for Staff and Services							
Staff	**Annual $ / FTE**	**Stage 1 Annual $**	**Stage 2 Annual $**	**Mine Year 1 Annual $**	**Source**	**Basis Document Reference**	**SRCE**
Closure							
State Project Manager	TBD	TBD	TBD	TBD		Staff - Closure 1	Human Resources
Site Manager	$224,640	$187,574	$187,574	$187,574	NTS 4/22/16 letter #1 Mid Level Professional	Staff - Closure 2	Human Resources
Project Engineer	$223,600	$111,800	$167,700	$223,600	Barr 1/1/16 price list Engineer/Scientist/Specialist II average	Staff - Closure 3	Human Resources
Accountant/Purchaser	$187,200	$93,600	$140,400	$187,200	Barr 1/1/16 price list Support Personnel I maximum	Staff - Closure 4	Human Resources
Security Chief	$56,160	$56,160	$56,160	$56,160	NorthTek Security Services 4/5/16 letter	Staff - Closure 5	Human Resources
Security Officer	$31,595	$132,700	$132,700	$132,700	NorthTek Security Services 4/5/16 letter	Staff - Closure 5	Human Resources
Water Treatment/Utility	$67,038	$55,977	$196,758	$337,538	Express Employment 4/4/16 letter Maintenance 1	Staff - Closure 6	Human Resources
Post Closure							Human Resources
Site Manager	$224,640	$187,574	$187,574	$187,574	NTS 4/22/16 letter #1 Mid Level Professional	Staff - Post Closure 1	Human Resources
Water Treatment/Utility	$67,038	$55,977	$196,758	$337,538	Express Employment 4/4/16 letter Maintenance 1	Staff - Post Closure 2	Human Resources
Services	**Unit $**	**Unit**					
Water Monitoring							
- sample analysis	$331	sample			Pace Analytical 2016 Price Sheet (see Attachment C Water Analysis)	Services 1b	Material Cost Water Analysis
- annual report	$3,492	year			NTS 4/22/16 letter #5 Water Quality Report Preparation	Services 1e	?
Dam Safety Monitoring							
- instrumentation data collection	$7,686	event			NTS 4/22/16 letter #7 Tailings Basin Instrumentation Inspection and Data Collection	Services 2a	Other User
- instrumentation report	$2,850	event			NTS 4/22/16 letter #8 Tailings Basin Instrumentation Report Preparation	Services 2b	Other User
- geotechnical inspection	$7,000	year			Barr 4/1/16 letter	Services 2c	Other User
- annual report	$10,500	year			Barr 4/1/16 letter	Services 2d	Other User
SW-619 Landfill Monitoring							
- water and gas monitoring	$10,150	year			NTS 4/22/16 letter #6 SW-619 Groundwater + Gas Vent Monitoring	Services 3b	Other User
- annual report	$5,280	year			NTS 4/22/16 letter #6 SW-619 Staff Reporting	Services 3c	Other User
Coal Ash Landfill Monitoring							
- annual report	$2,640	year			NTS 4/22/16 letter #6 SW-619 Staff Reporting (assume 50% no gas/water monitoring)	Services 4b	Other User
Snow Plowing							
- average annual	$22,203				Average of 2013 to 2015	Services 5ab	Other User

Attachment C – Vehicle Schedule

Vehicle Schedule - Closure									
	Stage 1	Stage 2	Mine Year 1	Cost	Service Life	Stage 1 Annual $	Stage 2 Annual $	Mine Year 1 Annual $	Notes
State Project Manager	0	0	0						
Site Manager	0.5	1	1	$35,000	7	$2,500	$5,000	$5,000	pick up - 4WD
Project Engineer	0.5	1	1	$35,000	7	$2,500	$5,000	$5,000	pick up - 4WD
Accountant/Purchaser	0	0	0						
Security	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Water Treatment	0	1	1	$35,000	7	$0	$5,000	$5,000	pick up - 4WD
Utility	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Total	3	5	5			$15,000	$25,000	$25,000	

Vehicle Schedule - Post Closure									
	Stage 1	Stage 2	Mine Year 1	Cost	Service Life	Stage 1 Annual $	Stage 2 Annual $	Mine Year 1 Annual $	Notes
Site Manager	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Water Treatment	0	1	1	$35,000	7	$0	$5,000	$5,000	pick up - 4WD
Utility	1	1	1	$40,000	7	$5,714	$5,714	$5,714	pick up - 4WD with snow plow
Total	2	3	3			$10,714	$15,714	$15,714	

Attachment D –Water Analysis

Water Analysis - From Pace Analytical 2016 Price List			
Analyte	**Price**	**Qty/sample**	**Sample Cost**
Alkalinity	$18.75	1	$18.75
Arsenic	$20.00	1	$20.00
Calcium	$20.00	1	$20.00
Copper	$20.00	1	$20.00
Cobalt	$20.00	1	$20.00
Iron	$20.00	1	$20.00
Hardness Calc	$12.50	1	$12.50
Magnesium	$20.00	1	$20.00
Mercury Low Level	$112.50	0.25	$28.13
Nickel	$20.00	1	$20.00
pH	$6.25	1	$6.25
Specific Conductance	$12.50	1	$12.50
Sulfate	$25.00	1	$25.00
Total Dissolved Solids	$12.50	1	$12.50
Total Suspended Solids	$12.50	1	$12.50
Zinc	$20.00	1	$20.00
SubTotal			$288.13
Level 3 QC*		15%	$43.22
Total			$331.34
* Data Reporting, Complete Quality Control plus QC Limits and Batch Cross reference			

April 4th, 2016

To Whom It May Concern:

This letter serves as a verification of what Express Employment Professionals has been charging PolyMet for two building maintenance personnel and one janitor. All personnel started working for Express Employment Professionals on November 28th, 2011 and rates are as follows:

- Maintenance 1 - $32.23/hour
- Maintenance 2 - $30.77/hour
- Janitor - $14.51/hour

Our rates include the following:

- Weekly pay for the employees
- Workers' Compensation Insurance
- Social Security Tax
- Bonding of Employees
- General Liability Insurance coverage
- Advertising, recruiting, testing, interviewing and reference checks for new employee's
- Employee Coaching
- Weekly invoicing to client
- Benefits for employees
    - Vacation (typically 5 days/year for a full-time employee)
    - Holiday pay (recognized holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving, Christmas Day) based on eligibility
    - Health Insurance (Minimum Essential Coverage under the federal healthcare reform required by the ACA)
    - 401K Retirement savings plan
    - Direct deposit

Other Highlights of Using Express Employment:

- All employee benefits are paid out by Express, at no additional charge to the client company.
- We bill for services rendered on a pay-per-hour basis (ex: if a person works 15 hour/wk, you'll only be charged 15 hrs for that week).
- Locally owned & operated with offices in Hibbing, Grand Rapids, and Duluth.
- We assist with any employee issues that may arise.
- We deal with any unemployment issues that may arise.
- Personalized service and support by local employment specialists.

Please contact one of our offices if you have any future questions or request.

Sincerely,

Kala Linder

Kala Linder
Branch Manager
Kala.Linder@ExpressPros.com

Attachment 4.

Caterpillar Equipment Rates

EQUIPMENT RENTAL RATE TABLE				
EQUIPMENT TYPE (1)	Monthly Owner/Rental Rate	PREVENTATIVE MAINTENANCE COST [Cost Per Hour]	GROUND ENGAGING TOOLS CONSUMPTION [Cost Per Hour] (Wear Items)	TIRE COST TABLE [Cost Per Tire]
Bulldozers				
D6T	12,220			
D6T w/ Ripper	13,060			
D7E	16,640			
D8T	19,890			
D9T	$27,500			
D10T	33,340			
D11R				
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$ 10,430.00			
14M	16,910			
16M	23,530			
24M				
Track Excavators				
312E L	6,250			
320E L	7,490			
326F L	8,920			
329F L	10,730			
349F L	17,110			
374F L	26,050			
390F L	32,700			
Scrapers				
631G	33,930			
637G	N/A			
Wheeled Loaders				
924K	5,730			
930K	6,840			
950M	9,690			
966M	13,890			
972M	15,060			
980M	19,260			
988K	30,340			
990				
992G				
994D				
L2350				
Shovels				
PC2000				

PC3000				
PC4000				
PC5500				
PC8000				
Hydraulic Hammers				
H-120 (fits 325) w/ Machine	12,040			
H-160 (fits 345) w/ Machine	21,250			
H-180 (fits 365/385) w/ Machine	30,110			
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$ 3,220.00			
428D 4WD Backhoe				
CS533E Vibratory Roller	$ 7,220.00			
CS633E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP633E Sheepsfoot Compactor				
Light Truck - 1.5 Ton				
Supervisor's Truck				
Flatbed Truck				
Air Compressor + tools				
Welding Equipment				
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump				
Gas Engine Vibrator				
Generator 5KW				
HDEP Welder (pipe or liner)				
5 Ton Crane				
20 Ton Crane	$ 4,220.00			
50 Ton Crane				
120 Ton Crane				
Trucks				
725	11,000			
730	13,460			
735	16,970			
740	18,110			
773E				
777D				
785C				
793C				
797B				
613E (5,000 gal) Water Wagon				
621E (8,000 gal) Water Wagon				

777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd^3)				
NOTES:				
(1) Power Equipment Source:				
(2) Power Equipment Type:				
(3) Drilliing Equipment Source:				
(4) Other Equipment Source:				
(5) Drill rig includes support (pipe) truck				

Attachment 5.

Nevada standard rates (2015)

Nevada Standardized Bond Calculation
Source Data

Format Version:	***SRCE Data File v1.12***
File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Type:	***User Data***
Author/Source:	**Nevada Division of Environmental Protection (NDEP) & NV BLM**

Units of Measure:	**Imperial**

No. of Bases/Regions:	4

Basis/Region	Basis/Region Name	Basis/Region Description
Basis 1	**Northern Nevada**	Churchill, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 2	**Southern Nevada**	Clark, Esmeralda, Lincoln and Nye Counties
Basis 3	**N. Nevada Notice Level**	Notice Level Cost Basis for Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 4	**S. Nevada Notice Level**	Clark, Esmeralda, Lincoln and Nye Counties
Basis 5		
Basis 6		
Basis 7		
Basis 8		
Basis 9		
Basis 10		
Basis 11		
Basis 12		
Basis 13		
Basis 14		
Basis 15		

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	*SRCE_Cost_Data_File_1_12_Std_2015.xls*
Date:	*August 1, 2015*
Cost Basis:	*User Data*
Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

MONTHLY EQUIPMENT RATE TABLE [Cost Per Month] (1)

EQUIPMENT TYPE (2)	Basis 1 *Northern Nevada*	Basis 2 *Southern Nevada*	Basis 3 *N. Nevada Notice Level*	Basis 4 *S. Nevada Notice Level*
Bulldozers				
D6R	$9,900	$9,900	$3,300	$3,300
D6R w/ Winch				
D7R	$13,200	$13,200	$4,400	$4,400
D8R	$19,000	$19,000	$6,400	$6,400
D9R	$23,100	$23,100	$7,700	$7,700
D10R	$32,000	$32,000	$10,700	$10,700
D11R	$71,000	$71,000	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$9,600	$9,600	$3,200	$3,200
14G/H	$14,500	$14,500	$4,900	$4,900
16G/H	$21,000	$21,000	$7,000	$7,000
24M				
Track Excavators				
312C	$5,700	$5,700	$1,900	$1,900
320C	$7,440	$7,440	$2,480	$2,480
325C	$8,200	$8,200	$2,800	$2,800
330C	$10,800	$10,800	$3,600	$3,600
345B	$9,000	$9,000	$3,000	$3,000
365BL				
385BL	$22,500	$22,500	$7,500	$7,500
Scrapers				
631G	$16,000	$16,000	$5,400	$5,400
637G PP	$35,700	$35,700	N/A	N/A
Wheeled Loaders				
924G	$5,400	$5,400	$1,800	$1,800
928G	$6,000	$6,000	$2,000	$2,000
950G	$7,600	$7,600	$2,600	$2,600
966G	$10,900	$10,900	$3,700	$3,700
972G	$13,000	$13,000	$4,400	$4,400
980G	$13,000	$13,000	$4,400	$4,400
988G	$21,000	$21,000	$7,000	$7,000
990				
992G	$65,000	$65,000	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	$7,000	$7,000	$2,400	$2,400
H-160 (fits 345)	$8,600	$8,600	$2,800	$2,800
H-180 (fits 365/385)	$12,400	$12,400	$4,133	$4,133

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$3,420	$3,420	$1,140	$1,140
428D 4WD Backhoe	$4,200	$4,200	$1,400	$1,400
CS533E Vibratory Roller	$7,260	$7,260	$1,650	$1,650
CS663E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP663E Sheepsfoot Compactor				
Light Truck - 1.5 Ton	$5,073	$5,073	$1,153	$1,153
Supervisor's Truck	$3,225	$3,225	$733	$733
Flatbed Truck	$5,073	$5,073	$1,153	$1,153
Air Compressor + tools	$4,492	$4,492	$1,021	$1,021
Welding Equipment	$3,025	$3,025	$688	$688
Heavy Duty Drill Rig	$59,070	$59,070	$13,425	$13,425
Pump (plugging) Drill Rig	$59,070	$59,070	$13,425	$13,425
Concrete Pump	$14,916	$14,916	$3,390	$3,390
Gas Engine Vibrator	$647	$647	$147	$147
Generator 5KW	$987	$987	$224	$224
HDEP Welder (pipe or liner)	$7,898	$7,898	$1,795	$1,795
5 Ton Crane	$5,707	$5,707	$1,297	$1,297
20 Ton Crane	$15,290	$15,290	$3,475	$3,475
50 Ton Crane	$15,290	$15,290	$3,475	$3,475
120 Ton Crane				
Trucks				
725 (articulated)	$9,900	$9,900	$3,300	$3,300
730 (articulated)	$9,900	$9,900	$3,300	$3,300
735 (articulated)	$9,900	$9,900	$3,300	$3,300
740 (articulated)	$15,000	$15,000	$5,000	$5,000
769D	$21,000	$21,000	N/A	N/A
773E	$33,000	$33,000	N/A	N/A
777D	$54,000	$54,000	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$6,000	$6,000	$2,000	$2,000
621E (8,000 gal) Water Wagon	$11,000	$11,000	$3,700	$3,700
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd^3) (5)	$14,322	$14,322	$3,255	$3,255

NOTES:

(1) Power Equipment Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)
(4) Other Equipment Source:	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	*SRCE_Cost_Data_File_1_12_Std_2015.xls*
Date:	*August 1, 2015*
Cost Basis:	*User Data*
Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

PREVENTATIVE MAINTENANCE COST [Cost Per Hour] (1)

EQUIPMENT TYPE	Basis 1 *Northern Nevada*	Basis 2 *Southern Nevada*	Basis 3 *N. Nevada Notice Level*	Basis 4 *S. Nevada Notice Level*
Bulldozers				
D6R	$5.18	$5.18	$5.18	$5.18
D6R w/ Winch				
D7R	$3.31	$3.31	$3.31	$3.31
D8R	$5.71	$5.71	$5.71	$5.71
D9R	$7.92	$7.92	$7.92	$7.92
D10R	$9.68	$9.68	$9.68	$9.68
D11R	$12.22	$12.22	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$6.08	$6.08	$6.08	$6.08
14G/H	$6.62	$6.62	$6.62	$6.62
16G/H	$5.33	$5.33	$5.33	$5.33
24M				
Track Excavators				
312C	$3.90	$3.90	$3.90	$3.90
320C	$4.16	$4.16	$4.16	$4.16
325C	$3.38	$3.38	$3.38	$3.38
330C	$5.19	$5.19	$5.19	$5.19
345B	$7.04	$7.04	$7.04	$7.04
365BL				
385BL	$6.07	$6.07	$6.07	$6.07
Scrapers				
631G	$7.01	$7.01	$7.01	$7.01
637G PP	$11.55	$11.55	N/A	N/A
Wheeled Loaders				
924G	$3.80	$3.80	$3.80	$3.80
928G	$4.00	$4.00	$4.00	$4.00
950G	$5.01	$5.01	$5.01	$5.01
966G	$6.69	$6.69	$6.69	$6.69
972G	$5.28	$5.28	$5.28	$5.28
980G	$5.28	$5.28	$5.28	$5.28
988G	$9.65	$9.65	$9.65	$9.65
990				
992G	$11.46	$11.46	$11.46	$11.46
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A
Demolition Grapples				
G315 (fits 322/325)	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A
Other Equipment				
420D 4WD Backhoe	$3.39	$3.39	$3.39	$3.39
428D 4WD Backhoe	$3.40	$3.40	$3.40	$3.40
CS533E Vibratory Roller				
CS663E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP663E Sheepsfoot Compactor				
Light Truck - 1.5 Ton				
Supervisor's Truck				
Flatbed Truck				
Air Compressor + tools				
Welding Equipment				
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump				
Gas Engine Vibrator				
Generator 5KW				
HDEP Welder (pipe or liner)				
5 Ton Crane				
20 Ton Crane				
50 Ton Crane				
120 Ton Crane				
Trucks				
725 (articulated)	$7.55	$7.55	$7.55	$7.55
730 (articulated)	$7.55	$7.55	$7.55	$7.55
735 (articulated)	$7.55	$7.55	$7.55	$7.55
740 (articulated)	$7.18	$7.18	$7.18	$7.18
769D	$8.37	$8.37	N/A	N/A
773E	$7.28	$7.28	N/A	N/A
777D	$10.40	$10.40	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$5.75	$5.75	$5.75	$5.75
621E (8,000 gal) Water Wagon	$6.75	$6.75	$6.75	$6.75
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$7.55	$7.55	$7.55	$7.55
(1) PM Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted

Nevada Standardized Bond Calculation
Equipment Costs

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Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

G.E.T CONSUMPTION [Cost Per Hour] (1) (Wear Items)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Bulldozers				
D6R	$4.72	$4.72	$4.72	$4.72
D6R w/ Winch				
D7R	$7.01	$7.01	$7.01	$7.01
D8R	$9.12	$9.12	$9.12	$9.12
D9R	$14.19	$14.19	$14.19	$14.19
D10R	$19.86	$19.86	$19.86	$19.86
D11R	$29.51	$29.51	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$9.79	$9.79	$9.79	$9.79
14G/H	$14.15	$14.15	$14.15	$14.15
16G/H	$19.33	$19.33	$19.33	$19.33
24M				
Track Excavators				
312C	$3.69	$3.69	$3.69	$3.69
320C	$4.26	$4.26	$4.26	$4.26
325C	$5.37	$5.37	$5.37	$5.37
330C	$5.92	$5.92	$5.92	$5.92
345B	$6.99	$6.99	$6.99	$6.99
365BL				
385BL	$12.38	$12.38	$12.38	$12.38
Scrapers				
631G	$7.74	$7.74	$7.74	$7.74
637G PP	$9.72	$9.72	N/A	N/A
Wheeled Loaders				
924G	$4.07	$4.07	$4.07	$4.07
928G	$4.21	$4.21	$4.21	$4.21
950G	$7.83	$7.83	$7.83	$7.83
966G	$9.83	$9.83	$9.83	$9.83
972G	$12.45	$12.45	$12.45	$12.45
980G	$12.45	$12.45	$12.45	$12.45
988G	$13.33	$13.33	$13.33	$13.33
990				
992G	$30.62	$30.62	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	$5.34	$5.34	$5.34	$5.34
H-160 (fits 345)	$10.41	$10.41	$10.41	$10.41
H-180 (fits 365/385)	$12.02	$12.02	$12.02	$12.02

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$3.28	$3.28	$3.28	$3.28
428D 4WD Backhoe	$3.38	$3.38	$3.38	$3.38
CS533E Vibratory Roller	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	N/A	N/A	N/A	N/A
Supervisor's Truck	N/A	N/A	N/A	N/A
Flatbed Truck	N/A	N/A	N/A	N/A
Air Compressor + tools	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig	N/A	N/A	N/A	N/A
Pump (plugging) Drill Rig	N/A	N/A	N/A	N/A
Concrete Pump	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A
5 Ton Crane	N/A	N/A	N/A	N/A
20 Ton Crane	N/A	N/A	N/A	N/A
50 Ton Crane	N/A	N/A	N/A	N/A
120 Ton Crane	N/A	N/A	N/A	N/A
Trucks				
725 (articulated)	$2.93	$2.93	$2.93	$2.93
730 (articulated)	$2.93	$2.93	$2.93	$2.93
735 (articulated)	$2.93	$2.93	$2.93	$2.93
740 (articulated)	$3.03	$3.03	$3.03	$3.03
769D	$3.28	$3.28	N/A	N/A
773E	$3.68	$3.68	N/A	N/A
777D	$4.12	$4.12	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon				
621E (8,000 gal) Water Wagon				
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$2.93	$2.93	$2.93	$2.93
Notes:				
(1) G.E.T. Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	*SRCE_Cost_Data_File_1_12_Std_2015.xls*
Date:	*August 1, 2015*
Cost Basis:	*User Data*
Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

TIRE COST TABLE [Cost Per Tire(1,2,3)]

EQUIPMENT TYPE	Basis 1 *Northern Nevada*	Basis 2 *Southern Nevada*	Basis 3 *N. Nevada Notice Level*	Basis 4 *S. Nevada Notice Level*
Bulldozers				
D6R	N/A	N/A	N/A	N/A
D6R w/ Winch	N/A	N/A	N/A	N/A
D7R	N/A	N/A	N/A	N/A
D8R	N/A	N/A	N/A	N/A
D9R	N/A	N/A	N/A	N/A
D10R	N/A	N/A	N/A	N/A
D11R	N/A	N/A	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$2,056.32	$2,056.32	$2,056.32	$2,056.32
14G/H	$2,815.06	$2,815.06	$2,815.06	$2,815.06
16G/H	$3,808.00	$3,808.00	$3,808.00	$3,808.00
24M				
Track Excavators				
312C	N/A	N/A	N/A	N/A
320C	N/A	N/A	N/A	N/A
325C	N/A	N/A	N/A	N/A
330C	N/A	N/A	N/A	N/A
345B	N/A	N/A	N/A	N/A
365BL	N/A	N/A	N/A	N/A
385BL	N/A	N/A	N/A	N/A
Scrapers				
631G	$8,364.27	$8,364.27	$8,364.27	$8,364.27
637G PP	$8,364.27	$8,364.27	N/A	N/A
Wheeled Loaders				
924G	$2,836.96	$2,836.96	$2,836.96	$2,836.96
928G	$2,836.96	$2,836.96	$2,836.96	$2,836.96
950G	$4,274.00	$4,274.00	$4,274.00	$4,274.00
966G	$6,804.90	$6,804.90	$6,804.90	$6,804.90
972G	$6,804.90	$6,804.90	$6,804.90	$6,804.90
980G	$7,163.80	$7,163.80	$7,163.80	$7,163.80
988G	$11,250.26	$11,250.26	$11,250.26	$11,250.26
990				
992G	$25,086.15	$25,086.15	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000	N/A	N/A	N/A	N/A
KOM PC3000	N/A	N/A	N/A	N/A
KOM PC4000	N/A	N/A	N/A	N/A
KOM PC5500	N/A	N/A	N/A	N/A
KOM PC8000	N/A	N/A	N/A	N/A
Hydraulic Hammers				
H-120 (fits 325)	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A
Demolition Grapples				
G315 (fits 322/325)	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A
Other Equipment				
420D 4WD Backhoe	$431.73	$431.73	$431.73	$431.73
428D 4WD Backhoe	$431.73	$431.73	$431.73	$431.73
CS533E Vibratory Roller	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	$130.90	$130.90	$130.90	$130.90
Supervisor's Truck	$130.90	$130.90	$130.90	$130.90
Flatbed Truck	$130.90	$130.90	$130.90	$130.90
Air Compressor + tools	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A
5 Ton Crane				
20 Ton Crane				
50 Ton Crane				
120 Ton Crane				
Trucks				
725 (articulated)	$4,274.00	$4,274.00	$4,274.00	$4,274.00
730 (articulated)	$4,274.00	$4,274.00	$4,274.00	$4,274.00
735 (articulated)	$6,804.90	$6,804.90	$6,804.90	$6,804.90
740 (articulated)	$7,163.80	$7,163.80	$7,163.80	$7,163.80
769D	$3,916.34	$3,916.34	N/A	N/A
773E	$6,868.68	$6,868.68	N/A	N/A
777D	$12,196.62	$12,196.62	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$3,382.58	$3,382.58	$3,382.58	$3,382.58
621E (8,000 gal) Water Wagon	$8,710.66	$8,710.66	$8,710.66	$8,710.66
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$463.15	$463.15	$463.15	$463.15
Notes:				
(1) Unit Cost Basis:	Cost per set	Cost per set	Cost per set	Cost per set
(2) Cost Basis:	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.
(3) Tire Cost Source:	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015
(4) Tire Wear Source (defined in model):	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20

Nevada Standardized Bond Calculation
Labor Rates

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HOURLY LABOR RATE TABLE

EQUIPMENT TYPE [1] OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
EQUIPMENT OPERATORS - Labor Groups and Base Pay Rate ($/hr) [2]								
Bulldozers								
D6R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D6R w/ Winch								
D7R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D8R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D9R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D10R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D11R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
Wheeled Dozers								
824G								
834G								
844								
854G								
Motor Graders								
120H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
14G/H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
16G/H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
24M								
Track Excavators								
312C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
320C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
325C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
330C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
345B	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
365BL								
385BL	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
Scrapers								
631G	Group 10	$49.36	Group 15	$59.23	Group 10	$49.36	Group 15	$59.23
637G PP	Group 11	$49.79	Group 15	$59.23	Group 11	$49.79	Group 15	$59.23
Wheeled Loaders								
924G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
928G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
950G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
966G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
972G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
980G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
988G	Group 11	$49.79	Group 10	$58.85	Group 11	$49.79	Group 10	$58.85
990								
992G	Group 11A	$51.43	Group 10	$58.85	Group 11A	$51.43	Group 10	$58.85
994D								
L-2350								
Shovels								
KOM PC2000								
KOM PC3000								
KOM PC4000								
KOM PC5500								
KOM PC8000								
Hydrauilc Hammers								
H-120 (fits 325)								
H-160 (fits 345)								
H-180 (fits 365/385)								
Demolition Shears								
S340 (fits 322/325/330)								
S365 (fits 330/345)								
S390 (fits 365/385)								
Demolition Grapples								
G315 (fits 322/325)								
G320 (fits 325/330)								
G330 (fits 345/365)								

Nevada Standardized Bond Calculation
Labor Rates

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HOURLY LABOR RATE TABLE

EQUIPMENT TYPE [1] OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
Other Equipment								
420D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Group 10A	$49.55	Group 4	$58.40
428D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Group 10A	$49.55	Group 4	$58.40
CS533E Vibratory Roller	Group 6	$47.85	Group 4	$58.40	Group 6	$47.85	Group 4	$58.40
CS663E Vibratory Roller								
CP533E Sheepsfoot Compactor								
CP663E Sheepsfoot Compactor								
Light Truck - 1.5 Ton								
Supervisor's Truck								
Flatbed Truck								
Air Compressor + tools	Group 3	$46.64	Group 1	$55.67	Group 3	$46.64	Group 1	$55.67
Welding Equipment	Group 9	$49.01	Group 6	$58.62	Group 9	$49.01	Group 6	$58.62
Heavy Duty Drill Rig	Group 10	$49.36	Group 2	$56.62	Group 10	$49.36	Group 2	$56.62
Pump (plugging) Drill Rig	Group 10	$49.36	Group 2	$56.62	Group 10	$49.36	Group 2	$56.62
Concrete Pump								
Gas Engine Vibrator	Group 6	$47.85	Group 6	$58.62	Group 6	$47.85	Group 6	$58.62
Generator 5KW								
HDEP Welder (pipe or liner)								
5 Ton Crane	Group 10A	$49.55	Group 8	$58.73	Group 10A	$49.55	Group 8	$58.73
20 Ton Crane	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
50 Ton Crane	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
120 Ton Crane								
Fringe Benefits								
Equip Op Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$0.00
Zone and Area Adjustments - Miles and Rates ($hr) [3]								
Equipment Zone 1	< 50 miles	$0.00	< 20 Miles	$0.00	< 50 miles	$0.00	< 20 Miles	$0.00
Equipment Zone 2	50 to 150 miles	$2.00	20 to 40 miles	$2.00	50 to 150 miles	$2.00	20 to 40 miles	$2.00
Equipment Zone 3	151 to 300 miles	$3.00	40 to 60 miles	$3.00	151 to 300 miles	$3.00	40 to 60 miles	$3.00
Equipment Zone 4	> 300 miles	$4.00	> 60 miles	$3.50	> 300 miles	$4.00	> 60 miles	$3.50
Equipment Zone 5								
Equipment Zone 6								
Equipment Zone 7								
NOTES:								
(1) Equipment Type:	Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent	
(2) Equipment Operator Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010		D-B NV120038 1/6/2012		D-B NV100064 10/01/2010	
(3) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
TRUCK DRIVERS - Labor Groups and Base Pay Rate ($/hr) [4]								
725 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
730 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
735 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
740 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
769D	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
773E								
777D	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
785C								
793C								
797B								
613E (5,000 gal) Water Wagon	Water Truck > 2	$28.61	Group 3	$46.44	Water Truck > 2	$28.61	Group 3	$46.44
621E (8,000 gal) Water Wagon	Water Truck > 2	$28.61	Group 4	$46.62	Water Truck > 2	$28.61	Group 4	$46.62
777D Water Truck								
785C Water Truck								
Dump Truck (10-12 yd3)	Dump Truck Driv	$29.04	Group 2	$46.23	Dump Truck Driv	$29.04	Group 2	$46.23
Fringe Benefits								
Truck Driver Fringe Benefits ($/hr)		$13.64		$0.00		$13.64		$0.00
Zone and Area Adjustments [5]								
Truck Zone 1	< 50 miles	$0.00	< 30 miles	$0.00	< 50 miles	$0.00	< 30 miles	$0.00
Truck Zone 2	50 to 150 miles	$2.00	30-50 miles	$1.50	50 to 150 miles	$2.00	30-50 miles	$1.50
Truck Zone 3	151 to 300 miles	$3.00	50-70 miles	$2.50	151 to 300 miles	$3.00	50-70 miles	$2.50
Truck Zone 4	> 300 miles	$4.00	>70 miles	$3.50	> 300 miles	$4.00	>70 miles	$3.50
Truck Zone 5								
Truck Zone 6								
Truck Zone 7								
NOTES:								
(4) Truck Driver Source:	D-B TEAM0533-002 12/01/2010		D-B NV20100064 10/01/2010		D-B TEAM0533-002 12/01/2010		D-B NV20100064 10/01/2010	

Nevada Standardized Bond Calculation
Labor Rates

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HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
(5) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
LABORERS - Labor Groups and Base Pay Rate ($/hr) (6,7)								
General Laborer	Group 1	$30.82	Group 1	$42.94	Group 1	$30.82	Group 1	$42.94
Skilled Laborer	Group 4	$31.32	Group 3	$43.25	Group 4	$31.32	Group 3	$43.25
Driller's Helper	Group 3	$31.07	Group 2	$43.15	Group 3	$31.07	Group 2	$43.15
Rodmen (reinforcing concrete)	Group 2	$30.92	Group 3A	$43.34	Group 2	$30.92	Group 3A	$43.34
Cement finisher	Group 3	$31.07	Group 3A	$43.34	Group 3	$31.07	Group 3A	$43.34
Carpenter		$38.80		$39.56		$38.80		$39.56
Fringe Benefits								
Laborer Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$0.00
Carpenter Fringe Benefits ($/hr)		$0.00		$14.05		$0.00		$14.05
Zone and Area Adjustments (8)								
Laborer Zone 1	< 50 miles	$0.00	< 30 miles	$0.00	< 50 miles	$0.00	< 30 miles	$0.00
Laborer Zone 2	50 to 150 miles	$2.00	30-50 miles	$1.50	50 to 150 miles	$2.00	30-50 miles	$1.50
Laborer Zone 3	151 to 300 miles	$3.00	50-70 miles	$2.50	151 to 300 miles	$3.00	50-70 miles	$2.50
Laborer Zone 4	> 300 miles	$4.00	>70 miles	$3.50	> 300 miles	$4.00	>70 miles	$3.50
Laborer Zone 5			Laughlin	$2.25			Laughlin	$2.25
Laborer Zone 6								
Laborer Zone 7								
NOTES:								
(6) Laborer Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010		D-B NV120038 1/6/2012		D-B NV100064 10/01/2010	
(7) Carpenter Source:	D-B NV120038 1/6/2012		D-B CARP1780-011 07/01/2011		D-B NV120038 1/6/2012		D-B CARP1780-011 07/01/2011	
(8) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
PROJECT MANAGEMENT AND TECHNICAL LABOR - Base Pay Rate ($/hr) (9)								
Project Manager		$65.25		$65.25		$65.25		$65.25
Foreman		$60.75		$60.75		$60.75		$60.75
Field Geologist/Engineer		$92.13		$92.13		$92.13		$92.13
Field Tech/Sampler		$83.75		$83.75		$83.75		$83.75
Range Scientist		$92.13		$92.13		$92.13		$92.13
Senior Planning Engineer								
Project Engineer								
Mechanic/Fitter								
NOTES:								
(9) Project Manager:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31	
(9) Foreman Source:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31	
(9) Techical Labor Source:	SRK Consulting 2012 (Total		SRK Consulting 2012 (Total		SRK Consulting 2012 (Total		SRK Consulting 2012 (Total	
INDIRECT COSTS								
SOCIAL SECURITY, WORKMAN'S COMP, INSURANCE, ETC.								
Unemployment (%)		3.00%		3.00%		3.00%		3.00%
Retirement/SS/Medicare (%)		7.65%		7.65%		7.65%		7.65%
Workman's Compensation (%)		8.75%		8.75%		8.75%		8.75%
State Payroll Tax (13),(15),(17),(18)								
NOTES:								
(10) Workman's Comp Source:	RS Means R013113-60 NV		RS Means R013113-60 NV		RS Means R013113-60 NV		RS Means R013113-60 NV	
Unemployment Tax	NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606	

Nevada Standardized Bond Calculation
Reclamation Material Costs

File Name:	*SRCE_Cost_Data_File_1_12_Stc*
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Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	*Southern Nevada*	*N. Nevada Notice Level*	*S. Nevada Notice Level*
Revegetation Materials					
Seed Mixes					
Seed Mix	Units				
None					
Mix 1	Cost/Acre	$302.50	$302.50	$302.50	$302.50
Mix 2	Cost/Acre	$332.75	$332.75	$332.75	$332.75
Mix 3	Cost/Acre	$363.00	$363.00	$363.00	$363.00
Mix 4	Cost/Acre	$393.25	$393.25	$393.25	$393.25
User Mix 1	Cost/Acre				
User Mix 2	Cost/Acre				
User Mix 3	Cost/Acre				
User Mix 4	Cost/Acre				
User Mix 5 (see Seed Mix sheet)	Cost/Acre				
	Notes:				
Mulch					
Item	Units				
None					
Straw Mulch	Cost/lb	$0.15	$0.15	$0.15	$0.15
Hydro Mulch	Cost/lb	$0.25	$0.25	$0.25	$0.25
Timber Mulch	Cost/lb				
	Cost/lb				
	Cost/lb				
	Notes:	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)
		Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)
Amendments					
Item	Units				
None					
Organic Matter	Cost/lb	$0.70	$0.70	$0.70	$0.70
Treated Sludge	Cost/lb				
Chemical	Cost/lb	$0.46	$0.46	$0.46	$0.46
	Cost/lb				
	Cost/lb				
	Cost/lb				
	Notes:	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)
		Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)

Nevada Standardized Bond Calculation
Reclamation Material Costs

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RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	*Southern Nevada*	*N. Nevada Notice Level*	*S. Nevada Notice Level*
Well Abandonment Materials					
Description	Units				
Cement	50lb bag	$6.78	$6.78	$6.78	$6.78
Grout (Low Grade Bentonite)	50lb bag	$7.13	$7.13	$7.13	$7.13
Inert Material/Cuttings	cy				
	Notes:	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag
		(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added
Monitoring Costs					
Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Monitor Well Pump	ea.	$2,140.00	$2,140.00	$2,140.00	$2,140.00
Sampling Supplies	ea.	$5.00	$5.00	$5.00	$5.00
Water Analysis (Profile I) (1)	ea.	$380.00	$380.00	$380.00	$380.00
Leach Test (MWMP) w/ analysis	ea.	$450.00	$450.00	$450.00	$450.00
ABA + S speciation	ea.	$150.00	$150.00	$150.00	$150.00
WAD Cyanide in water	ea.	$50.00	$50.00	$50.00	$50.00
Water Analysis (Profile II) (1)	ea.	$430.00	$430.00	$430.00	$430.00
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	Notes:	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)

Nevada Standardized Bond Calculation
Reclamation Material Costs

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RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Fuel, Etc.					
Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Off-road Diesel - delivered (1)	$/gal	$2.66	$2.66	$2.66	$2.66
Pickup Truck Travel	$/mi	$0.58	$0.58	$0.58	$0.58
Electical Power	$/kWh	$0.08	$0.08	$0.08	$0.08
Notes:		(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).
		Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015
		Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	*SRCE_Cost_Data_File_1_12_Std_2015.xlsm*
Date:	*August 1, 2015*
Cost Basis:	*User Data*
Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
REVEGETATION									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Seeding - Broadcast Manual[1]	$/acres	$135.00	$50.00	$135.00	$50.00	$135.00	$50.00	$135.00	$50.00
Seeding - Broadcast Mechanical[1]	$/acres	$93.33	$27.00	$93.33	$27.00	$93.33	$27.00	$93.33	$27.00
Seeding - Drill[1]	$/acres	$140.00	$100.00	$140.00	$100.00	$140.00	$100.00	$140.00	$100.00
Seeding - Hydroseeding[1]	$/acres	$250.00	$125.00	$250.00	$125.00	$250.00	$125.00	$250.00	$125.00
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Shrub Planting - bare root 6-10 in (150- 250mm)[2]	ea.								
Tree Planting - bare root 11-16 in (270- 400mm)[3]	ea.								
Cactus Planting[4]	ea.								
NOTES:									
(1) Seeding Source:		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)	
(2) Shrub Source:									
(3) Tree Source:									
(4) Cactus Source:									
BUILDING and WALL DEMOLITION									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Building Demolition									
Lg. steel	C.F.								
Lg. concrete	C.F.								
Lg. masonry	C.F.								
Lg. mixed	C.F.								
Sm. steel	C.F.								
Sm. concrete	C.F.								
Sm. masonry	C.F.								
Sm. wood	C.F.								
Wall Demolition									
Block 4 in thick	S.F.		20%		20%		20%		20%
Block 6 in thick	S.F.		20%		20%		20%		20%
Block 8 in thick	S.F.		20%		20%		20%		20%
Block 12 in thick	S.F.		20%		20%		20%		20%
Conc 6 in thick	S.F.		10%		10%		10%		10%
Conc 8 in thick	S.F.		10%		10%		10%		10%
Conc 10 in thick	S.F.		10%		10%		10%		10%
Conc 12 in thick	S.F.		10%		10%		10%		10%
WASTE DISPOSAL									
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Rubbish and Waste Handling									
Dumpster delivery (average for all sizes)	ea.	$52.50		$52.50		$52.50		$52.50	
Haul (average for all sizes)	ea.	$165.00		$165.00		$165.00		$165.00	
Rent per month (average for all sizes)	ea.	$56.00		$56.00		$56.00		$56.00	
Disposal fee per ton (tonne) (average for all sizes)	ton	$62.00		$62.00		$62.00		$62.00	
NOTES:									
Dumpster Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Disposal Fee Source:		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Hazardous Material Handling - Solids									
Pickup fees 55 gal. drums	ea.	$245.00		$245.00		$245.00		$245.00	
Bulk material (average)	ton	$399.50		$399.50		$399.50		$399.50	
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	mile	$5.46		$5.46		$5.46		$5.46	
Dump site disposal fee	ton	$281.50		$281.50		$281.50		$281.50	
NOTES:									
Solid Handling Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Solid Disposal Fee Source:		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	*SRCE_Cost_Data_File_1_12_Std_2015.xlsm*
Date:	*August 1, 2015*
Cost Basis:	*User Data*
Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
Hazardous Material Handling - Liquids									
Vacuum Truck Pickup (2200 gal or 9,700 litres)	hr.	$143.00		$143.00		$143.00		$143.00	
Vacuum Truck Pickup (5000 gal or 2,000 litres)	hr.	$208.00		$208.00		$208.00		$208.00	
Dump site disposal fee	ton	$281.50		$281.50		$281.50		$281.50	
NOTES:									
Liquid Handling Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Liquid Disposal Fee Source:		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11	
Hydrocarbon Contaminated Soils (HCS)									
Insitu Biotreatment	C.Y	$18.18		$18.18		$18.18		$18.18	
HCS disposal fee	C.Y	$271.50		$271.50		$271.50		$271.50	
NOTES:									
Insitu Treatement Cost Source		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65	
HCS Disposal Fee Source:		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65	
UNDERGROUND OPENING CLOSURE									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Reinforced Concrete Bulkheads and Shaft Covers									
Grade walls - 15 in thick, 8 ft high	C.Y	$133.00		$133.00		$133.00		$133.00	
Grade walls - 15 in thick, 12 ft high	C.Y	$133.00		$133.00		$133.00		$133.00	
Elevated conc, 1-way beam & slab - 15ft span	C.Y	$247.00		$247.00		$247.00		$247.00	
Elevated conc, 1-way beam & slab - 25ft span	C.Y	$234.00		$234.00		$234.00		$234.00	
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Small Adit Plugging									
Bat Gate [5]	ea.	$2,911.27		$2,911.27		$2,911.27		$2,911.27	
Culvert Gate [5]	C.Y	$5,822.54		$5,822.54		$5,822.54		$5,822.54	
Adit Foam Plug [6]	C.Y	$291.13		$291.13		$291.13		$291.13	
Production Opening Foam Plug [6]	C.Y	$291.13		$291.13		$291.13		$291.13	
NOTES:									
(5) Bat Gate Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)	
(6) Foam Plug Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)	
MISC. LINEAR PROJECTS									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Fencing Installation									
Barbed 3-strand	ft	$0.45		$0.45		$0.45		$0.45	
Barbed 4-strand	ft	$0.60		$0.60		$0.60		$0.60	
Barbed 5-strand	ft	$0.75		$0.75		$0.75		$0.75	
Chain link 8 ft -10 ft Install	ft	$36.50		$36.50		$36.50		$36.50	
Wood stockade fence 6 ft high - Install	ft	$14.15		$14.15		$14.15		$14.15	
	ft								
	ft								
Fencing Removal									
Barbed 3-strand Removal	ft								
Barbed 4-strand Removal	ft								
Barbed 5-strand Removal	ft								
Chain link 8 ft -10 ft Removal	ft								
Wood, all types 4 ft -6 ft high Removal	ft								
	ft								
	ft								
Culvert Removal									
12 in (300 mm) Diameter	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
18 in (450 mm) Diameter	ft								
24 in (600 mm) Diameter	ft								
36 in (1m) Diameter	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	*SRCE_Cost_Data_File_1_12_Std_2015.xlsm*
Date:	*August 1, 2015*
Cost Basis:	*User Data*
Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
Pipeline Removal									
Plastic Pipe 3/4 in (mm) - 4 in (100 mm) diameter	ft								
6 in (150 mm) - 8 in (200 mm)	ft								
10 in (250 mm) - 18 in (450 mm)	ft								
20 in (500 mm) - 36 in (1 m)	ft								
Pipe and Drainpipe Installation									
Water 4in (100mm) 40ft (12m) length, welded HDPE	ft	$2.18		$2.18		$2.18		$2.18	
Water 6in (150mm) 40ft (12m) length, welded HDPE	ft	$5.15		$5.15		$5.15		$5.15	
Water 12in (300mm) 40ft (12m) length, welded HDPE	ft								
Drain 4in (100mm) perforated PVC	ft	$1.28		$1.28		$1.28		$1.28	
Drain 6in (150mm) perforated PVC	ft	$2.89		$2.89		$2.89		$2.89	
Drain 4in (100mm) corrugated, perf or plain	ft	$0.44		$0.44		$0.44		$0.44	
Drain 6in (150mm) corrugated., perf or plain	ft	$1.26		$1.26		$1.26		$1.26	
Drain Rock Preparation									
Item	**Units**		**Total**		**Total**		**Total**		**Total**
Crushing	C.Y		$0.50		$0.50		$0.50		$0.50
Screening	C.Y		$0.50		$0.50		$0.50		$0.50
Misc.									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Backhoe work	C.Y								
Powerline and Transformer Removal			**Total**		**Total**		**Total**		**Total**
Single Pole Powerlines [7]	mile		$40,461		$40,461		$40,461		$40,461
Double Pole Powerlines [8]	mile		$46,242		$46,242		$46,242		$46,242
Substation [9]	unit		$28,997		$28,997		$28,997		$28,997
NOTES:									
(7) Single Pole Source:		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015	
(8) Double Pole Source:		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015	
(9) Transformer Source:		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015	
EROSION, EVAPORATION and SEDIMENTATION CONTROL									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Rip-Rap & Rock Lining									
Rip-Rap 3/8 to 1/4 C.Y. pieces, grouted	S.Y.	$25.50		$25.50		$25.50		$25.50	
Rip-Rap 18 in min thick, no grout	S.Y.	$8.05		$8.05		$8.05		$8.05	
Gabions, 6 in deep	S.Y.	$11.25		$11.25		$11.25		$11.25	
Gabions, 9 in deep	S.Y.	$16.55		$16.55		$16.55		$16.55	
Gabions, 12 in deep	S.Y.	$22.50		$22.50		$22.50		$22.50	
Gabions, 18 in deep	S.Y.	$30.50		$30.50		$30.50		$30.50	
Gabions, 36 in deep	S.Y.	$41.50		$41.50		$41.50		$41.50	
Liner Installation									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Site grading	S.F.								
Compaction	S.F.								
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
60 mil HDPE Liner	S.F.		$0.50		$0.50		$0.50		$0.50
Construction Management Support									
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
Office Trailer, Furnished, no hook-ups	month		$188.00		$188.00		$188.00		$188.00
Toilet Portable, chemical	month		$130.75		$130.75		$130.75		$130.75
PRODUCTION OR DEWATERING WELL PUMP REMOVAL									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Pump Type									
Submersible [10]	ft to pump	$2.54	$5.53	$2.54	$5.53	$2.54	$5.53	$2.54	$5.53
Line Shaft [10]	ft to pump	$5.93	$12.91	$5.93	$12.91	$5.93	$12.91	$5.93	$12.91
NOTES:									
(10) Pump Removal Source:		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)	

Nevada Standardized Bond Calculation
Indirect Costs

File Name:	***CostData STD 3.xls***
Date:	***December 1, 2005***
Cost Basis:	***Standardized Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Administrative Cost Rates (%)					
	Cost Ranges for Indirect Cost Percentages				
	<=	**<=**	**<=**	**>**	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate	8.00%	6.00%		4.00%	
	<=	**<=**	**<=**	**>**	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	10.00%	8.00%	6.00%	4.00%	
3. Insurance (9)	1.50%	of labor costs			
4. Bond (10)	3.00%	of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)	10.00%	of the O&M costs			
	<=	**<=**	**<=**	**>**	
6. Contract Administration (12)	$1,000,000	$25,000,000		$25,000,000	
Variable Rate	10.00%	8.00%		6.00%	
Government Indirect Cost (13)	21.00%	of contract administration			

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

1. Federal construction contracts require Davis-Bacon wage rates for contracts over $2,000. Wage rate estimates may include base pay, payroll loading, overhead and profit. To avoid double counting of any of the identified administrative costs the operator must itemize the components of their labor cost estimates or provide BLM with a signed statement, under penalty of USC 1001, that identifies what specific administrative costs are included in the quoted hourly rate.

2. The reclamation cost estimate must include the estimated plugging cost of at least one drill hole for each active drill rig in the project area. Where the submitted Notice or approved Plan of Operations calls for drill holes to be plugged, but doesn't specifically require the drill holes be plugged before the drill rig has been moved from the drill pad, the reclamation cost estimate must include the plugging cost for those drill holes. For all drill holes and wells scheduled to be left open, the estimated plugging cost must be included in the reclamation cost estimate. Where the approved Plan of Operations proposes immediate mining through an area where the drilling is to occur, and the cost of the post-mining reclamation is included in the reclamation cost estimate, the cost estimate does not need to include the plugging costs for those drill holes.

3. Miscellaneous items should be itemized on accompanying worksheets.

4. Fluid management should be calculated only when mineral processing activities are involved. Fluid management represents the costs of maintaining proper fluid management to prevent overflow of solution ponds through premature cessation or abandonment of operations. Calculate a minimum six month direct cost estimate which includes power, supplies, equipment, labor and maintenance.

5. Handling of hazardous materials includes the cost of decontaminating, neutralizing, disposing, treating and/or isolating all hazardous materials used, produced, or stored on the site.

6. Any mitigation measures required in the Plan of Operations must be included in the reclamation cost estimate. Mitigation may include measures to avoid, minimize, rectify and reduce or eliminate the impact, or compensate for the impact.

7. Engineering, design and construction (ED&C) plans are often necessary to provide details on the reclamation needed to contract for the required work. To estimate the cost to develop an ED&C plan use 4-8% of the O&M cost. Calculate the ED&C cost as a percentage of the O&M cost as follows: up to and including $1 million, use 8%; over $1 million to $25 million, use 6%; and over $25 million, use 4%. Inclusion of a line item for the development of an ED&C plan may not be necessary for small operations, such as notice-level exploration. With small, uncomplicated reclamation efforts contracting may be able to proceed without developing an ED&C plan. [ED&C is automatically eliminated if "Notice" is selected on the Property Information Sheet]

8. A contingency cost is included in the reclamation cost estimation to cover unforeseen cost elements. Calculate the contingency cost as a percentage of the O&M cost as follows: up to and including $500,000, use 10%; over $500,000 to $5 million, use 8%; over $5 million to $50 million, use 6%; and greater than $50 million, use 4%. As with the ED&C cost, inclusion of a contingency cost may not be necessary for small operations, such as notice-level exploration.

9. Insurance premiums are calculated at 1.5% of the total labor costs. Enter the premium amount if liability insurance is not included in the itemized unit costs.

10. Federal construction contracts exceeding $100,000 require both a performance and a payment bond (Miller Act, 40 USC 270et seq.). Each bond premium is figured at 1.5% of the O&M cost. Enter the sum of both premium costs on this line.

11. For Federal construction contracts, use 10% of estimated O&M cost for the contractor's profit.

12. To estimate the contract administration cost, use 6 to 10% of the operational and maintenance (O&M) cost. Calculate the contract administration cost as a percentage of the O&M cost as follows: up to and including $1 million, use 10%; over $1 million to $25 million, use 8%; and greater than $25 million use 6%.

13. Government indirect cost rate is 21% of the contract administration costs.

Attachment 6.

DandT Seeding Contingency Reclamation Estimate on Letterhead.doc

D & T Landscaping, Inc.
PO Box 65
Solway, MN 56678
Office Phone & Fax 218-467-9242
Email: dntwinge@paulbunyan.net

Dave's Cell 218-556-4560
Deb's Cell 218-760-0894
Tom's Cell 218-760-3795

4/5/16

PolyMet Mining, Inc.
PO Box 475, 6500 Co Rd 666
Hoyt Lakes, MN 55750

Att: Steve DeVaney,

Below, please find some rough estimates for the Contingency Reclamation Estimate:

1. **Commercial Fertilizer and Seed for Tailings Basin Flats – Supply/Apply/ Incorporate Unit Pricing per acre @ 500 lb/acre $390.00/Acre**
2. **Commercial Fertilizer and Seed for Tailings Basin Slopes – Supply/Apply/Incorporate Unit Pricing per acre @ 200 lb/Acre $540.00/Acre**
3. **Commercial Fertilizer and Seed for Overburden – Supply/Apply/Incorporate Unit Pricing per Acre @ 200 lb/Acre $295.00/Acre**
4. **4.) Mulch – Supply and Incorporate. Unit Pricing per Acre @ 2 ton/acre of Hay or Straw Mulch $340.00/Acre**

Thank You,

Deb Winge

Attachment 7.

Water analysis cost

Pace Analytical Services, Inc.
2016 Price List

Water		
Analyte	**Method Number**	**Unit Price**
Organics		
Gas Chromatography / Mass Spectrometry (GC/MS)		
VOCs (medium level)	8260B	$81.25
VOCs - Low Level	8260B	$87.50
1,4 Dioxane	8260B SIM	$118.75
VOCs 524.2 (drinking water)	524.2	$137.50
VOCs 624 (waste water)	624	$162.50
SVOC	8270C, D	$206.25
Acid Extractibles - Phenols	8270C,D	$156.25
Base Neutral (BN) Extractibles	8270C, D	$156.25
SVOC 625 (waste water)	625	$243.75
PAHs	8270C,D	$125.00
PAHs (low level)	8270C,D SIM	$87.50
cPAH	8270C,D SIM	$206.25
MN Dept of Ag List 1	8270D	$206.25
MN Dept of Ag List 2	8270D	$225.00
Pentachlorophenol (PCP)	8270C,D SIM	$218.75
Gas Chromatography (GC)		
DBCP, EDB	8011	$62.50
PCBs	8082/8082A	$75.00
Pesticides, Organochlorine	8081A, B	$137.50
Pesticides, Organochlorine and PCBs	8081A,B + 8082A	$225.00
Petroleum Hydrocarbons		
Total Purgeable Petroleum Hydrocarbons		
BTEX	8260B	$31.25
BTEX/MTBE	8260B	$33.75
BTEX/WI GRO	8260/WI GRO	$43.75
BTEX/TPH as Gas	8260/8015	$43.75
BTEX/MTBE/WI GRO	8260/WI GRO	$43.75
BTEX/MTBE/Naphthalene	8260B	$45.00
BTEX/MTBE/Naphthalene/1,2 DCA	8260B	$50.00
BTEX/MTBE/Trimethylbenzenes (PVOC)	8260B	$50.00
Gasoline Range Organics (GRO)	AK 101	$56.25
Gasoline Range Organics (GRO)	WI GRO	$28.75
NWTPH-Gx	NWTPH-Gx	$56.25
TPH as Gas	OA-1	$68.75
TPH as Gasoline (C6-C10)	8015B,C	$31.25
VPH	MA VPH	$93.75
Petroleum Hydrocarbons		
Total Extractible Petroleum Hydrocarbons		
Diesel Range Organics (DRO)	AK 102	$68.75
Residual Range Organics (RRO)	AK 103	$68.75
Diesel Range Organics (DRO)/Residual Range Organics (RRO)	AK 102/AK 103	$93.75
Diesel Range Organics (DRO)	WI DRO	$37.50
WI DRO w/silica gel clean-up on final run	WI DRO	$56.25
Extended Range Organics C10-C32 **or** C10-C36	WI DRO	$81.25
Extended Range Organics C10-C36	WI DRO	$81.25
EPH screen	MA EPH	$68.75
EPH fractions after screen	MA EPH	$125.00
TPH as Diesel (C10-C28)	8015B,C	$37.50
TPH as Diesel (C10-C28) with silica gel clean-up	8015B,C	$56.25
Motor Oil Range (C24-C36)	8015B,C	$50.00
Motor Oil Range (C24-C36) with silica gel clean-up	8015B,C	$68.75
Oil and Grease	1664A	$62.50
HEM - SGT (TPH)	1664A	$81.25
NWTPH-Dx	NWTPH-Dx	$75.00
NWTPH-Dx with silica gel clean-up	NWTPH-Dx	$93.75
TPH as Diesel	OA-2	$75.00

Water		
Analyte	**Method Number**	**One-time client**
Wet Chemistry / Inorganic Analysis		
Acidity	SM2310B	$18.75
Alkalinity, Total (includes carbonate, bicarbonate, hydroxide) reported as CaCO3	SM2320B	$18.75
BOD, 5 day	Hach 10360/SM5210B	$37.50
Bromide	300.0	$25.00

BTUs	ASTM D240, D5865	$22.50
Carbon, Total Organic (double run)	SM5310C	$56.25
Carbon, Total Organic (quad run)	9060A	$131.25
Cation/Anion Balance (Na, Ca, Mg, K, Alkalinity, Sulfate, Chloride, N+N, Fluoride) Calculation only	Calculation only, see indiv. methods	$12.50
CBOD	Hach 10360/SM5210B	$37.50
Chloride	300.0	$25.00
Chloride	SM4500-Cl-E	$12.50
Chlorine, Residual	SM4500Cl-G	$12.50
Chlorophyll a	SM10200H	$37.50
Chromium, hexavalent	SM3500-Cr B	$43.75
Chromium, trivalent	Calculation only	$12.50
COD	SM5220D	$25.00
Color	SM2120	$12.50
Cyanide, Total	SM4500CN-E	$37.50
Dissolved Oxygen	Hach 10360	$62.50
Wet Chemistry / Inorganic Analysis		
E. coli bacteria	Quantitray	$62.50
Eh	ASTM D1498	$37.50
Fecal coliform bacteria	SM9222D	$25.00
Fluoride	300.0	$25.00
Fluoride	SM4500F-C	$16.25
Formaldehyde	NIOSH 3500	$56.25
Hardness (calc only) (requires Ca and Mg at additional charge)	SM2340B/200.7	$12.50
Heterotrophic Plate Count (HPC)	SM 9215 B	$22.50
Nitrogen, Ammonia	SM4500NH3/350.1	$18.75
Nitrogen, Ammonia (if distillation is required)	SM4500NH3/350.1	$37.50
Nitrogen, Nitrate	SM4500 NO3-H/353.2/300.0	$17.50
Nitrogen, Nitrite	SM4500-NO2-B/353.2/300.0	$17.50
Nitrogen, Nitrate+Nitrite	SM4500 NO3-H/353.2/300.0	$17.50
Nitrogen, Total Kjeldahl	351.2	$31.25
Total Inorganic Nitrogen	Calculation only	$12.50
Total Organic Nitrogen (calc. only, requires 351.2, 350.1)	Calculation only	$12.50
Total Persulfate Nitrogen	SM 4500 N-C	$62.50
pH (Corrosivity)	SM4500H+B	$6.25
Phosphorus, Ortho	SM4500P-E	$31.25
Phosphorus, Ortho	365.3/300.0	$31.25
Phosphorus, Ortho, Low Level	SM4500P-E	$37.50
Phosphorus, Total or Dissolved	SM4500P-E	$25.00
Phosphorus, Total or Dissolved	365.1	$25.00
Phosphorus, Total, Low Level	SM4500P-E	$37.50
Phosphorus, Total or Dissolved, Low Level	365.1	$37.50
Specific Conductance	SM2510B/120.1	$12.50
Sulfate	ASTM D516/300.0	$25.00
Sulfide	SM4500S2D	$37.50
Surfactants (MBAS)	SM5540C	$93.75
Total Coliform (membrane filtration)	SM 9222 B (quantitative)	$28.75
Total Coliform & E. Coli	SM 9223 B (presence/absence)	$22.50
Total Dissolved Solids	SM2540C	$12.50
Total Phenolics (recoverable)	420.4	$31.25
Total Settleable Solids	SM 2540F	$12.50
Total Suspended Solids	SM2540D/USGS I-3765	$12.50
Total Suspended Solids - low level	SM2540D/USGS I-3765	$18.75
Total Volatile Solids	160.4	$25.00
Turbidity	SM2130B/180.1	$12.50
Water		
Metals		
Hexavalent Chromium (Cr VI)	SM3500-Cr-B	$43.75
Mercury (Hg)	7470A/245.1	$43.75
Mercury - Low Level	1631 E	$112.50
Methyl Mercury	1630	$218.75
Selenium Hydride	SM 3114C	$93.75
Sodium Absorption Ratio (includes Ca, Mg, Na)	6010B,C/6020/6020A	$56.25
Individual Metals by ICP (Inductively Coupled Plasma) EPA 6010B, C		
Metal Analysis	6010B,C/200.7	$13.75
RCRA metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag)	6010B,C/200.7/7470A	$87.50
Individual Metals by ICP/MS (Inductively Coupled Plasma/Mass Spectrometry) EPA 6020/6020A		
Metal Analysis	6020/6020A/200.8	$20.00
Dioxin and PCB Congeners		
2,3,7,8 TCDD (drinking water)	1613B/8290/8290A	$250.00
17 Dioxin Compounds	1613B/8290/8290A	$743.75
PCB Congeners - Food List (7 Congeners)	1668	$531.25
PCB Congeners - WHO List (12 Congeners)	1668	$600.00
PCB Congeners - 209 Congeners	1668	$981.25
Dissolved Gases		

Methane only	RSK 175	$72.50
Ethane, Ethene, Methane, Propane	RSK 175	$100.00
Other Charges		
Charges can include any/all of the items noted to the right - to be charged when applicable. Prices may vary		Cost of sample supplies Disposal of unused sample supplies Time for packing/shipping of sample supplies Shipping/courier charges Unused sample supplies
Additional compounds (added to method after analysis)		$75/hour + analysis
Composite of samples		$10/container
Copy of chromatogram (if not requested at time of sample submittal)		$15/analysis/sample
Data validation/technical review of data		$100/hour
Deionization (DI) water - laboratory grade		$25/Gallon
Deionization (DI) water - ultra pure		Cost + Shipping + 15%
Delivery of sample containers (<1 workday notice)		$100 + Shipping
Delivery of sample containers (<3 workday notice)		$50 + Shipping
Disposal of unanalyzed material		materials + handling
Electronic Data Deliverable (EDD)		request quote
Extract and hold or hold of sample		50% of cost of analysis
Hard copy of Final Report		$10
Minimum laboratory order (one-time client)		$250
Reporting in multiple formats		$35
Return shipping - if requesting other than standard carrier		Cost
Sample filtration		$10/container
Sample preparation fee		$75/hour
Summa canisters not returned in 2 weeks		$50/can per week
Unannounced short hold or samples received <50% of hold time		Applicable rush surcharge
Hourly Time & Material Rates		
Technician		$60/hour
Project Manager		$70/hour
Analyst		$75/hour
Supervisor		$105/hour
Lab Manager / Assistant General Manager		$125/hour
Senior General Manager		$150/hour
Officer		$200/hour
Turnaround Times and Rush Surcharges		
Standard (10 Working Business Days)	Not Applicable	No Surcharge
6-9 Business Days	Not Applicable	1.25x
5 Business Days	Not Applicable	1.5x
3-4 Business Days	Not Applicable	2x
2 Business Days	Not Applicable	2.5x
1 Business Day	Not Applicable	3x
Less than 1 Business Day	Not Applicable	Quote
Standard TAT is 10 Business days. All requested turnaround times less than 5 business days MUST be pre-arranged to insure on-time delivery. Day of sample receipt is day zero. Report due close of business on agreed upon day.		
Deliverables / Data Packages		
Level 1 Sample Data Reporting Only		No Surcharge
Level 2 Complete Quality Control (QC) Data Blanks, Spikes, duplicates (including matrix spike duplicates), laboratory control samples, relative percent difference (RPD), percent recovery		No Surcharge
Level 3 Items listed in Level 2 plus QC limits, QA batch cross reference table. Allow an additional two weeks for data package.		15% Surcharge ($50 minimum per Work Order)
Level 4 Items listed in Levels 2 and 3 including sample raw data and chromatograms. Allow an additional two weeks for data package.		20% Surcharge ($50 minimum per Work Order)

Pricing Notes

All prices include:

a) Containers, preservatives, coolers, labels, chain-of-custody forms, *except* terracore kits and encore sample containers

b) Standard Electronic Deliverables via email

c) Access to Data via PacePort

Items included represent services provided by Pace Analytical. Numerous additional services and certifications are available throughout our nationwide network of labs. The prices shown are for routine projects with standard turnaround times. Specific projects may be bid individually. These prices should be used as guidelines, as exact pricing will depend on project size and expected turnaround time. Please consult Pace Analytical for assistance.

· Pace Analytical will dispose of all non-hazardous samples. Pace Analytical reserves the right to return to the client any highly hazardous, acutely toxic, or radioactive samples and sample containers.

· The Client is responsible for informing Pace of any necessary certifications, reporting limits and/or methods at the time of initial project set-up.

· Pace Analytical reserves the right to subcontract any method listed with prior consent of the Client.

· Methods listed are EPA Methods unless otherwise noted.

Attachment 8.

MP CommercialRates.pdf

To Our Commercial/Industrial Customers

On December 10, 2012, Minnesota Power received approval of the rates contained herein from the Minnesota Public Utilities Commission. These rates will be applied to usage on or after January 1, 2013.

For your information and convenient reference, this folder contains the following electric service rates and rules:

- **GENERAL SERVICE**
- **LARGE LIGHT & POWER SERVICE**
- **COMMERCIAL/INDUSTRIAL DUAL FUEL INTERRUPTIBLE ELECTRIC SERVICE**
- **COMMERCIAL/INDUSTRIAL CONTROLLED ACCESS ELECTRIC SERVICE**

Should you desire any further information regarding these rates and how they apply to

your business, please visit **www.mnpower.com** or call **1-800-228-4966**.

minnesota power

AN ALLETE COMPANY

Form 4961A Rev. 2/13
J-59645 TCI

GENERAL SERVICE

APPLICATION

To any customer's electric service requirements when the total electric requirements are supplied through one meter. Service shall be delivered at one point from existing facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery. Service hereunder is limited to customers with total power requirements of less than 10,000 kW and is subject to Company's Electric Service Regulations and any applicable Riders.

Applicable to multiple metered service only in conjunction with the respective Rider for such service.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at one standard low voltage of 120/240 to 4160 volts; except that within the Low Voltage Network Area, service shall be three phase, four wire, 60 hertz, 277/480 volts.

RATE (Monthly)

Customers Without A Demand Meter

Service Charge	$10.50
Energy Charge for all kWh (¢/kWh)	7.836¢

Customers With A Demand Meter

Service Charge	$10.50
Demand Charge for all kW	$5.86
Energy Charge for all kWh (¢/kWh)	5.288¢

There shall be added to the monthly bill, as computed above, an Affordability Surcharge determined in accordance with the Pilot Rider for Customer Affordability of Residential Electricity (CARE).

Plus any applicable adjustments.

MINIMUM CHARGE (Monthly)

The appropriate service charge plus any applicable adjustments; however, in no event will the Minimum Charge (Monthly) for three phase service be less than $25.00.

HIGH VOLTAGE SERVICE

Where customer contracts for service delivered and metered at (or compensated to) the available primary voltage of 13,000 volts or higher, the monthly bill, before Adjustments, will be subject to a discount of $1.75 per kW of Billing Demand. In addition, where customer contracts for service delivered and metered at (or compensated to) the available transmission voltage of 115,000 volts or higher, the monthly bill, before Adjustments, will be further subject to a discount of 0.284¢ per kWh of Energy.

High Voltage Service shall not be available from the Low Voltage Network Area as designated by the Company.

DETERMINATION OF THE BILLING DEMAND

When customer's use exceeds 2500 kWh for three consecutive months or where the connected load indicates

customer's demand may be greater than 10 kW, the customer may be placed on a demand rate.

The Billing Demand will then be the kW measured during the 15-minute period of the customer's greatest use during the month, as adjusted for power factor, but not less than the minimum demand specified in the customer's contract.

Demand will be adjusted by multiplying by 85% and dividing by the average monthly power factor in percent when the average monthly power factor is less than 85% lagging. However, in no event shall the average monthly power factor used for calculation in this paragraph be less than 45%.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

LARGE LIGHT AND POWER SERVICE

APPLICATION

To the entire electrical service requirements on the customer's premises delivered at one point from existing facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery.

Service hereunder is limited to customers with total power requirements of less than 50,000 kW and is subject to the Company's Electric Service Regulations and any applicable Riders. Customers with total power requirements in excess of 10,000 kW shall be served under this rate only where the customer and the Company have executed an electric service agreement having an initial minimum term of ten (10) years with a minimum cancellation provision of four (4) years.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at one standard low voltage of 120/240 to 4160 volts; except that within the Low Voltage Network Area service shall be three phase, four wire, 60 hertz, 277/480 volts.

RATE (Monthly)

Demand Charge		
For the first 100 kW or less of Billing Demand	$1,100.00	
All additional kW of Billing Demand ($/kW)		$9.30
Energy Charge		
All kWh (¢/kWh)		3.722¢

There shall be added to the monthly bill, as computed above, an Affordability Surcharge determined in accordance with the Pilot Rider for Customer Affordability of Residential Electricity (CARE).

Plus any applicable adjustments.

HIGH VOLTAGE SERVICE

When service is delivered and metered at (or compensated to) the available primary voltage of 13,000 volts or higher, the Demand Charge will be subject to a discount of $1.75 per kW of Billing Demand. In addition, where service is delivered and metered at (or compensated to) the available transmission voltage of 115,000 volts or higher, the Energy Charge will also be subject to a discount of 0.284¢ per kWh of Energy.

High voltage service shall not be available from the Low Voltage Network Area as designated by the Company.

DETERMINATION OF THE BILLING DEMAND

Billing Demand is the kW measured during the 15-minute period of customer's greatest use during the month, as adjusted for power factor, except that the Billing Demand will not be less than the amount by which the greatest adjustment demand during the preceding eleven months exceeds 100 kW, but no more than 75% of such adjusted demand. However, the Billing Demand shall not be less than the minimum demand specified in the customer's contract.

Demand will be adjusted by multiplying by 85% and dividing by the average monthly power factor in percent when the average monthly power factor is less than 85% lagging. However, in no event shall the average monthly power factor used for calculation in this paragraph be less than 45%.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

COMMERCIAL/INDUSTRIAL DUAL FUEL INTERRUPTIBLE SERVICE

APPLICATION

To the interruptible electric service requirements of Commercial/Industrial Customers where an alternative source of energy is available to satisfy these requirements during period of interruption. Service shall be delivered at one point from facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery. Service is subject to the Company's Electric Service Regulations and any applicable Riders.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at low voltage (voltage level lower than that available from the Company's 13,000 volt system) or high voltage (voltage level equal to or greater than that available from the Company's 13,000 volt system).

RATE (Monthly)

Service Charge

Low Voltage Service $10.50	
High Voltage Service	$10.50

Energy Charge

Low Voltage Service (¢/kWh)	5.178¢
High Voltage Service (¢/kWh)	4.791¢

Plus any applicable adjustments.

The High Voltage Service Rate is applicable where service is delivered and metered at (or compensated to) the available high voltage level (13,000 volt system or higher).

MINIMUM CHARGE (Monthly)

The Minimum Charge shall be the Service Charge plus any applicable Adjustments.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

CONTRACT PERIOD

Not less than 1 year or such longer period as may be required under an Electric Service Agreement.

SERVICE CONDITIONS

1. The primary energy source for the Company-approved Dual Fuel installation must be electric. An approved Dual Fuel installation requires that the secondary or backup energy source be capable of continuous operation. Under no circumstances will firm electric service qualify as the secondary or backup energy source.
2. The interruptible load of the approved Dual Fuel installation shall be separately served and metered and shall at no time be connected to facilities serving customer's firm load.
3. The duration and frequency of interruptions shall be at the discretion of the Company. Interruption will normally occur at such times:
   a. when the Company is required to purchase or generate power at a cost higher than the customer's energy charge,
   b. when the Company expects to incur a system peak in excess of its Mid-Continent Area Power Pool (MAPP) accredited generating capability,
   c. when in the Company's opinion the reliability of the system is endangered, or
   d. when the Company performs necessary testing of interruptibility of the customer's load.

Interruptions shall normally occur for capacity related needs before interruptions for any certified interruptible loads for Large Power, Large Light and Power, and General Service (those loads that meet the requirements specified in the MAPP Procedure for the Certification of Interruptible Demand).

4. The Company shall not be liable for any loss or damage caused by or resulting from any interruption of service except in the case of gross negligence on the part of the Company.
5. The customer must be prepared to supply all of the interruptible load from an alternative energy source for up to 30% of the customer's Dual Fuel requirements during any annual period.
6. The customer will install, at its expense, a load-break switch, circuit breaker, or other means of allowing the Company to automatically interrupt the customer's Dual Fuel load by sending a command or signal. The Company reserves the right to inspect and approve the installation to ensure compliance and consistency with the Company's interruption system. If the Company's system cannot support automatic interruption, interruption shall be made in accordance with Service Condition 8. The customer must provide a continuous 120 volt AC power source at the Company's control point for operation of the Company's remote control equipment.
7. The rate contemplates that this service will utilize existing facilities with no additional major expenditures. The Customer shall pay the Company the installed cost of any additional facilities required which are not supported by this rate. Customers who have guaranteed annual revenue commitments to support line extension costs under a firm rate schedule that are not fully satisfied before switching to Dual Fuel service may be required to have their extension cost contributions recalculated.
8. Upon receiving a control signal from the Company, the customer must shed its interruptible load in ten (10) minutes or less, and for a duration as required by the Company, whenever the Company determines such interruption is necessary. Customers with existing provisions in their Electric Service Agreements for longer notice before interruption shall continue to have thirty (30) minutes to shed their interruptible loads through the term of their existing contracts or December 31, 1998, whichever is later.
9. Those customers who fail to interrupt their interruptible load after being notified to do so by the Company shall be responsible for all costs incurred by the Company due to such failure, including but not limited to penalties assessed the Company by the Mid-Continent Area Power Pool in the event the Company experiences a system capacity deficiency. Those costs shall be charged on a pro rata basis to all customers who did not interrupt as requested. Such customer shall also be billed as follows:
   a. The first failure to interrupt shall result in the customer being billed for the entire month on the standard applicable General Service or Large Light and Power Service Schedule (thereby not receiving an interruptible discount).
   b. If a second such failure to interrupt occurs, in addition to billing as specified in (a) above, the Company reserves

the right to discontinue the customer's service under the Dual Fuel Interruptible Electric Service Schedule.

COMMERCIAL/INDUSTRIAL CONTROLLED ACCESS ELECTRIC SERVICE

APPLICATION

To any electric service for commercial/industrial customers for controlled storage or loads which will be energized only for the time period between 11 p.m. and 7 a.m. daily. Service is subject to Company's Electric Service Regulations and any applicable Riders.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at low voltage (voltage level lower than that available from Company's 13,000 volt system) or high voltage (voltage level equal to or greater than that available from the Company's 13,000 volt system, supplied through one meter at one point of delivery.

RATE (Monthly)

Service Charge	
High Voltage Service	$10.50
Low Voltage Service	$10.50
Energy Charge	
High Voltage Service	4.032¢
Low Voltage Service	4.332¢

Plus any applicable adjustments.

The High Voltage Service Rate is applicable where service is delivered and metered at (or compensated to) the available high voltage level (13,000 volt system or higher).

MINIMUM CHARGE (Monthly)

The Minimum Charge shall be the Service charge plus any applicable Adjustments.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

CONTRACT PERIOD

Not less than 30 days or such longer period as may be required under an Electric Service Agreement.

SERVICE CONDITIONS

1. The controlled load shall be separately served and metered and shall at no time be connected to facilities servicing the customer's other loads.
2. The total connected controlled load shall not exceed 200 kW.
3. Any controlled energy storage load to which this service schedule applies must have sufficient capacity to satisfy the customer's energy needs during the non-energized period.
4. The Company shall not be liable for any loss or damage caused by or resulting from any interruption of service except in the case of gross negligence on the part of the Company.
5. The customer's load shall be controlled by a switching device approved or supplied by the Company and paid for and installed by the customer. The customer must provide a continuous 120 volt AC power source at the Company's control point for operation of the Company's control equipment.
6. The rate contemplates that this service will utilize existing facilities with no additional major expenditures. The customer shall pay the Company the installed cost of any additional facilities required which are not supported by this rate.

ADJUSTMENTS APPLICABLE TO ALL ELECTRIC SERVICE RATES LISTED

1. There shall be added to or deducted from the monthly bill, as computed above, a fuel and purchased energy adjustment determined in accordance with the Rider for Fuel and Purchased Energy Adjustment.
2. There shall be added to the monthly bill, as computed above, an emissions-reduction adjustment determined in accordance with the Rider for Arrowhead Regional Emission Abatement (AREA).
3. There shall be added to the monthly bill, as computed above, a transmission investment adjustment determined in accordance with the Rider for Transmission Cost Recovery.
4. There shall be added to the monthly bill, as computed above, a renewable resources adjustment determined in accordance with the Rider for Renewable Resources.
5. There shall be added to the monthly bill a conservation program adjustment determined in accordance with the Rider for Conservation Program Adjustment. The combination of the fuel adjustment and the Conservation Program Adjustment shall be shown on the customer's bill as the Resource Adjustment.
6. There shall be added to the monthly bill the applicable proportionate part of any taxes and assessments imposed by any governmental authority which are assessed on the basis of meters or customers, or the price of or revenues from electric energy or service sold, or the volume of energy generated, transmitted or purchased for sale or sold.
7. Bills for service within the corporate limits of the cities of Aurora, Duluth, Hermantown, Little Falls, Long Prairie, Nashwauk, Park Rapids, Staples and other cities with approved franchise fee riders shall include an upward adjustment as specified in the applicable franchise fee rider for each city.
8. Minnesota Power will assess a Late Payment Charge of 1.50% or $1.00 per monthly billing period, whichever is greater, on that portion of a retail customer's account representing charges for utility service(s) past due, if the unpaid utility balance exceeds $10.00. Any portion of a utility bill under dispute will not be charged a Late Payment Charge while the dispute is being resolved. At the Company's discretion, any Late Payment Charge, or portion thereof, will be waived in accordance with the Minnesota Public Utilities Act.

Attachment 9.

Changes over time

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engineering and environmental consultants

BARR

Memorandum

To: Jennifer Saran
From: Pete Kero and Nancy Dent
Subject: NorthMet Project Feature Changes Over Time
Date: October 7, 2016
c: Jim Scott

1.0 Introduction

Some NorthMet Project (Project) features change over the Project's 20-year Life of Mine (LOM). Under Minnesota Rules, PolyMet will update its Contingency Reclamation Estimate (CRE) annually based on these changes to Project features, as well as other regulatory and technological changes that may occur. The purpose of this document is to describe the planned changes in mine features over time, quantify those changes, and provide a basis for the quantities.

Generally, the size and number of Project features grow to a peak in Mine Year 11, then decrease as mining and progressive reclamation take place concurrently through Mine Year 20. After Mine Year 20 (during the reclamation phase), Project features and quantities will change only as a result of closure activities. This memorandum accordingly provides data for only Mine Years 0 through 20, and does not address post-mining reclamation. The changes to facilities over the life of the mine that are described in this memorandum are based on permit-level designs. This document may be updated after final design to reflect any refinements.

Table 1 summarizes the features at several key points in the Project's life: Mine Years 1, 3, 11 and 20. Mine Year 1 is the year Phase 1 operations begin. Mine Year 3 is the year the Hydrometallurgical Plant (Phase 2) begins operations. Mine Year 11 is the year that stockpiles reach their maximum extent. Mine Year 20 is the end of mine life. Data in Table 1 is summarized for Stage 1 and Stage 2 of Pre-Operation Construction. Stage 1 represents the reclamation liability that would exist with all new facilities constructed but no mining operations started (no Duluth Complex rock blasted) and Stage 2 is the reclamation liability that would exist by adding the legacy building demolition to Stage 1. Large Figure 1 illustrates the Pre-Operation Construction features at the Mine Site for both Stage 1 and 2. Large Figure 2 illustrates the Pre-Operation Construction features at the Plant Site for both Stages 1 and 2.

Large Table 1 provides the changes in Project features on a year-by-year basis and is the source for Table 1, except for items related to Water Treatment. Section 2.0 discusses the changes in Project features over time and Section 3.0 provides the basis for how Large Table 1 was developed.

2.0 Changes in Project Features over time

2.1 Mine Site Features

The temporary waste rock stockpiles increase in size until Mine Year 11 at which point the East Pit becomes available for direct disposal of mined Category 2/3 and Category 4 Waste Rock and relocation of the waste rock in the Category 2/3 and Category 4 Waste Rock Stockpiles. The liner acres, collection piping length, the number sumps, and number of pumps/piping length to the WWTF increase during

operations as the stockpile footprints increase. The amount of rock to be relocated increases as mining progresses.

The Category 1 Waste Rock Stockpile footprint increases in size until Mine Year 6 at which point the Category 1 Stockpile has sufficient capacity for disposal of all mined Category 1 Waste Rock. The acres to be covered increase as mining progresses and decrease as progressive reclamation occurs. In the early years of operation while the footprint of the stockpile is being established, the west end of the containment system is open. This means that if there is a contingency closure during those years, closure of the west end of the containment system must be provided. The length of this extension increases as mining progresses and is eliminated when the footprint is fully established in Mine Year 6.

Table 1 Project Feature Changes Over Time

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Category 2/3 Waste Rock Stockpile						
Liner Acres to be Removed and Footprint Reclaimed[4]	Mine Year 1	Mine Year 1	63	119	181	0
Liner Collection Piping Feet to be Removed[3]	Mine Year 1	Mine Year 1	45,300	76,500	118,500	0
Sump/Pond Acres to be Reclaimed[4]	Mine Year 1	Mine Year 1	6.7	9.2	12.2	0
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2	4	6	0
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	8,000	10,000	12,000	0
Tons to Relocate[1]	none	Stage 1	5,238,766	13,968,736	44,021,108	0
Category 4 Waste Rock Stockpile						
Liner Acres to be Removed and Footprint Reclaimed[4]	Mine Year 1	Mine Year 1	29	57	57	0
Liner Collection Piping Feet to be Removed[3]	Mine Year 1	Mine Year 1	21,590	41,690	41,690	0
Sump/Pond Acres to be Reclaimed[4]	Mine Year 1	Mine Year 1	4.5	4.5	4.5	0
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2	2	2	0
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2,500	2,500	2,500	0
Tons to Relocate[1]	none	Stage 1	1,489,201	3,379,412	6,206,813	0
Ore Surge Pile						
Liner Acres to be Removed and Footprint Reclaimed	Mine Year 1	Mine Year 1	32	32	32	32
Liner Collection Piping Feet to be Removed	Mine Year 1	Mine Year 1	30,000	30,000	30,000	30,000
Sump/Pond Acres to be Reclaimed	Mine Year 1	Mine Year 1	2.3	2.3	2.3	2.3
Pumps to WWTF to be Removed	Mine Year 1	Mine Year 1	2	2	2	2

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Piping Feet to WWTF to be Removed	Mine Year 1	Mine Year 1	1,600	1,600	1,600	1,600
Tons to Relocate	none	Stage 1	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Waste Rock Stockpile						
Footprint Acres to Reclaim	13	Stage 1	0	0	0	0
Acres to Cover[5]	none	Stage 1	205	369	526	64
Containment System Feet to Extend[4]	none	Stage 1	2,800	2,800	0	0
Containment System Acres to Breach & Reclaim	41	Stage 1	0	0	0	0
Pits						
East Exposed/Unblasted Rock Acres to Reclaim	95	Stage 1	0	0	0	0
East Pit Wall Acres to Reclaim[1]	none	Stage 1	10.1	10.1	9.2	9.2
West Pit Exposed/Unblasted Rock Acres to Reclaim	none	Stage 1	0	0	65	0
West Pit Wall Acres to Reclaim[1]	none	Stage 1	0	8.7	13.5	13.5
Central Pit Wall Acres to Reclaim[1]	none	Stage 1	0	0	8.9	8.9
Pit Perimeter Fence - Barb Wire[2]	none	Stage 1	1,100	1,400	2,300	1,400
Pit Perimeter Fence - Non-Climbable[2]	none	Stage 1	11,000	19,900	32,800	33,700
Pit Access Gates[1]	none	Stage 1	1	2	2	3
Mine Water Ponds						
Pond Acres to be Reclaimed[3]	Mine Year 1	Mine Year 1	19.4	21.6	23.1	23.1
Liner Acres to be Removed (not all ponds lined) [3]	Mine Year 1	Mine Year 1	12.4	14.6	16.1	16.1
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	4	6	6	6

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	9,000	11,000	11,000	11,000
Pond Underdrain Piping Feet to be Removed	Mine Year 1	Mine Year 1	4,500	6,000	6,900	6,900
Stormwater Systems						
Pond Acres to Reclaim	Mine Year 1	Mine Year 1	17.4	21.7	21.7	21.7
Ditch Feet to Reclaim	Mine Year 1	Mine Year 1	10,700	10,700	10,700	8,300
Haul Roads						
Feet to be Reclaimed[1]	Mine Year 1	Mine Year 1	22,000	28,700	31,500	21,500
Flotation Tailings Basin (FTB)						
Beach Acres to Reclaim	40	Stage 1	0	0	0	0
Beach Acres to Amend[5]	none	Stage 1	95	93	212	428
Pond Acres to Amend[5]	none	Stage 1	421	427	1,124	905
Borrow Area Acres to Reclaim	31.6	Stage 1	44.7	16.5	18	19.5
Hydrometallurgical Residue Facility (HRF)						
Pre-Load Disturbed Acres to Reclaim	5	Stage 1	25	0	0	0
Acres to Cover[5]	none	Stage 1	0	49	49	98
Years to Drain[5]	none	Stage 1	0	1	5	9
Water Treatment						
Legacy Tailings Basin	non-mechanical	Stage 1	none	none	none	none
WWTF Pit Flushing Avg GPM	none	Stage 1	642[6]	899[7]	1,925[7]	1,925[8]
WWTF Pit Flushing Years	none	Stage 1	4[6]	6[7]	14[7]	14[8]
Years from Closure to Pit Overflow	none	Stage 1	9[6]	14[7]	32[7]	32[8][9]
WWTF Pit Overflow Avg GPM	none	Stage 1	0[6]	150[7]	321[7]	321[8]

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
WWTP Reclamation Avg GPM	none	Stage 1	2,957(6)	3,066(7)	3,500(7)	3,500(5)
WWTP Reclamation Years	none	Stage 1	8(6)	13(7)	35(7)	35(5)
WWTP Long-term Avg GPM	none	Stage 1	2,534(6)	2,450(7)	2,450(7)	2,450(5)

(1) Assumes Progressive Reclamation (Reference (1))
(2) For most years the total length of fence is based off AutoCAD drawings, except for year 11-20 where the total length was given from the GIS (Reference (1))
(3) Assumes Progressive Reclamation (Reference (2)
(4) Assumes Progressive Reclamation (Reference (3))
(5) Reference (4)
(6) Reference (5)
(7) See Section 2.3 for Mine Year 3 and Mine Year 11 data sources.
(8) Reference (6)
(9) Mine Year 20 value assumes pumping from Plant Site to West Pit to accelerate flooding, see Reference (6)) Section 6.1.2.3.2, Mine Year 1 assumes no Plant Site water.

The pits increase in size as mining progresses, initially mining from the East Pit only. The length of pit perimeter fence and number of pit lake access gates increase as the pits expand. The acres of pit wall to be reclaimed increase as mining progresses and decrease as progressive reclamation occurs.

The haul roads and associated mine water ditches increase in length as mining progresses and decrease as temporary stockpiles are no longer used and the associated roads become inactive.

The mine water management system increases in size as mining progresses. The pond acres, liner acres, number sumps and number of pumps/piping length to the WWTF increase as mining progresses.

The stormwater system increases over time as infrastructure expands. Stormwater ditches, perimeter dikes, ponds, and outlet structures are added as the existing system expands with new facilities. After Mine Year 20, Pond B and the associated portion of the North Perimeter Stormwater Ditch, Pond C-West, Pond C-East and the associated portion of the South Perimeter Stormwater Ditch and Pond D and Ditch D will be removed. Pond A will remain in long-term closure (regraded to drain to the East Pit) as well as the other stormwater ditches.

2.2 Plant Site Features

The Flotation Tailings Basin (FTB) changes as the exterior dams are raised and the tops move inward. The acres of beach and pond change over the Project life to reflect dam raises. The acres of existing tailings that are disturbed change over the Project life, reflecting their use as a borrow source.

The Hydrometallurgical Residue Facility (HRF) changes as the exterior dams are raised and the tops move inward. The acres to be covered change over the Project life to reflect dam raises. The time to drain the material in the facility for placement of the final cover increases with the amount of material in the facility. Because the HRF is planned to be constructed in Phase 2, it is not included in the CRE until Mine Year 3, except the wetlands restoration caused by pre-loading activities.

There are Phase 2 buildings that are also not included in the CRE until Mine Year 3 including the Oxygen Plant and the Hydrometallurgical Plant.

2.3 Water Treatment

Water treatment changes over the life of the Project in response to changes in Project features discussed above. Quantities for water treatment and unblasted rock acres to reclaim are described in detail, with basis for contingency closure in Mine Year 1 in the Technical Memorandum entitled "NorthMet Project – CRE O&M for water treatment during reclamation and long-term closure after Mine Year 1" (Reference (5)). The time-weighted average flow rates from that technical memo are listed in Table 1 as the water treatment flow rates for different periods of reclamation and closure (Reference (5)). Water treatment and unblasted rock acres to reclaim quantities for Mine Year 20 were calculated by water modeling efforts conducted for the Final Environmental Impact Statement (Reference (7)). Based on preliminary modeling of closure after Mine Year 11, water treatment quantities for Mine Year 11 were set equal to those calculated for Mine Year 20. Water treatment quantities for Mine Year 3 were interpolated from Mine Year 1 and Mine Year 11 values.

3.0 Basis for Changes in Project Features over time

Large Table 1 details the Project features that change on a year-to-year basis as the mine develops. It also shows how the quantities change over time (e.g., the acres of West Pit Wall that would need to be reclaimed every year, starting in Mine Year 0 and ending in Mine Year 20). The basis for the changes over time is described below. Drawings referenced below are compiled and attached to this memo.

3.1 Mine Pit

The NorthMet Project Mine Plan (Reference (1)) describes the development and progressive reclamation of mine features over time. Pit wall area needing reclamation (in acres) was determined from measurements using a 3-Dimensional Civil 3D model created by importing year-by-year pit dimensional AutoCAD drawings provided by PEG Engineering. The length of haul roads needing reclamation (in linear feet) and progressive reclamation was estimated by AutoCAD measurements using attached Mine Site and Dunka Road Earthwork Drawings EW-010 and EW-011, Mine Site and Dunka Road Earthwork Haul Road Reclamation Plans A (Mine Years 1-11) and B (Mine Years 11-20). The number of pit access gates relates to the number of active mine pits over time (e.g., one while only the East Pit is active, two when both the East and West Pits are active, etc.). Fencing requirements (4-strand barbed wire and non-climbable fence) were based on the pit perimeter measurements from the AutoCAD drawings for Mine Years 0 through 11, and GIS figures for Mine Years 11 through 20.

3.2 Category 1, 2/3 and 4 Stockpiles and Ore Surge Pile, and associated Liners, Underdrains, Sumps and Ponds

The progressive construction of the Category 1 Waste Rock Stockpile groundwater containment system over the first five years of mining is described in the Rock and Overburden Management Plan (ROMP, Reference (3)). For Mine Years 1 through 4 (prior to full completion of the groundwater containment system in Mine Year 5), the additional length of groundwater containment system that would need to be constructed to close the loop was estimated by AutoCAD measurements using Groundwater Containment System Drawings GCS-003, GCS-004, GCS-005, and GCS-006 for the Category 1 Stockpile Groundwater Containment System Mine Years 0, 2, 3 and 5 Layouts, respectively. Breaching of the Containment System during pre-operation construction was also based on these drawings.

The construction and progressive reclamation of the Category 1 stockpile are described in the ROMP (Reference (3)) and it was assumed that progressive reclamation begins in Mine Year 14 at a rate of 66 acres per year. The construction and progressive reclamation of the Category 2/3 and 4 stockpile and Ore Surge Pile liner systems and associated mine water sumps and overflow ponds are described in the ROMP (Reference (3)). The acres of Category 2/3 and 4 or Ore Surge Pile stockpile liner systems were estimated by AutoCad measurements using Category 1, 2/3, and 4 Stockpile Drawings SKP-003, SKP-004, SKP-005, and SKP-006, Mine Year 1, 2, 11 and 21 Limits, respectively. It was assumed that deconstruction of the Category 4 stockpile liner will be completed by the end of Mine Year 11 and deconstruction of the Category 2/3 stockpile liner begins in Mine Year 14 at a rate of 30 acres per year. The acres of associated stockpile liner sumps/ponds were estimated by AutoCAD measurements for progressive construction and reclamation using Mine Site Mechanical Infrastructure Drawing MD-016 Mine Drainage Infrastructure Reclamation Plan. The length of Category 2/3 and 4 stockpile collection and Ore Surge Pile overliner and underdrain piping over time was estimated by AutoCAD measurements using Category 1, 2/3, and 4 Stockpile Drawings SKP-016, SKP-017, SKP-022, SKP-023, SKP-028 and SKP-029 related to the Category 2/3 and 4 stockpile and Ore Surge Pile underdrain and overliner piping plans.

The Category 2/3 and 4 stockpile and Ore Surge Pile piping and pumping system to the WWTF are detailed in the Water Management Plan - Mine (Reference (2)). The length of piping for the Category 2/3 and 4 stockpiles and Ore Surge Pile was estimated by AutoCAD measurements using Drawing MD-002 Mine Drainage Infrastructure Mine Year 11 General Layout from the Mine Site Mechanical Infrastructure drawing set. The number of stockpile pumps is shown on Mine Site Mechanical Infrastructure Drawing ME-003 Mechanical Infrastructure General Drawings, Mine Site, Mine Drainage Flow Diagram.

The tons of stockpile and Ore Surge Pile to relocate was calculated using year-by-year mining estimates for waste rock and ore as documented in the Mine Plan (Reference (1)).

3.3 Stormwater and Mine Water Ponds

Stormwater pond construction is detailed in the Water Management Plan - Mine (Reference (2)). Also, the construction of mine water ponds, liners, pumps and piping are detailed in the Water Management Plan - Mine (Reference (2)).

Stormwater pond acres to be reclaimed and stormwater ditches to be reclaimed were estimated by AutoCAD measurements for progressive construction and reclamation using Mine Site Stormwater Drawing SW-031 Dikes, Ditches, and Ponds, Reclamation Plan.

The acres of mine water ponds, liners and linear feet of mine water pond piping to be reclaimed was estimated by AutoCAD measurements using Drawing MD-002 Mine Drainage Infrastructure Mine Year 11 General Layout in the Mine Site Mechanical Infrastructure drawing set. The number of mine water pumps is shown on Drawing ME-003 Mechanical Infrastructure General Drawings, Mine Site, Mine Drainage Flow Diagram.

3.4 Flotation Tailings Basin

Acres of beach and pond bottom at the FTB to amend with bentonite was documented in Appendix B of the NorthMet Project Water Quality Modeling Data Package, Volume 1 – Mine Site (Reference (6)). The acreage of the borrow areas within the Tailings Basin that need to be reclaimed was computed using the borrow areas from FTB Support Drawing FTB-003; Existing Conditions.

3.5 Hydrometallurgical Residue Facility

The acres of HRF to cover and years to drain were calculated based on HRF development sequencing (footprint impacted) and timing, the year-by-year accumulation of hydrometallurgical residue, and assumed drainage rate of 115 gallons per cubic yard of material. The acres were estimated using HRF Drawings HRF-005, HRF-008 and HRF-010; Emergency Basin Excavations and Removals, Lift 1 Layout, and Lift 3 Layout, respectively.

References

1. **Poly Met Mining Inc.** NorthMet Project Mine Plan (v5). July 2016.

2. —. NorthMet Project Water Management Plan - Mine Site (v5). July 2016.

3. —. NorthMet Project Rock and Overburden Management Plan (v8). July 2016.

4. —. NorthMet Project Water Modeling Data Package Volume 2 - Plant Site (v11). March 2015.

5. **Barr Engineering Co.** NorthMet Project – CRE O&M for water treatment during reclamation and long-term closure after Mine Year 1 - 10 mg/L WWTP Sulfate Target Technical Memo to Jennifer Saran. October 2016.

6. **Poly Met Mining Inc.** NorthMet Project Water Modeling Data Package Volume 1 - Mine Site (v14). February 2015.

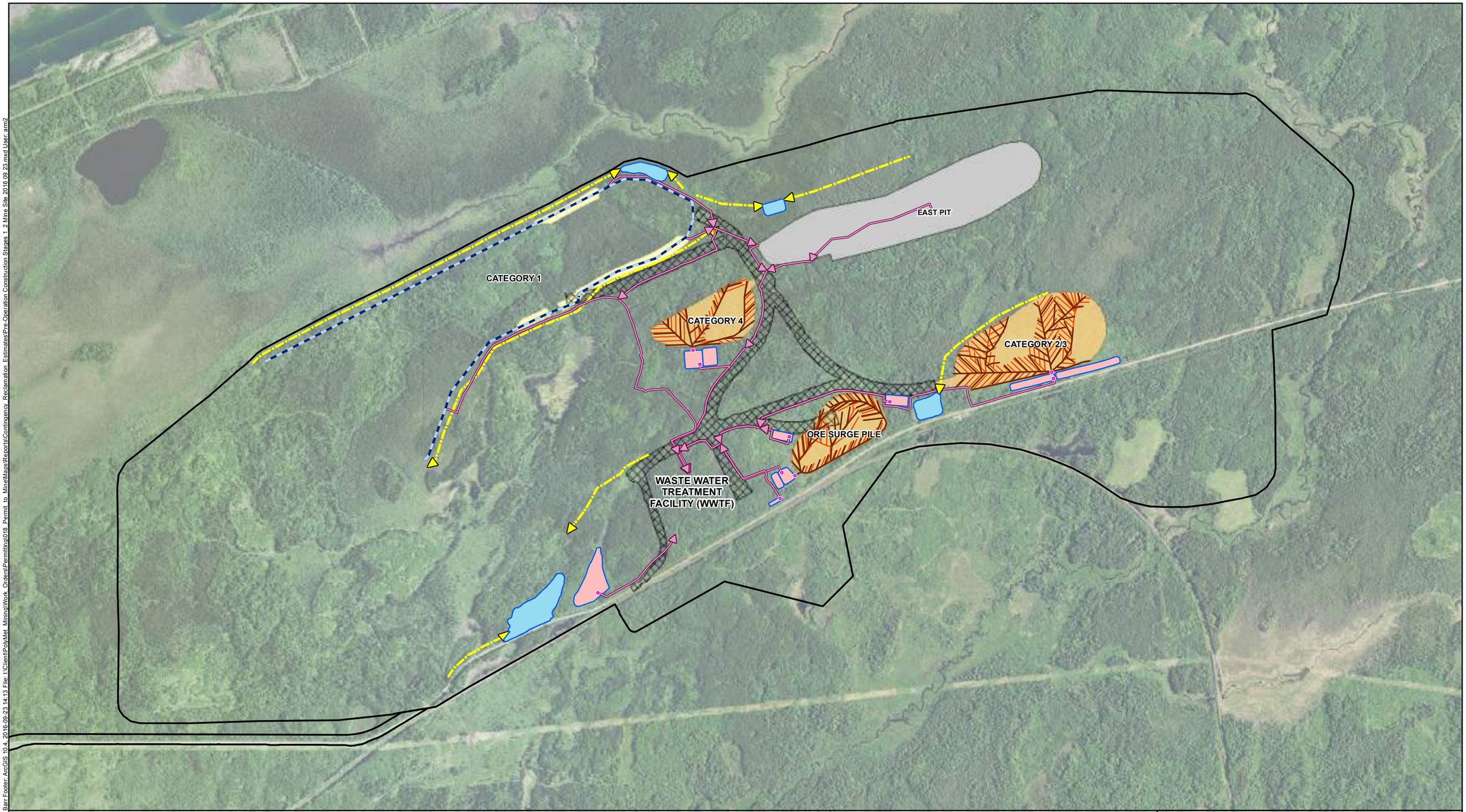
7. **Minnesota Department of Natural Resources, U.S. Army Corps of Engineers and U.S. Forest Service.** Final Environmental Impact Statement: NorthMet Mining Project and Land Exchange. November 2015.

Large Tables

Large Table 1 Reclamation Features that Vary by Closure Year

	Units that Vary by Closure Year																					
Year of Closure	0 - Stage 1	0 - Stage 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Category 2/3 Stockpile Liner (acres)	63	63	63	63	119	119	119	181	181	181	181	181	181	181	181	181	150	120	90	60	30	0
Category 2/3 Stockpile Piping (LF)	8,000	8,000	8,000	8,000	10,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0	0
Category 2/3 Stockpile Sump/Pond (acres)	6.7	6.7	6.7	6.7	9.2	9.2	9.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	9.2	9.2	6.7	6.7	6.7	0.0
Category 2/3 Stockpile Pumps	2	2	2	2	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Category 2/3 Stockpile Overliner and Underdrain Piping (LF)	45,300	45,300	45,300	45,300	76,500	76,500	76,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	94,800	71,100	47,400	23,700	0
Category 2/3 Stockpile Relocation (tons)	0	0	5,238,766	9,671,631	13,968,736	17,624,295	20,039,335	24,388,312	26,954,315	31,286,526	35,946,676	40,017,183	44,021,108	44,021,108	38,281,584	32,542,061	26,802,537	21,063,014	15,323,491	9,583,967	3,844,444	0
Category 4 Stockpile Liner (acres)	29	29	29	29	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Piping (LF)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Sump/Pond (acres)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Overliner and Underdrain Piping (LF)	21,590	21,590	21,590	21,590	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Relocation (tons)	0	0	1,489,201	2,251,698	3,379,412	4,206,959	4,648,816	5,314,412	5,863,428	5,974,068	6,107,575	6,184,408	6,206,813	0	0	0	0	0	0	0	0	0
OSP Liner (acres)	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
OSP Piping (LF)	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
OSP Sump/Pond (acres)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
OSP Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OSP Overliner and Underdrain Piping (LF)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
OSP Relocation (tons)	0	0	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Footprint to Reclaim (acres)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Cover (acres)	0	0	205	205	369	369	458	526	526	526	526	526	526	526	526	460	394	328	262	196	130	64
Category 1 Stockpile Containment System Completion (LF)	0	0	2,800	2,800	2,800	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Containment System Breach & Reclaim (acres)	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Exposed/Unblasted Rock to Reclaim (Acres)	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Wall Unreclaimed (Acres)	0	0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
West Pit Exposed/Unblasted Rock to Reclaim (Acres)	0	0	0	0	0	4	40	0	0	0	0	52	65	0	0	0	0	0	0	0	0	0
West Pit Wall Unreclaimed (Acres)	0	0	0	8.7	8.7	8.7	8.9	8.9	8.9	11.0	11.0	16.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Central Pit Wall Unreclaimed (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Fence - 4 strand barb wire (LF)	0	0	1,100	1,400	1,400	1,400	1,400	1,400	1,400	1,700	1,700	1,600	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	1,400
Fence - non climbable (LF)	0	0	11,000	19,900	19,900	21,200	20,700	20,700	20,700	22,100	22,100	30,100	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	33,700
Pit Access Gates	0	0	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Mine Drainage Pond (acres)	19.4	19.4	19.4	19.4	21.6	21.6	21.6	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Mine Drainage Pond Liner (acres)	12.4	12.4	12.4	12.4	14.6	14.6	14.6	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Mine Drainage Pond Pumps	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Mine Drainage Pond Pipe (LF)	9,000	9,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Mine Drainage Pond Underdrains	4,500	4,500	4,500	5,200	6,000	6,000	6,000	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
Stormwater Pond (acres)	17.4	17.4	17.4	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
Stormwater Ditch (LF)	5,200	5,200	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	8,300	8,300
Unreclaimed Haul Road (LF)	22,000	22,000	22,000	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	31,500	31,500	31,500	29,500	27,500	27,500	27,500	27,500	21,500	21,500
FTB Beach to Reclaim (acres)	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTB Beach to Amend with Bentonite (acres)	0	0	95	95	93	92	91	89	87	203	207	211	212	212	212	212	216	219	222	225	420	428
FTB Pond Bottom to Amend with Bentonite (acres)	0	0	421	424	427	430	432	434	443	1068	1093	1118	1124	1130	1136	1142	1136	1129	1122	1116	905	905
FTB Borrow Area to Reclaim (acres)	31.6	31.6	44.7	16.9	16.5	16.5	15.9	15.9	12.0	12.0	12.0	12.0	18.0	22.4	22.4	22.4	26.8	26.8	26.8	26.8	21.5	19.5
HRF Disturbed Acres to Reclaim (acres)	5	5	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HRF cover (acres)	0	0	0	0	49	49	49	49	49	49	49	49	49	54	60	65	71	76	82	87	93	98
HRF drainage (years)	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9

Large Figures



EIS Project Areas
East Pit Exposed/Unblasted Rock to Reclaim
Stockpile Footprint to Reclaim
Stockpile Liner Acres to be Removed and Footprint Reclaimed
Overliner Collection Piping
Underliner Collection Piping
Haul Roads to be Reclaimed
Stormwater Systems
Ditch to Reclaim
Pond Acres to Reclaim
Groundwater Containment System
Mine Water Systems
Pond/Liner to be Reclaimed (OSLA pond not lined)
Piping to WWTF to be Removed
Pumps to WWTF to be Removed

0 750 1,500 3,000
Feet

BARR

PRE-OPERATION CONSTRUCTION CHANGES OVER TIME STAGES 1 & 2 - MINE SITE

NorthMet Project
Poly Met Mining, Inc.

Large Figure 1
Contingency Reclamation Estimate

FLOTATION TAILINGS BASIN

CELL 2E

CELL 2W

CELL 1E

HYDROMETALLURGICAL RESIDUE FACILITY

Booster Pump House

Coarse Crusher

Concentrator

Drive House 1

Water Treatment Plant

Water Tower Plant Site

A-Lab

Rubber Shop

Drive House 2

Lube House

Fine Crusher

West of Concentrator

Warehouse 49

Rebuild Shop

Warehouse Electrical

General Shops

Carpenter's Shop

Area 2 Buildings

Imagery Source: FSA, 2013.

EIS Project Areas
Pre-Load Disturbed Acres to Reclaim
Beach Area to Reclaim
Borrow Area to Reclaim - Stage 1

0 750 1,500 3,000
Feet

BARR

PRE-OPERATION CONSTRUCTION CHANGES OVER TIME STAGES 1 & 2 - TAILINGS BASIN

NorthMet Project
Poly Met Mining, Inc.

Large Figure 2
Contingency Reclamation Estimate

Drawings

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

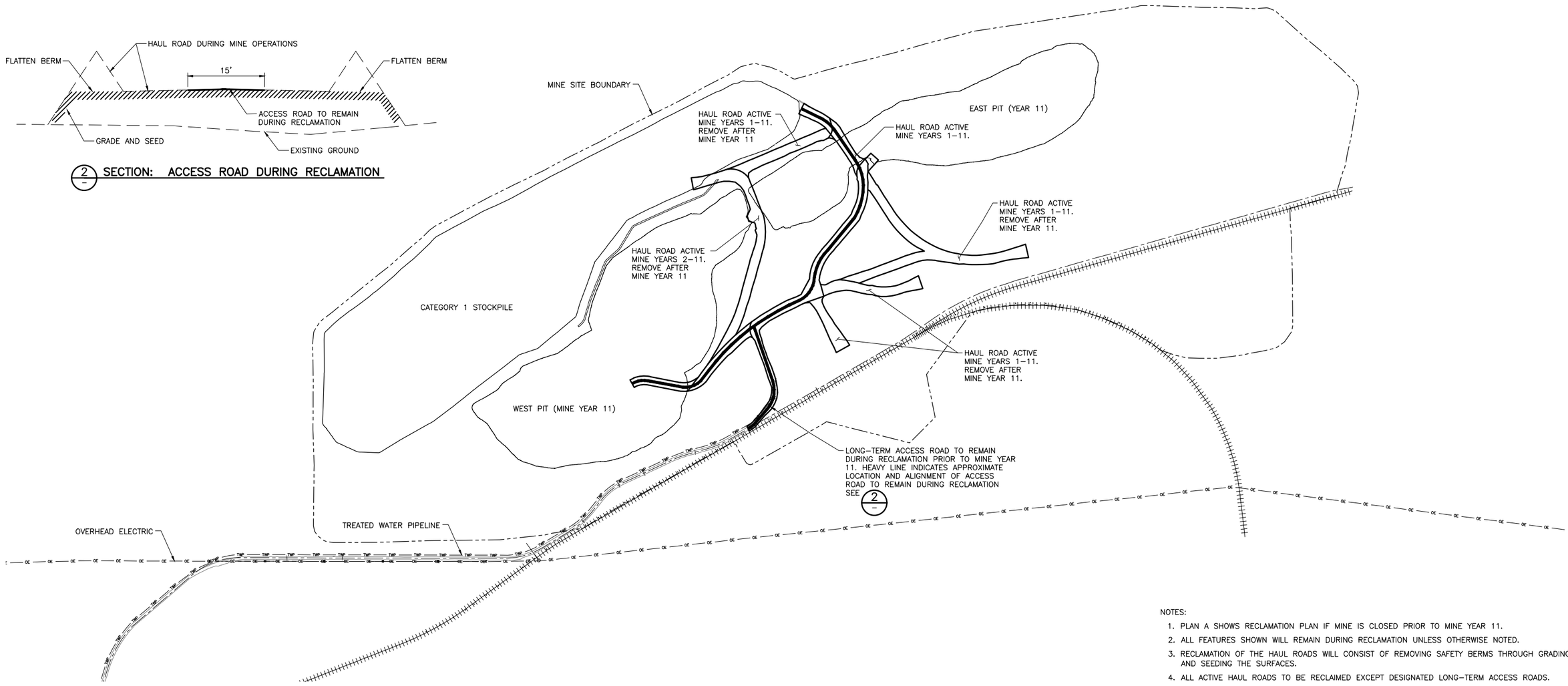
Permit Application Support Drawings: Mine Site and Dunka Road Earthwork

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology “mine drainage” as noted in these drawings will be changed to “mine water”.

2 SECTION: ACCESS ROAD DURING RECLAMATION



1 PLAN: HAUL ROAD RECLAMATION PLAN A

0 1000 2000
SCALE IN FEET

NOTES:

1. PLAN A SHOWS RECLAMATION PLAN IF MINE IS CLOSED PRIOR TO MINE YEAR 11.
2. ALL FEATURES SHOWN WILL REMAIN DURING RECLAMATION UNLESS OTHERWISE NOTED.
3. RECLAMATION OF THE HAUL ROADS WILL CONSIST OF REMOVING SAFETY BERMS THROUGH GRADING AND SEEDING THE SURFACES.
4. ALL ACTIVE HAUL ROADS TO BE RECLAIMED EXCEPT DESIGNATED LONG–TERM ACCESS ROADS.

VER NO	DATE	DESCRIPTION
1	5/21/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/21/15
FOR CONSTRUCTION		
NOT APPROVED FOR CONSTRUCTION.		

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/21/15 LICENSE# 20533

DRAWN: KKB
CHECKED: ATS
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

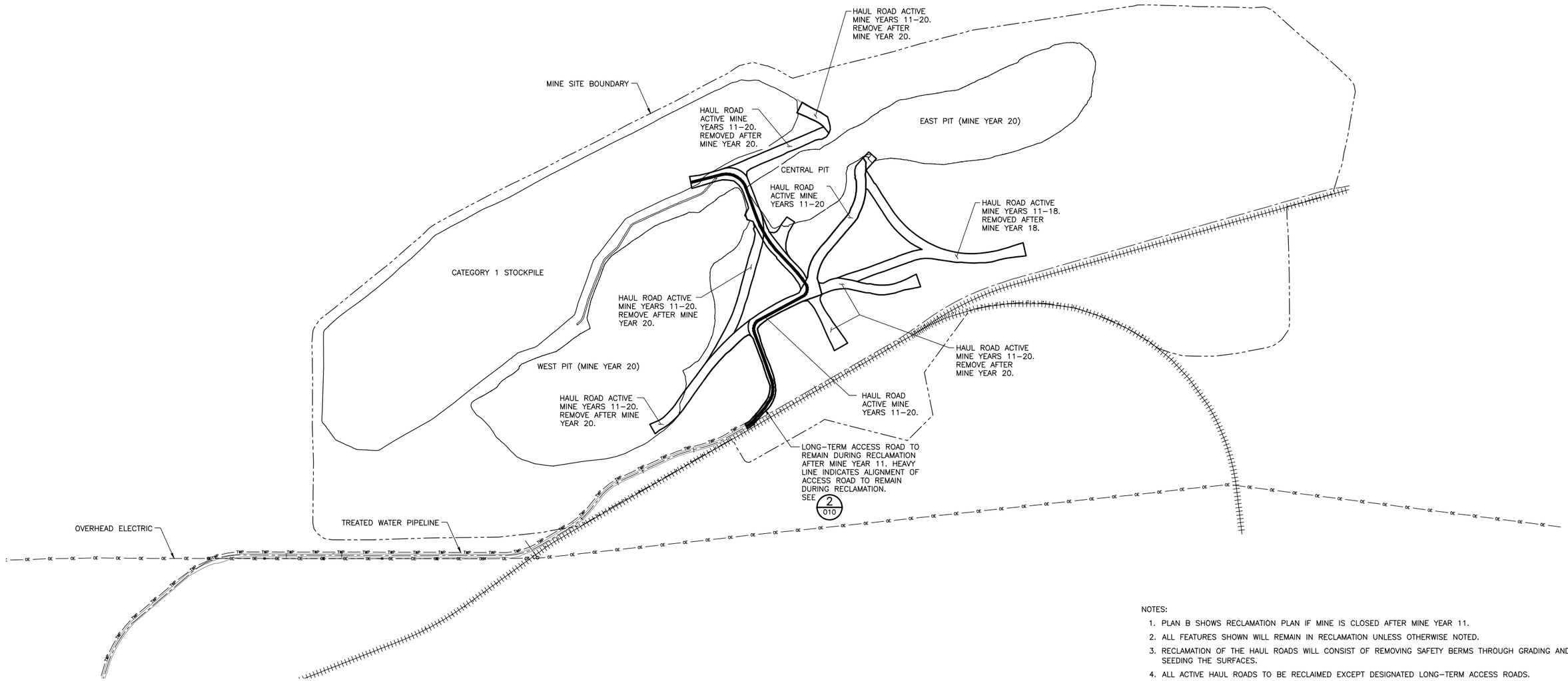
PLANT DRAWING NUMBER:

MINE SITE & DUNKA ROAD EARTHWORK
HAUL ROAD RECLAMATION PLAN A
MINE YEARS 1–11

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. EW–010
REV



NOTES:

1. PLAN B SHOWS RECLAMATION PLAN IF MINE IS CLOSED AFTER MINE YEAR 11.
2. ALL FEATURES SHOWN WILL REMAIN IN RECLAMATION UNLESS OTHERWISE NOTED.
3. RECLAMATION OF THE HAUL ROADS WILL CONSIST OF REMOVING SAFETY BERMS THROUGH GRADING AND SEEDING THE SURFACES.
4. ALL ACTIVE HAUL ROADS TO BE RECLAIMED EXCEPT DESIGNATED LONG–TERM ACCESS ROADS.

1/– PLAN: HAUL ROAD RECLAMATION PLAN B

0 1000 2000
SCALE IN FEET

N

VER NO	DATE	DESCRIPTION
1	5/21/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUED	VERSION	DATE
FOR PERMITTING	1	5/21/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/21/15 LICENSE# 20533

DRAWN: KKB
CHECKED: ATS
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE SITE & DUNKA ROAD EARTHWORK
HAUL ROAD RECLAMATION PLAN B
MINE YEARS 11–20

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
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DWG. NO. EW–011
REV

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

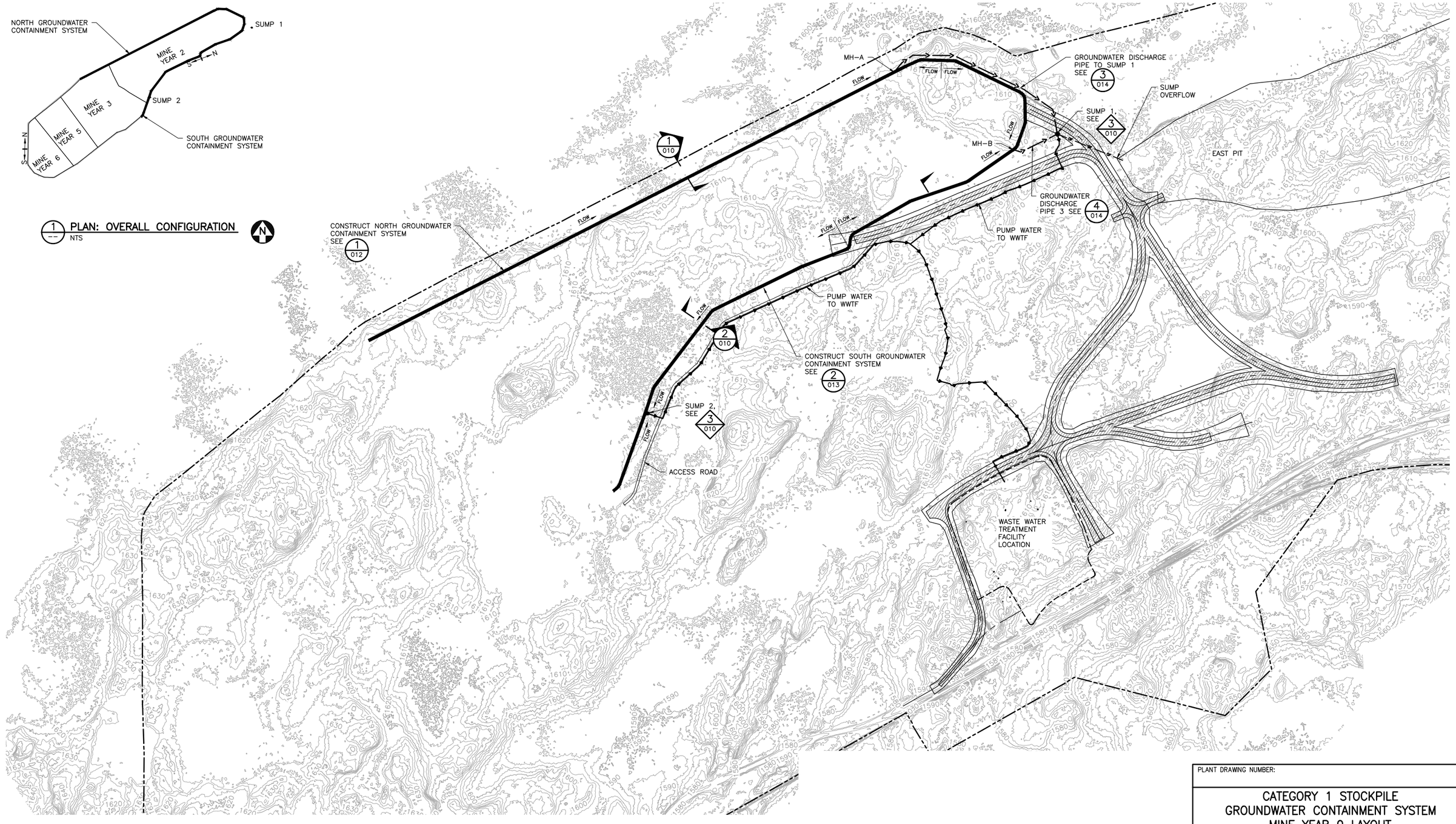
Permit Application Support Drawings: Category 1 Stockpile Groundwater Containment System

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
GCS-003	To meet construction stormwater requirements, a temporary berm will be added on the west side of the Mine Year 0 Category 1 Stockpile footprint to control mine water runoff as the stockpile is built out.

1 PLAN: OVERALL CONFIGURATION
NTS



2 PLAN: GCS – MINE YEAR 0 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 0 LAYOUT

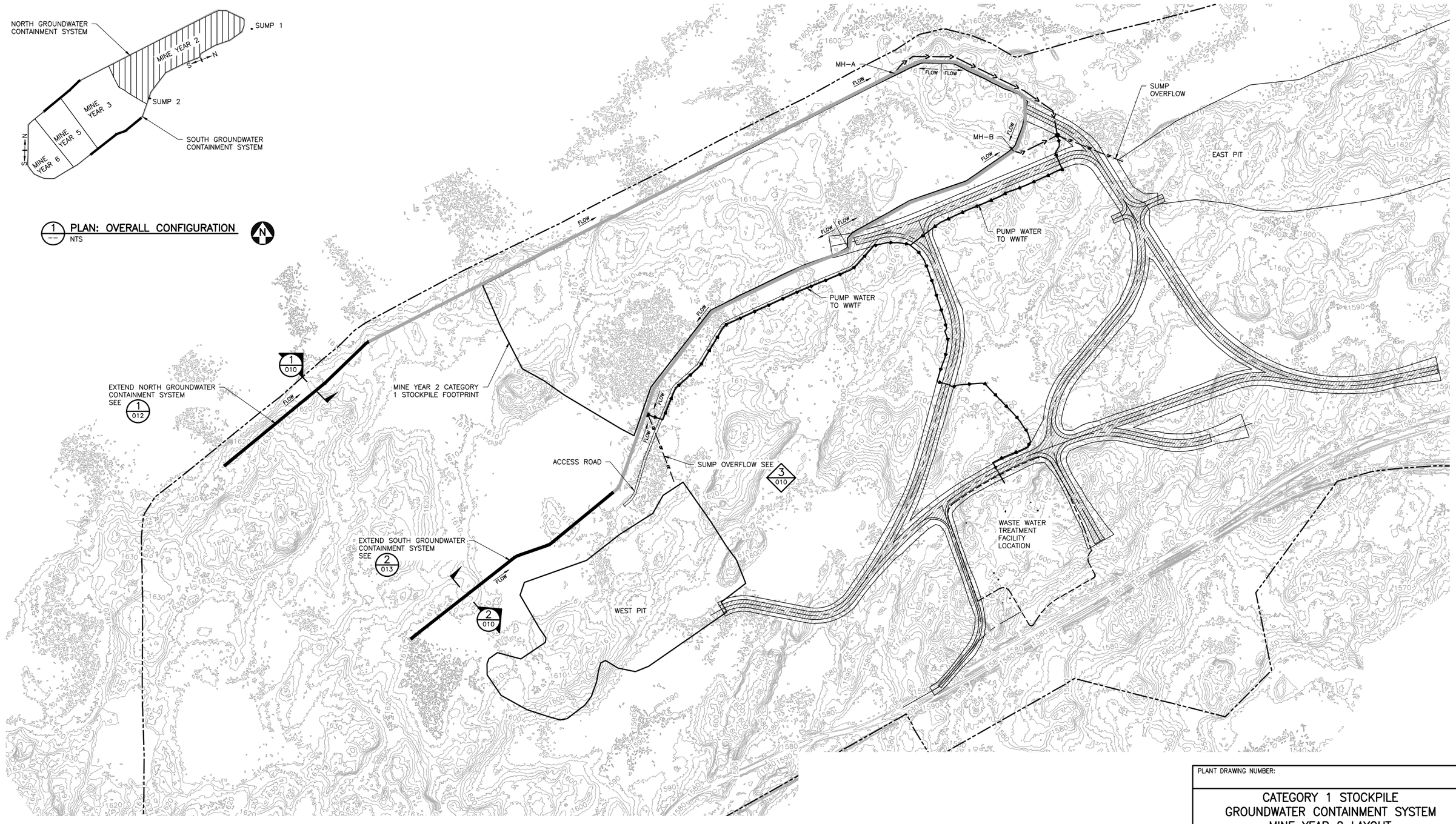
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. GCS-003
REV

INCHES 1 2

1 / -- PLAN: OVERALL CONFIGURATION
NTS



2 / -- PLAN: GCS – MINE YEAR 2 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

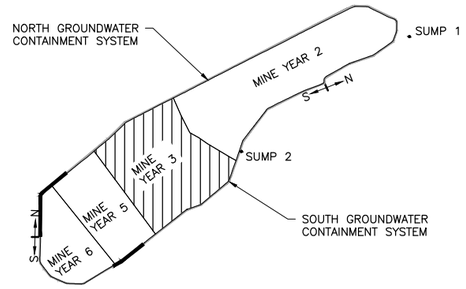
PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 2 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. GCS–004
REV



1 / -- PLAN: OVERALL CONFIGURATION
NTS

N

MH–A
MH–B
FLOW
SUMP OVERFLOW
EAST PIT
PUMP WATER TO WWTF
MINE YEAR 3 CATEGORY 1 STOCKPILE FOOTPRINT
ACCESS ROAD
SUMP OVERFLOW
WASTE WATER TREATMENT FACILITY LOCATION
WEST PIT
1 / 010
EXTEND NORTH GROUNDWATER CONTAINMENT SYSTEM SEE 1 / 012
2 / 010
EXTEND SOUTH GROUNDWATER CONTAINMENT SYSTEM SEE 2 / 013

2 / -- PLAN: GCS – MINE YEAR 3 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 3 LAYOUT

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. GCS–005
REV

1 PLAN: OVERALL CONFIGURATION
NTS

2 PLAN: GCS – MINE YEAR 5 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 5 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. GCS-006
REV

Errata Sheet

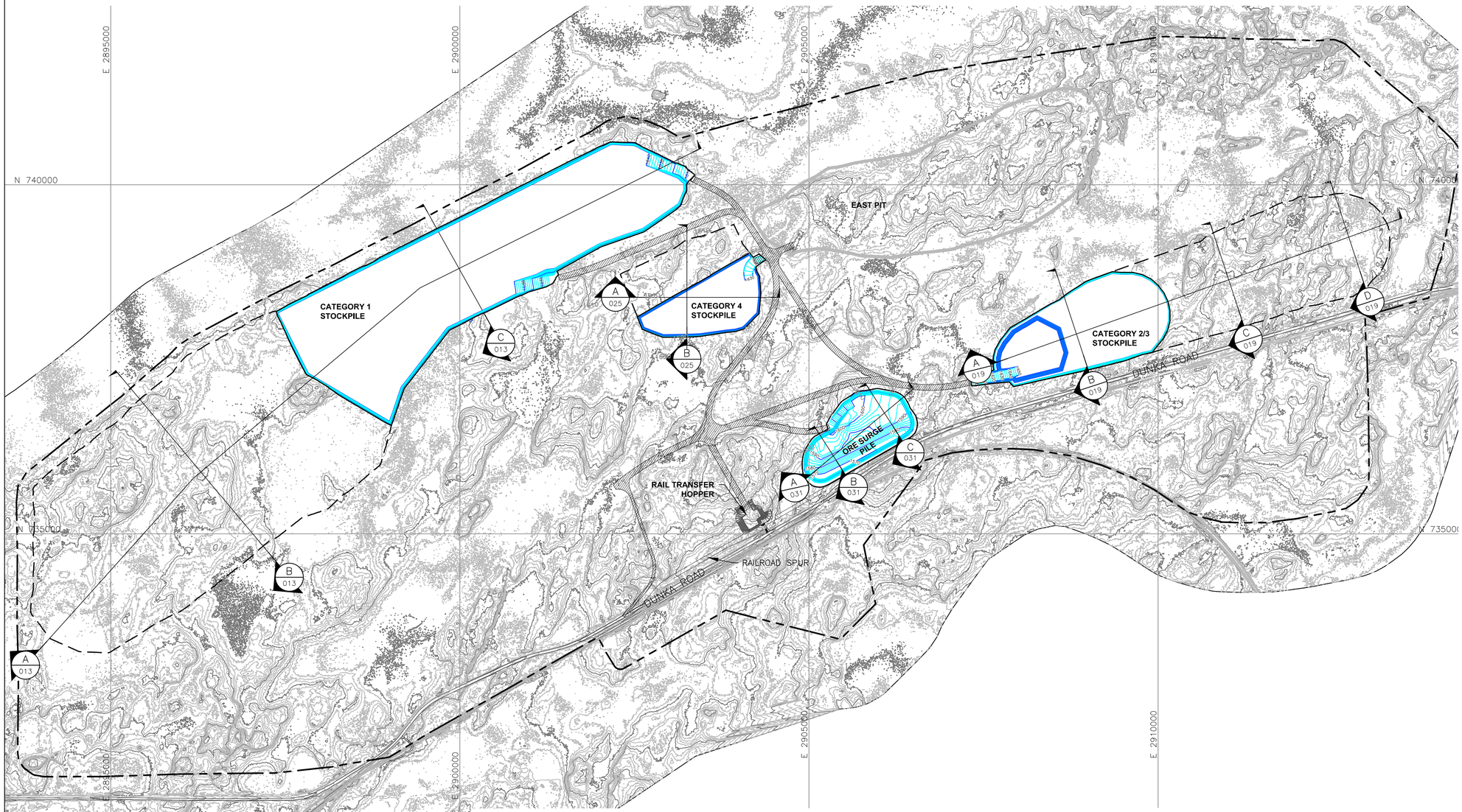
Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Categories 1, 2/3, and 4 Stockpiles and Ore Surge Pile Design

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology “mine drainage” as noted in these drawings will be changed to “mine water”.



LEGEND

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED STOCKPILE LAYOUTS (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- MINE YEAR 1 PIT BOUNDARY (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 019)
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 1 LIMITS

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-003 REV

LEGEND

- EXISTING GROUND TOPOGRAPHY (1590, 1580)
- PROPOSED GRADING TOPOGRAPHY (1590, 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 2 (SEE NOTE 1)
- MINE YEAR 1 AND 2 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 019)
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

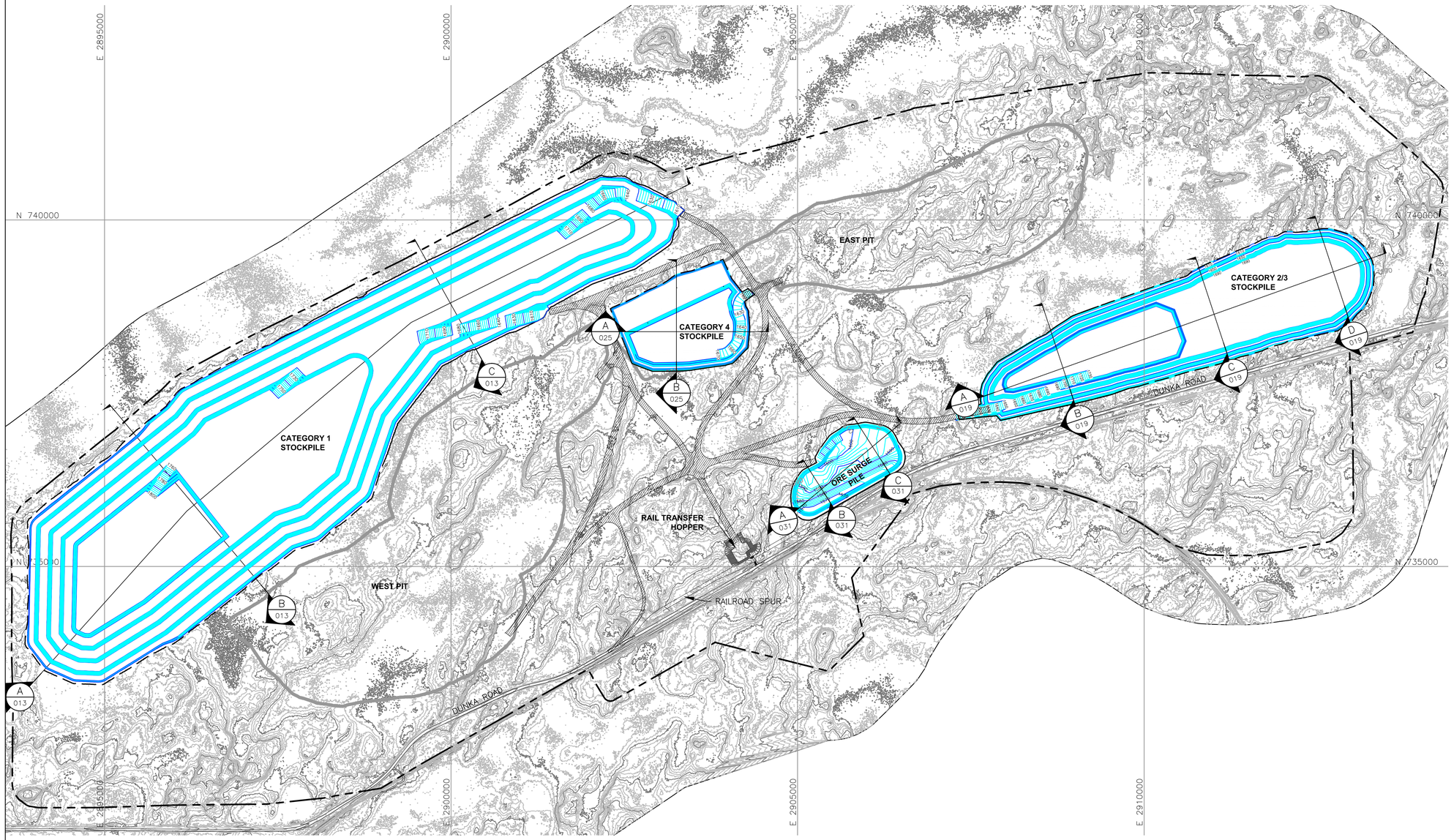
STOCKPILE LAYOUTS – MINE YEAR 2 LIMITS

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-004
REV



LEGEND

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED LAYOUTS (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 11 (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 025)
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

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SIGNATURE B Bronson
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 11 LIMITS

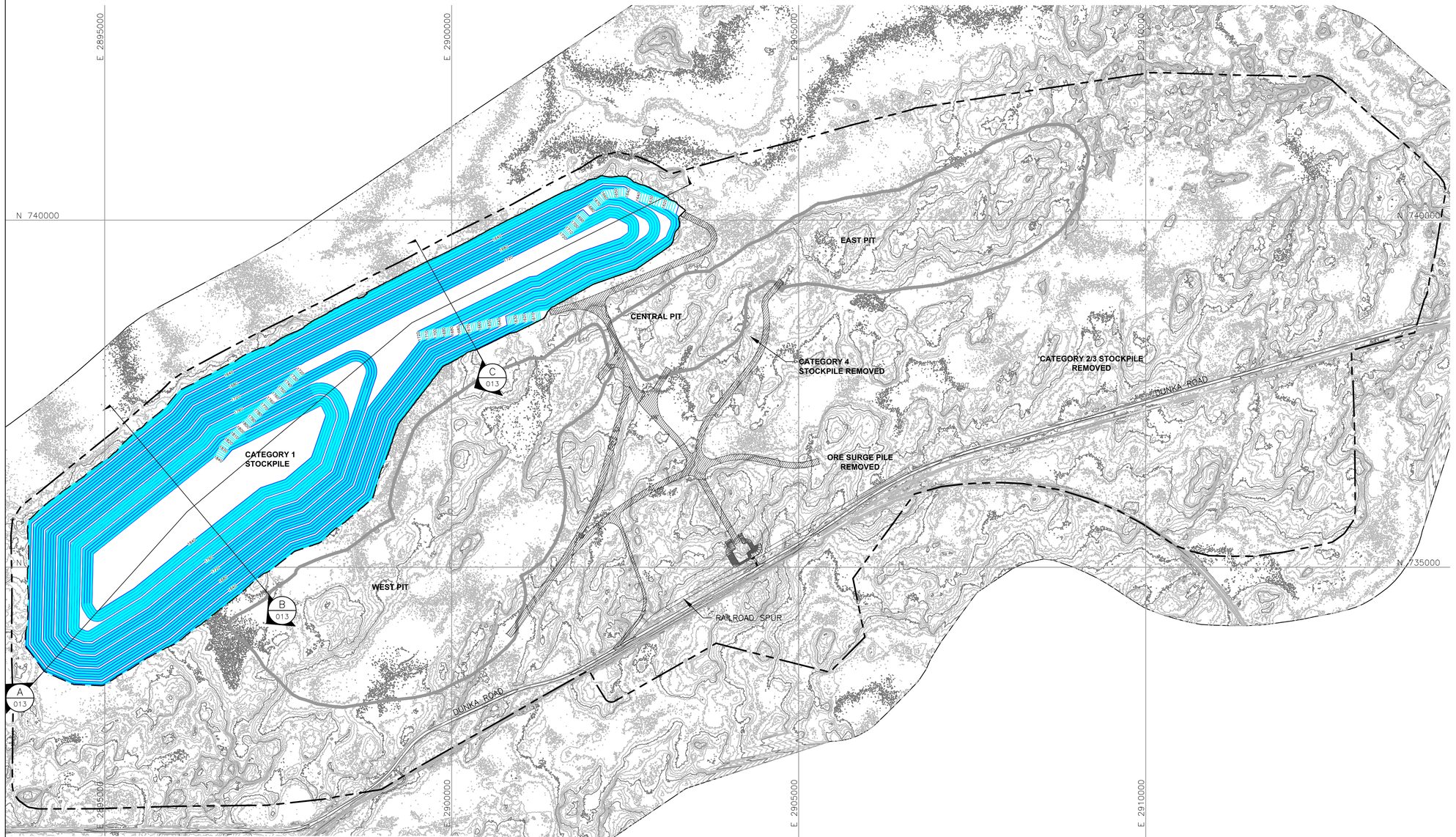
POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-005
REV

INCHES 1 2



LEGEND

- EXISTING GROUND TOPOGRAPHY (1590, 1580)
- PROPOSED LAYOUT CONTOURS (1590, 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- ULTIMATE PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 013)
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS MINE YEAR 21 LIMITS CLOSURE CONFIGURATION

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
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DWG. NO. SKP-006
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INCHES 1 2

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Mechanical Infrastructure

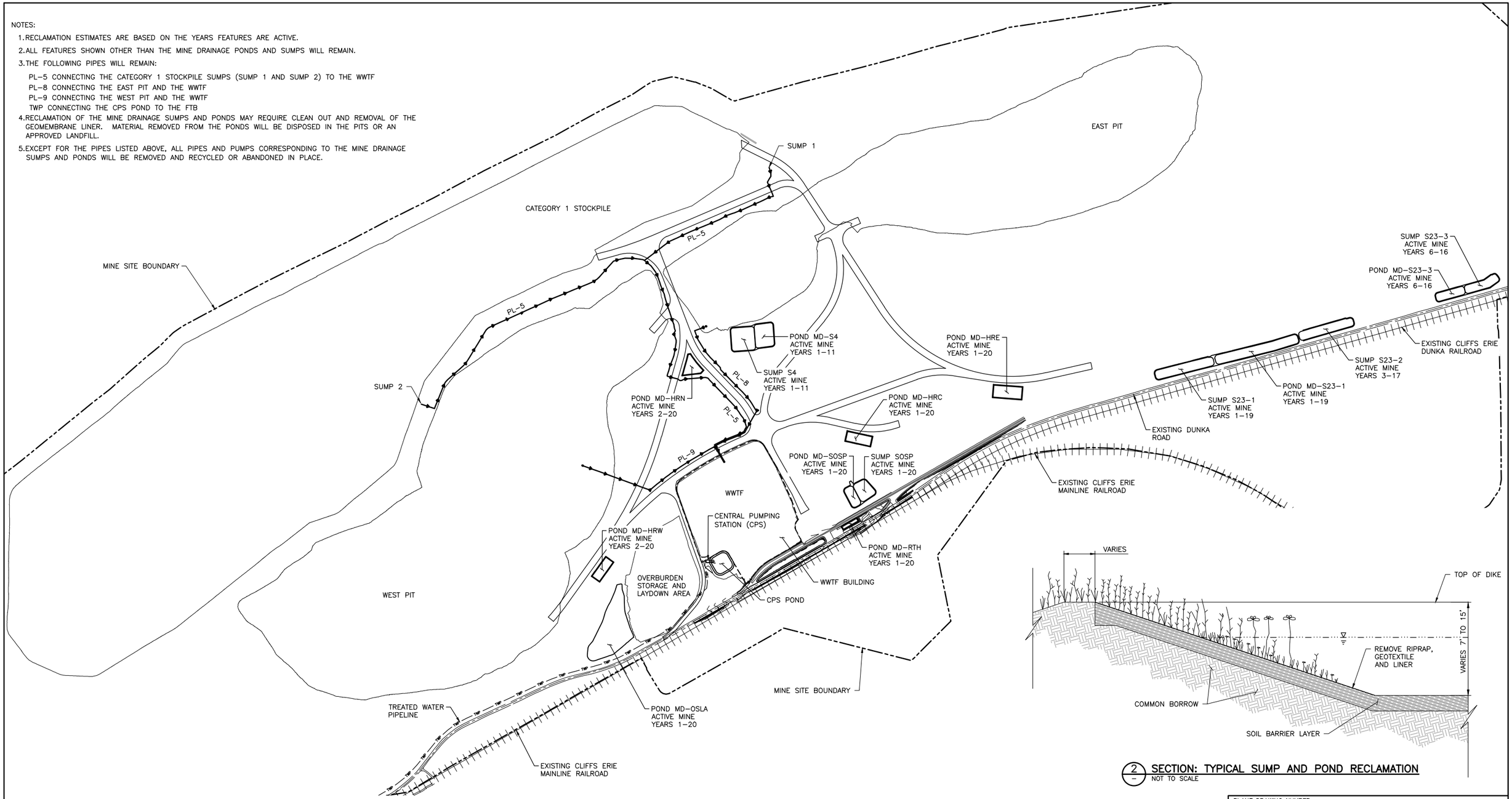
September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
MD-003	The grading for the access road from the Fueling and Maintenance Facility to Pond MD-SOSP & Sump SOSP will be revised to optimize drainage.

NOTES:

1. RECLAMATION ESTIMATES ARE BASED ON THE YEARS FEATURES ARE ACTIVE.
2. ALL FEATURES SHOWN OTHER THAN THE MINE DRAINAGE PONDS AND SUMPS WILL REMAIN.
3. THE FOLLOWING PIPES WILL REMAIN:
   - PL–5 CONNECTING THE CATEGORY 1 STOCKPILE SUMPS (SUMP 1 AND SUMP 2) TO THE WWTF
   - PL–8 CONNECTING THE EAST PIT AND THE WWTF
   - PL–9 CONNECTING THE WEST PIT AND THE WWTF
   - TWP CONNECTING THE CPS POND TO THE FTB
4. RECLAMATION OF THE MINE DRAINAGE SUMPS AND PONDS MAY REQUIRE CLEAN OUT AND REMOVAL OF THE GEOMEMBRANE LINER. MATERIAL REMOVED FROM THE PONDS WILL BE DISPOSED IN THE PITS OR AN APPROVED LANDFILL.
5. EXCEPT FOR THE PIPES LISTED ABOVE, ALL PIPES AND PUMPS CORRESPONDING TO THE MINE DRAINAGE SUMPS AND PONDS WILL BE REMOVED AND RECYCLED OR ABANDONED IN PLACE.



1 PLAN: GENERAL LAYOUT RECLAMATION

0 600 1200

SCALE IN FEET

2 SECTION: TYPICAL SUMP AND POND RECLAMATION

NOT TO SCALE

VER NO.	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: VJS

CHECKED: CMK2

BARR PROJECT NO.: 23/69–0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE RECLAMATION PLAN

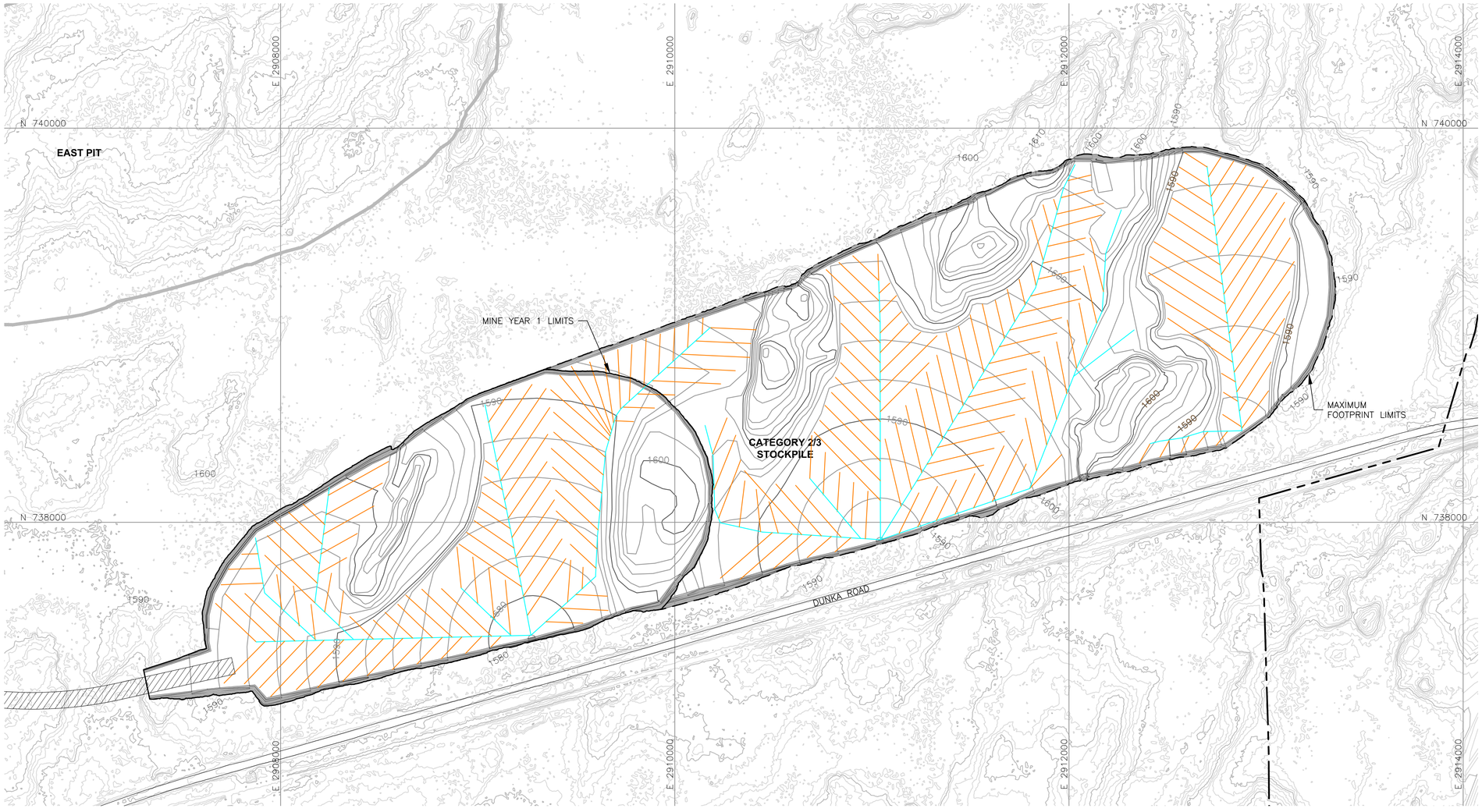
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. MD–016

REV

INCHES 1 2



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6–INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER AND LOCATION OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 300 600
SCALE IN FEET

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PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 2/3 STOCKPILE
UNDERDRAIN PIPING PLAN
MINE YEAR 1 AND MAXIMUM

POLYMET MINING
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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DWG. NO. SKP–016
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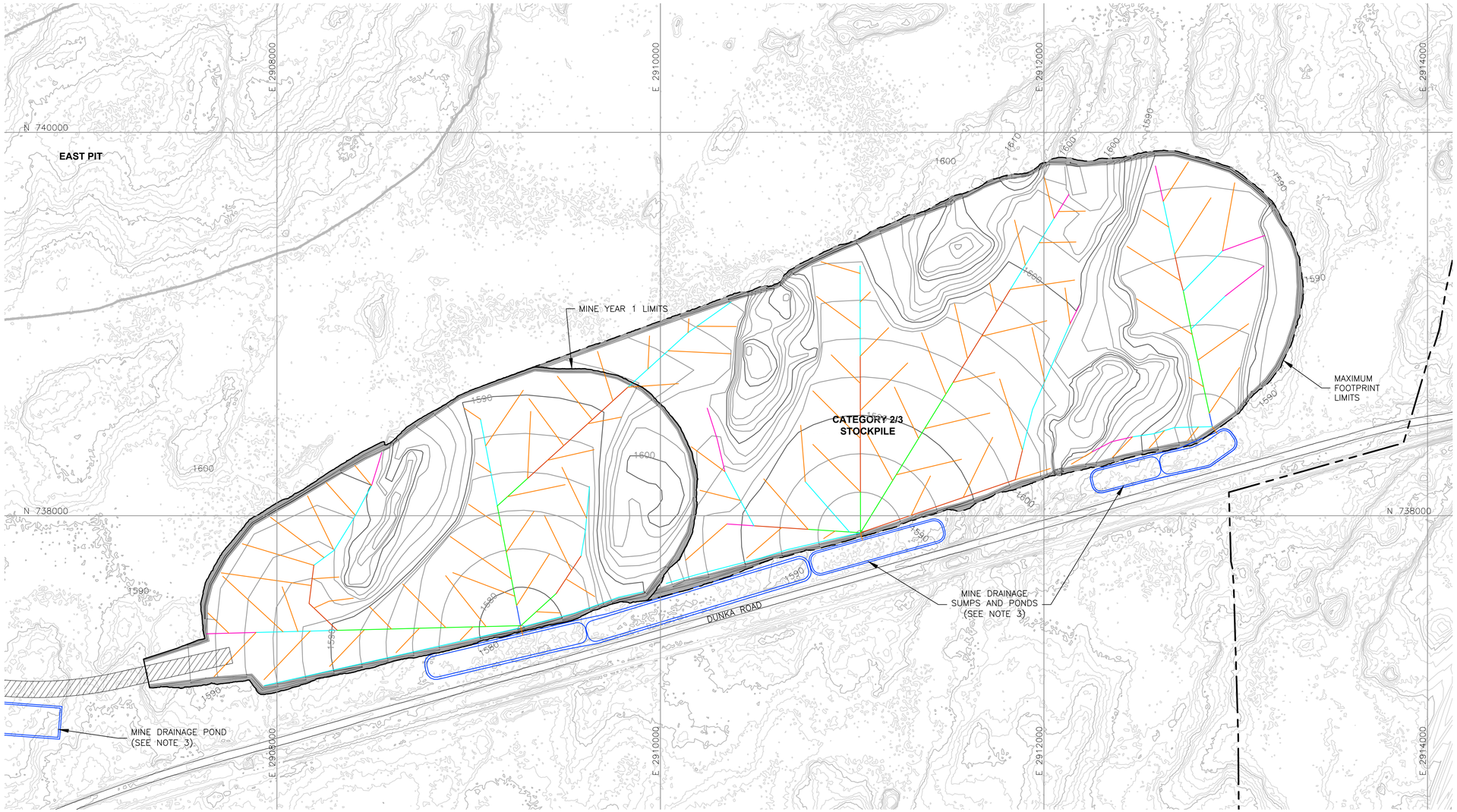
INCHES 1 2



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

TERTIARY COLLECTION PIPING
- 4–INCH

PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 200 400
SCALE IN FEET

VER NO	DATE	DESCRIPTION
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PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 2/3 STOCKPILE OVERLINER DRAINAGE PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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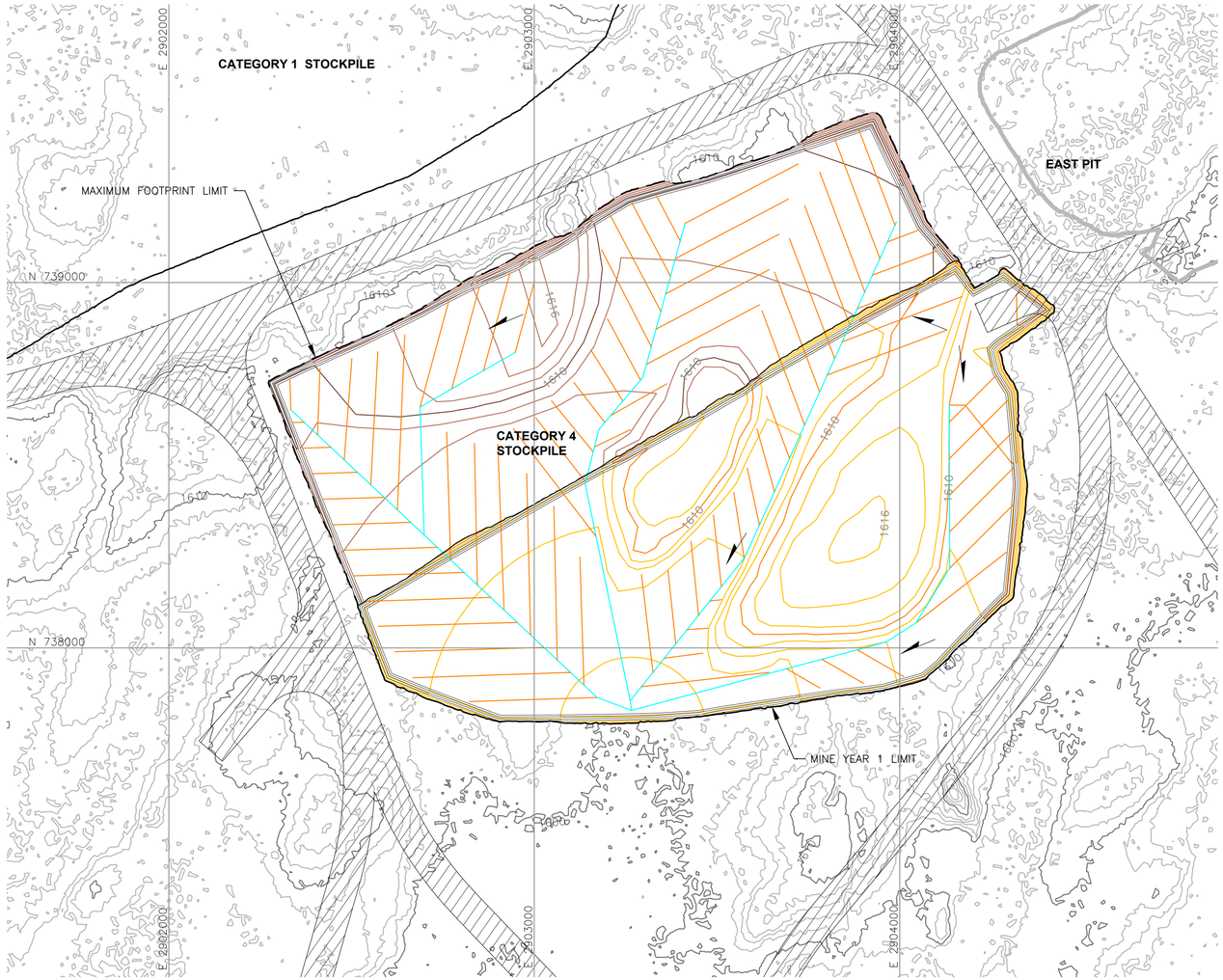
DWG. NO. SKP–017
REV

INCHES 1 2



LEGEND

- EXISTING GROUND TOPOGRAPHY (1590, 1580)
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY (1590, 1600)
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY (1590, 1600)
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6–INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER AND LOCATION OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 200 400
SCALE IN FEET

VER NO	DATE	DESCRIPTION
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SIGNATURE S Bronson
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 4 STOCKPILE
UNDERDRAIN PIPING PLAN
MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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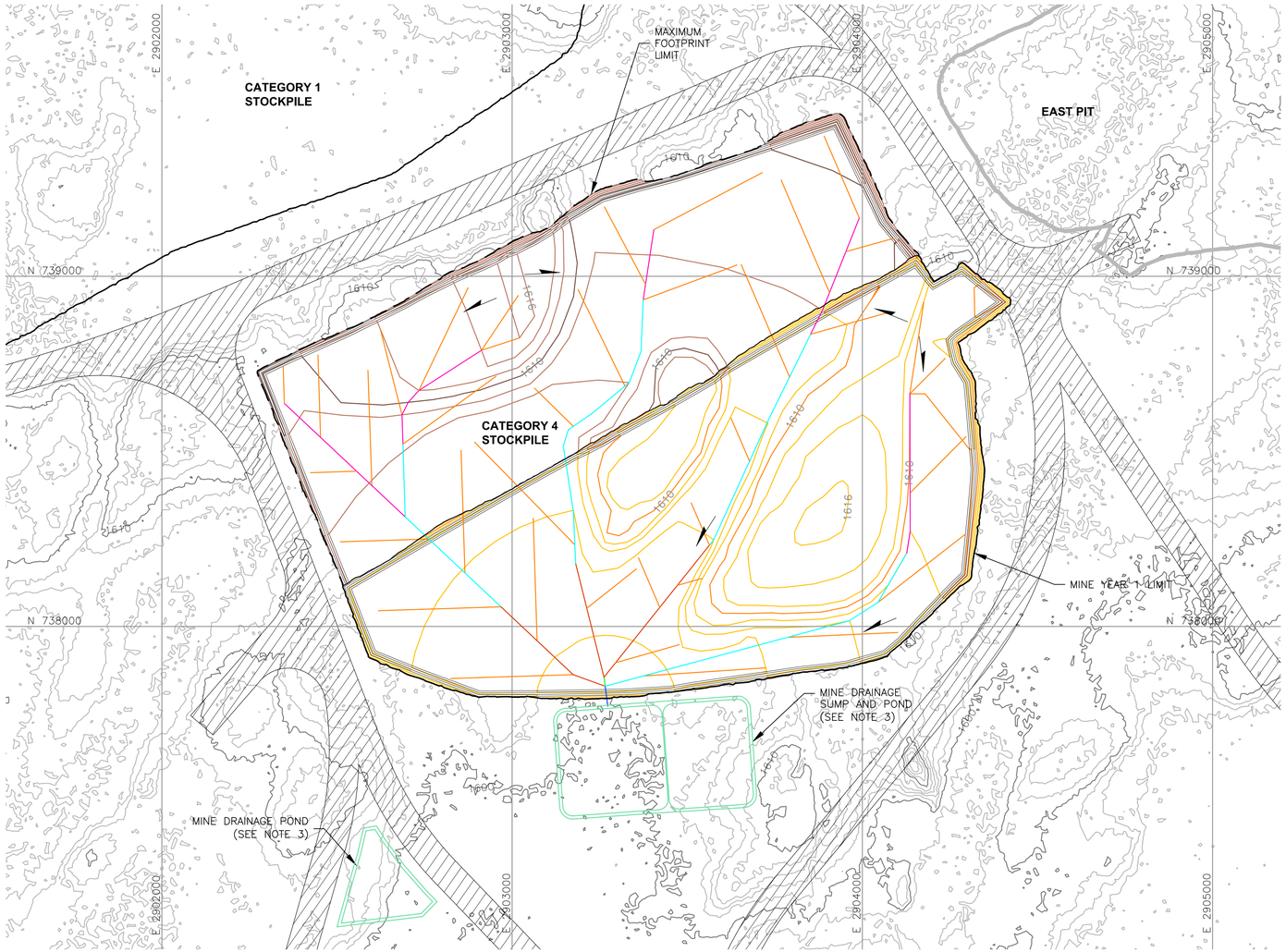

LEGEND

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY (1590 / 1600)
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY (1590 / 1600)
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

MINE YEAR 1 – TERTIARY COLLECTION PIPING
- 4–INCH

MINE YEAR 1 – PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 200 400
SCALE IN FEET

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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 4 STOCKPILE OVERLINER DRAINAGE PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980–0540
Fax: (303) 985–2080
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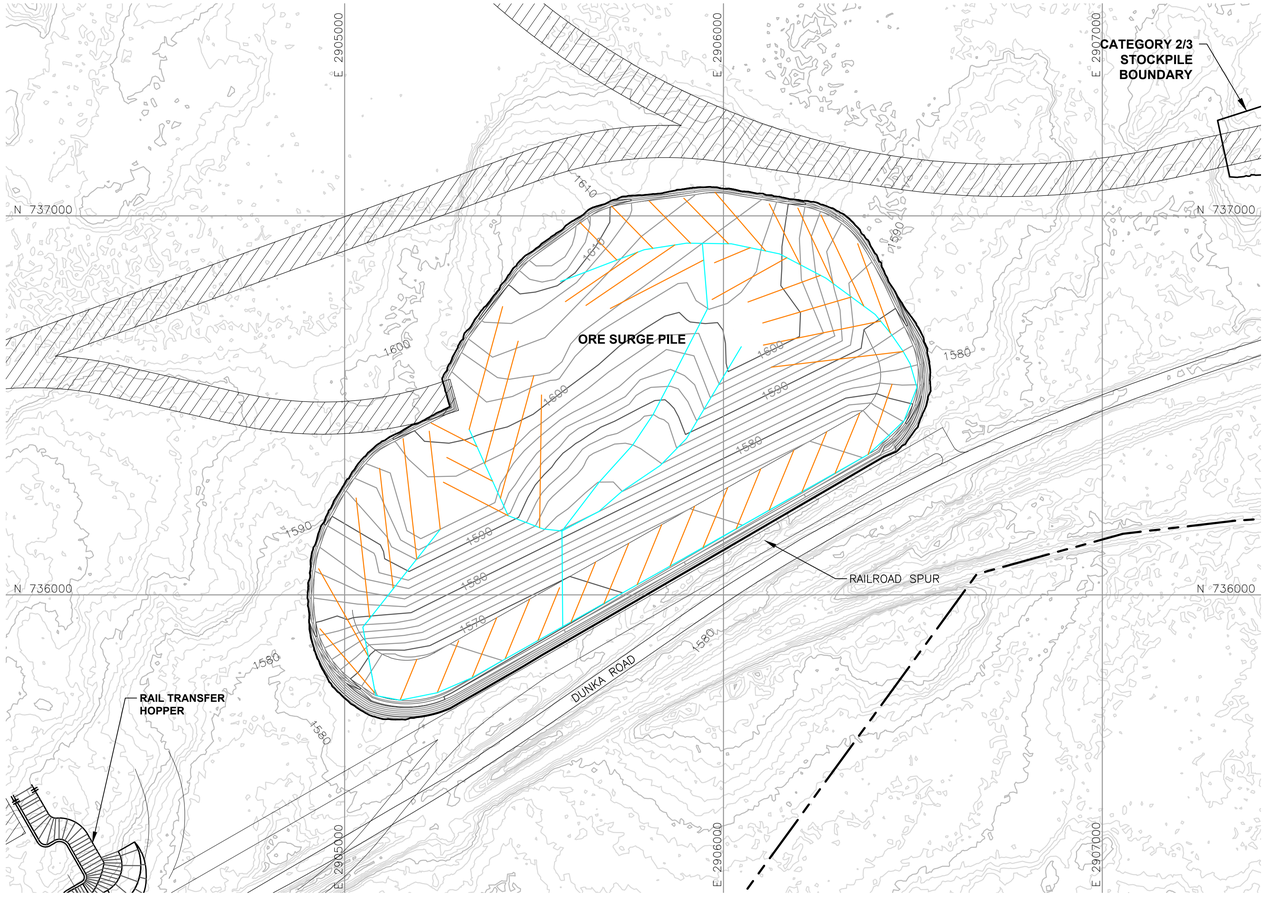
INCHES 1 2



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6–INCH

NOTES

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2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS.
2. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 200 400
SCALE IN FEET

VER NO	DATE	DESCRIPTION
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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

ORE SURGE PILE UNDERDRAIN PIPING PLAN

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980–0540
Fax: (303) 985–2080
www.golder.com

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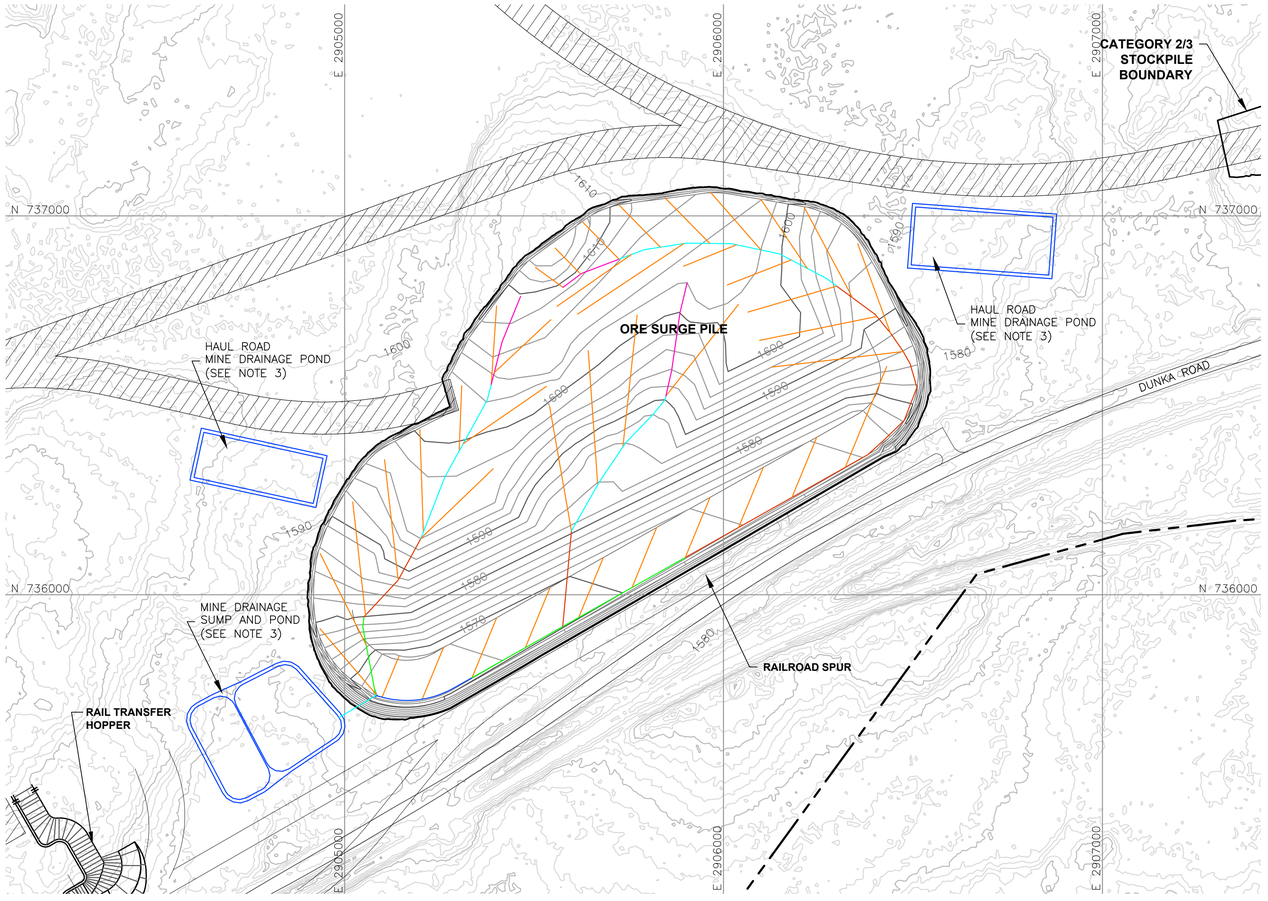

LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

MINE YEAR 1 – TERTIARY COLLECTION PIPING
- 4–INCH

MINE YEAR 1 – PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 200 400
SCALE IN FEET

VER NO	DATE	DESCRIPTION
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ISSUE STATUS		
ISSUED	VERSION	DATE
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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

ORE SURGE PILE
OVERLINER DRAINAGE PIPING PLAN

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
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DWG. NO. SKP–029
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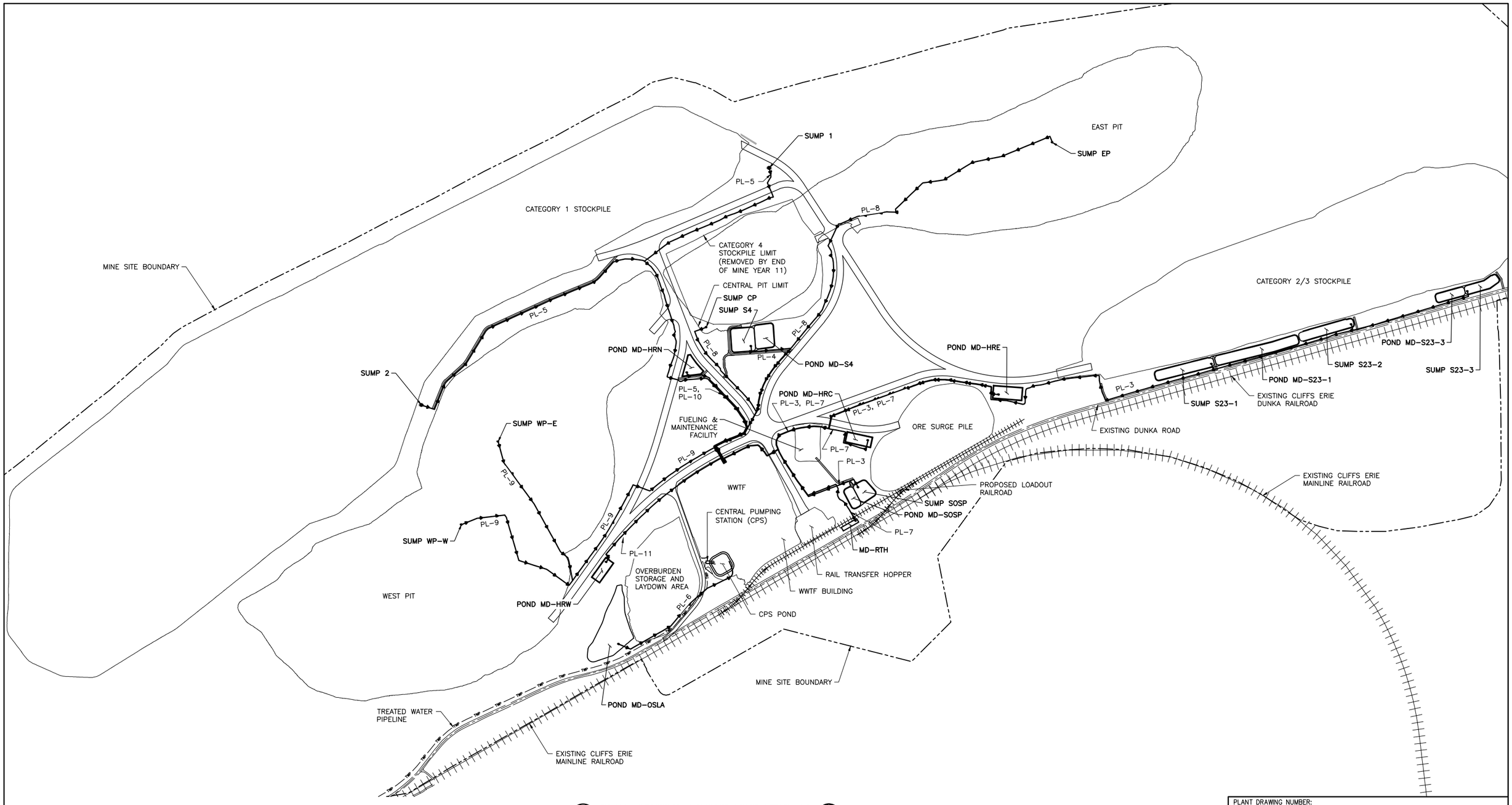
INCHES 1 2



1 PLAN: GENERAL LAYOUT MINE YEAR 11

0 600 1200

SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS		
ISSUED	VERSION	DATE
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FOR CONSTRUCTION		
NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: KRM

CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE
MINE YEAR 11 GENERAL LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
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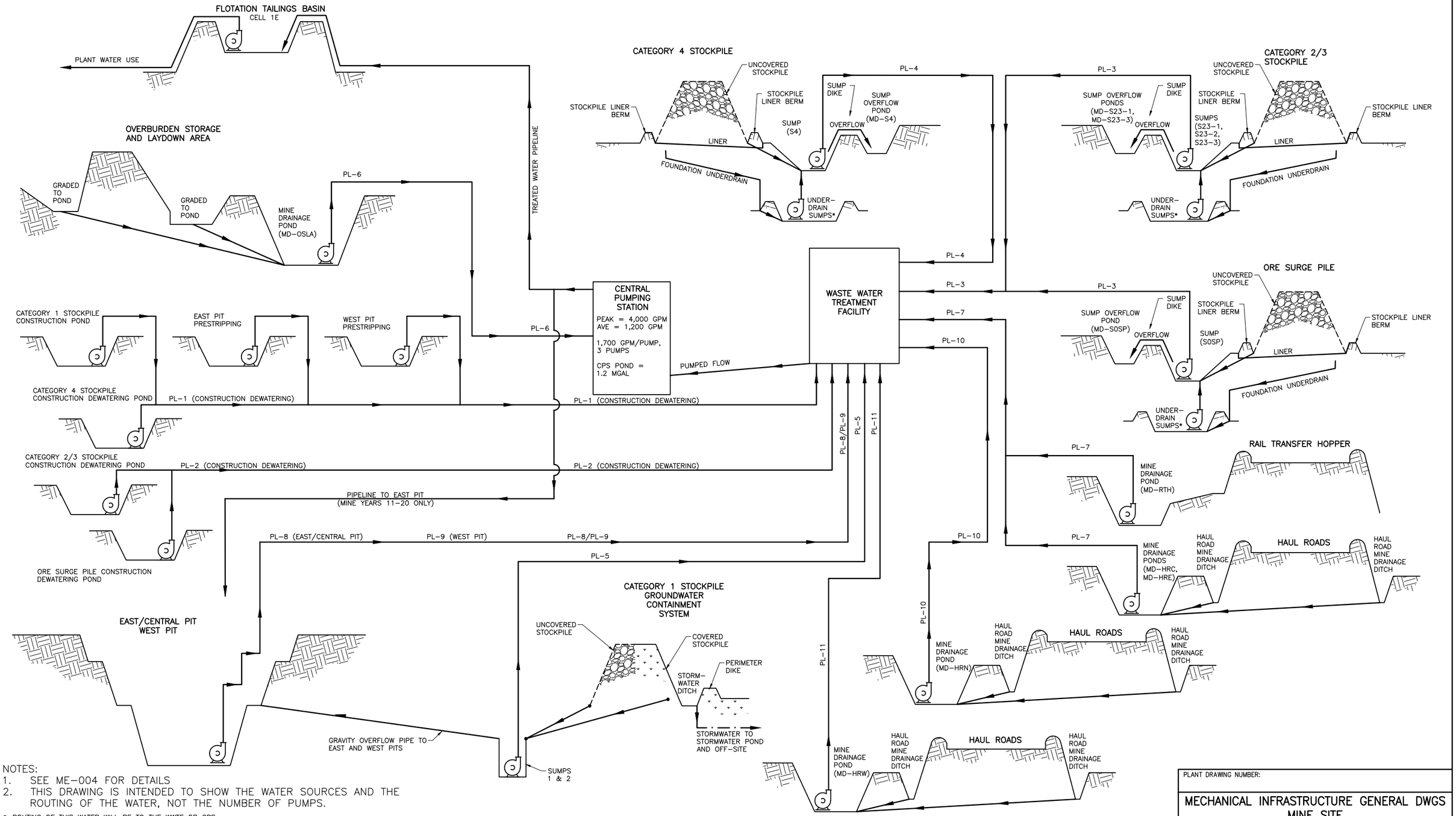
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. MD-002

REV



NOTES:
1. SEE ME-004 FOR DETAILS
2. THIS DRAWING IS INTENDED TO SHOW THE WATER SOURCES AND THE ROUTING OF THE WATER, NOT THE NUMBER OF PUMPS.

* ROUTING OF THIS WATER WILL BE TO THE WWTF OR CPS DEPENDING ON WATER QUALITY TESTING RESULTS.

LEGEND

- STORMWATER FLOW
- SITE MINE DRAINAGE FLOW
- COVERED STOCKPILE/GRASS
- UNCOVERED STOCKPILE
- UNCOVERED EARTHWORK
- PUMP

VER NO	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/18/15
FOR CONSTRUCTION		
NOT APPROVED FOR CONSTRUCTION		

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: VJS

CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MECHANICAL INFRASTRUCTURE GENERAL DWGS
MINE SITE
MINE DRAINAGE FLOW DIAGRAM

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. ME-003

REV

INCHES 1 2

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Mine Site Stormwater

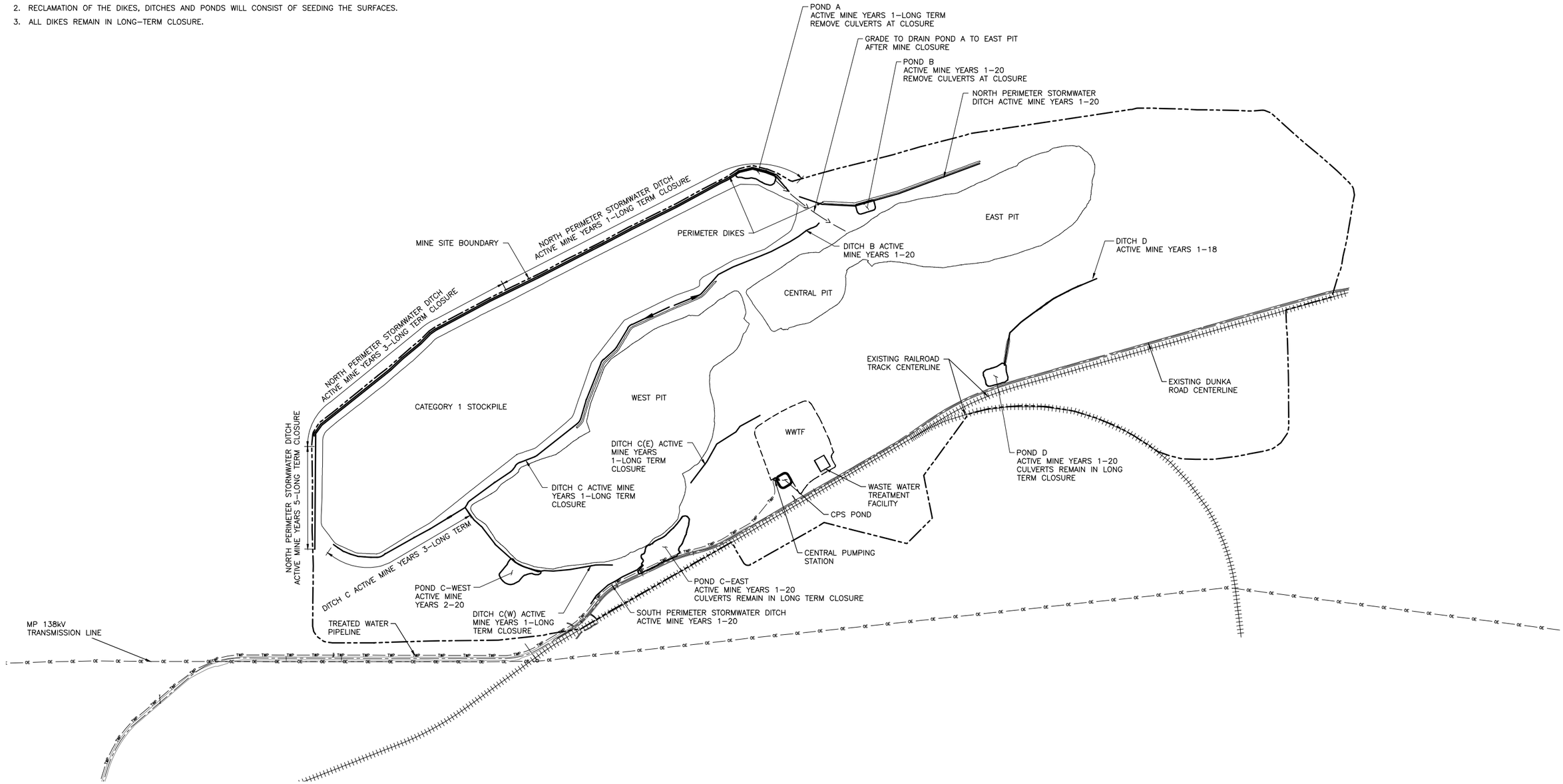
September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
SW-031	Temporary sedimentation basins or stormwater infiltration basins may be added to meet construction stormwater requirements. There is currently an infiltration basin shown on the Waste Water Treatment Facility drawings between the Ore Surge Pile and the Rail Transfer Hopper that is not shown on this Mine Site Stormwater drawing set. These construction stormwater features require additional site-specific data and will be evaluated in final design.

NOTES:

1. ALL FEATURES SHOWN WILL REMAIN IN LONG–TERM CLOSURE UNLESS OTHERWISE NOTED.
2. RECLAMATION OF THE DIKES, DITCHES AND PONDS WILL CONSIST OF SEEDING THE SURFACES.
3. ALL DIKES REMAIN IN LONG–TERM CLOSURE.



1 – PLAN: STORMWATER DIKES, DITCHES, AND PONDS RECLAMATION PLAN

0 1000 2000
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	5/26/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/26/15
FOR CONSTRUCTION		

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PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/26/15 LICENSE# 20533

DRAWN: KKB/ATS
CHECKED: ATS
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE SITE STORMWATER
DIKES, DITCHES, AND PONDS
RECLAMATION PLAN

POLYMET MINING

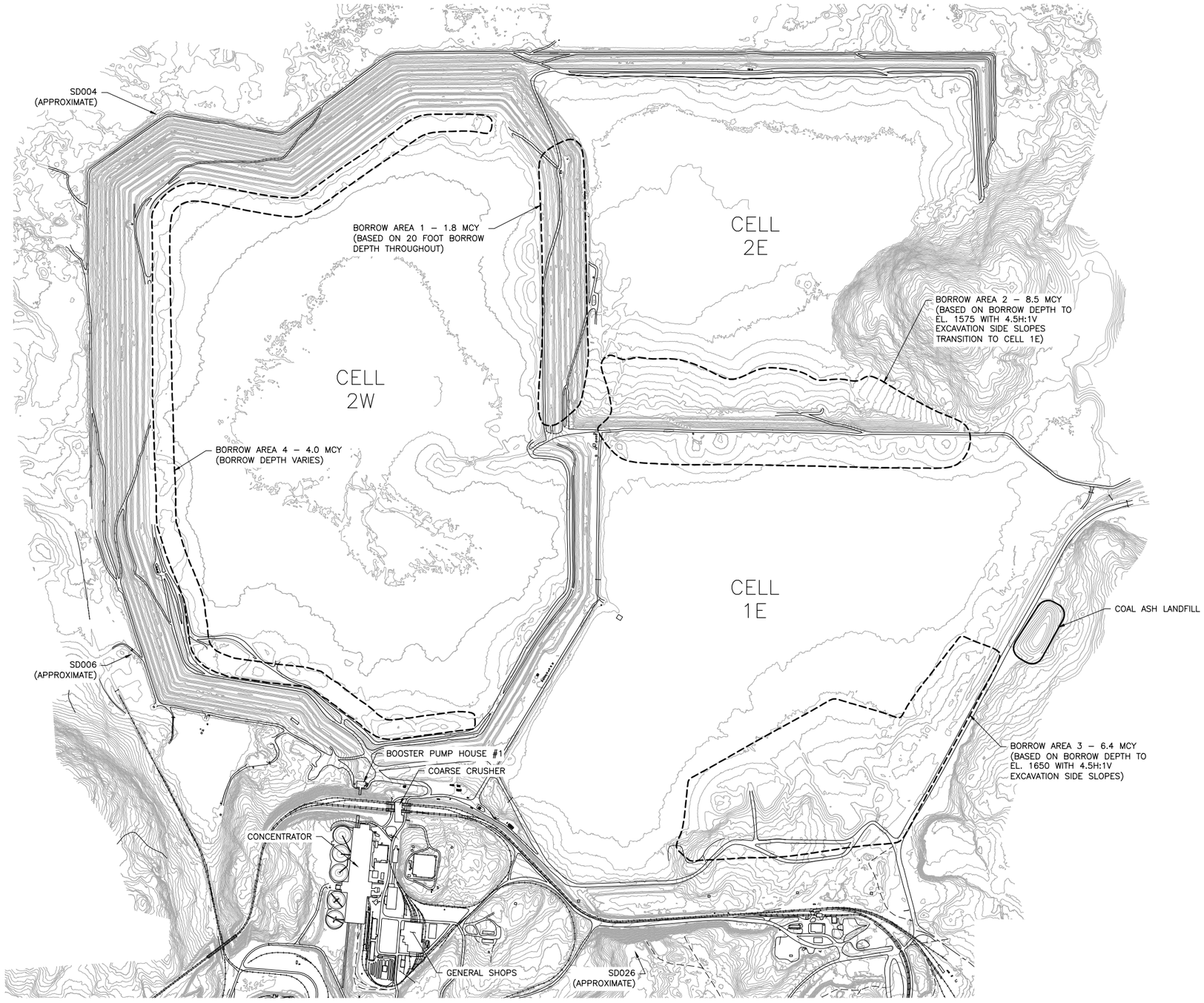
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. SW–031 REV

INCHES 1 2



1 PLAN: EXISTING CONDITIONS

0 800 1600

SCALE IN FEET

NOTES:

1. CONTOURS DO NOT REFLECT BORROW REMOVAL.
2. BORROW LTVSMC COARSE TAILINGS IN THE NUMERICAL SEQUENCE SHOWN.
3. COAL ASH LANDFILL TO BE RELOCATED TO HYDROMET RESIDUE FACILITY OR ALTERNATE PERMITTED FACILITY PRIOR TO TAILINGS DEPOSITION IN CELL 1E.

VER NO	DATE	DESCRIPTION
1	10/14/11	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	12/07/12	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
3	04/12/13	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 3 – ATTACHMENT A
4	11/25/14	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 4 – ATTACHMENT A
5	03/03/15	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 5 – ATTACHMENT A
6	5/20/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	6	5/20/15
FOR CONSTRUCTION	–	–

NOT APPROVED FOR CONSTRUCTION

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PRINTED NAME THOMAS J. RADUE

SIGNATURE Thomas J. Radue

DATE 5/20/15 LICENSE# 20951

DRAWN: CAD

CHECKED: TJR

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

FLOTATION TAILINGS BASIN EXISTING CONDITIONS

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. FTB-003

REV

NOTES:

1. APPROXIMATE SOIL AND ROCK REMOVAL VOLUME = 329,000 CY
2. DISPOSE OF DEMOLITION DEBRIS IN LTVSMC EXISTING INDUSTRIAL LANDFILL. APPROXIMATE DISTANCE TO LANDFILL IS 3 MILES.

1 PLAN: EMERGENCY BASIN REMOVALS

0 200 400
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY
EMERGENCY BASIN EXCAVATIONS
AND REMOVALS

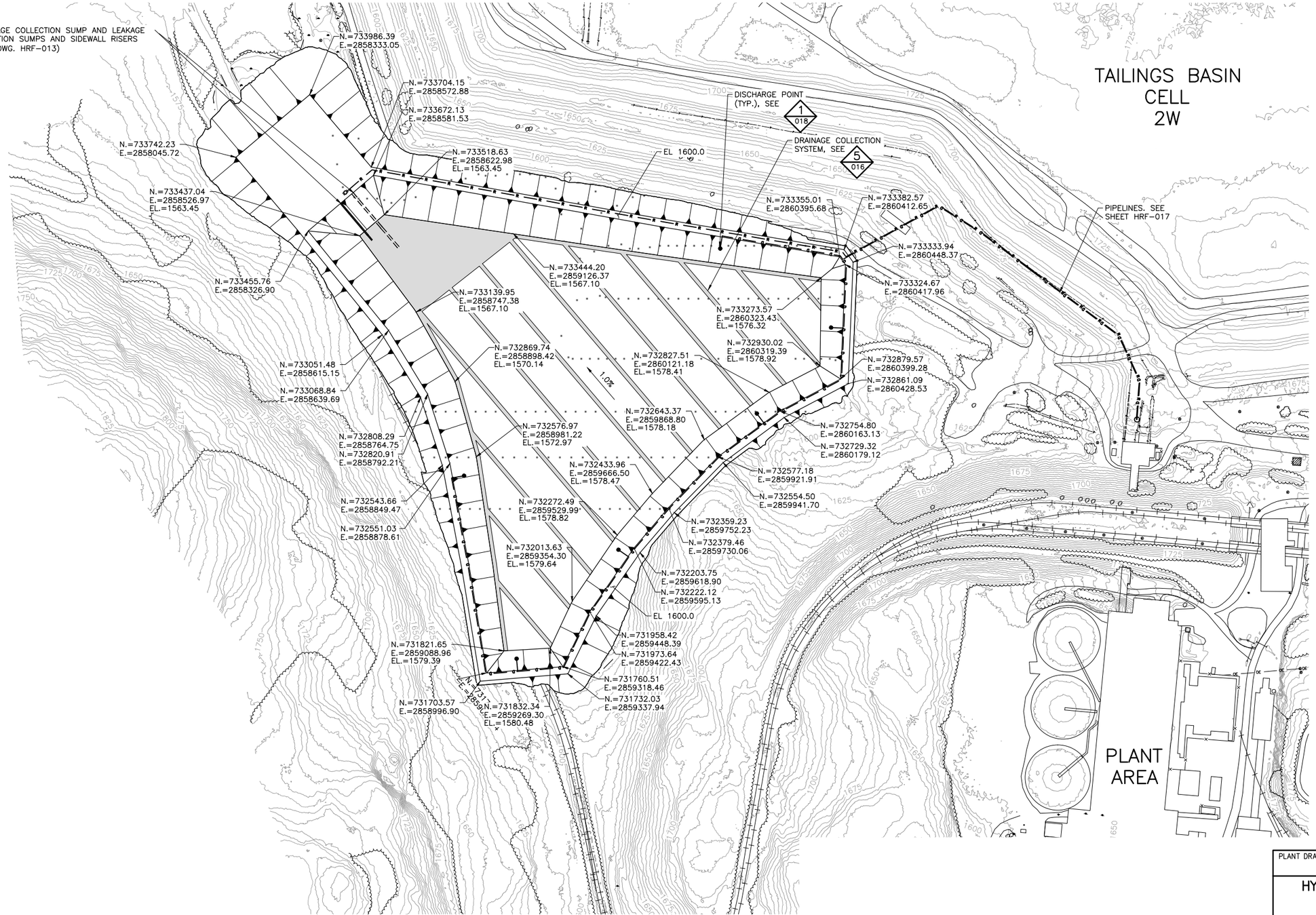
POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. HRF-005
REV

INCHES 1 2



NOTES:

1. UPPER LINER SURFACE SHOWN.
2. DRAINAGE COLLECTION GEOCOMPOSITE SHOWN (SHADED AREA).
3. PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.

1 PLAN: LIFT 1 LAYOUT

0 200 400
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUED	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

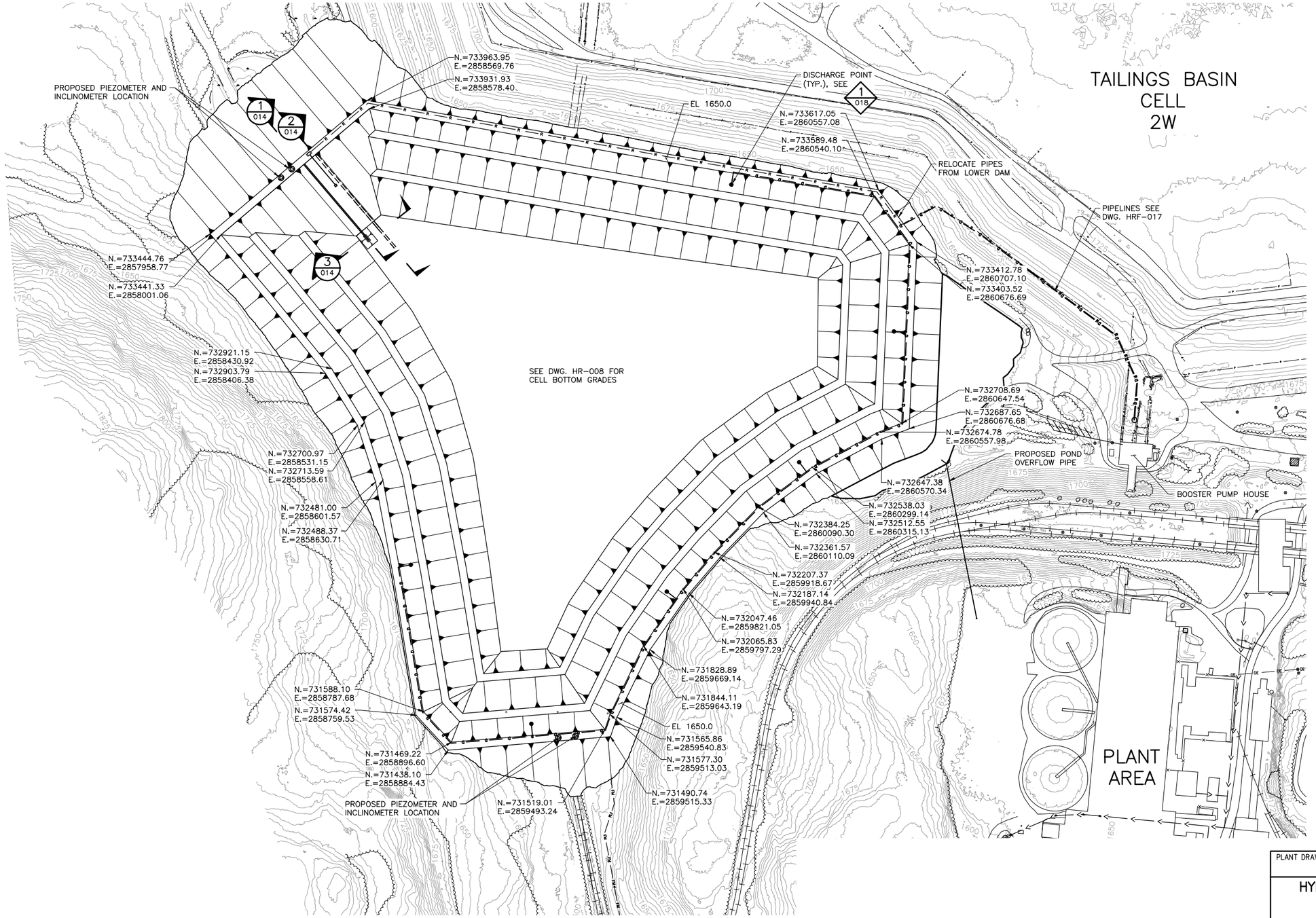
HYDROMETALLURGICAL RESIDUE FACILTY LIFT 1 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. HRF-008
REV

INCHES 1 2



NOTES:

1. LIFT 3 CONSTRUCTION YEAR TO BE BASED ON HRF CAPACITY CONSUMPTION RATE.
2. UPPER LINER SURFACE SHOWN.
3. PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.

1 PLAN: LIFT 3 LAYOUT

0 200 400
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY
LIFT 3 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. HRF-010 REV

INCHES 1 2

Attachment 10.

Lundgren motors truck

Toprak, Filiz

From: Jim Scott <jr.scott@frontiernet.net>
Sent: Friday, June 17, 2016 2:55 PM
To: Toprak, Filiz
Subject: Fw: F-250 lease
Attachments: vehicle lease 2016 Ford.doc

Follow Up Flag: Follow up
Flag Status: Completed

Filiz

Purchase quite for pick ups – replace $35,000 placeholder

No quote for plow but internet search for adjustable V (V – invertedV – slant right.left – straight) is about $5000

Jim

From: Steve DeVaney
Sent: Tuesday, June 14, 2016 12:41 PM
To: Jim Scott
Subject: Fw: F-250 lease

FYI

From: Bruce Lundgren <blundgren@mchsi.com>
Sent: Tuesday, June 14, 2016 9:56 AM
To: Steve DeVaney
Subject: Re: F-250 lease

Steven,

The total for that truck would be $37,520.69. This includes all applicable taxes, license, and fees. Please let me know what else I can do for you.

Respectfully,

Bruce Lundgren
Lundgren Ford

From: Steve DeVaney
Sent: Tuesday, June 14, 2016 8:58 AM
To: Bruce Lundgren
Subject: Re: F-250 lease

Bruce,

PolyMet would like to know the full purchase price for the truck that you proposed the lease.

Thanks,
Steve DeVaney
PolyMet Mining, Inc.

From: Bruce Lundgren <blundgren@mchsi.com>
Sent: Tuesday, April 05, 2016 9:37:16 AM
To: Steve DeVaney
Subject: F-250 lease

Steven,

Please review the attached lease quote. I did not want to bother you with a credit application at this time so these numbers are approximate. If you need to be more specific please let me know. As always, if there is anything more I can do for you don't hesitate to call on me. Thanks for your interest.

Respectfully,

Bruce Lundgren

Attachment 11.

Demo

Asbestos Abatement Cost Proposal - Bid Form

Scope of Work Description	Reference Information	Asbestos Removal & Disposal Costs
Legacy Area 1 - used by project		
Area 1 Shop and Truck Storage (Bldg. 220)	ACT Report Zone H	$82,500
Area 1 Cold Storage (Bldg. 221)	No ACT report	$5,000
Area 1 Reporting Building (Bldg. 231)	No ACT report	$5,000
Area 1 Boiler House (Bldg. 226)	ACT Report Zone H	$2,500
Area 1 Fire Pump House & Water Tank (Bldg. 228)	ACT Report Zone H	$2,500
Legacy Area 2 - used by project		
Area 2 Service Shop (Bldg. 201)	ACT Report Zone I	$95,000
Area 2 Truck Storage (Bldg. 202)	ACT Report Zone I	$3,000
Area 2 Cold Storage (204)	ACT Report Zone I	$3,000
Area 2 Shop Locomotive Service Shop (Bldg. 203)	ACT Report Zone I	$52,500
Legacy Tailings Basin Buildings - used by project		
Foreman's Office (Bldg. 718)	No ACT report	$6,500
Reporting Building (Bldg. 719)	No ACT report	$6,500
Lube House (Bldg. 720)	No ACT report	$2,500
Reporting Building (Bldg. 724)	No ACT report	$2,500
Lube Oil Building (Bldg. 725)	No ACT report	$2,500
Legacy Plant Area - used by project		
Rebuild Shop (Bldg 602)	ACT Report Zone A	$85,000
General Shop (Bldg. 601)	ACT Report Zone A	$481,000
Carpenter Shop (Bldg. 603)	ACT Report Zone A	$2,500
Warehouse 49 (Bldg. 920)	ACT Report Zone A	$49,000
Warehouse 45 (Bldg. 921, Electrical)	ACT Report Zone A	$13,500
Lube House (Bldg. 926)	ACT Report Lubricant Storage Building	$52,000
Rubber Shop (Bldg. 605)	ACT Report Rubber Storage Building	$24,000
Water Treatment Plant & Storage Tanks	ACT Report Water Treatment Plant	$45,000
Colby Pump House	No ACT report	$2,500
Administration Building	ACT Report Administration Building	$850,000
Main Gate	No ACT report	$5,000
Sewage Treatment Plant	No ACT report	$5,000
Return Water Barge	No ACT report	$5,000

Total ACM Abatement Cost: **$1,891,000**

Asbestos Abatement Cost Proposal - Bid Form

Scope of Work Description	Reference Information	Asbestos Removal & Disposal Costs
Legacy Area 1 - used by project		
Area 1 Shop and Truck Storage (Bldg. 220)	ACT Report Zone H	$82,500
Area 1 Cold Storage (Bldg. 221)	No ACT report	$5,000
Area 1 Reporting Building (Bldg. 231)	No ACT report	$5,000
Area 1 Boiler House (Bldg. 226)	ACT Report Zone H	$2,500
Area 1 Fire Pump House & Water Tank (Bldg. 228)	ACT Report Zone H	$2,500
Legacy Area 2 - used by project		
Area 2 Service Shop (Bldg. 201)	ACT Report Zone I	$93,050
Area 2 Truck Storage (Bldg. 202)	ACT Report Zone I	$3,000
Area 2 Cold Storage (204)	ACT Report Zone I	$3,000
Area 2 Shop Locomotive Service Shop (Bldg. 203)	ACT Report Zone I	$52,150
Area 2 Shop Locomotive Fueling	ACT Report Zone I	$2,500
Legacy Tailings Basin Buildings - used by project		
Foreman's Office (Bldg. 718)	No ACT report	$6,500
Reporting Building (Bldg. 719)	No ACT report	$6,500
Lube House (Bldg. 720)	No ACT report	$2,500
Reporting Building (Bldg. 724)	No ACT report	$2,500
Lube Oil Building (Bldg. 725)	No ACT report	$2,500
Legacy Plant Area - used by project		
Rebuild Shop (Bldg 602)	ACT Report Zone A	$85,000
General Shop (Bldg. 601)	ACT Report Zone A	$480,800
Carpenter Shop (Bldg. 603)	ACT Report Zone A	$2,500
Warehouse 49 (Bldg. 920)	ACT Report Zone A	$49,000
Warehouse 45 (Bldg. 921, Electrical)	ACT Report Zone A	$13,500
Lube House (Bldg. 926)	ACT Report Lubricant Storage Building	$52,000
Rubber Shop (Bldg. 605)	ACT Report Rubber Storage Building	$24,000
Water Treatment Plant & Storage Tanks	ACT Report Water Treatment Plant	$45,000
Colby Pump House	No ACT report	$2,500
Administration Building	ACT Report Administration Building	$850,000
Main Gate	No ACT report	$5,000
Sewage Treatment Plant	No ACT report	$5,000
Return Water Barge	No ACT report	$5,000

Total ACM Abatement Cost: **$1,891,000**

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates							Mavo	Arrowhead Consulting & Testing
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Total Demo**	**Site Restoration**	**Assets Recovery**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**
Pre-Demolition Services			$54,400								
Legacy - demoed as part of construction											
Additive Building & Heating Plant							$1,593,300			Included in Lakehead's total demo	
Bentonite silos	8.1.14						inc in above			n/a	
Area 2 Water Tower (price separate from Heating & Additives buildings	8.1.29					$30,000	$30,000	$2,500	$1,125	n/a	
Legacy Tailings Basin Buildings - Demoed as part of construction											
Foreman's Office (Bldg. 718)	8.1.28	No ACT report				$9,350		$400		$6,500	$1,100
Reporting Building (Bldg. 719)	8.1.28	No ACT report				$9,900		$400		$6,500	$1,100
Lube House (Bldg. 720)	8.1.28	No ACT report				$2,500		$400		$2,500	$850
Reporting Building (Bldg. 724)	8.1.28	No ACT report				$3,300		$400		$2,500	$900
Lube Oil Building (Bldg. 725)	8.1.28	No ACT report				$2,500		$400		$2,500	$850
Legacy Area 1 - used by project											
Area 1 Shop and Truck Storage (Bldg. 220)	8.1.6	ACT Report Zone H		$2,900.00	$106,900	$103,332	$213,132	$74,669	$37,000	$82,500	
Area 1 Cold Storage (Bldg. 221)	8.1.6	ACT Report Zone H		$400.00	$48,970	$10,860	$60,230	$13,400	$2,800	$5,000	
Area 1 Reporting Building (Bldg. 231)	8.1.6	No ACT report				$9,900				$5,000	$850
Area 1 Boiler House (Bldg. 226)	8.1.6	ACT Report Zone H		$200.00	$13,500	$9,875	$23,575	$3,000	$200	$2,500	
Area 1 Fire Pump House & Water Tank (Bldg. 228)	8.1.6	TE-8-142 and TE-8-144, ACT Report Zone H		$410.00		$11,250	$11,660			$2,500	
Area 1 Locomotive Fueling	8.1.6	ACT Report Zone H		$500.00	$22,500	$10,100	$33,100	$6,250	$1,000	n/a	
Legacy Area 2 - used by project											
Area 2 Service Shop (Bldg. 201)	8.1.7	ACT Report Zone I		$2,200.00	$160,900	$38,990	$202,090	$37,334	$10,940	$93,050	
Area 2 Truck Storage (Bldg. 202)	8.1.7	ACT Report Zone I		$2,000.00	$63,190	$9,175	$74,365	$13,988	$3,075	$3,000	
Area 2 Cold Storage (204)	8.1.7	ACT Report Zone I		$697.00	$42,560	$13,080	$56,337	$14,100	$1,700	$3,000	
Area 2 Shop Locomotive Service Shop (Bldg. 203)	8.1.7	ACT Report Zone I		$3,400.00	$20,500	$12,300	$36,200	$11,113	$1,625	$52,150	
Area 2 Locomotive Fueling	8.1.7	ACT Report Zone I		$2,000.00	$20,900	$11,800	$34,700	$6,250	$975	$2,500	
Hose House (Bldg. 209) Not to be used in project	8.1.7	No ACT report			$3,000	$9,150				$2,500	$850
Sample House (Bldg. 208) Not to be used in project	8.1.7	No ACT report			$25,400	$20,300				$5,000	$950
Reporting Building (Bldg. 425) Not to be used in project	8.1.7	No ACT report			$3,300	$9,200				$3,500	$850
Legacy Plant Area - used by project											
Rebuild Shop (Bldg 602)	8.1.9	ACT Report Zone A		$3,000.00	$70,200	$125,600	$198,800	$27,560	$13,940	$85,000	
General Shop (Bldg. 601) Includes Acetylene Building (Bldg.604)	8.1.8	ACT Report Zone A		$15,000.00	$199,190	$353,600	$567,790	$182,300	$113,796	$480,800	
Carpenter Shop (Bldg. 603)	8.1.21	ACT Report Zone A		$2,000.00	$10,200	$13,250	$25,450	$3,300	$100	$2,500	
Coarse Crusher	8.1.1			$10,000.00	$313,345	$1,551,800	$1,875,145	$593,890	$199,325	$1,070,618	
Drive House 1 conv and housings	8.1.2	Drive Houses 1 & 2 and conveyors are all considered	$133,200	$7,500.00	$165,569	$141,540	$314,609	$46,900	$41,050	incl. in above	
Drive House 2 inc conv and housings	8.1.3	to be one structure for demo purposes.	inc in above		inc in above	inc in above	inc in above	inc in above	inc in above	incl. in Fines Crusher	
Fine Crusher	8.1.4			$45,000.00	$302,430	$1,373,460	$1,720,890	$203,400	$205,250	$439,686	
Warehouse 49 (Bldg. 920)	8.1.16	ACT Report Zone A		$6,500.00	$27,586	$82,800	$116,886	$15,947	$5,350	$49,000	
Warehouse 45 (Bldg. 921, Electrical)	8.1.15	ACT Report Zone A		$2,500.00	$35,159	$72,700	$110,359	$15,947	$3,590	$13,500	
Lube House (Bldg. 926)	8.1.10	ACT Report Lubricant Storage Building		$578.00	$17,000	$20,550	$38,128	$7,385	$1,600	$52,000	
Rubber Shop (Bldg. 605)	8.1.26	ACT Report Rubber Storage Building		$1,000.00	$30,464	$36,550	$68,014	$11,269	$5,150	$24,000	
Concentrator Building and Thickeners	8.1.5 AND 8.1.25			$100,000.00	$1,248,260	$5,895,850	$7,244,110	$1,145,998	$2,141,430	$1,535,236	
A-Lab	8.1.11			$500.00	$9,400	$14,560	$24,460	$2,940	$2,450	included in Concentrator	
Hinsdale Bridge	8.1.24			$0.00	$16,700	$616,300	$633,000	$15,200	$148,500	n/a	
Water Reservoir	8.1.12			$5,000.00		$98,100	$103,100	$914,400	$7,750	n/a	
Plant Site Water Tower	8.1.12	TG-7-005, Similar to Area 2 water tower				$30,000	$30,000	$2,500	$1,125	n/a	
Water Treatment Plant & Storage Tanks	8.1.27	TG-6-021		$1,000.00	$20,000	$72,600	$93,600	$2,250		$45,000	
Colby Pump House	8.1.13				$41,000	$8,260	$49,260	$1,500		$2,500	$1,000
Administration Building	8.1.17			$3,900.00		$157,935	$161,835	$18,200		$850,000	
Main Gate	8.1.18			$100.00		$11,400	$11,500	$875		$5,000	$900
Booster Pump House #1	8.1.19			$300.00		$23,500	$23,800	$9,200		included in Concentrator	
Sewage Treatment Plant	8.1.20	No ACT report		$0.00		$62,700	$62,700	$19,520		$5,000	$900
Portable Pump Houses	8.1.22	No ACM materials - See Dwg. TB-7-095		$0.00		$9,890	$9,890	$3,400		n/a	
Return Water Barge	8.1.23	No ACT report		$0.00		$44,900	$44,900			$5,000	$1,300
General Infrastructure (railroads, tunnels, roadways, etc)						$4,988,921	$4,988,921	$1,504,000	$237,500		
Railroads	8.2.5	Figure 7 and Krech & Ojard Dwg. C1		$0.00		$380,000	$380,000				
Tunnels (Service & Electrical)	8.2.2	TJ-63		$0.00		$1,856,000	$1,856,000			$2,127,767	
Galleries	8.2.2	Was estimated as a portion of the concentrator								included in Concentrator	
Sanitary Systems and Wells	8.2.1					$17,500	included in associated areas				
Pipelines				$0.00		$2,190,000	$2,190,000	$591,000			
Colby Lake water supply	8.2.2					$900,000		$98,000			
Inter pit pipeline	8.2.2					$562,000					

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates							Mavo	Arrowhead Consulting & Testing
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Total Demo**	**Site Restoration**	**Assets Recovery**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**
Natural Gas line	8.2.2					$150,000					
Tailings management above ground	8.2.2					$378,000					
Tailings management underground						$200,000					
Power Lines	8.2.3	Figures 5 & 5.1		$0.00		$97,810.00	$97,810				
Roads and Parking Lots	8.2.6	Figure 9		$0.00		$465,000	$465,000	$195,000			
New - Phase 1 - Plant Site											
Flotation Plant and Reagent Building	9.1.1			$75,000		$621,800	$696,800	$147,600	$242,500		
Concentrate Storage and Loadout Facility	9.1.2			$12,000		$273,760	$285,760	$48,100	$37,500		
Plant Site Sewage Treatment Plant	9.1.3	See Barr SOW 23 & Dwg. TL-2		$1,000.00		$118,000	$118,000	$30,000			
Railroads	9.3.3	See Barr SOW 19		$0.00		$185,000		$111,000			
Pipelines	9.3.1	SOW 12 and 14		$0.00		$1,555,000		$375,000			
Power Lines	9.3.2	SK-11-255		$0.00							
Roads and Parking Lots	9.3.4			$0.00							
Plant Site Wastewater Treatment Plant (WWTP) Ponds not included	9.5.2	See Barr SOW 20		$0.00		$245,000					
New - Phase 1 - Mine Site											
Maintenance Service and Fueling Facility	9.2.1			$1,100		$19,210	$20,310	$7,300	$1,200		
Rail Transfer Hopper	9.2.2	See Barr SOW 15		$1,100.00		$40,000	$41,100	$45,000	$1,200		
Rail Transfer Hopper Control Bldg	9.2.2	See Barr SOW 15		$100.00		$18,600	$18,700				
Rail Transfer Hopper Platform	9.2.2	See Barr SOW 15				$60,000	$60,000				
Central Pumping Station	9.2.3	See Barr SOW 7		$500.00		$14,000	$14,500	$1,200			
Railroads	9.2.4	See Barr SOW's 16, 17, 18		$0.00		$45,000	$45,000	$33,750			
Pipelines	9.3.1	See Barr SOW'S 05, 06, and 08		$0.00		$580,133	$580,133	$217,000			
Power Lines	9.3.2	See Barr SOW 13		$0.00		$83,900	$83,900		$7,175		
Roads and Parking Lots	9.3.4	See Barr SOW 1		$0.00		$392,000	$392,000	$132,000			
Mine Site Wastewater Treatment Facility (WWTF)	9.5.1	See Barr SOW 06		$0		$498,000	$498,000	$14,000			
New - Phase 2							$0				
Reagent Building	9.4.1	Bldg. Dims: 270' x 85' x 75' tall		$15,000.00		$820,000	$835,000	$4,100	$22,500		
Oxygen Plant	9.4.1	310' x 310' x 75' tall		$65,000.00		$4,238,600	$4,303,600	$16,600	$72,500		
Limestone Preparation	9.4.1	125' x 70' x 60' tall		$7,500.00		$345,000	$352,500	$1,750	$12,500		
Hydrometallurgical Plant	9.4.1	525' x 144' x 90' tall		$49,000.00		$4,365,000	$4,414,000	$13,500	$62,500		
Hydrometallurgical Reagents	9.4.1	144' x 90' x 90' tall		$15,000.00		$815,000	$830,000	$2,200	$17,500		
Railroads	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00							
Pipelines	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$1,450,000					
Power Lines	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00							
Roads and Parking Lots	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$156,000		$59,225			

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
a.	Coarse Crusher									
1	Below the ground level elevation of 1710', remove all existing HTHW pipelines with damaged or deteriorated insulation and all insulation fragments.					1478		124,817		
2	Below the ground level elevation of 1710', remove all equipment lubrication lines with damaged or deteriorated insulation and all insulation fragments.					1469		124,057		
3	Below the ground level elevation of 1710', remove any loose or fallen paint chips.					80		6,756		
4	Above the ground elevation of 1710', remove all lubrication lines with damaged or deteriorated insulation and all insulation fragments. Remove the insulation on the lubrication holding tanks.					730		61,649		
5	In the electrical control room, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					170		14,357		
6	In the electrical control room basement, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					250		21,113		
7	Clean the Coarse Crusher building of all extraneous debris and taconite fines.	2564						204,248		
8	Kill and clean mold from all Coarse Crusher building surfaces.	80						6,373		
9	Install protective railings around floor openings on apron feeder floor. Reestablish the north conveyor gallery exit by replacing all structurally compromised stair treads.	200						15,932		
	Sub-totals	2844	0	0	0	4177	0	579,302	320	0
b.	Conveyor 1A/1B tunnel & Drive house 1 (556 ft.)									
1	Remove approximately 1200' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 1A and 1 B tunnel.					418		35,500		
2	Abate any loose or fallen paint chips.					80		6,756		
3	Clean tunnel and Drive House walkways and stairs of extraneous debris and taconite fines.	1283						102,204		
4	Kill and clean mold from all tunnel and Drive House No. 1 building surfaces.	120						9,559		
5	In Drive House #1, remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation between 1A and 1B tunnel and S -3 tunnel. Patch remaining partially deteriorated HTHW pipeline insulation.					76		6,418		
	Subtotal	1403	0	0	0	574	0	160,237	0	0
	Totals	4247	0	0	0	4751	0	$739,538	320	0

Supervision & Field Administration	Man-hours est.	950	Est. Cost	$92,500.00
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$132,900.00
Estimated Material Costs (Itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (Itemize)			Est. Cost	$100,890.00
			Total Estimated Cost	$1,070,618

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
e.	**Fine Crusher**									
1	Remove all existing HTHW pipelines with damaged or deteriorated insulation from the 4A/4B conveyor tunnel up to elevation 1794' on the north side of column 5. This insulation has tested positive for asbestos or probable ACM					496		41,887		
2	Remove all equipment lubrication lines damaged or deteriorated insulation and all insulation fragments from the 4A/4B conveyor tunnel up to the lube tanks at elevation 1817'-9" on the north side of column row 5. This insulation has tested positive for asbestos or probable ACM					901		76,089		
3	Remove any loose or fallen paint chips below the ground level elevation 1710'. The paint chips have tested positive for lead based material.					80		6,756		
4	Clean the Fine Crusher building of all extraneous debris and taconite fines.	987						78,624		
5	Kill and clean mold from Fine Crusher building surfaces.	80						6,373		
6										
	Sub-totals	1067	0	0	0	1477	0	209,730	0	0
f.	**Conveyors 4A\4B tunnel & Drive House No. 2** (120 ft. long)									
1	Remove approximately 275' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 4A and 4B tunnel. The insulation has tested positive for asbestos or probable ACM.					139		11,739		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					80		6,756		
3	Clean tunnel and Drive house walkways and stairs of extraneous debris and taconite fines.	601						48,354		
4	Kill and clean mold from all conveyor and Drive House No. 2 surfaces	80						6,373		
5	Remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in Drive House No. 2. The insulation has tested positive for asbestos or probable ACM.					88		7,432		
	Sub-totals	687	0	0	0	307	0	80,653	0	0
	Totals	**1754**	**0**	**0**	**0**	**1784**	**0**	**$290,382**	**0**	**0**

Supervision & Field Administration	Man-hours est.	441	Est. Cost	42,953
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$5,000.00
Estimated Material Costs (Itemize)			Est. Cost	$41,000.00
Estimated Misc. Costs (Itemize)			Est. Cost	$60,350.00
			Total Estimated Cost	$439,686

NSW Lib	Description	Est. Man-Hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)
		Laborer	Operators	FD	Painters	Asbestos	Electrician		
0	Service Tunnels								
a-i	Service Tunnel S-1 (20X10X440)								
1	Remove approximately 910' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					210		[illegible]	
2	Abate any loose or fallen paint chips.					44		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					400		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					80		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-ii	Service Tunnel S-2 (20X10X330)								
1	Remove approximately 1,300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					321		[illegible]	
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead-based material.					53		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					525		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					97		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-iii	Service Tunnel S-3 (6X6X457)								
1	Remove approximately 165' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					58		[illegible]	
2	Abate any loose or fallen paint chips.					6		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					33		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					8		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-iv	Service Tunnel S-4 (10X10X372)								
1	Remove approximately 900' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					198		[illegible]	
2	Abate any loose or fallen paint chips.					37		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					89		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					22		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-v	Service Tunnel S-5 (7X8X35)								
1	Remove approximately 65' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					41		[illegible]	
2	Abate any loose or fallen paint chips.					8		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					4		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-vi	Service Tunnel S-6 (8X8X31)								
1	Remove approximately 31' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					49		[illegible]	
2	Abate any loose or fallen paint chips.					6		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					3		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					2		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-vii	Service Tunnel S-7 (7X8X655)								
1	Remove approximately 1360' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					438		[illegible]	
2	Abate any loose or fallen paint chips.					65		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					165		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					36		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-viii	Service Tunnel S-8 (7X8X30)								
1	Remove approximately 300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					68		[illegible]	
2	Abate any loose or fallen paint chips.					6		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					8		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-ix	Service Tunnel S-9 (0-6X7-8X303)								
1	Remove approximately 750' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					226		[illegible]	
2	Abate any loose or fallen paint chips.					42		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					102		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					18		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-x	Service Tunnel S-10 (6X5X65)								
1	Remove approximately 150' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					51		[illegible]	
2	Abate any loose or fallen paint chips.					10		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					9		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					4		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
a-xi	Service Tunnel S-11 (6X6X54)								
1	Remove approximately 135' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					93		[illegible]	
2	Abate any loose or fallen paint chips.					16		[illegible]	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		[illegible]	
4	Kill and clean mold from all tunnel surfaces.					8		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Totals	0	0	0	0	3142	0	295,122	21.0

Supervision & Field Administration	Man-hours est.	353	Est. Cost	$53,862
Craft support (Carpenters, Teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Rentals)			Est. Cost	$48,685.00
Estimated Material Costs (Rentals)			Est. Cost	$5,000.00
Estimated Misc. Costs (Rentals)			Est. Cost	$76,360.00
			Total Estimated Cost	$479,029

SUM-UP	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs
		Labor	Operator	FF	Painters	Asbestos	Electricians			
a.	**Electrical Tunnels**									
a-1.	**Electric Tunnel E-1N thru E-6N and E-1S thru E-6S** (7X8X295)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					2109		178,105		
2	Remove all existing deteriorated electric cables.					781		65,040		
3	Remove extraneous debris and taconite dust in the tunnel.					302		25,504		
4	Kill and clean mold from all tunnel surfaces.					147		12,414		
5	Remove all taconite fines and reestablish the emergency egress hatches					224		18,917		
	Sub-total	0	0	0	0	3564	0	300,980	277	0
a-2.	**Electric Tunnel E-7** (7X8X295)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					424		35,807		
2	Remove all existing deteriorated electric cables.					147		12,414		
3	Remove extraneous debris and taconite dust in the tunnel.					28		2,367		
4	Kill and clean mold from all tunnel surfaces.					57		4,813		
	Sub-total	0	0	0	0	657	0	55,401	111	0
a-3.	**Electric Tunnel E-8** (8 to 14 X 6-6 to 11 X 275ft)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					3125		263,906		
2	Remove all existing deteriorated electric cables.					1235		104,296		
3	Remove extraneous debris and taconite dust in the tunnel.					425		35,896		
4	Kill and clean mold from all tunnel surfaces.					251		17,819		
	Sub-total	0	0	0	0	4036	0	421,917	1008	0
a-4.	**Electric Tunnel E-9** (5-6X6-6X240)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					261		13,765		
2	Remove all existing deteriorated electric cables.					99		8,294		
3	Remove extraneous debris and taconite dust in the tunnel.					28		2,365		
4	Kill and clean mold from all tunnel surfaces.					55		1,267		
	Sub-total	0	0	0	0	245	0	25,691	61	0
a-5.	**Electric Tunnel E-10** (4-6X5-6X200)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					151		12,757		
2	Remove all existing deteriorated electric cables.					38		3,209		
3	Remove extraneous debris and taconite dust in the tunnel.					28		2,365		
4	Kill and clean mold from all tunnel surfaces.					14		1,182		
	Sub-total	0	0	0	0	231	0	19,508	93	0
a-6.	**Electric Tunnels E-11** (5-6X6-6X50), **E-12** (5X6-9X15 to 7-6X2-6X22), **E-13** (same as 12), **E-14** (7-6X2-6X22), **E-15** (same as 14), **West Service Tunnel, and East Service Tunnel** (both service tunnels (6X15X190)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					374		31,584		
2	Remove all existing deteriorated electric cables.					102		8,614		
3	Remove extraneous debris and taconite dust in the tunnel.					79		6,349		
4	Kill and clean mold from all tunnel surfaces.					32		2,702		
	Sub-total	0	0	0	0	587	0	49,249	235	0
a-al.	**Electric Tunnel E-16** (739-6X205)									
1	Remove extraneous debris and taconite dust in the tunnel.					80		6,756		
	Sub-total	0	0	0	0	80	0	6,756	0	0
	Concentrator									
6	In the North and South electrical control room basements, remove all existing ceiling tiles.					333		27,953		
7	In the North and South electrical control room basements, remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					1439		121,017		
8	In the North and South electrical control room basements, remove all existing deteriorated electric cables.					2143		180,974		
	Sub-total	0	0	0	0	3915	0	329,944	739	0
	Totals	0	0	0	0	14213	0	1,300,309	2447	0

Supervision & Field Administration	Man-hours est.	Est. Cost	86,455
Craft support (Carpenters, Ironwrker, Misc operator, Misc labor)	Man-hours est.	Est. Cost	
Estimated Equipment Costs (Rental)		Est. Cost	210,100
Estimated Material Costs (Rental)	***Not Yet Available***	Est. Cost	10,000
Estimated Misc. Costs (Rental)		Est. Cost	130,943
		Total Estimated Cost	1,648,738

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper (lbs.
		Labor	Operator	Air	Painters	Asbestos	Electricians			
a.	Concentrator (1400 ft long building)									
1	Remove approximately 3,000' of existing HFHW pipelines along "J" and "Q" columns lines with damaged or deteriorated insulation and all fragments of insulation in 4A and 4B tunnel.					823		$9,834		
2	Remove all insulated equipment fabrication lines and all insulation fragments.					1256		$36,954		
3	Remove any loose or fallen paint chips.					200		$2,400		
4	Kill and clean mold from all Concentrator building surfaces.					342		$2,844		
5	Install protective railings around floor openings or separator deck and north side rod mill deck.					250		$2,850		
9	Remove all floor tiles from the offices, locker rooms, washrooms, and central control room.					981		$6,264		
10	Remove all ceiling tiles from the offices, locker rooms, washrooms, and central control room.					1147		$6,854		
11	In the North and South Air and Cable Ducts, remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					861		$1,021		
12	In the North and South Air and Cable Ducts, remove all existing deteriorated electric cables.					564		$9,324		
	Sub-totals	0	0	0	0	6223	0	$103,970	0	0
d-xii.	Service Gallery G-1, G-2, and Service Tunnel S-12 (20X10X670)									
1	Remove approximately 1500' of existing HFHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					858		$2,458		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					98		$1,176		
3	Clean tunnel walkways of extraneous debris and taconite fines.					1000		$4,500		
4	Kill and clean mold from gallery and tunnel surfaces					80		$2,544		
	Subtotal	0	0	0	0	2,036	0	$10,678	0	0
d-xiii.	Service Gallery G-3 North Pipeway (20X10X700)									
1	Remove approximately 1500' of existing HFHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					1256		$36,937		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					80		$1,750		
3	Clean tunnel walkways of extraneous debris and taconite fines.					250		$1,957		
4	Kill and clean mold from gallery and tunnel surfaces					80		$2,544		
	Subtotal	0	0	0	0	1666	0	$43,939	0	0
d-xiv.	Service Gallery G-4 South Pipe way, G-5 Gallery, and Service Tunnel S-13 (20X10X2200)									
1	Remove approximately 4500' of existing HFHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					2006		$44,501		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					351		$9,985		
3	Clean tunnel walkways of extraneous debris and taconite fines.					576		$8,640		
4	Kill and clean mold from gallery and tunnel surfaces					200		$4,845		
	Subtotal	0	0	0	0	3133	0	$67,971	0	0
	Totals	0	0	0	0	12912	0	$1,046,194	0	0

Supervision & Field Administration	Man-hours est.	804	Est. Cost	$8,550
Craft support (Carpenters, Ironmen, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemized)			Est. Cost	$162,360.00
Estimated Material Costs (Itemized)			Est. Cost	$15,000.00
Estimated Misc. Costs (Itemized)			Est. Cost	$253,470.00
			Total Estimated Cost	$1,535,574

Coarse Crusher

Misc Cost Breakdown

Air Samples		$1,000
Haul & Dispose of ACM		$48,430
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$7,400
MDH Fees		$5,870
Admin Exp (phones, office, facilities,etc.)		$5,200
HAZ/Reg Waste Collection		$20,000
Stair/Railing Repair		$10,000
SUBCONTRACT TOTAL	========>	$100,650

Fine Crusher

Misc Cost Breakdown

Air Samples		$600
Haul & Dispose of ACM		$18,360
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$3,615
MDH Fees		$2,445
Admin Exp (phones, office, facilities,etc.)		$3,455
Scaffold		$21,000
Reg/Haz Waste Collection/Disposal		$8,125
SUBCONTRACT TOTAL	========>	$60,350

Service Tunnels

Misc Cost Breakdown

Air Samples		$1,600
Haul & Dispose of ACM, Fines, Salvage		$60,610
Dispose of Lead Based Paint Scrapings		$390
Insurance (1%)		$2,790
MDH Fees		$3,780
Admin Exp (phones, office, facilities,etc.)		$2,190
Access Construction (BUDGET)		$5,000
SUBCONTRACT TOTAL	========>	$76,360

Electrical Tunnels

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose (acm, salvage)		$57,120
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$16,800
MDH Fees		$17,300
Haz/Reg Waste collection/disposal		$25,000
Admin Exp (phones, office, facilities,etc.)		$16,473
SUBCONTRACT TOTAL	========>	$136,943

CONCENTRATOR

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose of ACM		$25,840
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$14,820
MDH Fees		$15,560
Admin Exp (phones, office, facilities,etc.)		$5,000
Reg/Haz Waste Collection/Disposal		$45,000
Scaffold		$143,000
SUBCONTRACT TOTAL	========>	$253,470

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
a.	**Coarse Crusher**									
1	Below the ground level elevation of 1710', remove all existing HTHW pipelines with damaged or deteriorated insulation and all insulation fragments.					1478		124817		
2	Below the ground level elevation of 1710', remove all equipment lubrication lines with damaged or deteriorated insulation and all insulation fragments.					1469		124057		
3	Below the ground level elevation of 1710', remove any loose or fallen paint chips.					80		6756		
4	Above the ground elevation of 1710', remove all lubrication lines with damaged or deteriorated insulation and all insulation fragments. Remove the insulation on the lubrication holding tanks.					730		61646		
5	In the electrical control room, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					170		14357		
6	In the electrical control room basement, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					250		21113		
7	Clean the Coarse Crusher building of all extraneous debris and taconite fines.	2564						204248		
8	Kill and clean mold from all Coarse Crusher building surfaces.	80						6373		
9	Install protective railings around floor openings on apron feeder floor. Reestablish the north conveyor gallery exit by replacing all structurally compromised stair treads.	200						15932		
	Sub-totals	2844	0	0	0	4177	0	575501	320	0
b.	**Conveyor 1A\1B tunnel & Drive house 1** (550 ft.)									
1	Remove approximately **1200'** of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 1A and 1 B tunnel.					418		33300		
2	Abate any loose or fallen paint chips.					80		6756		
3	Clean tunnel and Drive House walkways and stairs of extraneous debris and taconite fines.	1283						102204		
4	Kill and clean mold from all tunnel and Drive House No. 1 building surfaces.	120						9559		
5	In Drive House #1, remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation between 1A and 1B tunnel and S -3 tunnel. Patch remaining partially deteriorated HTHW pipeline insulation.					76		6418		
	Subtotal	1403	0	0	0	574	0	160237	0	0
	Totals	**4247**	**0**	**0**	**0**	**4751**	**0**	**$709,538**	**320**	**0**

Supervision & Field Administration	Man-hours est.	950	Est. Cost	$92,550.00
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$132,900.00
Estimated Material Costs (Itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (Itemize)			Est. Cost	$77,220.00
			Total Estimated Cost	$1,047,188

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$3,400.00	3400
800402	Fuel	5	@	$1,200.00	6000
800403	Generators	5	@	$3,000.00	15000
800405	Lift Rental	5	@	$7,500.00	37500
800408	Skidsteer	5	@	$3,200.00	16000
800409	Vac Loader	2	@	$10,000.00	20000
800410	Boring Equip	70	@	$500.00	35000
	SUBTOTAL				132900

MATERIALS ITEMIZATION

Stairs/Railings	======>	5000
		=========
		5000

Misc Cost Breakdown

Air Samples		$1,000
Haul & Dispose of ACM		$15,000
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$7,400
MDH Fees		$5,870
Admin Exp (phones, office, facilities,etc.)		$5,200
HAZ/Reg Waste Collection		$20,000
Stair/Railing Repair		$10,000
SUBCONTRACT TOTAL.	========>	$77,020

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper lbs.
		Labor	Operator	Welder	Painters	Asbestos	Electrician			
c.	Fine Crusher									
1	Remove all existing HD/W pipelines with damaged or deteriorated insulation from the 4A/4B conveyor tunnel up to elevation 1794' on the north side of column 5. This insulation has tested positive for asbestos or probable ACM					450		43,887		
2	Remove all equipment lubrication lines damaged or deteriorated insulation and all insulation fragments from the 4A/4B conveyor tunnel up to the tube racks at elevation 1807'-9" on the north side of column row 5. This insulation has tested positive for asbestos or probable ACM.					501		76,069		
3	Remove any loose or fallen paint chips below the ground level elevation 1717'. The paint chips have tested positive for lead based material					60		6,756		
4	Clean the Fine Crusher building of all extraneous debris and Lacombe Silica	937						78,668		
5	Kit and clean mold from Fine Crusher building surfaces.	50						5,377		
6										
	Sub-totals	2193	0	0	0	3477	0	209,736	0	0
e.	Conveyors 4A/4B tunnel & Drive House No. 2(120' E. long)									
1	Remove approximately 275' of existing HD/W pipelines with damaged or deteriorated insulation and all fragments of insulation on 4A and 4B (upper). The insulation has tested positive for asbestos or probably ACM					139		11,739		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					80		6,756		
3	Clean tunnel and Drive house walkways and stairs of extraneous debris and Lacombe Silica.	807						68,354		
4	Kit and clean mold from all conveyor and Drive House No. 2 surfaces	80						6,877		
5	Remove approximately 120' of existing HD/W pipelines with damaged or deteriorated insulation and all fragments of insulation on Drive House No. 2. The insulation has tested positive for asbestos or probable ACM.					85		7,432		
	Sub-totals	887	0	0	0	303	0	101,053	0	0
	Totals	3754	0	0	0	3780	0	$310,582	0	0

Supervision & Field Administration	Man-hours est.	441	Est. Cost	41,953
Craft Support (Carpenters, Teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (rental)			Est. Cost	55,000.00
Estimated Material Costs (rental)			Est. Cost	541.00.00
Estimated Misc. Costs (rental)			Est. Cost	51,640.00
			Total Estimated Cost	5450,776

EQUIPMENT ITEMIZATION

600601	Small Tool Repair	1	@	$1,200.00	1200
600602	Fuel	2	@	$1,200.00	2400
600603	Generators	2	@	$3,000.00	6000
600605	Lift Rental	3	@	$7,500.00	15000
600606	Skidsteers	2	@	$3,200.00	6400
600609	Vac Loader	1	@	[illegible]	30000
	SUBTOTAL				[illegible] 61000

MATERIALS ITEMIZATION

Railing/Tread Steel	5000
	5000

Misc Cost Breakdown

Air Samples	$600
Haul & Dispose of ACM	$9,450
Dispose of Lead Based Paint Scrapings	$2,750
Insurance (1%)	$2,615
MDH Fees	$2,445
Admin Exp (phones, office, facilities,etc.)	$3,450
Scaffold	$21,000
Reg/Haz Waste Collection/Disposal	$8,125
SUBCONTRACT TOTAL <<<<<<<<	$61,440

SOW ref.	Description	Estimated Hours						Total Labour Cost	Total Material Cost (Ex-Works)
		Tube	Chamber	Lift	Turnout / Access	Derailleur			
4	Service Tunnels								
4.1	Service Tunnel S-1 (2000–2040)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				320			48,000	
2	Supply and install cable joints and terminations				24			9,600	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	408	0	0	73,440	0
4.2	Service Tunnel S-2 (2040–2080)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.3	Service Tunnel S-3 (2080–2120)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.4	Service Tunnel S-4 (2120–2160)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.5	Service Tunnel S-5 (2160–2200)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.6	Service Tunnel S-6 (2200–2240)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.7	Service Tunnel S-7 (2240–2280)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.8	Service Tunnel S-8 (2280–2320)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.9	Service Tunnel S-9 (2320–2360)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
4.10	Service Tunnel S-10 (2360–2400)								
1	Excavate and construct 1,200 m of existing 10 kV underground cable route including cable pulling, jointing and testing				360			54,000	
2	Supply and install cable joints and terminations				32			7,680	
3	Carry out insulation resistance and continuity tests on all circuits				48			11,520	
4	Provide as-built drawings and submit to the client				16			3,840	
	Sub-total	0	0	0	456	0	0	77,040	0
	Total	0	0	0	4,560	0	0	770,400	0

Engineering, Project Management	Man-hours	4,560	770,400
Civil Works (Excavation, Backfill, Reinstatement)	Allowance	1	1,200,000
Underground Power Cable (10 kV)	12 km		960,000
Cable Accessories (Joints, Terminations)	12 km		144,000
Contingency (5%)			154,020
Total			3,228,420

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$885.00	885
800402	Power Washer	3	@	$3,200.00	9600
800403	Generators	3	@	$3,000.00	9000
800405	Fuel	3	@	$1,200.00	3600
800408	Skidsteer	3	@	$3,200.00	9600
800409	Vac Loader	1	@	$12,000.00	12000
800410	Hoisting Equip	0	@	$100.00	0
	SUBTOTAL				44585

MATERIALS ITEMIZATION

Budget	------>	$000
		$000

Misc Cost Breakdown

Air Samples	$1,000
Haul & Dispose of ACM, Fines, Salvage	$11,200
Disposal of Lead Based Paint Scrapings	$390
Insurance (1%)	$2,700
MBH Fees	$3,780
Admin Exp (phones, office, facilities,ect.)	$2,100
Access Construction (BUDGET)	$5,000
SUBCONTRACT TOTAL ==========>	$46,990

SOW No.	Description	[illegible]						[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
4.	Electrical Tunnels									
4.1	Electric Tunnel E-1 [illegible] E-45 [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					153		[illegible]		
4	[illegible]					143		[illegible]		
5	[illegible]					[illegible]		[illegible]		
	Subtotal	9	9	4	4	[illegible]	[illegible]	[illegible]	737	7
4.2	Electric Tunnel E-7 [illegible]									
1	[illegible]					404		[illegible]		
2	[illegible]					137		[illegible]		
3	[illegible]					34		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	5	0	0	0	[illegible]	[illegible]	[illegible]	115	5
4.3	Electric Tunnel E-1 [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	0	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]
4.4	Electric Tunnel E-3 [illegible]									
1	[illegible]					163		[illegible]		
2	[illegible]					19		[illegible]		
3	[illegible]					14		[illegible]		
4	[illegible]					15		[illegible]		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	38	0
4.5	Electric Tunnel E-10 [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					28		[illegible]		
3	[illegible]					28		[illegible]		
4	[illegible]					14		[illegible]		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	59	0
4.6	Electric Tunnels E-11 [illegible], E-12 [illegible], E-13 [illegible], E-14 [illegible], E-15 [illegible], West Service Tunnel, and East Service Tunnel [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					28		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	[illegible]	0
4.7	Electric Tunnels E-16 [illegible]									
1	[illegible]					[illegible]		[illegible]		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	[illegible]	0
	Concentrator									
5	[illegible]					[illegible]		[illegible]		
1	[illegible]					[illegible]		[illegible]		
6	[illegible]					[illegible]		[illegible]		
	Subtotal	0	1	1	0	[illegible]	0	[illegible]	[illegible]	0
	Total	0	0	0	0	[illegible]	0	[illegible]	[illegible]	0

[illegible]	[illegible]	[illegible]	[illegible]	26,491
[illegible]	[illegible]		[illegible]	
[illegible]			[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	15,000
[illegible]			[illegible]	[illegible]
			[illegible]	[illegible]

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$8,893.00	8200
800402	Fuel	5	@	$1,200.00	6000
800403	Generators	5	@	$3,000.00	15000
800405	Lift Rental	5	@	$1,500.00	7500
800406	Skidsteer (2)	12	@	$3,200.00	38400
800409	Vac Loader	1	@	$10,000.00	10000
800410	Scaffold	1	@	$125,000.00	125000
	SUBTOTAL				210100

MATERIALS ITEMIZATION

Stair/Railings	=======>	15000
		==========
		15000

Misc Cost Breakdown

Air Samples	$1,500
Haul & Dispose (acm, salvage)	$29,400
Dispose of Lead Based Paint Scrapings	$2,750
Insurance (1%)	$16,800
MDH Fees	$17,300
Haz/Reg Waste collection/disposal	$25,000
Admin Exp (phones, office, facilities,etc.)	$16,473
SUBCONTRACT TOTAL ==========>	$109,223

IOW #	Description	Est. Man Hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. Asbestos Cutter Fee
		Labor	Operator	IW	Pipefitter	Asbestos	Electrician			
8	[illegible] (Bldg [illegible])									
1	[illegible]					621		226,455		
2	[illegible]					1,385		[illegible]		
3	[illegible]					320		[illegible]		
4	[illegible]					150		21,645		
5	[illegible]					400		16,450		
9	[illegible]					921		[illegible]		
10	[illegible]					2,142		[illegible]		
11	[illegible]					440		[illegible]		
14	[illegible]					344		45,418		
	Subtotal	0	0	0	0	[illegible]	0	526,014	0	0
[illegible]	Service Gallery G-1, G-2, and Service Tunnel S-12 ([illegible])									
1	[illegible]					[illegible]		72,458		
2	[illegible]					[illegible]		4,276		
3	[illegible]					315		19,144		
4	[illegible]					50		[illegible]		
	Subtotal	0	0	0	0	1,724	0	[illegible]	0	0
[illegible]	Service Gallery G-1 North Pipeway ([illegible])									
1	[illegible]					1,795		[illegible]		
2	[illegible]					80		6,359		
3	[illegible]					[illegible]		21,987		
4	[illegible]					39		[illegible]		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	0	0
[illegible]	Service Gallery G-4 South Pipeway, G-5 Gallery, and Service Tunnel S-11 ([illegible])									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		33,587		
3	[illegible]					316		44,513		
4	[illegible]					105		[illegible]		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	0	0

	Total	0	0	0	0	[illegible]	0	[illegible]	0	0

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	
[illegible]			[illegible]	[illegible]
[illegible]			[illegible]	[illegible]
[illegible]			[illegible]	[illegible]
			[illegible]	[illegible]

EQUIPMENT ITEMIZATION

Small Tool Repair	1	@	$5,500.00	5500
Fuel	4	@	$1,500.00	6000
Generators	4	@	$3,340.00	13360
Forklift	4	@	$2,200.00	8800
Skidsteer	8	@	$3,200.00	25600
Van Loader	2	@	$10,000.00	20000
Scissor Lift	4	@	$1,500.00	6000
Heating Equip	40	@	$350.00	14000
SUBTOTAL				102260

MATERIALS ITEMIZATION

Repair Steel	=======>	15000
		==========
		15000

Misc Cost Breakdown

Air Samples		$2,500
Haul & Dispose of ACM		$13,300
Dispose of Lead Based Paint Scrapings		$9,750
Insurance (1%)		$14,820
MDH Fees		$15,560
Admin Exp (phones, office, facilities,etc.)		$5,000
Reg/Haz Waste Collection/Disposal		$45,000
Scaffold		$140,000
SUBCONTRACT TOTAL	[illegible]	$240,930

PolyMet is evaluating the proposal, to assist in our effort we have a few follow up questions.

1) Please provide an estimated duration to complete the work in each project area.

Coarse Crusher – 95 days
Fine Crusher – 44 days
Concentrator – 80 days
Service Tunnels – 55 days
Electric Tunnels – 90 days

2) Please describe your proposed methods and techniques for lead abatement.

Areas of delaminated/deteriorated paint will be misted then either vacuumed or scraped and collected for disposal. TCLP will be performed for disposal protocols.

3) Please describe your proposed methods and techniques for general cleanup in each project area.

General debris will be removed to a location directed by Polymet staff. Fines will be vacuumed via vec loader or HEPA vacuums. Main walk ways will be mopped (concrete floors only). All debris will be collected and discarded as directed by Polymet staff.

4) Please describe your proposed methods and techniques for removal of the ACM fire protective wrap, Transite conduit, and electrical cable.

The electrical tunnel will be placed under a containment consisting of critical barriers, negative air and attached personnel and equipment decontamination units. Upon the removal, all electrical cabling will be removed from the transite conduit and removed to an area directed by Polymet. Transite conduit will then be removed, packaged and disposed.

Owner's response to Mavo's Clarifications & Assumptions

Mavo item 1). It is assumed that all overhead cranes are operational and can be used as a work platform for the cleaning/power washing portion of the project.

Owner's response – The schedule to reinstate the overhead cranes has not been determined, thus it should not be assumed they will be operational during the project.

Scaffold erection and additional lift erection has been added to the budget

---

Mavo item 2). Owner to provide power and potable water. Mavo Systems will provide water filtration to power washing equipment. It is assumed that there will be a minimum water pressure of 20 PSI at the nozzle.

Owner's response – The contractor is responsible for supply of potable water.

Section D, item I of the work scope states: The Contractor shall supply **drinking and wash water**, field offices and lunchrooms, sanitary facilities, and wash water collection and filtering. The owner shall supply temporary electrical power at select locations.

Section 1 item ee of the general conditions also state: The Contractor will furnish their employees an adequate supply of portable water, containers, disposable cups, and trash receptacles for used cups.

Potable water will be contractor responsibility

Mavo item 8). Electrical tunnel E8 is assumed to be 1,956 lineal feet not the 2,756 listed in the scope work.

Owner's response – The length of E-8 tunnel has been check and verified at 2,756 feet.

Confirmed

Mavo item 10). Included in the scope of work is the handling all the waste streams by disposal at the on-site landfill which the exception of the ACM wrapped lube oil piping. Excluded is the disposal of the miscellaneous hazardous waste such as bulbs, ballasts, paint, lead paint, chemicals, solvents, etc. – these items will be hauled to a central location and owner to take care of from there.

Owner's response – The Contractor is responsible for removal, transport, and disposal of hazardous materials.

Section D, item i of the work scope states: The Contractor is responsible for removal, transport, and disposal of hazardous materials. Contractor must secure the appropriately knowledgeable, certified, and/or licensed personnel to perform all hazardous waste activities. The Contractor is responsible to obtain permits and submit all reports required by state and federal agencies.

[redacted]

Proposal Specific Questions

1) The Mavo equipment itemization and estimate does not include lunch or office trailers, de-con stations, onsite vehicles, dumpsters, forklifts, or trucks. Will you be using these? If so what is the estimated cost?

   [redacted]

2) The Mavo material itemization list includes consumables, which could be stated as a single entry = Man-hours * consumable rate, which is already covered as a portion of your labor hours. An example of anticipated material items is welding rod, cutting gases, lumber, rod stock and flat iron for hand rail, and grating for stairs. Did you include any of these items? [redacted]

3) Do you have any resumes available for your Superintendent, Foremen and Project Manager? [redacted]

MAVO SYSTEMS

John Kraskey
Project Manager

Mavo Systems, Inc.
Duluth, MN

Qualifications
27 Years Abatement Experience

Summary of Work Experience

06/88 to 05/94	Rem-Con, Inc.	Worker/ Site Supervisor
05/94 to 10/2004	Envirobate, Inc	Supervisor/Project Manager
10/2004 to present	Mavo Systems, Inc.	Project/Regional Manager

Education and Industry Training / Certification

1988 - 1992	Construction Laborers – Lino Lakes, MN Asbestos Abatement Workers Certification
1992 - 2015	Construction Laborers – Lino Lakes, MN Asbestos Abatement Site Supervisor Certification
1996	Air Sampling Certification – MacNeil Environmental
1997 - 2015	Lead Abatement Contractor /Site Supervisor Certification

MAVO SYSTEMS

Melverd Nelson
Superintendent

Mavo Systems, Inc.
White Bear Lake, MN

Qualifications
19 Years Abatement Experience

Summary of Work Experience

07/96 To Present Mavo Systems, Inc. Worker/ Site Supervisor

Education and Industry Training / Certification

1996 Construction Laborers – Lino Lakes, MN Asbestos Abatement Workers Certification

1997 Construction Laborers – Lino Lakes, MN Asbestos Abatement Site Supervisor Certification

1998 Asbestos Abatement Contractor /Site Supervisor Refresher Course Lake States – White Bear Lake Two Day Air Sampling

1999 Construction Laborers – Lino Lakes, MN
Asbestos Abatement Contractor/ Supervisor Refresher Course

2000 Construction Laborers – Lino Lakes, MN
Asbestos Abatement Contractor/ Supervisor Refresher Course Firefighter I & II Training, Confined Space, Ladder Safety, Hazmat, Building Construction, Sprinkler Systems, Fire Safety

2001 Construction Laborers – Lino Lakes, MNAsbestos Abatement Contractor/ Supervisor Refresher Course Anoka Hennepin Technical College EMT-B Training, First Aid, CPR, EMT-B Certified

2002 Construction Laborers – Lino Lakes, MN Asbestos Abatement Contractor/ Supervisor Refresher Course Lead Abatement Contractor/ Supervisor Certification

2003-2015 Construction Laborers – Lino Lakes, MN Asbestos Abatement Contractor/ Supervisor Refresher Course/ Lead Abatement Contractor/ Supervisor Refresher Course

MAVO SYSTEMS

Gust Wells
Superintendent

Mavo Systems, Inc.
White Bear Lake, MN

Qualifications
8 Years Abatement Experience

Summary of Work Experience

06/2007 to Present	Mavo Systems, Inc.	Worker/Foreman/ Site Supervisor

Education and Industry Training / Certification

2008 - 2015	Construction Laborers – Lino Lakes, MN Asbestos Abatement Supervisor Certification
2007	Construction Laborers – Lino Lakes, MN Air Sampling Certification
2010 - 2015	Construction Laborers - Lead Abatement Contractor /Site Supervisor Certification
2011 - 2016	Construction Laborers – Lead Renovator (RRP) Course
2013 - 2016	MN Emergency Medical Services Regulatory Board – First Responder
2010 - 2016	Construction Laborers – Lino Lakes, MN Hazwoper (Haz Waste) Course

MAVO SYSTEMS

Environmental and Specialty Contracting Services

BUDGET PROPOSAL

DATE: ***June 7, 2016***

PROPOSAL SUBMITTED TO:	**PolyMet**	DESCRIPTION OF WORK:	**Legacy ACM Abatement**
ADDRESS:		SITE LOCATION:	**PolyMet**
CITY, STATE, ZIP:	**Hoyt Lakes, MN**	ADDRESS:	
ATTENTION:	**Mike Glissman**	CITY, STATE, ZIP:	**Hoyt Lakes, MN**
PHONE:	**218.471.2150**		

Mavo Systems, Inc. proposes the following scope of work:

This budgetary proposal is for abatement of ACM materials from remaining structures as part of a closure procedure for the PolyMet NorthMet venture. The pricing attached represents removal of acm materials from buildings and structures that will be necessary to facilitate demolition by others. No other removals are included in this pricing.

Pricing includes all costs associated with asbestos removal for each location identified except 3rd party monitoring typically retained by owner.

All pricing represents removal procedures compliant with all federal, state and local regulations governing asbestos abatement.

Legacy Area 1 - used by project	**Scope of Work**
Area 1 Shop and Truck Storage (Bldg. 220)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Area 1 Cold Storage (Bldg. 221)	- windows
Area 1 Reporting Building (Bldg. 231)	- windows
Area 1 Boiler House (Bldg. 226)	- windows
Area 1 Fire Pump House & Water Tank (Bldg. 228)	- windows
Legacy Area 2 - used by project	
Area 2 Service Shop (Bldg. 201)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Area 2 Truck Storage (Bldg. 202)	- windows
Area 2 Cold Storage (204)	- windows
Area 2 Shop Locomotive Service Shop (Bldg. 203)	- flooring, mastics, tsi, valves, gaskets, windows
Legacy Tailings Basin Buildings - used by project	
Foreman's Office (Bldg. 718)	- flooring, mastics, tsi, windows
Reporting Building (Bldg. 719)	- flooring, mastics, tsi, windows
Lube House (Bldg. 720)	- windows
Reporting Building (Bldg. 724)	- windows
Lube Oil Building (Bldg. 725)	- windows
Legacy Plant Area - used by project	
Rebuild Shop (Bldg 602)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
General Shop (Bldg. 601)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Carpenter Shop (Bldg. 603)	- windows
Warehouse 49 (Bldg. 920)	- flooring, mastics, tsi, valves, gaskets, windows
Warehouse 45 (Bldg. 921, Electrical)	- tsi, windows
Lube House (Bldg. 926)	- flooring, mastics, tsi, valves, gaskets, windows
Rubber Shop (Bldg. 605)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Water Treatment Plant & Storage Tanks	- flooring, mastics, tsi, valves, gaskets, windows
Colby Pump House	- valves, gaskets, windows
Administration Building	- flooring, mastics, tsi, plaster, windows
Main Gate	- flooring, mastics, windows
Sewage Treatment Plant	- valves, gaskets, windows
Return Water Barge	- valves, gaskets, windows

***anticipate a 2% increase to all pricing for each year until performance.*

Submitted: John Kraskey

Appendix 15.3 Construction Year 2 Projected Financial Assurance Estimate

Basis of Financial Assurance Estimate:
Nonferrous Construction Year 2

1 Introduction

In Minnesota, a permittee must submit, as part of its annual report in the first quarter of each calendar year (and with its initial Permit to Mine application), a contingency reclamation estimate (or financial assurance estimate) for reclamation activities and/or corrective action in the event that operations cease in that calendar year. The basis for this approach is that the State wants to ensure that a source of funds is available for the State's use if the permittee fails to perform any of its obligations (e.g., if the company goes bankrupt some time during the year). Therefore, the financial assurance estimate must include the estimated costs for any reclamation associated with proposed activities in the coming year.

SRK has been retained by PolyMet to compile the financial assurance estimates for the NorthMet Project's second year of construction (Construction Year 2). Construction Year 2 starts when any NorthMet construction is initiated, and financial assurance would be due upon issuance of the Permit to Mine.

2 Methodology

The contingency reclamation estimate was prepared using the Standardized Cost Reclamation Estimate (SRCE) model version 1.4.16 available from http://www.nvbond.org. The SRCE was originally developed for the State of Nevada to provide a standardized approach to calculating bond costs for closure.

The purpose of the SRCE is to provide a systematic approach to the development of a closure cost with modules included for the most common closure elements encountered at mining operations. The SRCE does not include closure tasks that are not commonly found at mining operations and provides blank worksheets for the development of custom calculations which can be linked into the model.

The model inputs required are the physical dimensions of the various facilities and calculations are based upon first principles. These calculations and assumptions are demonstrated on each worksheet with diagrams and examples of the calculations performed by the model.

Equipment used in the model is standardized upon Caterpillar because they have the most extensive line of equipment and the most comprehensive technical specifications and productivities available. Equipment productivities are derived from the Caterpillar Performance Handbook (2004). Productivity for other types of equipment is derived from technical specifications where available or on field experience at Nevada mine closure sites.

Crews for various tasks are derived from the RS Means Heavy Construction Data (2006). Crew productivities are also derived from RS Means and used to calculate project specific unit rates utilizing the labor, equipment and material rates as defined for the project.

3 Data Requirements

Data required for SRCE consists of project data and cost data. Project data are dimensions, areas, distances, etc., that are specific to the project facilities. For this project, data consisted of dimensions of the roads, tailings facility, and buildings. The tables below list which worksheets in the model are used for this estimate, and which are not used.

Table 1: SRCE Worksheets Used

Property Information	Table of Contents	Cost Summary	Other User	Human Resources
Reclamation Quantities	Waste Rock Dumps	Tailings	Quarry and borrow areas	Haul Materials
Other Demo and Equipment Removal	Process ponds	Yards, etc	Well Abandonment	Misc Costs
Monitoring	Construction Management	Labor Rates	Equipment Costs	Material Costs
Misc Unit Costs	Fleets	Productivity	Tools	Seed Mixture
User 1	User 2	User 3	User 4	User 5
User 8				

Table 2: SRCE Worksheets Not Used

Cost Schedule	Solution Management	Closure Planning	G & A	Exploration
Exploration roads and pads	Heap Leach	Roads	Pits	Underground openings
Foundations and Buildings	Sediment and Drainage Control	Landfills	Waste Disposal	

Custom calculations are prepared using the “User” worksheets in the back of the model. Wherever possible these calculations are linked back to the model such that the calculations are updated whenever unit rates are updated. Cost totals from the User worksheets are linked into the Other User worksheet.

4 Model Results

The Cost Summary worksheet provides a breakdown of inputs by labor, equipment, and material categories per the headings below to provide the total direct costs per heading:

- Earthwork/Recontouring
- Revegetation/Stabilization
- Detoxification of water/Water Treatment/Disposal of Waste

- Structure, Equipment, Facility Removal (Demolition)
- Monitoring
- Closure Planning, G&A, Human Resources

A discussion is provided below in the Inputs Section under the relevant headings for the worksheets that were used.

5 Basis of Construction Year 2 Financial Assurance Estimates

5.1 Assumptions and Summary

During Construction Year 2, there will be no Duluth Complex or Virginia Formation rock blasted, and therefore no pits and no waste rock in stockpiles. Also, no processing will occur at the Plant Site, and therefore no nonferrous tailings will be deposited in the Flotation Tailings Basin (FTB).

- Direct costs
  - Demolition of structures (buildings, railroads, power lines, pipelines, roads and parking lots) at Plant Site and Mine Site built in construction year 2
    - removal of structure to grade
    - off-site disposal of demolition material
    - covering with soil and revegetating of structure footprint
  - Tailings Basin
    - Reshaping and reseeding of first lift
  - Mine Site
    - Replace topsoil stripped off of Mine Site features (Category 1 Waste Rock Stockpile, Category 2/3 Waste Rock Stockpile, Category 4 Waste Rock Stockpile, Ore Surge Pile (OSP), East Pit footprint, Overburden Storage and Laydown Area (OSLA)) and revegetate (no mulch)
  - Water monitoring
  - Well abandonment
  - Piping and liners installed (i.e., foundation of waste rock stockpiles, process water ponds) will be left in place rather than removed (covered and revegetated)
  - 1 site manager; 1 accountant/procurement; 1 site engineer; 1 laborer
- Indirect costs
  - 5% contingency, engineering design/construction

6 Data Inputs and Model Basics

This section provides a discussion of the particular data input into the model to calculate a closure cost.

Data and information used in building the SRCE are provided in the attachments. The SRCE file is provided in Attachment 1 and the Cost data file in Attachment 2. Some costs required for closure planning and permitting are based upon SRK's experience in permitting and closing mine sites.

The below built in worksheet headings discuss the activities and assumptions used in estimating the closure costs in the order they appear in the SRCE spreadsheet.

6.1 Cost Inputs

6.1.1 Labor Rates

Labor rates have been taken from the Minnesota Department of Labor and Industry Prevailing Wages for State Funded Construction Projects for commercial construction in St. Louis County (Attachment 3).

Labor rates are broken down by basic hourly rates and fringe rates as provided in the Minnesota prevailing wages. Following this, unemployment, retirement/SS/Medicare, and workman's compensation are added. The unemployment tax has been included for new employers in a high experience rating industry. Workman's compensation has been taken from RS Means 2015 (R013113-60 MN).

6.1.2 Equipment Costs

Monthly equipment rental rates have been acquired from the local Caterpillar dealer (Attachment 4). Where equipment rates were not readily available, SRK used Nevada standardized monthly rental rates (from Cashman Equipment, Nevada) for nominal costs (Attachment 5). These monthly rental rates are divided by the number of hours worked in a month to obtain hourly rental rates.

Preventive maintenance (PM), ground-engaging tools (GET) consumption, and tire costs have been taken from Nevada standardized costs. PM and GET are provided as hourly add-ons and hourly tire expenditure costs are calculated by dividing tire cost with tire life expectancy.

The SRCE multiplies the fuel unit cost ($/gal) with the fuel use rates in the Caterpillar Handbook, Edition 35, Ch. 20 to estimate the cost of fuel consumption per hour.

All of these components added together provide the total hourly rate per equipment.

6.1.3 Material Costs

6.1.3.1 Seed Mixes

Costs for seed mixes for slope areas and flat areas were provided by D & T Landscaping, Inc. (Attachment 6). A sales tax rate of 6.875% was applied. SRK then split the Mix 1 cost equally into labor, equipment, and materials rates (Table 3). With the assumption that the labor and equipment burdens would be similar, material costs for Mix 2 and Mix 3 were obtained by keeping the labor and equipment rates constant and subtracting them from the cost for that seed mix. The same document also provides mulch costs.

Table 3

		Cost ($/acre)	Labor ($/acre)	Equipment ($/acre)	Materials ($/acre)
Mix 1	Tailings basin flats seed and fertilizer	417	139	139	**139**
Mix 2	Tailings basin slopes seed and fertilizer	577	139	139	**299**
Mix 3	Overburden seed and fertilizer	315	139	139	**37**

6.1.3.2 Cement, Grout

Nevada costs have been used for cement and grout used in well abandonment cost estimates.

6.1.3.3 Water Analysis Cost

Water analysis costs to be used in water quality monitoring cost estimation have been obtained from Attachment 7.

6.1.3.4 Fuel Cost

The fuel cost utilized in the earthworks activities in the SRCE was obtained from Mansfield Oil Company.

6.1.3.5 Electrical Power

The electrical power rate is consistent with based on Minnesota Power's commercial rates (Attachment 8).

6.1.4 Misc Unit Costs

Miscellaneous Unit Costs rely on RSMeans crews utilizing SRCE labor and equipment rates (example: pipe removal crew) as well as those that rely on quotes (revegetation).

6.1.5 Revegetation

The SRCE estimate assumes seeding by mechanical broadcast and it is used here to complement the material cost of revegetation with labor and equipment. Refer to Table 3 for the division of quotes for different seed mixes into components of materials, labor, and equipment costs.

6.2 Fleets

This sheet provides details on the fleets and crews utilized in various activities in the SRCE spreadsheet. Some fleets and/or crews are set while others can be customized. Still others have components that are calculated per item depending on user inputs (such as the number of trucks used in hauling depending on the distances between source and destination). No adjustments or over-rides have been made in this estimate.

6.3 Productivity

This sheet documents the productivities of equipment depending on specifications, work conditions, etc. It is based on the CAT Handbook Edition 35.

7 Closure Cost Estimate

Inputs in the closure cost estimate are based on Attachment 9 unless detailed otherwise.

7.1 Other User

7.1.1 Closure – Vehicles

¾ ton 4WD pick-up trucks will be required for the 2-year closure period. Annual costs based on a 7-year life and a purchase price of $37,521 from a 6/14/16 quote from Lundgren Motors (Attachment 10) divided equally between this estimate and other reclamation activities at the site.

7.1.2 Closure Snow Plowing

Snow plowing for the 2-year closure period will be provided by contractor that is currently providing this service to the site. Annual costs the average of costs for winters of 2013-14 and 2014-15 divided equally between this estimate and other reclamation activities at the site

7.1.3 Post closure vehicles

¾ ton 4WD pick-up trucks will be required for the 28-year post closure period. Annual costs based on a 7-year life and a purchase price of $37,521 from a 6/14/16 quote from Lundgren Motors (Attachment 10) divided equally between this estimate and other reclamation activities at the site.

7.1.4 Post closure snow plow attachment

Snow plowing for the 28-year post closure period will be provided staff labor and equipping one of the site pick-up trucks with a snow plow. Snow plow cost based on current listed price divided equally between this estimate and other reclamation activities at the site.

7.2 Human Resources

7.2.1 Closure – One Site Manager

Annual salary with benefits of $224,640 from an hourly rate of $108 based on Northeast Technical Services (NTS) rate for mid-level professional (Attachment 3). NTS is very familiar with the site and has been providing services at the site since before closure of LTVSMC. Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.4175.

7.2.2 Closure – One Project Engineer

Annual salary with benefits of $223,600 from an hourly rate of $107.50 based on Barr Engineering (Barr) average rate for a mid-level engineer (Attachment 3). Barr is very familiar with the reclamation requirements and designs at the site and has provided design and environmental services for the NorthMet Project since 2004. Annual cost based half full time divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.25.

7.2.3 Closure – One Accountant/Purchaser

Annual salary with benefits of $187,200 from an hourly rate of $90 based on Barr maximum rate for a level 1 support person (Attachment 3). Annual cost based half full time divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.25.

7.2.4 Closure – One Laborer

Annual salary with benefits of $67,038 from an hourly rate of $32.23 based on Express Employment Professionals (Express) rate for Maintenance 1 (Attachment 3). Express is very familiar with the site and has been providing temporary manpower services at the site since 2010. Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.25.

7.2.5 Post Closure – One Site Manager

Annual salary with benefits of $224,640 from an hourly rate of $108 based on Northeast Technical Services (NTS) rate for mid-level professional (Attachment 3). NTS is very familiar with the site and has been providing services at the site since before closure of LTVSMC. Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.4175.

7.2.6 Post Closure – One Laborer

Annual salary with benefits of $67,038 from an hourly rate of $32.23 based on Express Employment Professionals (Express) rate for Maintenance 1 (Attachment 3). Express is very familiar with the site and has been providing temporary manpower services at the site since 2010.

Annual cost based on full time for March through October and half time for November through February divided equally between this estimate and other reclamation activities at the site for a combined multiplier of 0.4175.

7.3 Reclamation Quantities

The Reclamation Quantities worksheet sums total earthworks costs and total earthworks amounts (volumes and areas). These data are then used to calculate project-specific unit costs. This worksheet can also be used to easily link calculations to the rest of the SRCE where sums of earthworks-related quantities are utilized.

7.4 Tailings

The legacy tailings storage facility will be scarified and revegetated.

7.5 Quarries and Borrow Areas

Topsoil will be placed on areas of the East pit that are exposed owing to stripping. The source of the topsoil stockpile will be the OSLA (see Figure 1). These exposed areas will then be revegetated. SRCE estimates the volume of growth media based on the disturbed surface area (the sum of slope areas and flat areas) multiplied by the thickness of the growth media layer.

7.6 Haul Materials

The “Generic Material Hauling” sheet cost items are included to account for disturbances related to the Category 2/3, Category 4, and ore surge stockpiles. At this time, there will be no material to backfill into the pit, however the areas will be stripped and disturbed in preparation of the storage of the waste rock and ore material.

These disturbances will be reclaimed by trucking and placing growth media from the material stockpiled at the OSLA. Revegetation will be with Mix 3 (Overburden seed and fertilizer).

The disturbances for the facilities included in this sheet were obtained from Attachment 9.

Replace topsoil and revegetate at category 2/3 and 4 waste rock areas and ore surge pile (SRCE 180, 29 and 31 acres)

7.7 Other Demolition and Equipment Removal

PolyMet prepared a specification (Attachment 11) for all demolition activities required at closure and Lakehead Constructors (Lakehead) submitted a 2016 proposal to execute this work.

PolyMet prepared a specification for asbestos abatement for all buildings to be demoed and Mavo Systems (Mavo) submitted a 6/7/16 proposal to execute this work.

These quotes have been broken down by labor and equipment at a ratio of 1:2 in the model. The sources of these quotes are provided in Attachment 11 and replicated in User 2.

This cost estimate includes the legacy and Phase 1 plant and mine site structure demolition costs.

7.8 Process Ponds

This sheet includes costs for backfilling of ponds with locally available excavation material and revegetation. Backfilling costs are estimated based on the volume of backfill per pond based on the dimensions of the ponds. Lengths and widths of ponds were obtained from the Mine Site Water Management Plan Large Figure 4 and depths calculated based on design volume data in Table 4-1 Sump and Pond Excess Capacity of the Mine Site Water Management Plan.

7.9 Yards, etc.

The “Yards” sheet allows for accounting of costs for regrading and cover and growth media placement as well as revegetation where the disturbance may not fit into any one of the previous categories covered.

Given the quotes for demolition of buildings includes the cost of reclaiming miscellaneous disturbances, the only item covered here is the OSLA Overburden Storage and Laydown Area minus wetland area.

7.10 Well Abandonment

The “Well Abandonment” sheet takes parameters such as well diameter and average depth to estimate the volume of grout, backfill, or a combination thereof and from there the cost of labor and materials as well as, if applicable, equipment. This estimate includes the monitoring wells drilled for Construction Year 2.

7.11 Monitoring

7.11.1 Reclamation Maintenance

For the purpose of covering any revegetation maintenance, 5% rework on all areas revegetated has been included.

7.11.2 Reclamation Monitoring

Professional monitoring services are included in the “Other User” sheet.

7.11.3 Water Quality Monitoring

Water quality monitoring is not included in the scope of the Construction Year 2 non-ferrous project.

7.12 Construction Management

Costs under “Construction Management” include road maintenance. A small grader will be included on site for a day a month during active reclamation and then on average a day a year over the long-term, post-closure period.

8 Conclusions

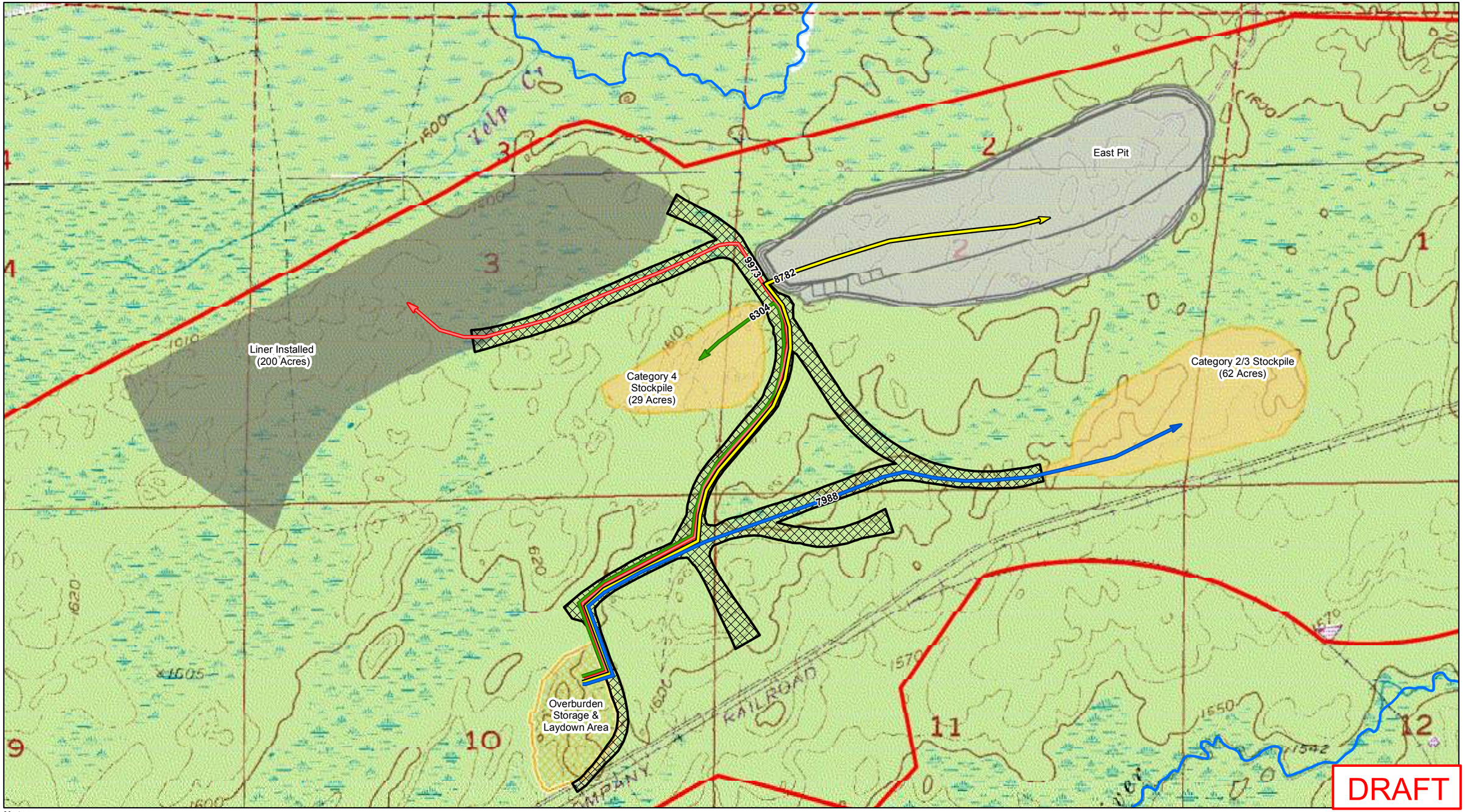
With 1.1% inflation rate and 8% discount rate, the grand total net present value for the NorthMet contingency reclamation estimate is $43,730,954.

Attachments

1. SRCE file
2. Cost Data File
3. Labor rates
4. Caterpillar Equipment Rates
5. Nevada standardized monthly rental rates (from Cashman Equipment, Nevada)
6. DandT Seeding Contingency Reclamation Estimate on Letterhead.doc
7. Water analysis cost
8. MP CommercialRates.pdf
9. Changes over time
10. Lundgren motors truck
11. Demo
12. Monitoring

Figure 1.

Haul Distances



Notes

1. Basemap from Esri and its data suppliers.
2. Project features supplied by Barr Engineering.
3. Year 1 stockpiles, mine pits and haul roads from map packages received from Barr in April 2014.

Legend

- Overburden to Category 2/3
- Overburden to Category 4
- Overburden to East Pit
- Overburden to Liner
- Partridge River
- Haul Roads
- Active Stockpiles
- Reclaimed Areas
- Installed Liner
- Mine Development
- Proposed Project Area Boundary

PolyMet Mining

Foth

N

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION
PREPARED BY: GMK		DATE: JUN. '16	
REVIEWED BY:		DATE:	
APPROVED BY:		DATE:	

POLYMET MINING

Revised FIGURE 2-1 (Haul Distances)

MINE SITE PERMIT YEAR 01 CONTINGENCY PLAN
PERMIT TO MINE APPLICATION
HOYT LAKES, MINNESOTA

Scale: 0 245 490 980 Feet

Date: JUNE 2016

Drafted by: GMK

Project No: 177900.020

Path: H:\Polymet\177900.020_PolyMet_Reclamation Cost Estimate\040_Drafting\Task_3\Working\GMK\Haul Distances_rev_20160616.mxd Date: 6/16/2016

Attachment 1.

SRCE file

Enter Data Below in Green and Blue Spaces

STANDARDIZED RECLAMATION COST ESTIMATOR

Version 1.4.1
Build 016 (revised 01 Aug 2014)
NOT YET VALIDATED FOR REGULATORY USE IN NEVADA

COST DATA FILE INFORMATION

File Name:	PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Cost Data File:	PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Data Date:	February, 2016
Cost Data Basis:	User Data — Data Cost Units: Imperial
Author/Source:	SRK Consulting, 2016

PROJECT INFORMATION

Property/Mine Name:	NorthMet — Property Code:
Project Name:	PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate
Date of Submittal:	September, 2016 — Average Altitude: 0 ft.
Units of Measure:	○ Metric (m, km, ha, etc.) ◉ Imperial (ft, mi, acres, etc.)
Select One:	○ Notice or Sm Exploration Plan ○ Lg Exploration Plan ◉ Mine Operation
Select One:	○ Private Land ◉ Public or Public/Private
Cost Estimate Type:	Surety
Cost Basis Category:	Polymet

MN prevailing wages, CAT equipment rates

Cost Basis Description:

☐ This project is in the State of Nevada

Closure Cost Estimate
Cost Summary
Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate
Project Date: September, 2016
Model Version: Version 1.4.1
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm

A. Earthwork/Recontouring	Labor (1)	Equipment (2)	Materials	Total
Exploration	$0	$0	$0	$0
Exploration Roads & Drill Pads	$0	$0	$0	$0
Roads	$0	$0	$0	$0
Well Abandonment	$15,582	$5,096	$147	$20,825
Pits	$0	$0	N/A	$0
Quarries & Borrow Areas	$171,449	$497,861	$0	$669,310
Underground Openings	$0	$0	$0	$0
Process Ponds	$143,390	$418,699	$0	$562,089
Heaps	$0	$0	$0	$0
Waste Rock Dumps	$0	$0	$0	$0
Landfills	$0	$0	$0	$0
Tailings	$837	$1,371	$0	$2,208
Foundation & Buildings Areas	$0	$0	$0	$0
Yards, Etc.	$38,080	$80,892	$0	$118,972
Drainage & Sediment Control	$0	$0	$0	$0
Generic Material Hauling	$78,491	$224,459	$0	$302,950
Other User Costs (from Other User sheet)	$787,465	$1,574,929	$0	$2,362,394
Other**				$0
Subtotal	**$1,235,294**	**$2,803,307**	**$147**	**$4,038,748**
Mob/Demob if included in Other User sheet	$0	$0	$0	$0
Mob/Demob				$0
Subtotal "A"	**$1,235,294**	**$2,803,307**	**$147**	**$4,038,748**

B. Revegetation/Stabilization	Labor (1)	Equipment (2)	Materials	Total
Exploration	$0	$0	$0	$0
Exploration Roads & Drill Pads	$0	$0	$0	$0
Roads	$0	$0	$0	$0
Well Abandonment				N/A
Pits	$0	$0	$0	$0
Quarries & Borrow Areas	$13,321	$13,321	$3,546	$30,188
Underground Openings				N/A
Process Ponds	$3,962	$3,962	$1,041	$8,965
Heaps	$0	$0	$0	$0
Waste Rock Dumps	$0	$0	$0	$0
Landfills	$0	$0	$0	$0
Tailings	$2,355	$2,355	$5,065	$9,775
Foundation & Buildings Areas	$0	$0	$0	$0
Yards, Etc.	$6,533	$6,533	$6,533	$19,599
Drainage & Sediment Control	$0	$0	$0	$0
Generic Material Hauling	$17,236	$17,236	$4,588	$39,060
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "B"	**$43,407**	**$43,407**	**$20,773**	**$107,587**

C. Detoxification/Water Treatment/Disposal of Wastes**	Labor (1)	Equipment (2)	Materials	Total
Process Ponds/Sludge				$0
Heaps				$0
Dumps (Waste & Landfill)				$0
Tailings				$0
Surplus Water Disposal				$0
Monitoring				$0
Miscellaneous				$0
Solid Waste - On Site	$0	$0	N/A	$0
Solid Waste - Off Site				$0
Hazardous Materials				$0
Hydrocarbon Contaminated Soils	$0	$0	$0	$0
Pumping (from Solution Mgmt sheet)	$0	$0	N/A	$0
Evaporation (from Solution Mgmt sheet)	$0	$0	$0	$0
Treatment (from Solution Mgmt sheet)	$0	$0	$0	$0
Decontamination (from Solution Mgmt sheet)	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$0	$2,950,532	$0	$2,950,532
Other**				$0
Subtotal "C"	**$0**	**$2,950,532**	**$0**	**$2,950,532**

D. Structure, Equipment and Facility Removal, and Misc.	Labor (1)	Equipment (2)	Materials	Total
Foundation & Buildings Areas	$0	$0	$0	$0
Other Demolition	$15,264,422	$30,589,669	$0	$45,854,091
Equipment Removal	$0	$0	$0	$0
Fence Removal	$0	$0		$0
Fence Installation	$0	$0	$0	$0
Culvert Removal	$0	$0	N/A	$0
Pipe Removal	$0	$0	N/A	$0
Powerline Removal	$0			$0
Transformer Removal	$0			$0
Rip-rap, rock lining, gabions	$0	$0	$0	$0
Other Misc. Costs	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "D"	**$15,264,422**	**$30,589,669**	**$0**	**$45,854,091**

E. Monitoring	Labor (1)	Equipment (2)	Materials	Total
Reclamation Monitoring and Maintenance	$2,167	$2,167	$2,167	$6,501
Ground and Surface Water Monitoring	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Subtotal "E"	**$2,167**	**$2,167**	**$2,167**	**$6,501**

F. Construction Management & Support	Labor	Equipment (2)	Materials	Total
Construction Management	$0	$0	N/A	$0
Construction Support	$0	$0	$0	$0
Road Maintenance	$31,564	$48,080	$0	$79,644
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "F"	**$31,564**	**$48,080**	**$0**	**$79,644**

Closure Cost Estimate
Cost Summary
Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate
Project Date: September, 2016
Model Version: Version 1.4.1
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm

G. Closure Planning, G&A, Human Resources			Include?	Total
Closure Planning				$0
General & Administration				$0
Human Resources				$2,378,900
Other User Costs (from Other User sheet)	$0	$111,351	$0	$111,351
Other**				$0
Subtotal "G"	**$0**	**$111,351**	**$0**	**$2,490,251**

Subtotal Operational & Maintenance Costs	Labor (1)	Equipment (2)	Materials (3)	Total
Subtotal A through G	**$16,576,854**	**$36,548,513**	**$23,087**	**$55,527,354**

** Other Operator supplied costs - additional documentation required.

Indirect Costs			Include?	Total
1. Engineering, Design and Construction (ED&C) Plan (7)				
2. Contingency (8)				$2,776,368
3. Insurance (9)	$248,653			
4. Performance Bond (10)				
5. Contractor Profit (11)				
6. Contract Administration (12)				
7. Government Indirect Cost (13)				
Subtotal Add-On Costs				**$2,776,368**
Total Indirect Costs as % of Direct Cost				5%
GRAND TOTAL				**$58,303,722**

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate	3%	3%	0.03	3%	0%
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	5%	5%	5%	5%	0%
3. Insurance (9)	1.5%	of labor costs			
4. Bond (10)	3.0%	of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)	10%	of the O&M costs			
	<=	<=	<=	>	
0	$0	$0		$0	
Variable Rate	0%	0%		1%	
0	0%	$0			

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

ect Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
of Submittal: September, 2016
Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
Data: User Data
Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016
First Year of Operation	2018
Operating Period	years
Closure Year 1:	2020
Closure Period:	2 years
Post Closure Period	28 years

Inflation Rate (r) (%):	
Market Risk (MR)(%):	
Discount Rate (i)(%):	
Closure Period:	
Post Closure Period:	

Engineering, Design and Construction Plan (%)	3%
Contingency (%)	5.0%
Contractor OH and Profit (CP)(%):	10%
Contract Administration (%)	1%
Show how many years in schedule (10 to 100)	55

Set Years

	Term (t)(years):	Total From Cost Summary	0	1	2	3	4	5	6	7	8
	Schedule Variance		2016	2017	2018	2019	2020	2021	2022	2023	2024
A. Earthwork/Recontouring											
Exploration	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 20,825					$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310					$ 669,310	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089					$ 562,089	$ -	$ -	$ -	$ -
Heaps	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208					$ 2,208	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972					$ 118,972	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950					$ 302,950	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394					$ 2,362,394	$ -	$ -	$ -	$ -
Other**	$ -	$ -									
Mob/Demob if included in Other User sheet	$ -	$ -									
Mob/Demob	$ -	$ -									
Subtotal "A"	$ -	$ 4,038,748	$ -	$ -	$ -	$ -	$ 4,017,923	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization											
Exploration	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A					$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188					$ 30,188	$ -	$ -	$ -	$ -
Underground Openings		N/A					$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965					$ 8,965	$ -	$ -	$ -	$ -
Heaps	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775					$ 9,775	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599					$ 19,599	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060					$ 39,060	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ 107,587	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**											
Process Ponds/Sludge	$ -	$ -									
Heaps	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -									
Decontamination (from Solution Mgmt sheet)	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532					$ 2,950,532	$ -	$ -	$ -	$ -
Other**	$ -	$ -									
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ 2,950,532	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.											
Foundation & Buildings Areas	$ -	$ -									
Other Demolition	$ -	$ 45,854,091					$45,854,091	$0	$0	$0	$0
Equipment Removal	$ -	$ -					$0	$0	$0	$0	$0
Fence Removal	$ -	$ -					$0	$0	$0	$0	$0
Fence Installation	$ -	$ -					$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -					$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -					$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -					$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -					$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -					$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -					$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -					$0	$0	$0	$0	$0
Other**	$ -	$ -									
Subtotal "D"	$ -	$ 45,854,091	$ -	$ -	$ -	$ -	$ 45,854,091	$ -	$ -	$ -	$ -
E. Monitoring											
Reclamation Monitoring and Maintenance	$ -	$ 6,501					$6,501	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -					$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ 6,501	$ -	$ -	$ -	$ -
F. Construction Management & Support											
Construction Management	$ -	$ -					$0	$0	$0	$0	$0
Construction Support	$ -	$ -					$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644					$14,481	$14,481	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -					$0	$0	$0	$0	$0
Other**	$ -	$ -									
Subtotal "F"	$ -	$ 79,644	$ -	$ -	$ -	$ -	$ 14,481	$ 14,481	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources											
Closure Planning	$ -	$ -									
General & Administration	$ -	$ -									
Human Resources	$ -	$ 2,378,900					$168,576	$168,576	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351					$41,670	$8,040	$2,680	$2,680	$2,680
Other**	$ -	$ -									
Subtotal "G"	$ -	$ 2,490,251	$ -	$ -	$ -	$ -	$ 210,245	$ 176,616	$ 75,600	$ 75,600	$ 75,600
Subtotal Operational & Maintenance Costs											
Subtotal A through G	$ -	$ 55,527,354	$ -	$ -	$ -	$ -	$ 53,161,360	$ 191,097	$ 77,410	$ 77,410	$ 77,410
Indirect Costs											
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A									
2. Contingency (8)		$ 2,776,368	$ -	$ -	$ -	$ -	$ 2,658,068	$ 9,555	$ 3,870	$ 3,870	$ 3,870
3. Insurance (9)		N/A									
4. Performance Bond (10)		N/A									
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A									
Subtotal Add-On Costs	$ -	$ 2,776,368	$ -	$ -	$ -	$ -	$ 2,658,068	$ 9,555	$ 3,870	$ 3,870	$ 3,870
Grand Total (Undiscounted)	$ -	$ 58,303,722	$ -	$ -	$ -	$ -	$ 55,819,428	$ 200,652	$ 81,280	$ 81,280	$ 81,280
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ -	$ -	$ -	$ 55,819,428	$ 200,652	$ 81,280	$ 81,280	$ 81,280
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ -	$ -	$ -	$ 55,819,428	$ 200,652	$ 81,280	$ 81,280	$ 81,280
Net Present Value (PV)	$PV = FV_{adj}/(1+i)^t$	$ 58,303,721	$ -	$ -	$ -	$ -	$ 55,819,428	$ 200,652	$ 81,280	$ 81,280	$ 81,280

Grand Total (Undiscounted)		$ 58,303,721
Grand Total (Inflation Adjusted) (FV)		$ 58,303,721
Grand Total Market Risk Adjusted (Fv_{adj})		$ 58,303,721
Grand Total Net Present Value (NPV)		$ 58,303,721

ect Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
of Submittal: September, 2016
Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
Data: User Data
Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016		Inflation Rate (r) (%):	
First Year of Operation	2018		Market Risk (MR)(%):	
Operating Period		years	Discount Rate (i)(%):	
Closure Year 1:	2020			
Closure Period:	2	years	Closure Period:	
Post Closure Period	28	years	Post Closure Period:	<<< Set years and click "Set Years" button

	Term (t)(years):	Total From Cost Summary	0	9	10	11	12	13	14	15	16	17
	Schedule Variance		2016	2025	2026	2027	2028	2029	2030	2031	2032	2033
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 20,825		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ -	$ 4,038,748	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 45,854,091		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 45,854,091	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 6,501		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644		$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 79,644	$ -	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -										
General & Administration	$ -	$ -										
Human Resources	$ -	$ 2,378,900		$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351		$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680
Other**	$ -	$ -										
Subtotal "G"	$ -	$ 2,490,251	$ -	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ -	$ 55,527,354	$ -	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A										
2. Contingency (8)		$ 2,776,368	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 2,776,368	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
Grand Total (Undiscounted)	$ -	$ 58,303,722	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Net Present Value (PV)	$PV = FV_{adj}/(1+i)^t$	$ 58,303,721	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280

Grand Total (Undiscounted)		$ 58,303,721
Grand Total (Inflation Adjusted) (FV)		$ 58,303,721
Grand Total Market Risk Adjusted (Fv_{adj})		$ 58,303,721
Grand Total Net Present Value (NPV)		$ 58,303,721

ect Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
of Submittal: September, 2016
Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
Data: User Data
Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016		Inflation Rate (r) (%):	
First Year of Operation	2018		Market Risk (MR)(%):	
Operating Period		years	Discount Rate (i)(%):	
Closure Year 1:	2020			
Closure Period:	2	years	Closure Period:	
Post Closure Period	28	years	Post Closure Period:	

	Term (t)(years):	Total From Cost Summary	0	18	19	20	21	22	23	24	25	26
	Schedule Variance		2016	2034	2035	2036	2037	2038	2039	2040	2041	2042
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 20,825		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ -	$ 4,038,748	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 45,854,091		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 45,854,091	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 6,501		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644		$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 79,644	$ -	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -										
General & Administration	$ -	$ -										
Human Resources	$ -	$ 2,378,900		$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351		$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680	$2,680
Other**	$ -	$ -										
Subtotal "G"	$ -	$ 2,490,251	$ -	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600	$ 75,600
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ -	$ 55,527,354	$ -	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410	$ 77,410
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A										
2. Contingency (8)		$ 2,776,368	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 2,776,368	$ -	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870	$ 3,870
Grand Total (Undiscounted)	$ -	$ 58,303,722	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Net Present Value (PV)	$PV = FV_{adj}/(1+i)^t$	$ 58,303,721	$ -	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280

Grand Total (Undiscounted)		$ 58,303,721
Grand Total (Inflation Adjusted) (FV)		$ 58,303,721
Grand Total Market Risk Adjusted (Fv_{adj})		$ 58,303,721
Grand Total Net Present Value (NPV)		$ 58,303,721

ect Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
of Submittal: September, 2016
Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
Data: User Data
Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016		Inflation Rate (r) (%):	
First Year of Operation	2018		Market Risk (MR)(%):	
Operating Period		years	Discount Rate (i)(%):	
Closure Year 1:	2020			
Closure Period:	2	years	Closure Period:	
Post Closure Period	28	years	Post Closure Period:	

	Term (t)(years):	Total From Cost Summary	0	27	28	29	30	31	32	33
	Schedule Variance		2016	2043	2044	2045	2046	2047	2048	2049
A. Earthwork/Recontouring										
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 20,825		$ -	$ -	$ -	$ 20,825	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 669,310		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 2,208		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 118,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 302,950		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,362,394		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -								
Mob/Demob if included in Other User sheet	$ -	$ -								
Mob/Demob	$ -	$ -								
Subtotal "A"	$ -	$ 4,038,748	$ -	$ -	$ -	$ -	$ 20,825	$ -	$ -	$ -
B. Revegetation/Stabilization										
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 30,188		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 9,775		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 19,599		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 107,587	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**										
Process Ponds/Sludge	$ -	$ -								
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -								
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 2,950,532		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -								
Subtotal "C"	$ -	$ 2,950,532	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
D. Structure, Equipment and Facility Removal, and Misc.										
Foundation & Buildings Areas	$ -	$ -								
Other Demolition	$ -	$ 45,854,091		$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -								
Subtotal "D"	$ -	$ 45,854,091	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring										
Reclamation Monitoring and Maintenance	$ -	$ 6,501		$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Subtotal "E"	$ -	$ 6,501	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support										
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 79,644		$1,810	$1,810	$1,810	$1,810	$1,810	$1,810	$1,810
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -								
Subtotal "F"	$ -	$ 79,644	$ -	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
G. Closure Planning, G&A, Human Resources										
Closure Planning	$ -	$ -								
General & Administration	$ -	$ -								
Human Resources	$ -	$ 2,378,900		$72,920	$72,920	$72,920	$72,920	$72,920	$72,920	$72,920
Other User Costs (from Other User sheet)	$ -	$ 111,351		$2,680	$2,680	$0	$0	$0	$0	$0
Other**	$ -	$ -								
Subtotal "G"	$ -	$ 2,490,251	$ -	$ 75,600	$ 75,600	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920
Subtotal Operational & Maintenance Costs										
Subtotal A through G	$ -	$ 55,527,354	$ -	$ 77,410	$ 77,410	$ 74,730	$ 95,555	$ 74,730	$ 74,730	$ 74,730
Indirect Costs										
1. Engineering, Design and Construction (ED&C) Plan (7)		N/A								
2. Contingency (8)		$ 2,776,368	$ -	$ 3,870	$ 3,870	$ 3,736	$ 4,778	$ 3,736	$ 3,736	$ 3,736
3. Insurance (9)		N/A								
4. Performance Bond (10)		N/A								
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A								
Subtotal Add-On Costs	$ -	$ 2,776,368	$ -	$ 3,870	$ 3,870	$ 3,736	$ 4,778	$ 3,736	$ 3,736	$ 3,736
Grand Total (Undiscounted)	$ -	$ 58,303,722	$ -	$ 81,280	$ 81,280	$ 78,466	$ 100,332	$ 78,466	$ 78,466	$ 78,466
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 81,280	$ 81,280	$ 78,466	$ 100,332	$ 78,466	$ 78,466	$ 78,466
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	Fv_{adj} = (FV + MR)		$ -	$ 81,280	$ 81,280	$ 78,466	$ 100,332	$ 78,466	$ 78,466	$ 78,466
Net Present Value (PV)	$PV = FV_{adj}/(1+i)^t$	$ 58,303,721	$ -	$ 81,280	$ 81,280	$ 78,466	$ 100,332	$ 78,466	$ 78,466	$ 78,466

Grand Total (Undiscounted)		$ 58,303,721
Grand Total (Inflation Adjusted) (FV)		$ 58,303,721
Grand Total Market Risk Adjusted (Fv_{adj})		$ 58,303,721
Grand Total Net Present Value (NPV)		$ 58,303,721

Closure Cost Estimate
Other User

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Other Cost Items Calculated Elsewhere

	Description (required)	ID Code	Facility Type	Quantity	Units	Total Capital Cost $	Material Unit Cost $	Labor Unit Cost $	Equipment/ Operating Unit Cost $	Cost Type (select)	Total Cost $	Comments
1	Closure - Pickup Trucks - Closure Year 1		Closure G & A	2	each				$2,680.05	G. Closure Planning, Ga	$5,360	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
2	Closure - Pickup Trucks - Closure Year 2		Closure G & A	2	each				$2,680.05	G. Closure Planning, Ga	$5,360	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
3	Closure - Snow Plowing - Closure Year 1		Closure G & A	1	each				$11,544.64	G. Closure Planning, Ga	$11,545	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs shared with Ferrou
4	Closure - Snow Plowing - Closure Year 2		Closure G & A	1	each				$11,544.64	G. Closure Planning, Ga	$11,545	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs shared with Ferrou
5	Closure - Pickup Trucks - Post-Closure Year 1		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
6	Closure - Pickup Trucks - Post-Closure Year 2		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
7	Closure - Pickup Trucks - Post-Closure Year 3		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
8	Closure - Pickup Trucks - Post-Closure Year 4		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
9	Closure - Pickup Trucks - Post-Closure Year 5		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
10	Closure - Pickup Trucks - Post-Closure Year 6		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
11	Closure - Pickup Trucks - Post-Closure Year 7		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
12	Closure - Pickup Trucks - Post-Closure Year 8		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
13	Closure - Pickup Trucks - Post-Closure Year 9		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
14	Closure - Pickup Trucks - Post-Closure Year 10		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
15	Closure - Pickup Trucks - Post-Closure Year 11		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
16	Closure - Pickup Trucks - Post-Closure Year 12		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
17	Closure - Pickup Trucks - Post-Closure Year 13		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
18	Closure - Pickup Trucks - Post-Closure Year 14		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
19	Closure - Pickup Trucks - Post-Closure Year 15		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
20	Closure - Pickup Trucks - Post-Closure Year 16		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
21	Closure - Pickup Trucks - Post-Closure Year 17		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
22	Closure - Pickup Trucks - Post-Closure Year 18		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
23	Closure - Pickup Trucks - Post-Closure Year 19		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
24	Closure - Pickup Trucks - Post-Closure Year 20		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
25	Closure - Pickup Trucks - Post-Closure Year 21		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
26	Closure - Pickup Trucks - Post-Closure Year 22		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
27	Closure - Pickup Trucks - Post-Closure Year 23		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
28	Closure - Pickup Trucks - Post-Closure Year 24		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
29	Closure - Pickup Trucks - Post-Closure Year 25		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
30	Closure - Pickup Trucks - Post-Closure Year 26		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
31	Closure - Pickup Trucks - Post-Closure Year 27		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
32	Closure - Pickup Trucks - Post-Closure Year 28		Closure G & A	1	each				$2,680.05	G. Closure Planning, Ga	$2,680	purchase price $37,520.69 with 7-year life; shared with Ferrous project; annual cost=37520.69/7/2=2
33	Post-Closure - Plow attachment for Vehicles		Closure G & A	1	ea				$5,000.00	G. Closure Planning, Ga	$2,500	
34	Areas of concern, legacy remediation (quote from NTS)		Other Facilities	1	ea				$2,950,532.00	C. Water Management	$2,950,532	User 4
35	SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)		Other Facilities	1	LS			$132,984.83	$265,969.67	A. Earthwork	$398,955	User 11
36	SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)		Other Facilities	1	LS			$14,214.67	$28,429.33	A. Earthwork	$42,644	User 11
37	SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)		Other Facilities	1	LS			$237,850.42	$475,700.83	A. Earthwork	$713,551	User 11
38	SOW 21: Category 1 Groundwater Containment System: Year 0		Other Facilities	1	LS			$402,414.73	$804,829.47	A. Earthwork	$1,207,244	User 11
						$0	$0	$787,465	$4,636,812		$5,424,277	

Notes: Capital cost is lump sum (i.e. not multiplied by the quantity).
Material, Labor and Equipment/Operating costs are unit costs (i.e. multiplied by the quantity).

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	Totals
Salaries & Benefits	$2,378,900
Severance & Relocation	$0
TOTALS	$2,378,900

Human Resources - Salary & Benefits

	Job Description (required)	Avg. Annual Salary (incl. benefits) $	Type	Closure Year 1 #	Closure Year 2 #	Closure Year 3 #	Closure Year 4 #	Closure Year 5 #	Closure Year 6 #	Closure Year 7 #	Closure Year 8 #	Closure Year 9 #	Closure Year 10 #	Closure Year 11 #	Closure Year 12 #	Closure Year 13 #	Closure Year 14 #	Closure Year 15 #	Closure Year 16 #	Closure Year 17 #	Closure Year 18 #	Closure Year 19 #	Closure Year 20 #	Closure Year 21 #	Closure Year 22 #	Closure Year 23 #	Closure Year 24 #	Closure Year 25 #
1	Closure - Site Manager	$224,640	Closure G & A	0	0.4175																						
2	Closure - Accountant	$187,200	Closure G & A	0	0.25																						
3	Closure - Utility	$67,038	Closure G & A	0	0.4175																						
4	Post-Closure - Site Manager	$224,640	Closure G & A			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
5	Post-Closure - Utility	$67,038	Closure G & A			0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	SUBTOTAL			$ 168,576	$ 168,576	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920

Notes:
Management costs shared with other projects.

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	
	Totals
Salaries & Benefits	$2,378,900
Severance & Relocation	$0
TOTALS	$2,378,900

Human Resources - Severance & Outplacement Benefits

	Job Description	Severance & Outplacement Cost $		Closure Year 1 #	Closure Year 2 #	Closure Year 3 #	Closure Year 4 #	Closure Year 5 #	Closure Year 6 #	Closure Year 7 #	Closure Year 8 #	Closure Year 9 #	Closure Year 10 #	Closure Year 11 #	Closure Year 12 #	Closure Year 13 #	Closure Year 14 #	Closure Year 15 #	Closure Year 16 #	Closure Year 17 #	Closure Year 18 #	Closure Year 19 #	Closure Year 20 #	Closure Year 21 #	Closure Year 22 #	Closure Year 23 #	Closure Year 24 #	Closure Year 25 #
1	**Closure - Site Manager**				0.4																								
2	**Closure - Accountant**				0.3																								
3	**Closure - Utility**				0.4																								
4	**Post-Closure - Site Manager**																												
5	**Post-Closure - Utility**																												
			SUBTOTAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Notes:
1. Assumes Severance + Outplacement

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xl
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	Totals
Salaries & Benefits	$2,378,900
Severance & Relocation	$0
TOTALS	$2,378,900

Human Resources - Salary & Benefits

	Job Description (required)	Avg. Annual Salary (incl. benefits) $	Type	Closure Year 26 #	Closure Year 27 #	Closure Year 28 #	Closure Year 29 #	Closure Year 30 #	Closure Year 31 #	Closure Year 32 #	Closure Year 33 #	Closure Year 34 #	Closure Year 35 #	Closure Year 36 #	Closure Year 37 #	Closure Year 38 #	Closure Year 39 #	Closure Year 40 #	Closure Year 41 #	Closure Year 42 #
1	Closure - Site Manager	$224,640	Closure G & A																	
2	Closure - Accountant	$187,200	Closure G & A																	
3	Closure - Utility	$67,038	Closure G & A																	
4	Post-Closure - Site Manager	$224,640	Closure G & A	0.25	0.25	0.25	0.25	0.25												
5	Post-Closure - Utility	$67,038	Closure G & A	0.25	0.25	0.25	0.25	0.25												
	SUBTOTAL			$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Notes:
Management costs shared with other projects.

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xl
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	Totals
Salaries & Benefits	$2,378,900
Severance & Relocation	$0
TOTALS	$2,378,900

Human Resources - Severance & Outplacement Benefits

	Job Description	Severance & Outplacement Cost $		Closure Year 26 #	Closure Year 27 #	Closure Year 28 #	Closure Year 29 #	Closure Year 30 #	Closure Year 31 #	Closure Year 32 #	Closure Year 33 #	Closure Year 34 #	Closure Year 35 #	Closure Year 36 #	Closure Year 37 #	Closure Year 38 #	Closure Year 39 #	Closure Year 40 #	Closure Year 41 #	Closure Year 42 #
1	**Closure - Site Manager**																			
2	**Closure - Accountant**																			
3	**Closure - Utility**																			
4	**Post-Closure - Site Manager**							0.3												
5	**Post-Closure - Utility**							0.3												
			SUBTOTAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Notes:
1. Assumes Severance + Outplacement

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$837	$1,371	N/A	$2,208
Subtotal Earthworks	**$837**	**$1,371**	**$0**	**$2,208**
Revegetation Cost	$2,355	$2,355	$5,065	$9,775
TOTALS	**$3,192**	**$3,726**	**$5,065**	**$11,983**

Tailings - User Input

You must fill in ALL green cells and relevant blue cells in this section for each tailings impoundment

	Facility Description		Physical - MANDATORY								Cover				Growth Media			
	Description (required)	ID Code	Underlying Ground Slope % Grade	Ungraded Slope _H:1V	Final (Regraded) Embankment Slope _H:1V	Final Embankment Height ft	Final Tailings Surface Area acres	Mid-Embankment or Ripping Length ft	Embankment Regrade Volume (if calculated elsewhere) cy	Surface Regrade Volume (calculated elsewhere) cy	Embankment Cover Thickness in	Tailings Surface Cover Thickness in	Distance from Cover Borrow ft	Slope from Tailings to Borrow % grade	Embankment Growth Media Thickness in	Tailings Surface Growth Media Thickness in	Distance from Growth Material Stockpile ft	Slope from Tailings to Stockpile % grade
1	**Tailings Basin - first lift of embankment constructed**		**0.0**	**4.5**	**4.5**	**20**	**0.00**	**7,974**										

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$837	$1,371	N/A	$2,208
Subtotal Earthworks	**$837**	**$1,371**	**$0**	**$2,208**
Revegetation Cost	$2,355	$2,355	$5,065	$9,775
TOTALS	**$3,192**	**$3,726**	**$5,065**	**$11,983**

Tailings - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each tailings impoundment

		Grading				Cover		Growth Media		Revegetation								
	Description (required)	Dozing Material Condition (select)	Embankment Material Type (select)	Grading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Embankment Slope (select)	Seed Mix Tailings Surface (select)	Mulch Embankment Slopes (select)	Mulch Tailings Surface (select)	Fertilizer Embankment Slopes (select)	Fertilizer Tailing Surface (select)	Embankment Slope Scarify/ Rip? (select)	Tailings Surface Scarify/ Rip? (select)	Scarifying/ Ripping Fleet (select)
1	**Tailings Basin - first lift of embankment constructed**									**Mix 2**	**Mix 1**	**Straw Mulch**	**Straw Mulch**			**Yes**	**Yes**	**Small Dozer**

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Tailings - Calculations

Surface Area Calculations

Top Surface Area provided by user

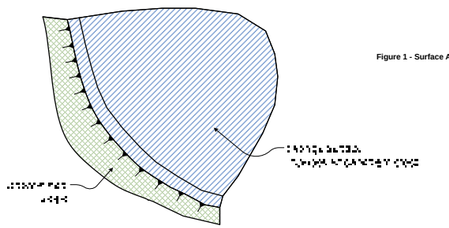


Figure 1 - Surface Areas

Final Slope Area and Footprint Area Calculations

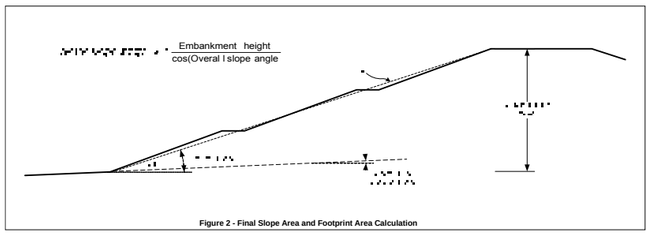


Figure 2 - Final Slope Area and Footprint Area Calculation

Grading Calculations

Grading assumed on impoundment surface only, not embankment
Average push distance assumed to be 2/3 of the 600 feet maximum from Catepillar Handbook or 400 feet
Material assumed to be loose stockile (1.2 productivity factor)
Dozing density correction based on dry sand = 2300/2400 = 0.96
Slope assumed to be 0 to 5% (1.0 productivity factor)

Ripping/Scarifying/Revegetation Calculation

Minimum 1 hr ripping/scarifying per area
Minimum 1 acre revegetation crew time per area

Regrading Volume Calculation

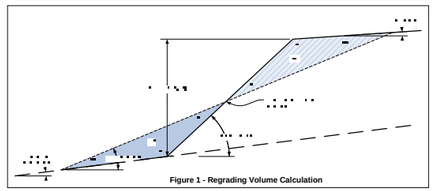


Figure 1 - Regrading Volume Calculation

Regrading Push Distance Calculation

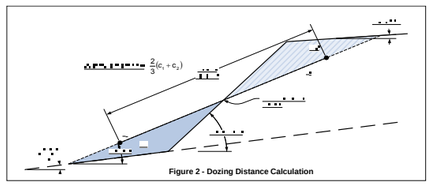


Figure 2 - Dozing Distance Calculation

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$837	$1,371	N/A	$2,208
Subtotal Earthworks	**$837**	**$1,371**	**$0**	**$2,208**
Revegetation Cost	$2,355	$2,355	$5,065	$9,775
TOTALS	**$3,192**	**$3,726**	**$5,065**	**$11,983**

Tailings - Embankment Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material Condition	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	Tailings Basin - first lift of embankment constructed	0		Select Fleet								$0	$0	$0
												$0	**$0**	**$0**

Tailings - Surface Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Density Correction	Dozing Material	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	Tailings Basin - first lift of embankment constructed			Select Fleet								$0	$0	$0
												$0	**$0**	**$0**

Tailings - Cover and Growth Media Costs

		Cover Placement								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Placement Fleet	Cover Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Placement Cost $	Growth Media Volume cy	Growth Media Placement Fleet	Growth Media Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoil Placement Cost $
1	Tailings Basin - first lift of embankment constructed						$0	$0	$0						$0	$0	$0
							$0	**$0**	**$0**						**$0**	**$0**	**$0**

Tailings - Scarifying/Revegetation Costs

	Description (required)	Embankment Slope Area acres	Tailings Surface Area acres	Total Surface Area acres	Final Slope Length ft	Ripping/ Scarifying Fleet	Slope Scarifying/ Ripping Hours hrs	Flat Area Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Cost $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Cost $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	Tailings Basin - first lift of embankment constructed	16.84		16.84	92	D6R	14		$837	$1,371	$2,208	$2,355	$2,355	$5,065	$9,775
		16.84		16.84			14		**$837**	**$1,371**	**$2,208**	**$2,355**	**$2,355**	**$5,065**	**$9,775**

Closure Cost Estimate
Quarries & Borrow Pits

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$171,449	$497,861	N/A	$669,310
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$171,449**	**$497,861**	**$0**	**$669,310**
Revegetation Cost	$13,321	$13,321	$3,546	$30,188
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$13,321	**$13,321**	**$3,546**	**$30,188**
TOTALS	**$184,770**	**$511,182**	**$3,546**	**$699,498**

Quarries & Borrow Pits - User Input — You must fill in ALL green cells in this section for each dump, lift or dump category

	Facility Description			Physical - MANDATORY									Cover				Growth Media			
	Description (required)	ID Code	Type	Underlying Ground Slope % Grade	Ungraded Slope _H:1V	Final Slope _H:1V	Final Top Slope % Grade	Bench or Highwall Height ft	Mid-Bench Length ft	Average Flat Area Long Dimension (ripping distance) ft	Final (Regraded) Footprint acres	Regrade Volume (1) (if calculated elsewhere) cy	Cover Thickness Slopes in	Cover Thickness Flat Areas in	Distance from Cover Borrow ft	Slope from Dump to Cover Borrow % grade	Slope Growth Media Thickness in	Flat Area Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Dump to Stockpile % grade
1	**East pit**		**Quarry**	**0.0**	**2.0**	**2.0**	**1.0**	**14**	**12,100**	**1,000**	**95.00**						**18.0**	**18.0**	**8,782**	**0.0**

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

The footprint consists of initial stripping.

Quarries & Borrow Pits - User Input (cont.) — You must fill in ALL green cells and relevant blue cells in this section for each dump, lift or dump category

		Grading				Cover		Growth Media		Revegetation									
	Description (required)	Dozing Material Condition (select)	Highwall Material Type (select)	Grading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Slopes (select)	Seed Mix Flat Areas (select)	Mulch Slopes (select)	Mulch Flat Areas (select)	Fertilizer Slopes (select)	Fertilizer Flat Areas (select)	Slope Scarify/ Rip? (select)	Flat Area Scarify/ Rip? (select)	Scarify/ Ripping Fleet (select)
1	**East pit**	**1**	**LS - broken**	**Med**				**Alluvium**	**Med Truck**	**Mix 3**	**Mix 3**	**None**	**None**					

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Quarries & Borrow Pits - User Input (cont.)

	Facility Description	Highwall Berms					Berm Construction		Excavate or Doze	Hauling (if selected method)				Revegetation		
	Description (required)	Berm (or Highwall) Length ft	Berm Height ft	Berm Base Width ft	Berm Sideslope Angle _H:1V	Volume (if calculated elsewhere) cy	Construction Method (select)	Berm Material Type (select)	Berm Construction Equipment Fleet (select)	Berm Hauling Fleet (select)	Distance to Borrow Source ft	Slope to Borrow Source % grade	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)
1	**East pit**															

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)
3. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary	Labor	Equipment	Materials	Totals
Grading Costs	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$171,449	$497,861	N/A	$669,310
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$171,449**	**$497,861**	**$0**	**$669,310**
Revegetation Cost	$13,321	$13,321	$3,546	$30,188
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$13,321	**$13,321**	**$3,546**	**$30,188**
TOTALS	**$184,770**	**$511,182**	**$3,546**	**$699,498**

Quarries & Borrow Pits - Calculations

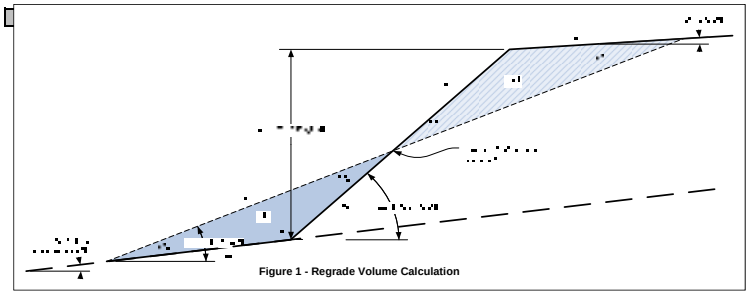


Figure 1 - Regrade Volume Calculation

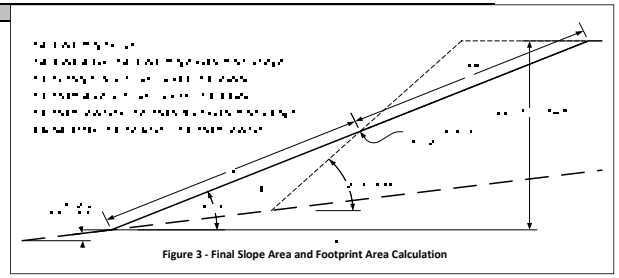


Figure 3 - Final Slope Area and Footprint Area Calculation

Regrading Push Distance Calculation

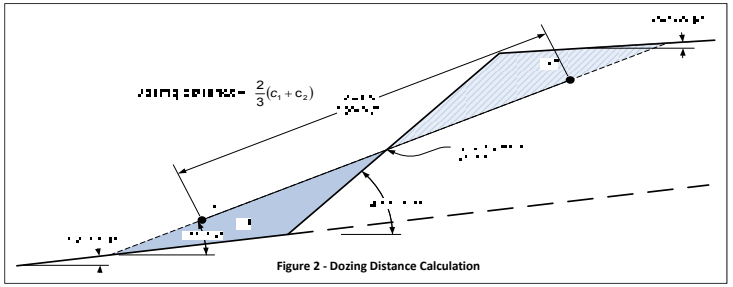


Figure 2 - Dozing Distance Calculation

Ripping/Scarifying Calculations

Minimum 1 hr ripping/scarifying time per dump

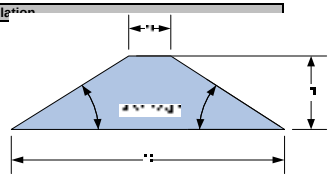
Slopes:
Number of passes = Final slope length ÷ Grader width
Travel distance = Number of passes x Mid-bench length
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)
Minimum 1 hr

Flat Areas:
Flat area width = Final flat area ÷ Average long dimensions
Number of passes = Flat area width ÷ Grader width
Travel distance = Number of passes x Average long dimensions
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)

Revegetation: Minimum 1 acre revegetation crew time per area

Safety Berm Volume Calculation

$$\frac{(a+b)}{2} \times h$$



Dozer productivity assumes push distance of:
100 feet

Dozer:
Length x (Berm Base Width + Dozer Push Distance) - accounts for disturbance created in borrow area

Excavator:
Length x (Berm Base Width + (2 x Excavator Track Width) - accounts for disturbance created in borrow area

Haul & Place:
Length x Berm Base Width - if necessary use Yards sheet to account for disturbance created in borrow area

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$171,449	$497,861	N/A	$669,310
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$171,449**	**$497,861**	**$0**	**$669,310**
Revegetation Cost	$13,321	$13,321	$3,546	$30,188
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$13,321	**$13,321**	**$3,546**	**$30,188**
TOTALS	**$184,770**	**$511,182**	**$3,546**	**$699,498**

Quarries & Borrow Pits - Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	**East pit**	0		D8R								$0	$0	$0
												$0	**$0**	**$0**

Quarries & Borrow Pits - Cover and Growth Media Costs

		Cover (lower layer)								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Replacement Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Cover Labor Cost $	Cover Equipment Cost $	Total Cover Cost $	Growth Media Volume cy	Growth Media Replacement Fleet	Fleet Productivity BCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	**East pit**						$0	$0	$0	231,914	740/988G	485	4	478	$171,449	$497,861	$669,310
							$0	**$0**	**$0**	231,914				478	**$171,449**	**$497,861**	**$669,310**

Quarries & Borrow Pits - Scarifying/Revegetation Costs

	Description (required)	Slope Area acres	Flat Area acres	Total Surface Area acres	Final Slope Length ft	Flat Area Long Dimension ft	Ripping/ Scarifying Fleet	Slope Scarifying/ Ripping Hours hrs	Flat Area Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Costs $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Costs $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**East pit**	8.61	87.22	95.83	31					$0	$0	$0	$13,321	$13,321	$3,546	$30,188
		8.61	87.22	95.83							**$0**	**$0**	**$13,321**	**$13,321**	**$3,546**	**$30,188**

Notes: 1) Minimum total ripping hours = 1 (i.e. If total ripping hrs (slope + flat) < 1, then one hour of fleet time is assumed, regardless of acres shown in in scarifying table.)
2) Assumes 50min/hr equipment availability

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Generic Material Hauling - Cost Summary

	Labor	Equipment	Materials	Totals
Hauling/Crush/Screen/Compact	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$78,491	$224,459	N/A	$302,950
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$78,491**	**$224,459**	**$0**	**$302,950**
Revegetation Cost	$17,236	$17,236	$4,588	$39,060
TOTALS	**$95,727**	**$241,695**	**$4,588**	**$342,010**

Generic Material Hauling - User Input

	Facility Description			Physical		Hauled Material			Crushing & Screening					Cover			Growth Media		
	Description (required)	ID Code	Type	Final Surface Area acres	Average Ripping Distance ft	Material Volume Required cy	Distance from Borrow Source (1) ft	Slope to Borrow Source % grade	Crush Material	Screen Material	Loss to Crushing/ Screening %	Distance to Placement Location (2) ft	Slope to Placement % grade	Cover Thickness in	Distance to Cover Borrow ft	Slope to Borrow % grade	Growth Media Thickness in	Distance to Growth Material Stockpile ft	Slope to Stockpile % grade
1	Category 2/3 stockpile relocation to East Pit		Stockpile	63.00	2,932												6	7,988	-5.0
2	Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock an		Stockpile	29.00	2,003												6	6,304	-5.0
3	Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overbur		Ore Stockpile	32.00	6,272												6	6,304	-5.0
4	East pit - assume depth of excavation before bedrock backfilled		Pit																

Notes:
1. Input distance to crusher if material to be crushed
2. Input distance from crusher to placement if material to be crushed
3. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

See User 1 for growth media haul distances

Generic Material Hauling - User Input (cont.)

		Hauling Material				Cover			Growth Media			Revegetation				
	Description (required)	Haul Material Type (select)	Material Hauling Fleet (select)	Each Fleet Size (from/to crusher) (user override)	Compact After Placement?	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch Type (select)	Fertilizer Type (select)	Scarify/ Rip? (select)	Scarifying/ Ripping Fleet (select)
1	Category 2/3 stockpile relocation to East Pit	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
2	Category 4 stockpile relocation to East Pit (quantities in U	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
3	Ore Surge Stockpile to East Pit (quantities in User 1) - Roc	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
4	East pit - assume depth of excavation before bedrock back	LS - broken	Med Truck													

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Generic Material Hauling - Load, Haul, Place and Grade

		Material Haulage								Crush and/or Compact			
	Description (required)	Material Volume to Crusher cy	Final Material Volume cy	Material Haulage Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Hauling Labor Cost $	Hauling Equipment Cost $	Total Crush/ Screen Cost $	Compact Labor Cost $	Compact Equipment Cost $	Total Load/Haul/ Place Cost $
1	Category 2/3 stockpile relocation to East Pit							$0	$0	$0	$0	$0	$0
2	Category 4 stockpile relocation to East Pit (quantities in U							$0	$0	$0	$0	$0	$0
3	Ore Surge Stockpile to East Pit (quantities in User 1) - Roc							$0	$0	$0	$0	$0	$0
4	East pit - assume depth of excavation before bedrock back							$0	$0	$0	$0	$0	$0
								$0	**$0**	**$0**	**$0**	**$0**	**$0**

Notes: Final Material Volume includes allowance for additional material hauled to crushing/screening plant based on Loss to Crushing/Screening input above.

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Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Generic Material Hauling - Cost Summary

	Labor	Equipment	Materials	Totals
Hauling/Crush/Screen/Compact	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$78,491	$224,459	N/A	$302,950
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$78,491**	**$224,459**	**$0**	**$302,950**
Revegetation Cost	$17,236	$17,236	$4,588	$39,060
TOTALS	**$95,727**	**$241,695**	**$4,588**	**$342,010**

Generic Material Hauling - Cover and Growth Media Costs

		Cover Placement								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Placement Fleet	Cover Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Placement Cost $	Growth Media Volume cy	Growth Media Placement Fleet	Growth Media Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoil Placement Cost $
1	Category 2/3 stockpile relocation to East Pit						$0	$0	$0	50,820	740/988G	578	6	88	$42,085	$119,889	$161,974
2	Category 4 stockpile relocation to East Pit (quantities in U						$0	$0	$0	23,393	740/988G	564	5	41	$17,157	$49,280	$66,437
3	Ore Surge Stockpile to East Pit (quantities in User 1) - Roc						$0	$0	$0	25,813	740/988G	564	5	46	$19,249	$55,290	$74,539
4	East pit - assume depth of excavation before bedrock back						$0	$0	$0	0					$0	$0	$0
							$0	**$0**	**$0**	100,026				175	**$78,491**	**$224,459**	**$302,950**

Generic Material Hauling - Scarifying/Revegetation Costs

	Description (required)	Total Surface Area acres	Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Cost $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Cost $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	Category 2/3 stockpile relocation to East Pit	63.00		$0	$0	$0	$8,757	$8,757	$2,331	$19,845
2	Category 4 stockpile relocation to East Pit (quantities in U	29.00		$0	$0	$0	$4,031	$4,031	$1,073	$9,135
3	Ore Surge Stockpile to East Pit (quantities in User 1) - Roc	32.00		$0	$0	$0	$4,448	$4,448	$1,184	$10,080
4	East pit - assume depth of excavation before bedrock back	0.10		$0	$0	$0	$0	$0	$0	$0
		124.10		**$0**	**$0**	**$0**	**$17,236**	**$17,236**	**$4,588**	**$39,060**

Closure Cost Estimate
Other Demo & Equip Removal

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Other Demoltion and Equipment Removal - Cost Summary	Labor	Equipment	Materials	Totals
Other Demolition	$15,264,422	$30,589,669	$0	$45,854,091
Equipment Removal	$0	$0	$0	$0
TOTALS	**$15,264,422**	**$30,589,669**	**$0**	**$45,854,091**

Other Demolition

	Facility Description								
	Description (required)	ID Code	Type	Quantity	Units	Labor Unit Cost $	Equipment Unit Cost $	Material Unit Cost $	Total Cost $
1	**Demo and Asbestos Abatement Cost Summary - User 2**		Site Facilities - Structures	**1**	**LS**	**$15,182,947.00**	**$30,365,894.00**		$45,548,841
2	**Above Ground Storage Tanks - User 2**		Site Facilities - Structures	**1**	**LS**	**$81,475.00**	**$162,950.00**		$244,425
3	**Remove & Dispose of Stockpile/Pond Liners - OSP**	**remove_3**	Site Facilities - Structures	**32**	**acres**		**$300.00**		$9,600
4	**Remove & Dispose of Collection pipe - OSP**	**remove_4**	Site Facilities - Structures	**3100**	**LF**		**$2.25**		$6,975
5	**Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile**	**remove_3**	Site Facilities - Structures	**63**	**acres**		**$300.00**		$18,900
6	**Remove & Dispose of Collection pipe - Category 2/3 Stockpile**	**remove_4**	Site Facilities - Structures	**4800**	**LF**		**$2.25**		$10,800
7	**Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile**	**remove_3**	Site Facilities - Structures	**29**	**acres**		**$300.00**		$8,700
8	**Remove & Dispose of Collection pipe - Category 4 Stockpile**	**remove_4**	Site Facilities - Structures	**2600**	**LF**		**$2.25**		$5,850
						$15,264,422	**$30,589,669**	**$0**	**$45,854,091**

Notes: **Quotes are broken down by labor and equipment at a ratio of 1:2.**

Equipment & Material Removal

	Facility Description								
	Description (required)	ID Code	Type	Quantity	Units	Labor Unit Cost ($)	Equipment Unit Cost ($)	Material Unit Cost ($)	Total Cost ($)
						$0	**$0**	**$0**	

Notes:

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - User Input

You must fill in ALL green cells and relevant blue cells in this section for each pond

	Facility Description		Pond Dimensions (1)					Backfill - (If trucks are used) (1)				Growth Media		
	Description (required)	ID Code	Pond Length ft	Pond Width ft	Pond Depth ft	Pond Sideslope Angle _H:1V	Disturbed Area (if calculated elsewhere) acres	Percent Backfill (100% if blank)	Distance from Backfill Borrow ft	Slope from Facility to Borrow Area % grade	Pond Volume (if calculated elsewhere) cy	Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Facility to Stockpile % grade
1	**Mine Site WWTF Pond - 1**		**230**	**180**	**10.0**	**3.0**			**1,000**	**0%**				
2	**Mine Site WWTF Pond - 2**		**340**	**340**	**10.0**	**3.0**			**1,000**	**0%**				
3	**Mine Site WWTF Pond - 3**		**670**	**320**	**10.0**	**3.0**			**1,000**	**0%**				
4	**Mine Site CPS Pond**		**240**	**240**	**10.0**	**3.0**			**1,000**	**0%**				
5	**Mine Site PW-OSLA**		**450**	**200**	**8.5**	**3.0**			**1,000**	**0%**				
6	**Mine Site PW-HRE**		**380**	**170**	**9.3**	**3.0**			**1,000**	**0%**				
7	**Mine Site PW-RTH**		**320**	**80**	**1.3**	**3.0**			**1,000**	**0%**				
8	**Mine Site Temporary pond**		**340**	**140**	**10.0**	**3.0**			**1,000**	**0%**				
9	**Mine Site S4, PW-S4**		**560**	**320**	**6.0**	**3.0**			**1,000**	**0%**				
10	**Mine Site SOSP, PW-SOSP**		**380**	**310**	**5.7**	**3.0**			**1,000**	**0%**				
11	**Mine Site PW-HRC**		**340**	**130**	**9.5**	**3.0**			**1,000**	**0%**				
12	**Mine Site S23-1**		**830**	**110**	**10.6**	**3.0**			**1,000**	**0%**				
13	**Mine Site PW-S23-1**		**1180**	**110**	**10.7**	**3.0**			**1,000**	**0%**				

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Dimensions from "Ponds_ml_20150723.xlsx" and "Ponds_ml_20150723.dwg" per "Water_Management_Plan_-_Mine_v4_MAR2015.pdf" Large Figure 4

Process Ponds - User Input (cont.)

		Liner	Backfill			Growth Media			Revegetation		
	Description (required)	Crew Cut & Fold Time (2) hrs	Backfill Material Type (select)	Backfill Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)
1	**Mine Site WWTF Pond - 1**	**1.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
2	**Mine Site WWTF Pond - 2**	**2.7**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
3	**Mine Site WWTF Pond - 3**	**4.0**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
4	**Mine Site CPS Pond**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
5	**Mine Site PW-OSLA**	**2.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
6	**Mine Site PW-HRE**	**2.2**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
7	**Mine Site PW-RTH**	**1.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
8	**Mine Site Temporary pond**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
9	**Mine Site S4, PW-S4**	**3.5**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
10	**Mine Site SOSP, PW-SOSP**	**2.8**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
11	**Mine Site PW-HRC**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
12	**Mine Site S23-1**	**3.8**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
13	**Mine Site PW-S23-1**	**5.2**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table
(2) Pond liner removal crew (2Clab + excavator) = 2 General Laborers + 325C Excavator

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Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

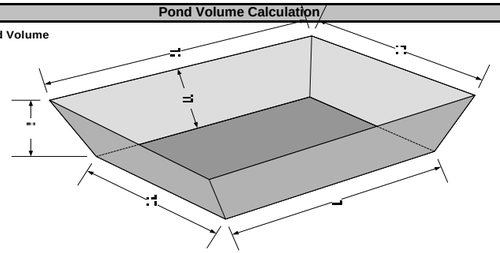
Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - Calculations

Pond Volume Calculation

Figure 1 - Pond Volume



Area and Volume of the Frustum of a Pyramid

$$\text{Surface Area} = \text{Base Area} + \text{Perimeter} \times \frac{s}{2}$$

$$\text{Volume} = \frac{\text{Base Area} \times d}{3}$$

Revegetation Calculations

Minimum 1 acre revegetation crew time per area

Process Ponds - Liner Cutting and Folding

	Description (required)	Crew Hours hrs	Total Labor Cost $	Total Equipment Cost $	Total Cover Cost $
1	**Mine Site WWTF Pond - 1**	2	$249	$131	$380
2	**Mine Site WWTF Pond - 2**	3	$413	$217	$630
3	**Mine Site WWTF Pond - 3**	4	$602	$315	$917
4	**Mine Site CPS Pond**	2	$292	$153	$445
5	**Mine Site PW-OSLA**	3	$395	$207	$602
6	**Mine Site PW-HRE**	2	$334	$175	$509
7	**Mine Site PW-RTH**	2	$243	$127	$370
8	**Mine Site Temporary pond**	2	$292	$153	$445
9	**Mine Site S4, PW-S4**	4	$535	$280	$815
10	**Mine Site SOSP, PW-SOSP**	3	$420	$220	$640
11	**Mine Site PW-HRC**	2	$286	$150	$436
12	**Mine Site S23-1**	4	$572	$300	$872
13	**Mine Site PW-S23-1**	5	$784	$411	$1,195
		36	**$5,417**	**$2,839**	**$8,256**

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
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Cost Estimate Type: Surety Cost Basis: Polymet

Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - Backfill and Growth Media Costs

		Pond Backfill								Growth Media							
	Description (required)	Backfill Volume cy	Backfill Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours hrs	Total Labor Cost $	Total Equipment Cost $	Total Backfill Cost $	Growth Media Volume cy	Growth Media Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	**Mine Site WWTF Pond - 1**	11,217	740/988G	546	2	21	$5,022	$15,135	$20,157						$0	$0	$0
2	**Mine Site WWTF Pond - 2**	35,704	740/988G	546	2	65	$15,543	$46,847	$62,390						$0	$0	$0
3	**Mine Site WWTF Pond - 3**	68,815	740/988G	546	2	126	$30,129	$90,812	$120,941						$0	$0	$0
4	**Mine Site CPS Pond**	16,444	740/988G	546	2	30	$7,174	$21,622	$28,796						$0	$0	$0
5	**Mine Site PW-OSLA**	23,393	740/988G	546	2	43	$10,282	$30,991	$41,273						$0	$0	$0
6	**Mine Site PW-HRE**	17,263	740/988G	546	2	32	$7,652	$23,063	$30,715						$0	$0	$0
7	**Mine Site PW-RTH**	1,129	740/988G	546	2	2	$478	$1,441	$1,919						$0	$0	$0
8	**Mine Site Temporary pond**	12,673	740/988G	546	2	23	$5,500	$16,577	$22,077						$0	$0	$0
9	**Mine Site S4, PW-S4**	36,139	740/988G	546	2	66	$15,782	$47,568	$63,350						$0	$0	$0
10	**Mine Site SOSP, PW-SOSP**	22,587	740/988G	546	2	41	$9,804	$29,550	$39,354						$0	$0	$0
11	**Mine Site PW-HRC**	11,132	740/988G	546	2	20	$4,782	$14,415	$19,197						$0	$0	$0
12	**Mine Site S23-1**	24,039	740/988G	546	2	44	$10,521	$31,712	$42,233						$0	$0	$0
13	**Mine Site PW-S23-1**	34,687	740/988G	546	2	64	$15,304	$46,127	$61,431						$0	$0	$0
		315,222				577	**$137,973**	**$415,860**	**$553,833**						**$0**	**$0**	**$0**

Process Ponds - Revegetation Costs

	Description (required)	Surface Area acres	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**Mine Site WWTF Pond - 1**	1.00	$139	$139	$37	$315
2	**Mine Site WWTF Pond - 2**	2.70	$375	$375	$100	$850
3	**Mine Site WWTF Pond - 3**	4.90	$681	$681	$181	$1,543
4	**Mine Site CPS Pond**	1.30	$181	$181	$48	$410
5	**Mine Site PW-OSLA**	2.10	$292	$292	$78	$662
6	**Mine Site PW-HRE**	1.50	$209	$209	$56	$474
7	**Mine Site PW-RTH**	0.60	$139	$139	$22	$300
8	**Mine Site Temporary pond**	1.10	$153	$153	$41	$347
9	**Mine Site S4, PW-S4**	4.10	$570	$570	$152	$1,292
10	**Mine Site SOSP, PW-SOSP**	2.70	$375	$375	$100	$850
11	**Mine Site PW-HRC**	1.00	$139	$139	$37	$315
12	**Mine Site S23-1**	2.10	$292	$292	$78	$662
13	**Mine Site PW-S23-1**	3.00	$417	$417	$111	$945
		28.10	**$3,962**	**$3,962**	**$1,041**	**$8,965**

Closure Cost Estimate
Yards, Etc.

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$38,080	$80,892	N/A	$118,972
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$38,080**	**$80,892**		**$118,972**
Revegetation Cost	$6,533	$6,533	$6,533	$19,599
TOTALS	**$44,613**	**$87,425**	**$6,533**	**$138,571**

Yards, Etc. - User Input

You must fill in ALL green cells and relevant blue cells in this section for each building or facility

	Facility Description			Physical			Cover			Growth Media		
	Description (required)	ID Code	Type	Area acres	Average Flat Area Long Dimension (ripping distance) ft	Regrade Volume (calculated elsewhere) cy	Cover Thickness in	Distance from Cover Borrow Area ft	Slope from Facility to Borrow Area % grade	Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Facility to Stockpile % grade
1	**OSLA Overburden Storage and Laydown Area minus wetland area**		**Yard**	**34.00**	**1,220**	**54,853**						
2	**Category 1 Footprint to Reclaim(acres)**		**Yard**	**13.00**	**750**	**20,973**						

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Assume average __ ft regrade over area: **1**

Yards, Etc. - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each building or facility

		Grading			Cover			Growth Media			Revegetation				
	Description (required)	Dozing Material Condition (select)	Dozing Material Type (select)	Grading Equipment Fleet (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)	Scarify/ Rip? (select)	Ripping Fleet (select)
1	**OSLA Overburden Storage and Laydown Area minus wetlan**	**1**	**Gravel**	**Small**							**Mix 1**				
2	**Category 1 Footprint to Reclaim(acres)**	**1**	**Gravel**	**Small**							**Mix 1**				

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$38,080	$80,892	N/A	$118,972
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$38,080**	**$80,892**		**$118,972**
Revegetation Cost	$6,533	$6,533	$6,533	$19,599
TOTALS	**$44,613**	**$87,425**	**$6,533**	**$138,571**

Yards, Etc. - Calculations

Grading Calculations

Average push distance assumed to be 2/3 of the 600 feet maximum from Catepillar Handbook or 400 feet
Material assumed to be loose stockile (1.2 productivity factor)
Slope assumed to be 0 to 5% (1.0 productivity factor)

Cover Volume Calculation

Yard area x cover thickness

Ripping/Scarifying Calculations

Flat area width = Final flat area ÷ Average long dimensions
Number of passes = Flat area width ÷ Grader width
Travel distance = Number of passes x Average long dimensions
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)
Minimum 1 hr ripping/scarifying per area

Revegetation

Minimum 1 acre revegetation crew time per area

Yards, Etc. - Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	**OSLA Overburden Storage and Laydown Area minus wetlar**	54,853	400	213	1.0	1.0	0.90	119	461	$27,559	$58,542	$86,101
2	**Category 1 Footprint to Reclaim(acres)**	20,973	400	213	1.0	1.0	0.90	119	176	$10,521	$22,350	$32,871
		75,827							637	**$38,080**	**$80,892**	**$118,972**

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$38,080	$80,892	N/A	$118,972
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$38,080**	**$80,892**		**$118,972**
Revegetation Cost	$6,533	$6,533	$6,533	$19,599
TOTALS	**$44,613**	**$87,425**	**$6,533**	**$138,571**

Yards, Etc. - Cover and Growth Media Costs

		Cover								Growth Media							
	Description (required)	Cover Volume cy	Topsoil Repacement Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Cost $	Growth Media Volume cy	Growth Media Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	OSLA Overburden Storage and Laydown Area minus wetlar						$0	$0	$0						$0	$0	$0
2	Category 1 Footprint to Reclaim(acres)						$0	$0	$0						$0	$0	$0
							$0	**$0**	**$0**						**$0**	**$0**	**$0**

Yards, Etc. - Scarifying/Revegetation Costs

	Description (required)	Surface Area acres	Area Long Dimension ft	Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Costs $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Costs $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	OSLA Overburden Storage and Laydown Area minus wetlar	34.00	1,220		$0	$0	$0	$4,726	$4,726	$4,726	$14,178
2	Category 1 Footprint to Reclaim(acres)	13.00	750		$0	$0	$0	$1,807	$1,807	$1,807	$5,421
		47.00			**$0**	**$0**	**$0**	**$6,533**	**$6,533**	**$6,533**	**$19,599**

Closure Cost Estimate
Well Abandonment

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$0	$0	$0	$0
Monitoring Wells	$15,582	$5,096	$147	$20,825
TOTALS	**$15,582**	**$5,096**	**$147**	**$20,825**

Production, Dewatering and Infiltration Well Closure

	Description (required)	ID Code	Number of Holes	Casing Diam in	Average Depth[1] ft bgs	Depth to First Water ft bgs	Original Static Water Level ft bgs	Top of Slotted Casing[2] ft bgs	Blank Casing Below Top of Screen[2] ft	Type of Pump (if any) (select)	Depth to Pump ft bgs	Hole Plug Method (select)	Casing Volume per ft cf	Perforation Length[3,4] ft	Grout Volume per Hole[4,5] cy	Cement Volume per Hole[6] cy	Inert Media Volume per Hole[7] cy	Pump Removal Labor Cost $	Pump Removal Equip Cost $	Perf Labor Cost $	Perf Equip Cost[8] $	Grout + Cement Labor Cost[9] $	Grout + Cement Equip Cost[9] $	Grout + Cement Material Cost $	Inert Media Labor Cost[10] $	Inert Media Equip Cost[9] $
																		$0	$0	$0	$0	$0	$0	$0	$0	$0

(1) For previously abandoned holes enter "0" for depth
(2) Wells abandoned per Nevada Administrative Code (NAC 534.420). Hole grouted and perforated from bottom to 50 feet (15.24m) above the top of the screen, or first water encountered or original static water level, depending on vertical hydraulic gradient and well construction parameters. Inert media (cuttings or alluvium) used from top of grout to top seal.
(3) Perforation length = amount of blank casing below first water (for confined aquifers) or predicted recovered water table (unconfined aquifers) + 50 feet (15.24m) of blank casing above water table
(4) Assumes 50' (15.24m) sanitary seal at top of hole. Therefore, perforation and grouting only required to bottom of sanitary seal.
(5) Assumes 100% loss to formation for grout (abandonite) for screened and perforated sections.
(6) Assumes 10' (3m) top seal of cement in casing only. See note 4.
(7) Inert material is cuttings or alluvium sourced locally.
(8) Includes perforation tool wear cost/ft of perforation (see Productivty Sheet).
(9) See Productivity Sheet for hourly production. Minimum 1 hr per hole + fixed hours per hole for move and setup. If no perforation required, use standard drill rig.
(10) See Productivity Sheet for hourly production. Minimum 1 hr per hole.

Notes:

Closure Cost Estimate
Well Abandonment

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment

	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$0	$0	$0	$0
Monitoring Wells	$15,582	$5,096	$147	$20,825
TOTALS	**$15,582**	**$5,096**	**$147**	**$20,825**

Monitoring Well Closure

	Description (required)	ID Code	Number of Holes	Casing Diam in	Average Depth ft bgs	Top of Screen[1] ft bgs	Hole Plug Method (select)	Casing Volume per ft ft3	Grout Volume/ Well[2,3] cy	Cement Volume per Hole[4] cy	Inert Backfill Volume per Hole[5] cy	Total Grouting Hours/ Hole hr	Total Inert Media Hours/ Hole hr	Grout + Cement Labor Cost[6] $	Grout + Cement Equip Cost[6] $	Grout + Cement Material Cost $	Inert Material Labor Cost[7] $	Inert Material Equip Cost[7] $	Total Cost $
1	Mine site - MW-05-02		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
2	Mine site - MW-05-08		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
3	Mine site - MW-05-09		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
4	Mine site - MW-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
5	Mine site - MW-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
6	Mine site - MW-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
7	Mine site - MW-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
8	Mine site - MW-5		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
9	Mine site - MW-6S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
10	Mine site - MW-6D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
11	Mine site - MW-7		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
12	Mine site - MW-8S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
13	Mine site - MW-8D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
14	Mine site - MW-9		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
15	Mine site - MW-10S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
16	Mine site - MW-10D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
17	Mine site - MW-11		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
18	Mine site - MW-12		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
19	Mine site - MW-13		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
20	Mine site - MW-14		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
21	Mine site - MW-15		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
22	Mine site - MW-16		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
23	Mine site - MW-17		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
24	Mine site - MW-18		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
25	Mine site - OB-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
26	Mine site - OB-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
27	Mine site - OB-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
28	Mine site - OB-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
29	Mine site - OB-5		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
30	Mine site - P-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
31	Mine site - P-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
32	Mine site - P-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
33	Mine site - P-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
34	Plant Site - GW-001		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
35	Plant Site - GW-002		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
36	Plant Site - GW-003		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
37	Plant Site - GW-004		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
38	Plant Site - GW-005		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
39	Plant Site - GW-006		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
40	Plant Site - GW-007		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
41	Plant Site - GW-008		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
42	Plant Site - GW-009		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
43	Plant Site - GW-010		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
44	Plant Site - GW-011		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
45	Plant Site - GW-012		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
46	Plant Site - GW-013		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
47	Plant Site - GW-014		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
48	Plant Site - GW-015		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
49	Plant Site - GW-016		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
														$0	**$0**	**$147**	**$15,582**	**$5,096**	**$20,825**

Wells abandoned per NAC 534.420 with bentonite grout placed to 50 feet above the top of the screen (see note 1).
(1) Assumes top of screen is at or above the static water level (in unconfined aquifers) or the depth of first water encountered (in confined aquifers).
(2) Assumes 25% loss to formation for grouting
(3) Grouting only required to 50' (15.24m) above the top of screen because monitor wells are constructed with a seal in the annular space.
(4) Assumes top 10' (3m) plugged with cement.
(5) Assumes hole plugged with inert material (cuttings or alluvium) above grout up to cement surface plug.
(6) See Productivity Sheet for hourly production. Minimum 1 hr per hole + fixed hours per hole for move and setup (see Productivty Sheet).
(7) See Productivity Sheet for hourly production. Minimum 1 hr per hole.

Notes:
Well ID's from
Large Table 10 of Water Management Plan - Mine
Well parameters assumed

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment				
	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$0	$0	$0	$0
Monitoring Wells	$15,582	$5,096	$147	$20,825
TOTALS	**$15,582**	**$5,096**	**$147**	**$20,825**

Well Construction

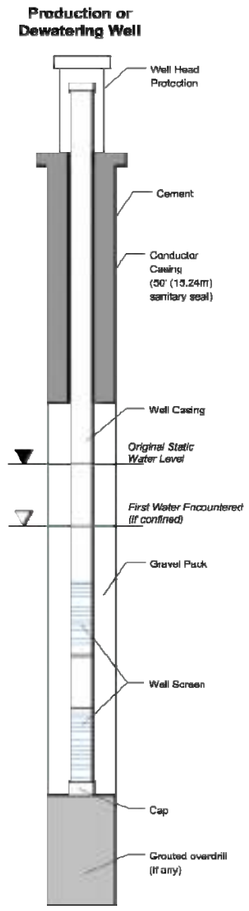

Figure 1 - Production Well

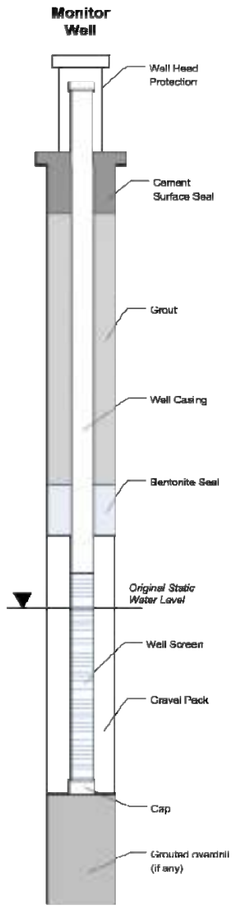

Figure 2 - Monitor Well

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Reclamation Monitoring & Maintenance - Cost Summary

	Labor	Equipment	Lab & Materials	Totals
Revegetation Maintenance	$2,167	$2,167	$2,167	$6,501
Erosion Maintenance	$0	$0	N/A	$0
Reclamation Monitoring	$0	$0	N/A	$0
Subtotal Reclamation Monitoring	**$2,167**	**$2,167**	**$2,167**	**$6,501**
Water Quality Monitoring	$0	$0	$0	$0
TOTAL MONITORING	**$2,167**	**$2,167**	**$2,167**	**$6,501**

Clear Sheet

Reclamation Maintenance

Description	Total Revegetation Surface Area (1,2) acres	% Area Requiring Reseeding	Seed Mix (select)	Area Requiring Reseeding acres	Seed $/acres	Labor $/acres	Equipment $/acres	Totals $
Revegetation Maintenance	312	**5%**	**Mix 1**	15.6	$139.00	$139.00	$139.00	
Labor								$2,167
Equipment								$2,167
Materials								$2,167
Cost/Acre								$417
							Subtotal	**$6,501**

Notes: 1) Surface area is NOT the same as footprint disturbance area typically used for permitting purposes.
2) If BRCE model, revegetation surface area determined by area included in PER, LOM or Surety estimate

	Total Volume Growth Media cy	% Volume Requiring Maintenance	Average Growth Media Placement Cost $/CY	Volume Requiring Replacement cy		Labor (assume: 25%) $/acres	Equipment (assume: 75%) $/acres	Total $
Erosion Maintenance	331,940		$2.93	0		$0.00	$0.00	$0

Notes:

Reclamation Monitoring

Description	Hrs/Day	Days/Year	Number of Years	Rate $/hr		
Field Work						
Field Geologist/Engineer				$75.15		$0
Range Scientist				$75.15		$0
Reporting						
Field Geologist/Engineer				$75.15		$0
Range Scientist				$75.15		$0
					Subtotal	**$0**
Travel						
	Hrs/Trip hr	**Trips/Year**	**Years**	**Truck Cost** $/hr		
Travel				$37.66		$0
					Subtotal	**$0**
					Total Reclamation Monitoring	**$0**

Notes: **Monitoring costs are included in the "Other User" sheet**

Closure Cost Estimate
Constr. Mgmt

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Construction Management & Road Maintenance - Cost Summary				
	Labor	Equipment	Materials	Totals
Construction Management	$0	$0	N/A	$0
Construction Support		$0		$0
Road Maintenance	$31,564	$48,080	$0	$79,644
TOTAL CONSTRUCTION MANAGEMENT	**$31,564**	**$48,080**	**$0**	**$79,644**

Clear Sheet

Construction Management

Construction Management Staff

Description	Duration mo.	Hours/ Month hr.	Number of Supervisors	Supervisor Rate $/hr	Labor Cost $	Equipment Cost[1] $	Totals $
Active Reclamation					$0	$0	$0
Monitoring & Maintenance					$0	$0	$0
				Total Staff	**$0**	**$0**	**$0**

Construction Management Support

Description	Duration mo.	Number of Units		Rental Rate $/mo	Generator Cost $/mo	Equipment Cost[1] $	Totals $
Temporary Office Rental						$0	$0
Temporary Toilets						$0	$0
					Total Support	**$0**	**$0**

Notes: Office rental assumes only 1 generator required for every 4 trailers

Total Construction Management **$0**

Road Maintenance

Description	Fleet Size (select)	Number	Duration mo.	Hours/ Month hr.	Labor Cost $	Equipment Cost $	Totals $
Active Reclamation							
Water Truck	**Small**	**0**	**24**	**8**	$0	$0	$0
Grader	**Small**	**1**	**24**	**8**	$11,478	$17,484	$28,962
Monitoring & Maintenance							
Water Truck	**Small**	**0**	**336**	**1**	$0	$0	$0
Grader	**Small**	**1**	**336**	**1**	$20,086	$30,596	$50,682

Description	Gallons/ Day	Days/ Month	Duration mo.	Cost/ Gallon $			Totals $
Water Fees							
Water Fees							$0
				Total Project Maintenance	**$31,564**	**$48,080**	**$79,644**

Notes: 1) Supervisor equipment = pickup truck

Closure Cost Estimate
Labor Rates

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	Direct Input
User Input - Pull Down List	Pull Down Selection
Program Constant (can override)	Alternate Input
Program Calculated Value	Locked Cell - Formula or Reference

ZONE ADJUSTMENTS			
Cost Basis/Project Region	Polymet	MN prevailing wages, CAT equipment rates	
Power Equipment Operators	none	$0.00	
Truck Drivers	none	$0.00	
Laborers	none	$0.00	

INDIRECT COSTS	
Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Labor Group	Base Rate ($/hr)	Zone Adjustment ($/hr)	Hourly Wage ($/hr)	Fringe ($/hr)	Retirement/ Medicare ($/hr)	Unemployment Insurance ($/hr)	Workman's Compensation ($/hr)	Other Indirect Costs ($/hr)	Additional User Markups to Base Rate† ($/hr)	Additional User Markups to Base Rate† %	Additional User Markups to Base Rate† ($/hr)	Total ($/hr)
Equipment Operators ($/hr) (2)													
Bulldozers													
D6R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D6R w/ Winch	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D7R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D8R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D9R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D10R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D11R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Wheeled Dozers													
824G					$17.15							$0	
834G					$17.15							$0	
844					$17.15							$0	
854G					$17.15							$0	
Motor Graders													
120H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
14G/H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
16G/H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
24M	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Track Excavators													
312C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
320C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
325C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
330C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
345B	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
365BL	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
385BL	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Scrapers													
631G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
637G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Wheeled Loaders													
924G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
928G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
950G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
966G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
972G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
980G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
988G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
990	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
992G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
994D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
L2350	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Shovels													
PC2000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC3000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC4000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC5500	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC8000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Hydraulic Hammers													
H-120 (fits 325)													
H-160 (fits 345)													
H-180 (fits 365/385)													
Demolition Shears													
S340 (fits 322/325/330)													
S365 (fits 330/345)													
S390 (fits 365/385)													
Demolition Grapples													
G315 (fits 322/325)													
G320 (fits 325/330)													
G330 (fits 345/365)													

Closure Cost Estimate
Labor Rates

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	Direct Input
User Input - Pull Down List	Pull Down Selection
Program Constant (can override)	Alternate Input
Program Calculated Value	Locked Cell - Formula or Reference

ZONE ADJUSTMENTS			
Cost Basis/Project Region	Polymet	MN prevailing wages, CAT equipment rates	
Power Equipment Operators	none	$0.00	
Truck Drivers	none	$0.00	
Laborers	none	$0.00	

INDIRECT COSTS	
Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

Other Equipment													
420D 4WD Backhoe	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
428D 4WD Backhoe	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CS533E Vibratory Roller	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CS633E Vibratory Roller	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CP533E Sheepsfoot Compactor	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CP633E Sheepsfoot Compactor	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Light Truck - 1.5 Ton	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Supervisor's Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Flatbed Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Air Compressor + tools	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Welding Equipment	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Heavy Duty Drill Rig	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Pump (plugging) Drill Rig	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Concrete Pump					$17.15							$0	
Gas Engine Vibrator	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Generator 5KW					$17.15							$0	
HDEP Welder (pipe or liner)					$17.15							$0	
5 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
20 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
50 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
120 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78

NOTES:

(1) Equipment Type:	Catepillar model or equivalent, LeTourneau
(2) Equipment Operator Source:	
(3) Zone Basis:	

Truck Drivers ($/hr) (4)													
725	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
730	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
735	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
740	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
769D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
773E	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
777D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
785C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
793C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
797B	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
613E (5,000 gal) Water Wagon	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
621E (8,000 gal) Water Wagon	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
777D Water Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
785C Water Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Dump Truck (10-12 yd3)	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78

NOTES:

(4) Truck Driver Source:	
(5) Zone Basis:	

Closure Cost Estimate
Labor Rates

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	Direct Input
User Input - Pull Down List	Pull Down Selection
Program Constant (can override)	Alternate Input
Program Calculated Value	Locked Cell - Formula or Reference

ZONE ADJUSTMENTS			
Cost Basis/Project Region	Polymet	MN prevailing wages, CAT equipment rates	
Power Equipment Operators	none	$0.00	
Truck Drivers	none	$0.00	
Laborers	none	$0.00	

INDIRECT COSTS	
Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

Laborers ($/hr) (6,7)

General Laborer	69-101	$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Skilled Laborer	69-102	$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Driller's Helper		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Rodmen (reinforcing concrete)		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Cement finisher		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Carpenter	69-704	$30.85	$0.00	$30.85	$16.08	$0.46	$2.36	$3.39	$0.00			$0	$53.14

NOTES:

(6) Laborer Source:	
(7) Carpenter Source:	
(8) Zone Basis:	

Project Management and Technical Labor ($/hr) (9)

Project Manager		$76.25	$0.00	$76.25	$16.87	$1.14	$5.83	$8.39	$0.00			$0	$108.47
Foreman		$78.04	$0.00	$78.04	$16.87	$1.16	$5.97	$8.58	$0.00			$0	$110.62
Field Geologist/Engineer		$48.51	$0.00	$48.51	$16.87	$0.72	$3.71	$5.34	$0.00			$0	$75.15
Field Tech/Sampler		$36.37	$0.00	$36.37	$16.87	$0.54	$2.78	$4.00	$0.00			$0	$60.56
Range Scientist		$48.51	$0.00	$48.51	$16.87	$0.72	$3.71	$5.34	$0.00			$0	$75.15
Senior Planning Engineer					$16.87								
Project Engineer					$16.87								
Mechanic/Fitter					$16.87								
Surveyor		$39.96	$0.00	$39.96	$16.87	$0.60	$3.06	$4.40	$0.00			$0	$64.88
Electrician		$56.28	$0.00	$56.28	$16.87	$0.84	$4.31	$6.19	$0.00			$0	$84.48
					$16.87								
					$16.87								

NOTES:

(9) Project Manager:	
(9) Foreman Source:	
(9) Techical Labor Source:	
Other Labor Source:	
Other Labor Source:	
†Additional User Markups	
(These are added by the user to the	
base rate to account for site-specific	
conditions or corporate requirements)	

Closure Cost Estimate
Equipment Costs

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Monthly Rental Basis: 176 hrs month

EQUIPMENT RENTAL RATE TABLE

EQUIPMENT TYPE (1)	Monthly Owner/Rental Rate	Equipment Hourly Rate	Fuel/Lube/ Wear	Total Rate
Bulldozers				
D6R	$12,220.00	$69.43	$28.50	$97.93
D6R w/ Winch	$13,060.00	$74.20	$18.66	$92.86
D7R	$16,640.00	$94.55	$32.45	$126.99
D8R	$19,890.00	$113.01	$43.79	$156.81
D9R	$27,500.00	$156.25	$64.43	$220.68
D10R	$33,340.00	$189.43	$83.01	$272.44
D11R	$62,000.00	$352.27	$120.50	$472.78
Wheeled Dozers				
824G			$32.09	$32.09
834G			$37.61	$37.61
844			$44.78	$44.78
854G			$56.72	$56.72
Motor Graders				
120H	$10,430.00	$59.26	$31.80	$91.06
14G/H	$16,910.00	$96.08	$44.88	$140.96
16G/H	$23,530.00	$133.69	$54.39	$188.08
24M			$46.27	$46.27
Track Excavators				
312C	$6,250.00	$35.51	$13.12	$48.63
320C	$7,490.00	$42.56	$22.96	$65.51
325C	$8,920.00	$50.68	$28.99	$79.67
330C	$10,730.00	$60.97	$35.48	$96.44
345B	$17,110.00	$97.22	$45.40	$142.62
365BL	$26,050.00	$148.01	$39.40	$187.41
385BL	$32,700.00	$185.80	$70.50	$256.29
Scrapers				
631G	$33,930.00	$192.78	$69.23	$262.01
637G	$34,500.00	$196.02	$101.88	$297.91
Wheeled Loaders				
924G	$5,730.00	$32.56	$18.96	$51.51
928G	$6,840.00	$38.86	$21.66	$60.53
950G	$9,690.00	$55.06	$29.02	$84.08
966G	$13,890.00	$78.92	$40.67	$119.59
972G	$15,060.00	$85.57	$43.25	$128.82
980G	$19,260.00	$109.43	$47.36	$156.79
988G	$30,340.00	$172.39	$70.71	$243.10
990	$47,670.00	$270.85	$50.75	$321.60
992G	$65,000.00	$369.32	$136.54	$505.86
994D	$71,500.00	$406.25	$107.46	$513.71
L2350	$78,650.00	$446.88	$197.01	$643.89
Shovels				
PC2000			$110.45	$110.45
PC3000			$149.25	$149.25
PC4000			$208.95	$208.95
PC5500			$355.22	$355.22
PC8000			$444.77	$444.77
Hydraulic Hammers				
H-120 (fits 325)	$3,120.00	$17.73	$5.29	$23.02
H-160 (fits 345)	$4,140.00	$23.52	$10.35	$33.87
H-180 (fits 365/385)	$4,060.00	$23.07	$12.02	$35.09
Demolition Shears				
S340 (fits 322/325/330)				$0.00
S365 (fits 330/345)				$0.00
S390 (fits 365/385)				$0.00
Demolition Grapples				
G315 (fits 322/325)				$0.00
G320 (fits 325/330)				$0.00
G330 (fits 345/365)				$0.00
Other Equipment				
420D 4WD Backhoe	$3,220.00	$18.30	$16.30	$34.59
428D 4WD Backhoe	$5,220.00	$29.66	$16.41	$46.07
CS533E Vibratory Roller	$7,220.00	$41.02	$11.19	$52.22
CS633E Vibratory Roller			$14.18	$14.18
CP533E Sheepsfoot Compactor			$11.19	$11.19
CP633E Sheepsfoot Compactor			$14.18	$14.18
Light Truck - 1.5 Ton	$5,803.60	$32.98	$4.68	$37.66
Supervisor's Truck	$3,586.00	$20.38	$3.19	$23.57
Flatbed Truck	$5,803.60	$32.98	$15.16	$48.13
Air Compressor + tools	$4,642.88	$26.38	$2.99	$29.37
Welding Equipment	$3,025.00	$17.19	$5.97	$23.16
Heavy Duty Drill Rig	$61,380.00	$348.75	$35.82	$384.57
Pump (plugging) Drill Rig	$61,380.00	$348.75	$29.85	$378.60
Concrete Pump	$15,224.00	$86.50	$29.85	$116.35
Gas Engine Vibrator	$703.56	$4.00	$2.99	$6.98
Generator 5KW	$1,065.24	$6.05	$4.48	$10.53
HDEP Welder (pipe or liner)	$8,162.00	$46.38	$5.97	$52.35
5 Ton Crane	$5,975.20	$33.95	$8.96	$42.91
20 Ton Crane	$4,220.00	$23.98	$11.94	$35.92
50 Ton Crane	$15,884.00	$90.25	$14.03	$104.28
120 Ton Crane			$15.52	$15.52
Trucks				
725	$11,000.00	$62.50	$39.30	$101.80
730	$13,460.00	$76.48	$40.80	$117.27
735	$16,970.00	$96.42	$56.15	$152.57
740	$18,110.00	$102.90	$57.51	$160.41
769D	$21,000.00	$119.32	$43.90	$163.22
773E	$27,000.00	$153.41	$55.52	$208.93
777D	$54,000.00	$306.82	$81.74	$388.56
785C			$72.39	$72.39
793C			$124.62	$124.62
797B			$175.37	$175.37
613E (5,000 gal) Water Wagon	$7,700.00	$43.75	$27.68	$71.43
621E (8,000 gal) Water Wagon	$13,000.00	$73.86	$46.53	$120.40
777D Water Truck			$50.00	$50.00
785C Water Truck			$72.39	$72.39
Dump Truck (10-12 yd^3)	$14,762.00	$83.88	$16.43	$100.31

NOTES:

(1) Power Equipment Source:	
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilling Equipment Source:	
(4) Other Equipment Source:	
(5) Drill rig includes support (pipe) truck	

Closure Cost Estimate
Equipment Costs

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm

FUEL, LUBE AND WEAR CALCULATIONS

EQUIPMENT TYPE	PM Cost Per Hour (1)	Under carriage or Tires (2)	G.E.T Consumption (3)	Fuel Use Rate gal/hr (4)	Cost@ 2.99/gal	Total Hourly Equipment Cost
Bulldozers						
D6R	$5.21		$4.63	6.25	$18.66	$28.50
D6R w/ Winch				6.25	$18.66	$18.66
D7R	$3.18		$6.88	7.50	$22.39	$32.45
D8R	$5.75		$8.94	9.75	$29.10	$43.79
D9R	$7.99		$13.90	14.25	$42.54	$64.43
D10R	$9.82		$19.46	18.00	$53.73	$83.01
D11R	$12.48		$28.92	26.50	$79.10	$120.50
Wheeled Dozers						
824G		$0.00		10.75	$32.09	$32.09
834G		$0.00		12.60	$37.61	$37.61
844		$0.00		15.00	$44.78	$44.78
854G		$0.00		19.00	$56.72	$56.72
Motor Graders						
120H	$6.11	$4.15	$9.60	4.00	$11.94	$31.80
14G/H	$6.68	$5.68	$13.87	6.25	$18.66	$44.88
16G/H	$5.37	$7.68	$18.95	7.50	$22.39	$54.39
24M				15.50	$46.27	$46.27
Track Excavators						
312C	$3.89		$3.62	1.88	$5.61	$13.12
320C	$4.15		$4.18	4.90	$14.63	$22.96
325C	$4.02		$5.27	6.60	$19.70	$28.99
330C	$5.19		$5.81	8.20	$24.48	$35.48
345B	$7.08		$6.68	10.60	$31.64	$45.40
365BL				13.20	$39.40	$39.40
385BL	$6.11		$12.15	17.50	$52.24	$70.50
Scrapers						
631G	$7.02	$9.84	$7.59	15.00	$44.78	$69.23
637G	$11.61	$9.84	$9.54	23.75	$70.89	$101.88
Wheeled Loaders						
924G	$3.79	$2.97	$3.99	2.75	$8.21	$18.96
928G	$4.12	$2.97	$4.13	3.50	$10.45	$21.66
950G	$4.93	$4.47	$7.68	4.00	$11.94	$29.02
966G	$6.75	$7.12	$9.64	5.75	$17.16	$40.67
972G	$5.27	$7.12	$12.21	6.25	$18.66	$43.25
980G	$5.27	$7.49	$12.21	7.50	$22.39	$47.36
988G	$9.76	$11.76	$13.07	12.10	$36.12	$70.71
990				17.00	$50.75	$50.75
992G	$11.62	$26.23	$30.03	23.00	$68.66	$136.54
994D				36.00	$107.46	$107.46
L2350				66.00	$197.01	$197.01
Shovels						
PC2000				37.00	$110.45	$110.45
PC3000				50.00	$149.25	$149.25
PC4000				70.00	$208.95	$208.95
PC5500				119.00	$355.22	$355.22
PC8000				149.00	$444.77	$444.77
Hydraulic Hammers						
H-120 (fits 325)	N/A		$5.29			$5.29
H-160 (fits 345)	N/A		$10.35			$10.35
H-180 (fits 365/385)	N/A		$12.02			$12.02
Demolition Shears						
S340 (fits 322/325/330)	N/A					$0.00
S365 (fits 330/345)	N/A					$0.00
S390 (fits 365/385)	N/A					$0.00
Demolition Grapples						
G315 (fits 322/325)	N/A					$0.00
G320 (fits 325/330)	N/A					$0.00
G330 (fits 345/365)	N/A					$0.00
Other Equipment						
420D 4WD Backhoe	$3.36	$0.76	$3.22	3.00	$8.96	$16.30
428D 4WD Backhoe	$3.37	$0.76	$3.32	3.00	$8.96	$16.41
CS533E Vibratory Roller				3.75	$11.19	$11.19
CS633E Vibratory Roller				4.75	$14.18	$14.18
CP533E Sheepsfoot Compactor				3.75	$11.19	$11.19
CP633E Sheepsfoot Compactor				4.75	$14.18	$14.18
Light Truck - 1.5 Ton		$0.21		1.50	$4.48	$4.68
Supervisor's Truck		$0.21		1.00	$2.99	$3.19
Flatbed Truck		$1.13		4.70	$14.03	$15.16
Air Compressor + tools			N/A	1.00	$2.99	$2.99
Welding Equipment			N/A	2.00	$5.97	$5.97
Heavy Duty Drill Rig				12.00	$35.82	$35.82
Pump (plugging) Drill Rig				10.00	$29.85	$29.85
Concrete Pump			N/A	10.00	$29.85	$29.85
Gas Engine Vibrator			N/A	1.00	$2.99	$2.99
Generator 5KW			N/A	1.50	$4.48	$4.48
HDEP Welder (pipe or liner)			N/A	2.00	$5.97	$5.97
5 Ton Crane				3.00	$8.96	$8.96
20 Ton Crane				4.00	$11.94	$11.94
50 Ton Crane				4.70	$14.03	$14.03
120 Ton Crane				5.20	$15.52	$15.52
Trucks						
725	$7.32	$15.08	$2.87	4.70	$14.03	$39.30
730	$7.32	$15.08	$2.87	5.20	$15.52	$40.80
735	$7.32	$24.02	$2.87	7.35	$21.94	$56.15
740	$7.32	$25.28	$2.97	7.35	$21.94	$57.51
769D	$8.46	$4.61	$3.22	9.25	$27.61	$43.90
773E	$7.23	$9.61	$3.61	11.75	$35.07	$55.52
777D	$10.48	$17.22	$4.04	16.75	$50.00	$81.74
785C				24.25	$72.39	$72.39
793C				41.75	$124.62	$124.62
797B				58.75	$175.37	$175.37
613E (5,000 gal) Water Wagon	$5.79	$3.98		6.00	$17.91	$27.68
621E (8,000 gal) Water Wagon	$6.76	$7.69		10.75	$32.09	$46.53
777D Water Truck				16.75	$50.00	$50.00
785C Water Truck				24.25	$72.39	$72.39
Dump Truck (10-12 yd3) (5)	N/A	$0.91	N/A	5.20	$15.52	$16.43

Notes:

(1) PM Source:	
(2) Undercarriage Source:	NV costs
(3) G.E.T. Source:	NV costs
(4) Fuel Use Source:	Caterpillar Handbook, Edition 35, Ch. 20; or estimated average for smaller vehicles
(5) Dump Truck Oper. Cost Source:	Means Heavy Construction (2008)

Closure Cost Estimate
Equipment Costs

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm

TIRE COST TABLES

Equipment	Tire Size	# of Tires Per Piece of Equipment	Cost Per Tire	Tire Cost (1)(2)	Life Expectency Hours (Low/Zone A) (3)	Tire Cost per Hour
Bulldozers						
D6R			N/A			
D6R w/ Winch			N/A			
D7R			N/A			
D8R			N/A			
D9R			N/A			
D10R			N/A			
D11R			N/A			
Wheeled Dozers						
824G	29.5R25	4		$0.00	3,500	$0.00
834G	35/65-R33	4		$0.00	3,500	$0.00
844	45/65-R39	4		$0.00	3,500	$0.00
854G	45/65-R45	4		$0.00	3,500	$0.00
Motor Graders						
120H	13PR24	6	$2,419.20	$14,515.20	3,500	$4.15
14G/H	20.5R25	6	$3,311.84	$19,871.04	3,500	$5.68
16G/H	23.5R25	6	$4,480.00	$26,880.00	3,500	$7.68
24M	23.5R25	6		$0.00	3,500	
Track Excavators						
312C			N/A			
320C			N/A			
325C			N/A			
330C			N/A			
345B			N/A			
365BL			N/A			
385BL			N/A			
Scrapers						
631G	37.25R35	4	$9,840.32	$39,361.28	4,000	$9.84
637G	37.25R35	4	$9,840.32	$39,361.28	4,000	$9.84
Wheeled Loaders						
924G	17.5R25	4	$3,337.60	$13,350.40	4,500	$2.97
928G	17.5R25	4	$3,337.60	$13,350.40	4,500	$2.97
950G	26.5R25	4	$5,028.24	$20,112.96	4,500	$4.47
966G	26.5R25	4	$8,005.76	$32,023.04	4,500	$7.12
972G	26.5R25	4	$8,005.76	$32,023.04	4,500	$7.12
980G	29.5R25	4	$8,428.00	$33,712.00	4,500	$7.49
988G	35/65-33	4	$13,235.60	$52,942.40	4,500	$11.76
990	41.25/70-39	4		$0.00	4,500	
992G	45/65R45	4	$29,513.12	$118,052.48	4,500	$26.23
994D	55/85R57	4		$0.00	4,500	
L2350	55/85R57	4		$0.00	4,500	
Shovels						
PC2000			N/A			
PC3000			N/A			
PC4000			N/A			
PC5500			N/A			
PC8000			N/A			
Hydraulic Hammers						
H-120 (fits 325)			N/A			
H-160 (fits 345)			N/A			
H-180 (fits 365/385)			N/A			
Demolition Shears						
S340 (fits 322/325/330)			N/A			
S365 (fits 330/345)			N/A			
S390 (fits 365/385)			N/A			
Demolition Grapples						
G315 (fits 322/325)			N/A			
G320 (fits 325/330)			N/A			
G330 (fits 345/365)			N/A			
Other Equipment						
420D 4WD Backhoe	340/80R18-19.5LR24	2	$1,145.03	$2,290.06	3,000	$0.76
428D 4WD Backhoe	340/80R18-16.9R28	2	$1,145.03	$2,290.06	3,000	$0.76
CS533E Vibratory Roller			N/A			
CS633E Vibratory Roller			N/A			
CP533E Sheepsfoot Compactor			N/A			
CP633E Sheepsfoot Compactor			N/A			
Light Truck - 1.5 Ton		4	154	$616.00	3,000	$0.21
Supervisor's Truck		4	154	$616.00	3,000	$0.21
Flatbed Truck		22	154	$3,388.00	3,000	$1.13
Air Compressor + tools			N/A			
Welding Equipment			N/A			
Heavy Duty Drill Rig		4		$0.00	3,000	
Pump (plugging) Drill Rig		4		$0.00	3,000	
Concrete Pump			N/A			
Gas Engine Vibrator			N/A			
Generator 5KW			N/A			
HDEP Welder (pipe or liner)			N/A			
5 Ton Crane		4		$0.00	3,000	
20 Ton Crane		4		$0.00	3,000	
50 Ton Crane		6		$0.00	3,000	
120 Ton Crane		6		$0.00	3,000	
Trucks						
725	23.5R25	6	$5,028.24	$30,169.44	2,000	$15.08
730	23.5R25	6	$5,028.24	$30,169.44	2,000	$15.08
735	26.5R25	6	$8,005.76	$48,034.56	2,000	$24.02
740	29.5R25	6	$8,428.00	$50,568.00	2,000	$25.28
769D	18.00R33	6	$4,607.46	$27,644.76	6,000	$4.61
773E	24.00R35	6	$8,005.76	$48,034.56	5,000	$9.61
777D	27.00R49	6	$14,348.96	$86,093.76	5,000	$17.22
785C	33.00R51	6		$0.00	4,000	
793C	40.00R57	6		$0.00	4,000	
797B	40.00R57	6		$0.00	4,000	
613E (5,000 gal) Water Wagon	23.5R25	6	$3,979.50	$23,877.00	6,000	$3.98
621E (8,000 gal) Water Wagon	33.25R29	6	$10,247.83	$61,486.98	8,000	$7.69
777D Water Truck	27.00R49	6		$0.00	5,000	
785C Water Truck	33.00R51	6		$0.00	4,000	
Dump Truck (10-12 yd3)		10	$544.88	$5,448.80	6,000	$0.91

Notes:

(1) Unit Cost Basis:	NV costs
(2) Cost Basis:	NV costs
(3) Tire Cost Source:	NV costs
(4) Tire Wear Source:	NV costs

Closure Cost Estimate
Material Costs

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Recla
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.x
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Revegetation Materials

Seed Mixes

Seed Mix	Description		Cost/Acre
None			
Mix 1	Basins		$139.00
Mix 2	Low Hills		$299.00
Mix 3	Uplands		$37.00
Mix 4	Riparian or Custom		
User Mix 1			
User Mix 2			
User Mix 3			
User Mix 4			
	Cost/lb	lbs/Acre	Cost/Acre
User Mix 5 (from Seed Mix sheet)	$9.94	$27.21	$270.48
Notes:			

Mulch

Item	Cost/lb	lbs/Acre	Cost/Acre
None			
Straw Mulch	$0.18	10	$1.80
Hydro Mulch		10	
Timber Mulch		10	
		10	
Notes:			

Amendments

Item	Cost/lb	lbs/Acre	Cost/Acre
None			
Organic Matter		10	
Treated Sludge		10	
Chemical		10	
		10	
Notes:			

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Recla
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.x
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety **Cost Basis: Polymet**

Well Abandonment Materials

Description	Cost/50lb bag	Units	Cost/unit*
Cement	$7.18	cy	$34.19
Grout (Low Grade Bentonite)	$9.96	cy	$47.43
Inert Material/Cuttings		cy	
		cy	
		cy	

* Assumes 1 bag mixes with water to make 0.21 y3 or 0.16 m3 of grout/cement slurry.

Monitoring Costs

Description	Units	Cost/unit
Monitor Well Pump	ea.	$2,140.00
Sampling Supplies	ea.	$0.00
Water Analysis	ea.	$331.00
Water treatment analyses	ea.	$100.00
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	
	ea.	

(1) WET Labs, Reno, Nevada (May 2014)

Fuel, Etc.

Description	Units	Cost/unit	User Overrides
Off-road Diesel - delivered (1)	$/gal	$2.985	
Pickup Truck Mileage	$/mi	$0.560	
Electical Power	$/kWh	$0.055	

Revegetation Method				
Slopes				
Disturbance Type	**Seed Application Method**	**Labor** Cost/Acre	**Equipment** Cost/Acre	**Total** Cost/Acre
Waste Rock Dumps	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Heap Leach	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Tailings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Quarries & Borrow Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Flat Areas and Undifferentiated				
Disturbance Type	**Seed Application Method**	**Labor** Cost/Acre	**Equipment** Cost/Acre	**Total** Cost/Acre
Exploration Trenches	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Exploration Roads	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Waste Rock Dumps	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Heap Leach	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Tailings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Quarries & Borrow Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Roads	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Haul Material	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Foundations & Buildings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Sediment & Drainge Control	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Process Ponds	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Landfills	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Yards, Etc.	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Revegetation Maintenance	**Mechanical Broadcast**	$139.00	$139.00	$278.00

Closure Cost Estimate
Misc. Unit Costs

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Revegetation

	Means Number	Unit	Crew	Daily Output	Daily Output User	Materials	Labor	Equipment	Total	Notes
Seeding - Broadcast Hand (1)		acres							$0.00	
Seeding - Broadcast Mechanical (1)		acres					$139.00	$139.00	$278.00	
Seeding - Drill (1)		acres		365					$0.00	
Seeding - Hydroseeding (1)				365					$0.00	
Shrub Planting - bare root 6-10 in (150- 250mm) (2)	02910-400-0561	ea.	1 Clab	365			$1.01	$0.00	$1.01	
Tree Planting - bare root 11-16 in (270- 400mm) (3)	02910-400-0562	ea.	1 Clab	260			$1.42	$0.00	$1.42	
Cactus Planting (4)		ea.	1 Clab						$0.00	
NOTES:										
(1) Seeding Source:										
(2) Shrub Source:										
(3) Tree Source:										
(4) Cactus Source:										

Building and Wall Demolition

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Daily Output User	Labor	Equipment	Premium	Total	Notes
Building Demolition										
Lg. steel	02220-110-0012	C.F.	B-8	21500		$0.16	$0.11		$0.27	
Lg. concrete	02220-110-0050	C.F.	B-8	15300		$0.23	$0.16		$0.39	
Lg. masonry	02220-110-0080	C.F.	B-8	20100		$0.18	$0.12		$0.30	
Lg. mixed	02220-110-0100	C.F.	B-8	20100		$0.18	$0.12		$0.30	
Sm. steel	02220-110-0500	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Sm. concrete	02220-110-0600	C.F.	B-3	11300		$0.27	$0.18		$0.45	
Sm. masonry	02220-110-0650	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Sm. wood	02220-110-0700	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Wall Demolition										
Block 4 in (100 mm) thick	02220-130-2000	S.F.	1 Clab	180		$2.05	$0.00	20%	$2.46	
Block 6 in (150 mm) thick	02220-130-2040	S.F.	1 Clab	170		$2.17	$0.00	20%	$2.60	
Block 8 in (200 mm) thick	02220-130-2080	S.F.	1 Clab	150		$2.46	$0.00	20%	$2.95	
Block 12 in (300 mm) thick	02220-130-2100	S.F.	1 Clab	150		$2.46	$0.00	20%	$2.95	
Conc 6 in (150 mm) thick	02220-130-2400	S.F.	B-9	160		$17.74	$1.47	10%	$21.13	
Conc 8 in (200 mm) thick	02220-130-2420	S.F.	B-9	140		$20.28	$1.68	10%	$24.16	
Conc 10 in (250 mm) thick	02220-130-2440	S.F.	B-9	120		$23.66	$1.96	10%	$28.18	
Conc 12 in (300 mm) thick	02220-130-2500	S.F.	B-9	100		$28.39	$2.35	10%	$33.81	

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Waste Disposal

Unit rates from Means Heavy Construction 2006 Edition by permission of R.S.Means/Reed Construction Data .

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment		Total	Notes
Rubbish Handling										
Dumpster delivery (average for all sizes)	02220-350-0910	ea.			$47.50				$47.50	
Haul (average for all sizes)	02220-350-0920	ea.			$149.00				$149.00	
Rent per month (average for all sizes)	02220-350-0940	ea.			$51.00				$51.00	
Disposal fee per ton (tonne) (average for all sizes)	02220-350-0950	ton			$56.00				$56.00	
NOTES:										
Dumpster Cost Source										
Dumpster Disposal Fee Source:										
Hazardous Material Handling - Solids (+ Liquids in drums)										
Pickup fees 55 gal (200 L). drums	02110-300-1100	ea.			$247.00				$247.00	
Bulk material (average)	02110-300-1220/1230	ton			$403.00				$403.00	
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	02110-300-1260/1270	mile			$5.50				$5.50	
Dump site solid disposal fee	02110-300-6000/6020	ton			$285.00				$285.00	
NOTES:										
Solid Handling Cost Source										
Solid Disposal Fee Source:										
Hazardous Material Handling - Liquids										
Vacuum Truck Pickup (2200 gal/8300 L)	02110-300-3110	hr.			$145.00				$145.00	
Vacuum Truck Pickup (5000 gal/19000 L)	02110-300-3120	hr.			$210.00				$210.00	
Dump site liquid disposal fee	02110-300-6000/6020	ton			$285.00				$285.00	
NOTES:										
Liquid Handling Cost Source										
Liquid Disposal Fee Source:										
Hydrocarbon Contaminated Soils (HCS)										
Insitu Biotreatment	02115-200-2020/2021	C.Y.			$8.00				$8.00	
HCS disposal fee	02115-200-2050/2055	C.Y.			$8.00				$8.00	
NOTES:										
Insitu Treatment Cost Source										
HCS Disposal Fee Source:										

Concrete Structure Installation

Weekly dumpster rental rates from Means Heavy Construction 2005 Edition with permission by R.S.Means/Reed Construction Data .
Weekly dumpster rental rates include haul to off-site disposal site and disposal fees

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Reinforced Concrete Bulkheads and Shaft Covers										
Grade walls - 15 in (400mm) thick, 8 ft (2.5m) high	03310-240-4300	C.Y.	C-14D	80.02	$139.00	$141.69	$14.69		$295.38	includes reinforcing
Grade walls - 15 in (400mm) thick, 12 ft (3.7m) high	03310-240-4350	C.Y.	C-14D	26.2	$139.00	$432.75	$44.85		$616.60	includes reinforcing
Elevated conc, 1-way beam & slab - 15ft (4.6m) span	03310-240-2700	C.Y.	C-14B	20.59	$257.00	$563.11	$57.08		$877.19	includes reinforcing
Elevated conc, 1-way beam & slab - 25ft (7.5m) span	03310-240-2750	C.Y.	C-14B	28.36	$245.00	$408.83	$41.44		$695.27	includes reinforcing
Bat Gate/Foam Plug Installation										
Bat Gate (5)		ea.			$2,870.42					materials $/ea. Installed
Culvert Gate (5)		ea.			$5,740.85					materials $/ea. Installed
Adit Foam Plug (6)		ea./C.Y.			$287.04					materials $/cy placed
Production Opening Foam Plug (6)		ea./C.Y.			$287.04					materials $/cy placed
NOTES:										
(5) Bat Gate Source:										
(6) Foam Plug Source:										

Closure Cost Estimate
Misc. Unit Costs

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Misc. Linear Projects

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Fencing Installation										
Barbed 3-strand	02820-170-1650	L.F.	B-80A	760	$0.39	$2.09	$0.40		$2.88	
Barbed 4-strand	extrapolated	L.F.	B-80A	570	$0.52	$2.78	$0.53		$3.83	
Barbed 5-strand	02820-130-0920	L.F.	B-80A	456	$0.65	$3.48	$0.66		$4.79	
Chain link 8-10ft (2.5-3m) Install	02820-130-0920	L.F.	B-80C	180	$33.00	$8.80	$1.67		$43.47	
Wood stockade fence 6 ft (2 m) high - Install	02820-510-1240	L.F.	B-80C	150	$12.70	$10.57	$2.01		$25.28	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
Fencing Removal										
Barbed 3-strand Removal	02220-220-1600	L.F.	2 Clab	430		$2.83	$0.70		$3.53	
Barbed 4-strand Removal	extrapolated	L.F.	2 Clab	355		$3.43	$0.85		$4.28	
Barbed 5-strand Removal	02220-220-1650	L.F.	2 Clab	280		$4.34	$1.08		$5.42	
Chain link 8-10 ft (2.5-3 m) Removal	02220-220-1700	L.F.	B-6	445		$2.73	$1.09		$3.82	
Wood, all types 4-6 ft ("1.5-2 m) high - Removal	02220-220-1775	L.F.	2 Clab	430		$2.83	$0.70		$3.53	
	user	L.F.								
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
Culvert Removal										
12 in (300 mm) Diameter	02220-220-2900	L.F.	B-6	175		$6.95	$2.77		$9.72	
18 in (450 mm) Diameter	02220-220-2930	L.F.	B-6	150		$8.11	$3.23		$11.34	
24 in (600 mm) Diameter	02220-220-2960	L.F.	B-6	120		$10.13	$4.04		$14.17	
36 in (1m) Diameter	02220-220-3000	L.F.	B-6	90		$13.51	$5.38		$18.89	
Pipeline Removal										
0.75 in (20mm) - 4 in (100 mm) diameter	02220-381-1600	L.F.	B-20	700		$3.00	$0.43		$3.43	
6 in (150 mm) - 8 in (200 mm)	02220-381-1700	L.F.	B-20	500		$4.20	$0.60		$4.80	
10 in (250 mm) - 18 in (450 mm)	02220-381-1800	L.F.	B-20	300		$7.00	$1.00		$8.00	
20 in (500 mm) - 36 in (1 m)	02220-381-1900	L.F.	B-20	200		$10.50	$1.51		$12.01	
Pipe and Drainpipe Installation										
Water 4in (100mm) 40ft (12m) length, welded HDPE	02510-760-0100	L.F.	B-22A	400	$3.74	$6.35	$5.24		$15.33	
Water 6in (150mm) 40ft (12m) length, welded HDPE	02510-760-0200	L.F.	B-22A	380	$7.45	$6.69	$5.52		$19.66	
Water 12in (300mm) 40ft (12m) length, welded HDPE	02510-760-0500	L.F.	B-22A	260		$9.77	$8.07		$17.84	
Drain 4in (100mm) perforated PVC	02620-630-2100	L.F.	B-14	315	$1.32	$10.53	$1.83		$13.68	
Drain 6in (150mm) perforated PVC	02620-630-2110	L.F.	B-14	300	$2.98	$11.06	$1.93		$15.97	
Drain 4in (100mm) corrugated, perf or plain	02620-660-0040	L.F.	2 Clab	1200	$0.46	$1.01	$0.25		$1.72	
Drain 6in (150mm) corrugated., perf or plain	02620-660-0060	L.F.	2 Clab	900	$1.33	$1.35	$0.33		$3.01	
Drain Rock Preparation										
Crushing		C.Y.							$0.50	
Screening		C.Y.							$0.50	
TOTAL									$1.00	
Misc.										
Backhoe work	02210-700-0120	C.Y.	B-11M	28		$17.08	$9.88		$26.96	
Powerline and Transformer Removal										
Single Pole		mile							$39,894.00	
Double Pole		mile							$45,593.00	
Transformer (9)		ea.							$5,000.00	

NOTES:

(7) Single Pole Source:	
(8) Double Pole Source:	
(9) Transformer Source:	

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Erosion and Sedimentation Control

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Rip-Rap & Rock Lining										
Rip-Rap 3/8 to 1/4 CY (m3) pieces, grouted	02370-450-0110	S.Y.	B-13	80	$17.70	$35.48	$10.43		$63.61	assumes on-site source of rip-rap
Rip-Rap 18 in (450 mm) min thick, no grout	02370-450-0200	S.Y.	B-13	53	$5.85	$53.56	$15.74		$75.15	assumes on-site source of rip-rap
Gabions, 6 in (150 mm) deep	02370-450-0400	S.Y.	B-13	200	$8.35	$14.19	$4.17		$26.71	assumes on-site source rock fill for gabions
Gabions, 9 in (250 mm) deep	02370-450-0500	S.Y.	B-13	163	$12.15	$17.42	$5.12		$34.69	assumes on-site source rock fill for gabions
Gabions, 12 in (300 mm) deep	02370-450-0200	S.Y.	B-13	153	$16.45	$18.55	$5.45		$40.45	assumes on-site source rock fill for gabions
Gabions, 18 in (450 mm) deep	02370-450-0200	S.Y.	B-13	102	$23.00	$27.83	$8.18		$59.01	assumes on-site source rock fill for gabions
Gabions, 36 in (1m) deep	02370-450-0200	S.Y.	B-13	60	$31.00	$47.31	$13.90		$92.21	assumes on-site source rock fill for gabions
HDEP Liner Installation										
Finish grading large area	2310-100-0100	S.F.	B-11L	54000		$0.02	$0.02		$0.04	
Compaction-riding, vibrating roller - 12in (300mm) lifts	2315-310-5100	C.Y.	B-10Y	2600		$0.33	$0.16		$0.49	
60 mil HDPE	2660-610-0010	S.F.	3 Skwk	1600	$0.53	$0.99	$0.43	10%	$2.15	
40 mil LDPE geomembran	user	S.F.	3 Skwk	5000	$0.55	$0.32	$0.14		$1.01	HRF Cover Sys UC
Non-woven geotextile	user	S.F.	3 Skwk	9000	$0.25	$0.18	$0.08		$0.51	HRF Cover Sys UC
Geogrid	user	S.F.	3 Skwk	9000	$0.20	$0.18	$0.08		$0.46	HRF Cover Sys UC
	user	S.F.	3 Skwk						$0.00	
Construction Management Support										
Office Trailer, Furnished, no hook-ups	0150-500-0250	mo.			$167.00				$167.00	
Toilet Portable, chemical	1590-400-6410	mo.			$132.00				$132.00	
TOTAL					$299.00				$299.00	

Pump and Casing Removal

	Pump Type	Measurement	Unit				Labor	Equipment		Total	Notes
Pump Removal											
Submersible		ft to pump	L.F.				$2.51	$5.45		$7.96	
Line Shaft		ft to pump	L.F.				$5.85	$12.72		$18.57	

NOTES:
(10) Pump Removal Source:

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
RIPPING						
Rip road						
Waste rock dumps, heaps, tails - rip flat surfaces						
Surface preparation						
Scarify						
Small Dozer w/ multi-shank						
D6R				$97.93	$59.78	$157.71
Totals				$97.93	$59.78	$157.71
Medium Dozer w/ multi-shank						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer w/ multi-shank						
D10R				$272.44	$59.78	$332.22
Totals				$272.44	$59.78	$332.22
Grader w/ multi-shank						
16G/H				$188.08	$59.78	$247.86
Totals				$188.08	$59.78	$247.86
GRADING						
Grading storage and structure areas						
Grading waste rock dumps and heaps						
Grading landfills						
Constructing pit safety berms						
Small Dozer Fleet						
D7R				$126.99	$59.78	$186.77
Totals				$126.99	$59.78	$186.77
Medium Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer Fleet						
D10R				$272.44	$59.78	$332.22
Totals				$272.44	$59.78	$332.22
EXPLORATION GRADING						
Backfilling and grading exploration trenches						
Grading flat exploration roads						
Small Dozer Fleet						
D7R				$126.99	$59.78	$186.77
Totals				$126.99	$59.78	$186.77
Medium Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
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Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
EXCAVATING						
Earthen Berms						
Diversion ditch excavation and backfill						
Underground openings backfill - excavate and place						
Pit berm construction (excavator option)						
Small Excavator						
325C				$79.67	$59.78	$139.45
Totals				$79.67	$59.78	$139.45
Medium Excavator						
330C				$96.44	$59.78	$156.22
Totals				$96.44	$59.78	$156.22
Large Excavator						
385BL				$256.29	$59.78	$316.07
Totals				$256.29	$59.78	$316.07
EXCAVATE AND RECONTOUR						
Recontour large roads (haul roads, access roads, etc.)						
Ponds - Excavate and pull liner and bury						
Small Excavator + Dozer						
325C				$79.67	$59.78	$139.45
D7R				$126.99	$59.78	$186.77
Total Equipment				$206.66	$119.56	$326.22
Medium Excavator + Dozer						
330C				$96.44	$59.78	$156.22
D9R				$220.68	$59.78	$280.46
Totals				$317.12	$119.56	$436.68
Large Excavator + Dozer						
385BL				$256.29	$59.78	$316.07
D10R				$272.44	$59.78	$332.22
Totals				$528.73	$119.56	$648.29
EXPLORATION ROAD/PAD RECONTOUR						
Recontour small roads (exploration roads, service roads, etc.)						
Cut and Fill reclamation on slopes						
Drill pad recountour						
Drill sump backfill						
Small Dozer						
D6R				$97.93	$59.78	$157.71
Totals				$97.93	$59.78	$157.71
Large Dozer						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Grader						
14G/H				$140.96	$59.78	$200.74
Totals				$140.96	$59.78	$200.74
Small Excavator						
320C				$65.51	$59.78	$125.29
Totals				$65.51	$59.78	$125.29
Medium Excavator						
345B				$142.62	$59.78	$202.40
Totals				$142.62	$59.78	$202.40

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
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Cost Estimate Type: Surety Cost Basis: Polymet

EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
LOAD, HAUL AND PLACE MATERIAL						
Rock placement						
Haul overburden for backfill						
Haul borrow for backfill						
Haul cover or growth media						
Small Truck/Loader Fleet						
725				$101.80	$59.78	$161.58
966G	**Loader**			$119.59	$59.78	$179.37
D7R		1		$126.99	$59.78	$186.77
Totals				$348.38	$179.34	$527.72
Medium Truck/Loader Fleet						
740				$160.41	$59.78	$220.19
988G	**Loader**			$243.10	$59.78	$302.88
D8R		1		$156.81	$59.78	$216.59
Totals				$560.32	$179.34	$739.66
Large Truck/Loader Fleet						
777D				$388.56	$59.78	$448.34
992G	**Loader**			$505.86	$59.78	$565.64
D10R		1		$272.44	$59.78	$332.22
Totals				$1,166.86	$179.34	$1,346.20
Extra Large Truck/Loader Fleet						
785C				$72.39	$59.78	$132.17
992G	**Loader**			$505.86	$59.78	$565.64
D11R		1		$472.78	$59.78	$532.56
Totals				$1,051.03	$179.34	$1,230.37
Scraper/Dozer Fleet						
631G				$262.01	$59.78	$321.79
D10R				$272.44	$59.78	$332.22
D7R		1		$126.99	$59.78	$186.77
Totals				$661.44	$179.34	$840.78
Tandem Scraper Fleet						
637G				$297.91	$59.78	$357.69
D7R		1		$126.99	$59.78	$186.77
Totals				$424.90	$119.56	$544.46
MISC. LOAD AND HAUL AND EARTHWORKS						
Sludge removal						
Drainage controls						
Misc. - Cat 325B Excavator / 10-12 yd3 Truck						
325C				$79.67	$59.78	$139.45
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$179.98	$119.56	$299.54
Misc. - Cat D9R Dozer/ Loader (5 yd3) / 10-12 yd3 Truck						
D9R				$220.68	$59.78	$280.46
966G				$119.59	$59.78	$179.37
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$440.58	$179.34	$619.92
Misc. - Cat D6 Dozer / Cat 966 Loader / 10-12 yd3 Truck						
D6R				$97.93	$59.78	$157.71
966G				$119.59	$59.78	$179.37
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$317.83	$179.34	$497.17

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
CONCRETE BREAKING						
Slab demolition Footing demolition Wall demolition						
Small - Cat 325B Excavator w/ H140D s Hammer						
325C				$79.67	$59.78	$139.45
H-120 (fits 325)				$23.02	$0.00	$23.02
D9R				$220.68	$59.78	$280.46
Totals				$323.37	$119.56	$442.93
Medium - Cat 345B Excavator w/ H180D s Hammer						
345B				$142.62	$59.78	$202.40
H-160 (fits 345)				$33.87	$0.00	$33.87
D9R				$220.68	$59.78	$280.46
Totals				$397.17	$119.56	$516.73
Large - Cat 385B Excavator w/ H180D s Hammer						
385BL				$256.29	$59.78	$316.07
H-180 (fits 365/385)				$35.09	$0.00	$35.09
D9R				$220.68	$59.78	$280.46
Totals				$512.06	$119.56	$631.62
DRILL HOLE ABANDONMENT						
Drill Hole - Grout or Cement						
Pump (plugging) Drill Rig				$378.60	$59.78	$438.38
Driller's Helper		2		$0.00	$92.22	$92.22
Totals				$378.60	$152.00	$530.60
Drill Hole - Inert Media (Means Crew B-11M+ 1 Laborer)						
420D 4WD Backhoe				$34.59	$59.78	$94.37
General Laborer		1		$0.00	$46.11	$46.11
Totals				$34.59	$105.89	$140.48
Drill Hole - Casing Perforation or Removal						
Heavy Duty Drill Rig				$384.57	$59.78	$444.35
Driller's Helper		2		$0.00	$92.22	$92.22
Totals				$384.57	$152.00	$536.57
MAINTENANCE FLEET						
Road Grading, Dust Suppression, Clean Up						
Maintenance - Small Water Truck and Cat 14G Grader						
613E (5,000 gal) Water Wagon				$71.43	$59.78	$131.21
120H				$91.06	$59.78	$150.84
Totals				$162.49	$119.56	$282.05
Maintenance - Medium Water Truck and Cat 16G Grader						
613E (5,000 gal) Water Wagon				$71.43	$59.78	$131.21
14G/H				$140.96	$59.78	$200.74
Totals				$212.39	$119.56	$331.95
Maintenance - Large Water Truck and Cat 16G Grader						
777D Water Truck				$50.00	$59.78	$109.78
16G/H				$188.08	$59.78	$247.86
Totals				$238.08	$119.56	$357.64
PROJECT SUPERVISION						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Totals				$23.57	$170.40	$193.97

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
MEANS CREW DEFINITIONS						
Crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data . For use with misc. unit costs where Means is the source for productivity						
1 Clab - Seedling Planting/Block Wall Demolition						
General Laborer		1		$0.00	$46.11	$46.11
Totals				$0.00	$46.11	$46.11
2 Clab - Barbed Wire/Wood Fence Removal, Drainpipe Installation, Pumping, Evaporation						
General Laborer		2		$0.00	$92.22	$92.22
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$152.00	$189.66
2 Clab + Excavator - Pond Liner Cut and Fold						
General Laborer		2		$0.00	$92.22	$92.22
325C				$79.67	$59.78	$139.45
Totals				$79.67	$152.00	$231.67
2 Clab + Welder - Bat Gates						
General Laborer		2		$0.00	$92.22	$92.22
Welding Equipment				$23.16	$59.78	$82.94
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$60.82	$211.78	$272.60
3 Clab - Foam Adit Plugs						
General Laborer		2		$0.00	$92.22	$92.22
420D 4WD Backhoe				$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$72.25	$211.78	$284.03
3 Clab + Welder - Culvert Bat Gate						
General Laborer		2		$0.00	$92.22	$92.22
Welding Equipment				$23.16	$59.78	$82.94
420D 4WD Backhoe				$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$95.41	$271.56	$366.97
3 Clab D - 3 Laborers + Foreman - Decontamination						
General Laborer		3		$0.00	$138.33	$138.33
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$61.23	$368.51	$429.74
3 SKWK - Liner Installation						
Skilled Laborer		3		$0.00	$138.33	$138.33
HDEP Welder (pipe or liner)		1		$52.35	$0.00	$52.35
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$86.94	$198.11	$285.05

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-3 - Small Building Demoltion						
LABOR						
General Laborer		2		$0.00	$92.22	$92.22
Foreman		1		$0.00	$110.62	$110.62
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
EQUIPMENT						
928G		1		$60.53	$59.78	$120.31
Dump Truck (10-12 yd3)		2		$200.62	$119.56	$320.18
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$261.15	$382.18	$643.33
B-6 - Chain Link Fence/Culvert Removal						
General Laborer		2		$0.00	$92.22	$92.22
928G		1		$60.53	$59.78	$120.31
Totals				$60.53	$152.00	$212.53
B-8 - Large Building Demolition						
LABOR						
General Laborer		2		$0.00	$92.22	$92.22
Foreman		1		$0.00	$110.62	$110.62
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
EQUIPMENT						
928G		1		$60.53	$59.78	$120.31
20 Ton Crane		1		$35.92	$59.78	$95.70
Dump Truck (10-12 yd3)		2		$200.62	$119.56	$320.18
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$297.07	$441.96	$739.03
B-9 - Concrete Wall Demolition						
General Laborer		4		$0.00	$184.44	$184.44
Foreman		1		$0.00	$110.62	$110.62
Air Compressor + tools				$29.37	$59.78	$89.15
Totals				$29.37	$354.84	$384.21

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-10Y - General Compaction						
General Laborer		1		$0.00	$46.11	$46.11
CS533E Vibratory Roller		1		$52.22	$59.78	$112.00
Totals				$52.22	$105.89	$158.11
B-11L - Fine Grading for Evaporation Pond Liner Base						
General Laborer		1		$0.00	$46.11	$46.11
14G/H		1		$140.96	$59.78	$200.74
Totals				$140.96	$105.89	$246.85
B-11M - Backhoe Work						
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Totals				$34.59	$59.78	$94.37
B-12G - Rip-Rap Machine Placed (Modified)						
966G		1		$119.59	$59.78	$179.37
325C		1		$79.67	$59.78	$139.45
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$236.92	$179.34	$416.26
B-13 - Grouted Rip-Rap & Gabion Baskets						
General Laborer		4		$0.00	$184.44	$184.44
Foreman		1		$0.00	$110.62	$110.62
50 Ton Crane		1		$104.28	$59.78	$164.06
Totals				$104.28	$354.84	$459.12
B-14 PVC Drain Pipe Installation						
Foreman		1		$0.00	$110.62	$110.62
General Laborer		4		$0.00	$184.44	$184.44
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$72.25	$414.62	$486.87
B-20 - Remove Pipelines						
Foreman		1		$0.00	$110.62	$110.62
Skilled Laborer		1		$0.00	$46.11	$46.11
General Laborer		1		$0.00	$46.11	$46.11
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$262.62	$300.28
B-22A - HDEP Installation - Pipe or Liner						
Skilled Laborer		1		$0.00	$46.11	$46.11
General Laborer		2		$0.00	$92.22	$92.22
D7R		1		$126.99	$59.78	$186.77
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Generator 5KW		1		$10.53	$0.00	$10.53
HDEP Welder (pipe or liner)		1		$52.35	$0.00	$52.35
Totals				$262.12	$317.67	$579.79
B-80A - Install Barbed Wire Fence						
General Laborer		3		$0.00	$138.33	$138.33
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$198.11	$235.77

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-80C - Install Chain Link Fence (Flatbed truck has small crane)						
General Laborer		3		$0.00	$138.33	$138.33
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$198.11	$235.77
C-14B - Elevated Concrete Slabs (Reinforced Concrete Shaft Covers)						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Carpenter		16		$0.00	$850.24	$850.24
General Laborer		2		$0.00	$92.22	$92.22
Rodmen (reinforcing concrete)		4		$0.00	$184.44	$184.44
Cement finisher		2		$0.00	$92.22	$92.22
Gas Engine Vibrator		1		$6.98	$59.78	$66.76
Concrete Pump		1		$116.35	$0.00	$116.35
Totals				$146.90	$1,449.30	$1,596.20
C-14D - Concrete Walls Formed in Place (Reinforced Concrete Adit Bulkheads)						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Carpenter		18		$0.00	$956.52	$956.52
General Laborer		2		$0.00	$92.22	$92.22
Rodmen (reinforcing concrete)		2		$0.00	$92.22	$92.22
Cement finisher		1		$0.00	$46.11	$46.11
Gas Engine Vibrator		1		$6.98	$59.78	$66.76
Concrete Pump		1		$116.35	$0.00	$116.35
Totals				$146.90	$1,417.25	$1,564.15

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Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Bulldozers

Dozer Specifications

Description	D11R	D10R	D9R	D8R	D7R	D6R
Blade Width (SU) (ft)	18.33	15.92	14.17	12.92	12.08	10.67
Shank Guage (3 shanks) (ft)	9.83	8.67	7.67	7.08	6.5	6.5
Pocket Spacing (ft)	4.75	4.33	3.87	3.58	3.25	3.25
Ripping Width (Ripper + 1 Pocket) (ft)	14.58	13	11.54	10.66	9.75	9.75
Ripping Speed (mph)	1	1	1	1	1	1
Ripping Maneuver (turn) Time (min)	0.25	0.25	0.25	0.25	0.25	0.25
Altitude Deration Factor	1	1	1	1	1	1
Ripping Hourly Production (excluding maneuvering time) (ft)	5,280	5,280	5,280	5,280	5,280	5,280

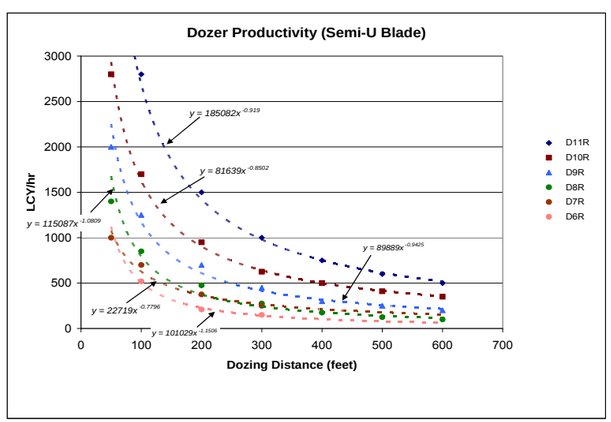
Source: Caterpillar Performance Handbook Edition 35

Dozer Productivity vs. Grading Distance

Average Dozing Distance (feet)	Production (LCY/hr) D11R	D10R	D9R	D8R	D7R	D6R
50	4,800	2,800	2,000	1,400	1,000	
100	2,800	1,700	1,250	850	700	520
200	1,500	950	700	475	375	210
300	1,000	625	450	275	250	150
400	750	500	300	175		
500	600	410	250	125		
600	500	350	200	100		

Source: Caterpillar Performance Handbook Edition 35

dozer productivity = k x Dozing Distance^{p} (see graph)						
k =	185082	81639	89889	115087	22719	101029
p =	-0.919	-0.8502	-0.9425	-1.0809	-0.7796	-1.1506



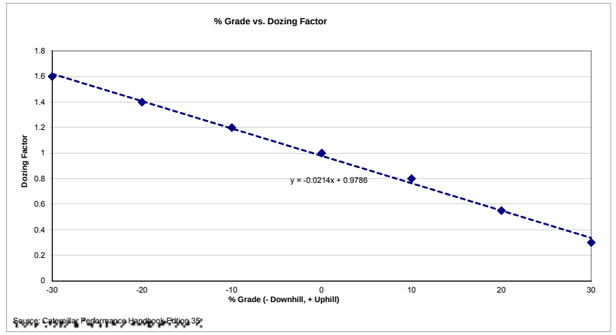
Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Bulldozers (cont.)

% Grade vs. Dozing Factor	
% Grade	Dozing Factor
-30	1.6
-20	1.4
-10	1.2
0	1
10	0.8
20	0.55
30	0.3

Source: Caterpillar Performance Handbook Edition 35
% Grade Dozing Factor = -0.0214x + 0.9786
(see graph)



Source: Caterpillar Performance Handbook Edition 35

Job Condition Correction Factors - Bulldozers	
OPERATOR	
Average	0.75
MATERIAL (1)	
Loose stockpile	1.2
Normal	1
Hard to cut; frozen — with tilt cylinder	0.8
Hard to drift; "dead" (dry,non-cohesive material) or very sticky material	0.8
Rock, ripped or blasted	0.6
SLOT DOZING OR SIDE BY SIDE (1)	1.2
VISIBILITY	
Good conditions	1
JOB EFFICIENCY	
50 min/hr	0.83

(1) Selected in facility worksheets.
Other factors included as standard factors.
Source: Caterpillar Performance Handbook Edition 35

Material Densities(1)		
Material	lb/cy	kg/m^3
Alluvium	2,900	1,720
Basalt	3,300	1,960
Clay - Dry	2,500	1,480
Granite - broken	2,800	1,660
Gravel	2,550	1,510
LS - broken	2,600	1,540
LS - crushed	2,600	1,540
Sandstone	2,550	1,510
Shale	2,100	1,250
Stone - crushed	2,700	1,600
Tailings - Coarse (dry, loose sand)	2,400	1,420
Tailings - Slimes (loose sand & clay)	2,700	1,600
Topsoil	1,600	950

(1) Source: Caterpillar Performance Handbook Edition 35

Note: uses Sand & Gravel - Dry from Caterpillar Handbook

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Scrapers

Scraper Specifications

Description	631G	637G
Empty Weight	100,600	112,760
Payload Capacity (cy)		
Struck	24	24
Heaped	34	34
Average	29	29
Loaded by	One D10R	Self*
Load Time (min)	1	1
Maneuver and Spread (min)	1	1
Job Efficiency	1	1
Rolling Resistance**	3	3
Altitude Deration Factor	1	1

* Requires pair

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials			Downhill Scraper Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)											
			631G						637G PP					
Material	lb/cy	Scraper Load lb	Loaded Weight (lbs)	22	16	10	5	1	Loaded Weight (lbs)	25	15	10	5	1
Alluvium	2,900	84,100	184,700	7.5	10	13	33	33	196,860	7	10	18.5	34	34
Basalt	3,300	95,700	196,300	7.5	10	13	24.5	33	208,460	7	10	18.5	25	34
Clay - Dry	2,500	72,500	173,100	7.5	10	13	33	33	185,260	7	10	18.5	34	34
Granite - broken	2,800	81,200	181,800	7.5	10	13	33	33	193,960	7	10	18.5	34	34
Gravel	2,550	73,950	174,550	7.5	10	13	33	33	186,710	7	10	18.5	34	34
LS - broken	2,600	75,400	176,000	7.5	10	13	33	33	188,160	7	10	18.5	34	34
LS - crushed	2,600	75,400	176,000	7.5	10	13	33	33	188,160	7	10	18.5	34	34
Sandstone	2,550	73,950	174,550	7.5	10	13	33	33	186,710	7	10	18.5	34	34
Shale	2,100	60,900	161,500	7.5	10	18	33	33	173,660	10	13.5	18.5	34	34
Stone - crushed	2,700	78,300	178,900	7.5	10	13	33	33	191,060	7	10	18.5	34	34
Tailings - Coarse (dry, loose sand)	2,400	69,600	170,200	7.5	10	13	33	33	182,360	7	10	18.5	34	34
Tailings - Slimes (loose sand & clay)	2,700	78,300	178,900	7.5	10	13	33	33	191,060	7	10	18.5	34	34
Topsoil	1,600	46,400	147,000	7.5	10	18	33	33	159,160	10	13.5	18.5	34	34
			Empty	10	18	24.5	33	33	Empty	10	13.5	18.5	34	34

Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

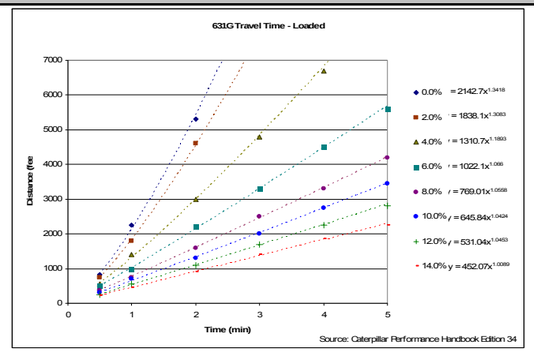
Productivity - Scrapers (cont.)

631G Scraper Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	825	2,250	5,300				2142.7	1.3418
2	750	1,800	4,600				1838.1	1.3083
4	550	1,400	3,000	4,800	6,700		1310.7	1.1893
6	490	1,000	2,200	3,300	4,500	5,600	1022.1	1.066
8	375	750	1,600	2,500	3,300	4,200	769.01	1.0558
10	300	700	1,300	2,000	2,750	3,450	645.84	1.0424
12	250	550	1,100	1,700	2,250	2,800	531.04	1.0453
14	225	450	900	1,400	1,850	2,250	452.07	1.0089

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



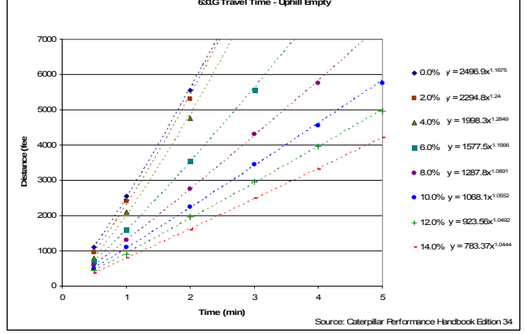
Source: Caterpillar Performance Handbook Edition 34

631G Scraper Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,100	2,550	5,550				2496.9	1.1675
2	950	2,400	5,300				2294.8	1.24
4	800	2,100	4,750				1998.3	1.2849
6	700	1,600	3,550	5,550			1557.5	1.1566
8	600	1,300	2,750	4,300	5,750		1287.8	1.0891
10	500	1,100	2,250	3,450	4,550	5,750	1068.1	1.0552
12	450	900	1,950	2,950	3,950	4,950	923.56	1.0492
14	375	800	1,600	2,500	3,300	4,200	783.37	1.0444

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

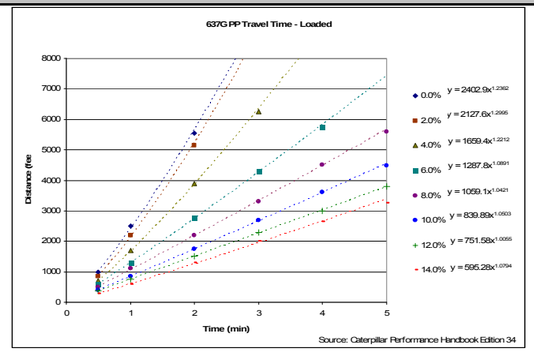
Productivity - Scrapers (cont.)

637G Push-Pull Scraper Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,000	2,500	5,550				2402.9	1.2362
2	850	2,200	5,150				2127.6	1.2995
4	700	1,700	3,900	6,250			1659.4	1.2212
6	600	1,300	2,750	4,300	5,750		1287.8	1.0891
8	500	1,100	2,200	3,300	4,500	5,600	1059.1	1.0421
10	400	850	1,750	2,700	3,600	4,475	839.89	1.0503
12	375	750	1,500	2,300	3,000	3,800	751.58	1.0055
14	275	600	1,300	2,000	2,650	3,250	595.28	1.0794

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



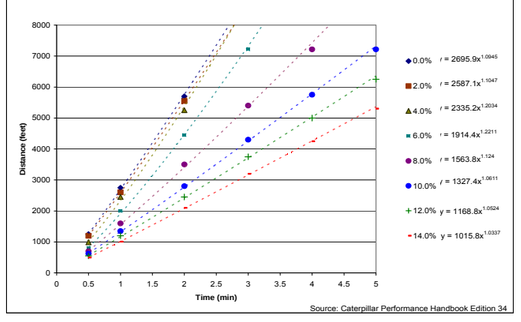
Source: Caterpillar Performance Handbook Edition 34

637G Push-Pull Scraper Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,250	2,750	5,700				2695.9	1.0945
2	1,200	2,600	5,550				2587.1	1.1047
4	990	2,450	5,250				2335.2	1.0234
6	800	2,000	4,450	7,216			1914.4	1.2211
8	700	1,600	3,500	5,400	7,216		1563.8	1.124
10	625	1,350	2,800	4,300	5,750	7,216	1327.4	1.0611
12	550	1,200	2,450	3,750	5,000	6,250	1168.8	1.0524
14	495	1,010	2,100	3,200	4,250	5,300	1015.8	1.0337

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Haul Trucks

Haul Truck Specifications

Description	769D	773E	777D	785C	793C	797B
Chassis Weight (lb)	53,506	70,330	113,160	170,000	259,500	473,600
Body Weight (lb)	17,350	20,300	34,785	36,788	70,785	104,200
Standard Liner Weight (lb)	7,000	8,600	12,040	16,846	24,418	8,800
Total Truck Weight (lb)	77,856	99,230	159,985	223,634	354,703	586,600
Payload Capacity (cy)						
Struck	21.6	34.8	55	78.5	126	228
Heaped	31.7	46	78.6	102	169	290
Average	26.65	40.4	66.8	90.25	147.5	259
Maneuver to Load Time (min)	0.7	0.7	0.7	0.7	0.7	0.7
Maneuver and Dump Time (min)	1.1	1.1	1.1	1.1	1.1	1.1
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5	2.5
Altitude Deration Factor	1	1	1	1	1	1

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials

Material	lb/cy	Truck (769D) Load lb	Truck (773E) Load lb	Truck (777D) Load lb
Alluvium	2,900	77,285	117,160	193,720
Basalt	3,300	87,945	133,320	220,440
Clay - Dry	2,500	66,625	101,000	167,000
Granite - broken	2,800	74,620	113,120	187,040
Gravel	2,550	67,958	103,020	170,340
LS - broken	2,600	69,290	105,040	173,680
LS - crushed	2,600	69,290	105,040	173,680
Sandstone	2,550	67,958	103,020	170,340
Shale	2,100	55,965	84,840	140,280
Stone - crushed	2,700	71,955	109,080	180,360
Tailings - Coarse (dry, loose sand)	2,400	63,960	96,960	160,320
Tailings - Slimes (loose sand & clay)	2,700	71,955	109,080	180,360
Topsoil	1,600	42,640	64,640	106,880

Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)

Material	769D Loaded Weight (lbs)	20	15	10	5	773E Loaded Weight (lbs)	20	15	10	5	777D Loaded Weight (lbs)	20	15	10	5
Alluvium	155,141	11	11	15	26	216,390	7	7	13	23	353,705	7	9	12	29
Basalt	165,801	11	11	11	20	232,550	7	7	13	23	380,425	7	7	12	21
Clay - Dry	144,481	11	11	15	26	200,230	7	9	13	23	326,985	7	9	16	29
Granite - broken	152,476	11	11	15	26	212,350	7	7	13	23	347,025	7	9	12	29
Gravel	145,814	11	11	15	26	202,250	7	9	13	23	330,325	7	9	16	29
LS - broken	147,146	11	11	15	26	204,270	7	9	13	23	333,665	7	9	12	29
LS - crushed	147,146	11	11	15	26	204,270	7	9	13	23	333,665	7	9	12	29
Sandstone	145,814	11	11	15	26	202,250	7	9	13	23	330,325	7	9	16	29
Shale	133,821	11	11	15	26	184,070	7	9	13	31	300,265	7	9	16	29
Stone - crushed	149,811	11	11	15	26	208,310	7	7	13	23	340,345	7	9	12	29
Tailings - Coarse (dry, loose sand)	141,816	11	11	15	26	196,190	7	9	13	23	320,305	7	9	16	29
Tailings - Slimes (loose sand & clay)	149,811	11	11	15	26	208,310	7	7	13	23	340,345	7	9	12	29
Topsoil	120,496	11	11	15	26	163,870	7	9	17	31	266,865	9	12	16	29
	Empty	15	15	26	36	Empty	13	17	23	42	Empty	16	16	29	39

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials

Material	lb/cy	Truck (785C) Load lb	Truck (793C) Load lb	Truck (797B) Load lb
Alluvium	2,900	261,725	427,750	751,100
Basalt	3,300	297,825	486,750	854,700
Clay - Dry	2,500	225,625	368,750	647,500
Granite - broken	2,800	252,700	413,000	725,200
Gravel	2,550	230,138	376,125	660,450
LS - broken	2,600	234,650	383,500	673,400
LS - crushed	2,600	234,650	383,500	673,400
Sandstone	2,550	230,138	376,125	660,450
Shale	2,100	189,525	309,750	543,900
Stone - crushed	2,700	243,675	398,250	699,300
Tailings - Coarse (dry, loose sand)	2,400	216,600	354,000	621,600
Tailings - Slimes (loose sand & clay)	2,700	243,675	398,250	699,300
Topsoil	1,600	144,400	236,000	414,400

Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)

Material	785C Loaded Weight (lbs)	20	15	10	5	793C Loaded Weight (lbs)	20	15	10	5	797B Loaded Weight (lbs)	20	15	10	5
Alluvium	485,359	8	8	14	27	782,453	7	7	10	17	1,337,700	7	7	9	17
Basalt	521,459	8	8	14	27	841,453	7	7	10	17	1,441,300	7	7	9	17
Clay - Dry	449,259	8	11	14	36	723,453	7	7	10	25	1,234,100	7	7	9	23
Granite - broken	476,334	8	8	14	27	767,703	7	7	10	17	1,311,800	7	7	9	17
Gravel	453,772	8	8	14	36	730,828	7	7	10	25	1,247,050	7	7	9	23
LS - broken	458,284	8	8	14	27	738,203	7	7	10	25	1,260,000	7	7	9	23
LS - crushed	458,284	8	8	14	27	738,203	7	7	10	25	1,260,000	7	7	9	23
Sandstone	453,772	8	8	14	36	730,828	7	7	10	25	1,247,050	7	7	9	23
Shale	413,159	8	11	14	36	664,453	7	7	10	25	1,130,500	7	7	13	23
Stone - crushed	467,309	8	8	14	27	752,953	7	7	10	17	1,285,900	7	7	9	23
Tailings - Coarse (dry, loose sand)	440,234	8	11	14	36	708,703	7	7	10	25	1,208,200	7	7	9	23
Tailings - Slimes (loose sand & clay)	467,309	8	8	14	27	752,953	7	7	10	17	1,285,900	7	7	9	23
Topsoil	368,034	8	11	19	36	590,703	7	10	13	25	1,001,000	7	9	13	23
	Empty	14	19	36	36	Empty	10	13	17	33	Empty	13	17	23	42

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

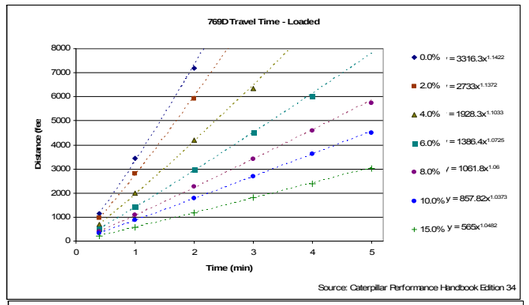
Productivity - Haul Trucks (cont.)

769D Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,148	3,428	7,183				3316.3	1.1422
4	689	1,984	4,198	6,330			1928.3	1.1033
6	508	1,427	2,952	4,510	6,002		1386.4	1.0725
8	394	1,082	2,263	3,411	4,592	5,740	1061.8	1.06
10	328	869	1,771	2,690	3,608	4,510	857.82	1.0373
15	213	574	1,181	1,804	2,394	3,018	565	1.0482

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35



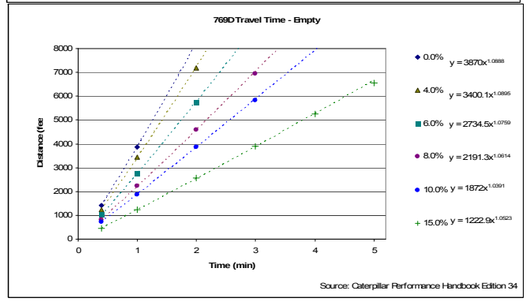
Source: Caterpillar Performance Handbook Edition 34

769D Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,427	3,870					3870	1.0888
4	1,246	3,444	7,183				3400.1	1.0895
6	1,017	2,755	5,740				2734.5	1.0759
8	820	2,230	4,592	6,954			2191.3	1.0614
10	722	1,870	3,870	5,838			1872	1.0391
15	459	1,246	2,558	3,903	5,248	6,560	1222.9	1.0523

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

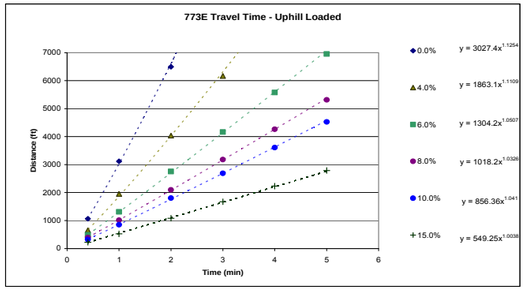
Productivity - Haul Trucks (cont.)

773E Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,066	3,117	6,496				3027.4	1.1254
4	656	1,952	4,035	6,168			1863.1	1.1109
6	492	1,312	2,756	4,167	5,577	6,955	1304.2	1.0507
8	394	1,017	2,100	3,182	4,265	5,315	1018.2	1.0326
10	328	853	1,804	2,690	3,609	4,528	856.36	1.041
15	226	525	1,083	1,673	2,231	2,789	549.25	1.0038

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

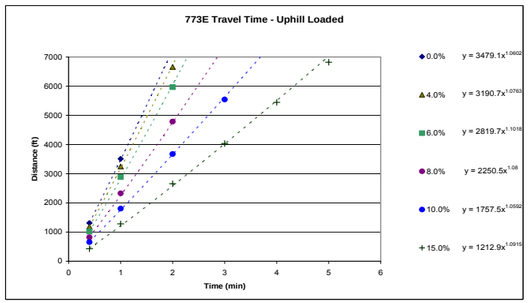


773E Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,312	3,510	7,218				3479.1	1.0602
4	1,181	3,248	6,660				3190.7	1.0763
6	1,017	2,887	5,971				2819.7	1.1018
8	820	2,329	4,790	7,218			2250.5	1.08
10	656	1,804	3,675	5,545			1757.5	1.0592
15	427	1,280	2,657	4,035	5,446	6,824	1212.9	1.0915

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

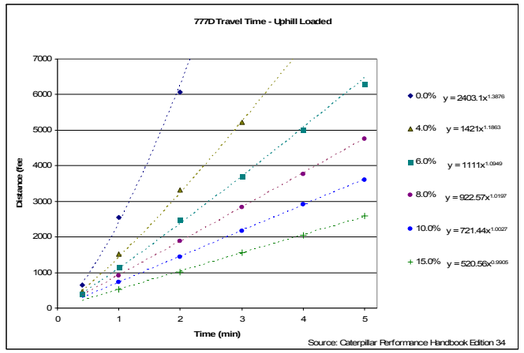
Productivity - Haul Trucks (cont.)

777D Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	656	2,558	6,068				2403.1	1.3876
4	459	1,509	3,313	5,215	7,085		1412	1.1863
6	394	1,148	2,460	3,706	5,018	6,298	1111	1.0949
8		918	1,886	2,837	3,772	4,756	922.57	1.0197
10		722	1,443	2,165	2,919	3,608	721.44	1.0027
15		525	1,017	1,558	2,034	2,591	520.56	0.9905

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



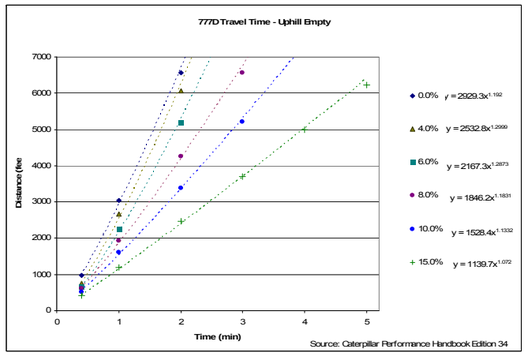
Source: Caterpillar Performance Handbook Edition 34

777D Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	968	3,034	6,560				2929.3	1.192
4	754	2,657	6,068				2532.8	1.2999
6	656	2,247	5,182				2167.3	1.2873
8	607	1,935	4,248	6,560			1846.2	1.1831
10	525	1,607	3,378	5,215	7,282		1528.4	1.1332
15	410	1,197	2,460	3,706	4,986	6,232	1139.7	1.072

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

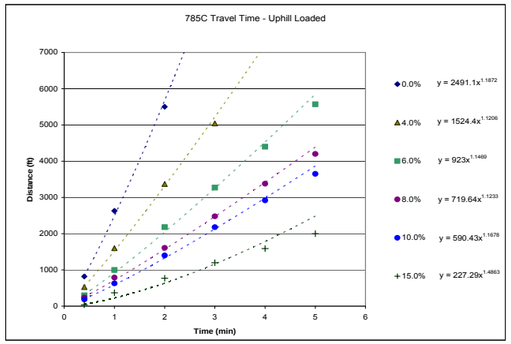
Productivity - Haul Trucks (cont.)

785C Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	820	2,630	5,500				2491.1	1.1872
4	530	1,600	3,370	5,040			1524.4	1.1206
6	300	1,000	2,180	3,270	4,400	5,570	923	1.1469
8	240	790	1,610	2,480	3,380	4,200	719.64	1.1233
10	190	630	1,400	2,180	2,920	3,650	590.43	1.1678
15	40	370	770	1,200	1,590	2,000	227.29	1.4863

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35

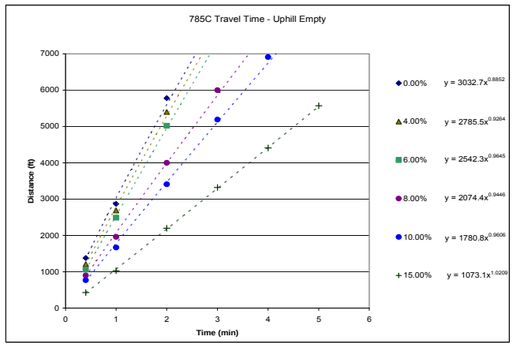


785C Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,380	2,870	5,780				3032.7	0.8852
4	1,210	2,690	5,400				2785.5	0.9264
6	1,060	2,490	5,020				2542.3	0.9645
8	900	1,960	4,000	6,000			2074.4	0.9446
10	770	1,670	3,410	5,190	6,910		1780.8	0.9606
15	430	1,030	2,200	3,320	4,410	5,570	1073.1	1.0209

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

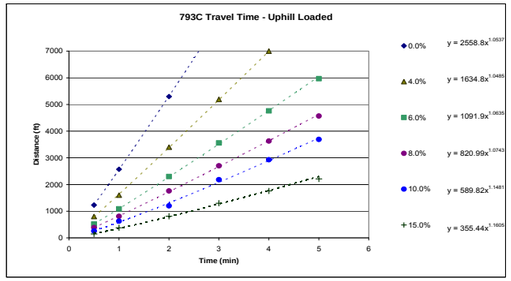
Productivity - Haul Trucks (cont.)

793C Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,230	2,570	5,300				2558.8	1.0537
4	800	1,600	3,400	5,190	7,000		1634.8	1.0485
6	520	1,090	2,300	3,560	4,760	5,970	1091.9	1.0635
8	390	810	1,760	2,700	3,630	4,570	820.99	1.0743
10	260	630	1,200	2,180	2,930	3,690	589.82	1.1481
15	150	380	810	1,300	1,760	2,210	355.44	1.1605

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

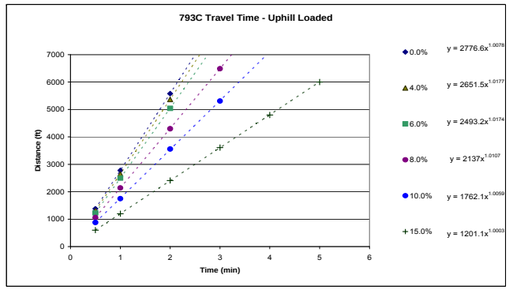


793C Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,380	2,780	5,580				2776.6	1.0078
4	1,310	2,650	5,370				2651.5	1.0177
6	1,230	2,500	5,040				2493.2	1.0174
8	1,060	2,140	4,300	6,490			2137	1.0107
10	880	1,750	3,560	5,310			1762.1	1.0059
15	600	1,200	2,410	3,610	4,800	6,000	1201.1	1.0003

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

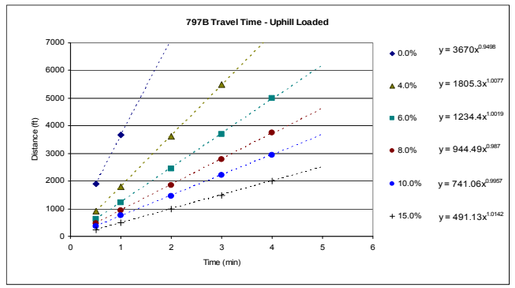
Productivity - Haul Trucks (cont.)

797B Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,900	3,670					3670	0.9498
4	900	1,800	3,620	5,480			1805.3	1.0077
6	620	1,230	2,450	3,700	5,000		1234.4	1.0019
8	480	940	1,850	2,790	3,750		944.49	0.987
10	370	750	1,460	2,220	2,950		741.06	0.9957
15	240	500	1,000	1,480	2,000		491.13	1.0142

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

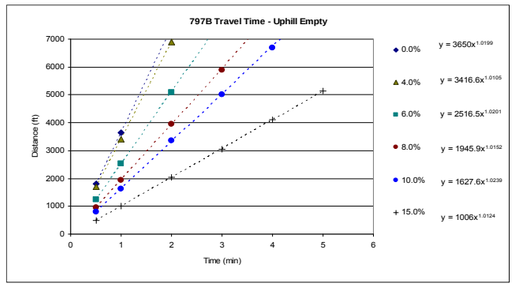


797B Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,800	3,650					3650	1.0199
4	1,700	3,400	6,900				3416.6	1.0105
6	1,240	2,520	5,100				2516.5	1.0201
8	960	1,950	3,960	5,900			1945.9	1.0152
10	800	1,620	3,350	5,000	6,700		1627.6	1.0239
15	500	1,000	2,040	3,050	4,100	5,130	1006	1.0124

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Articulated Trucks

Articulated Truck Specifications

Description	725	730	735	740
Chassis Weight (lb)				
Body Weight (lb)				
Standard Liner Weight (lb)				
Operating Weight (Empty) (lb)	50,120	51,220	65,830	72,070
Payload Capacity (cy)				
Struck	14.5	17.1	19.3	23.3
Heaped	18.8	22.1	31.8	30.2
Average	16.65	19.6	25.55	26.75
Maneuver to Load Time (min)	0.7	0.7	0.7	0.7
Maneuver and Dump Time (min)	1.1	1.1	1.1	1.1
Job Efficiency	0.83	0.83	0.83	0.83
Rolling Resistance**	2.5	2.5	2.5	2.5
Altitude Deration Factor	1	1	1	1

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials				Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)									
				725					730				
Material	lb/cy	Truck (725) Load lb	Truck (730) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	2,900	48,285	56,840	98,405	9	9	13	30	108,060	5	8	13	29
Basalt	3,300	54,945	64,680	105,065	5	9	13	22	115,900	5	8	13	29
Clay - Dry	2,500	41,625	49,000	91,745	9	13	13	30	100,220	8	8	13	29
Granite - broken	2,800	46,620	54,880	96,740	9	13	13	30	106,100	5	8	13	29
Gravel	2,550	42,458	49,980	92,578	9	13	13	30	101,200	8	8	13	29
LS - broken	2,600	43,290	50,960	93,410	9	13	13	30	102,180	8	8	13	29
LS - crushed	2,600	43,290	50,960	93,410	9	13	13	30	102,180	8	8	13	29
Sandstone	2,550	42,458	49,980	92,578	9	13	13	30	101,200	8	8	13	29
Shale	2,100	34,965	41,160	85,085	9	13	22	30	92,380	8	13	13	29
Stone - crushed	2,700	44,955	52,920	95,075	9	13	13	30	104,140	8	8	13	29
Tailings - Coarse (dry, loose sand)	2,400	39,960	47,040	90,080	9	13	13	30	98,260	8	8	13	29
Tailings - Slimes (loose sand & clay)	2,700	44,955	52,920	95,075	9	13	13	30	104,140	8	8	13	29
Topsoil	1,600	26,640	31,360	76,760	9	13	22	30	82,580	8	13	22	35
				Empty	13	13	22	30	Empty	13	13	22	35

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials				Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)									
				735					740				
Material	lb/cy	Truck (735) Load lb	Truck (740) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	2,900	74,095	77,575	139,925	7	9	13	27	149,645	7	9	17	23
Basalt	3,300	84,315	88,275	150,145	7	9	13	27	160,345	7	9	13	23
Clay - Dry	2,500	63,875	66,875	129,705	7	9	13	27	138,945	9	13	17	31
Granite - broken	2,800	71,540	74,900	137,370	7	9	13	27	146,970	7	9	17	23
Gravel	2,550	65,153	68,213	130,983	7	9	13	27	140,283	7	9	17	31
LS - broken	2,600	66,430	69,550	132,260	7	9	13	27	141,620	7	9	17	31
LS - crushed	2,600	66,430	69,550	132,260	7	9	13	27	141,620	7	9	17	31
Sandstone	2,550	65,153	68,213	130,983	7	9	13	27	140,283	7	9	17	31
Shale	2,100	53,655	56,175	119,485	9	9	18	27	128,245	7	13	17	31
Stone - crushed	2,700	68,985	72,225	134,815	7	9	13	27	144,295	7	9	17	23
Tailings - Coarse (dry, loose sand)	2,400	61,320	64,200	127,150	7	9	13	27	136,270	9	13	17	31
Tailings - Slimes (loose sand & clay)	2,700	68,985	72,225	134,815	7	9	13	27	144,295	7	9	17	23
Topsoil	1,600	40,880	42,800	106,710	9	13	18	36	114,870	9	13	17	31
				Empty	13	18	27	42	Empty	17	17	23	31

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

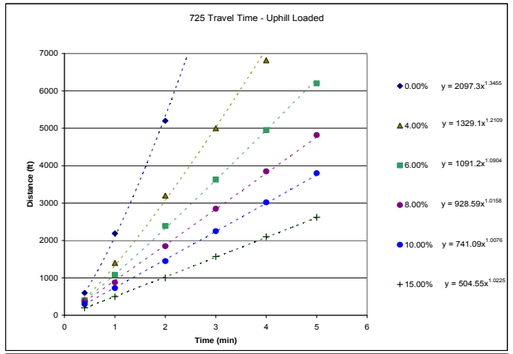
Productivity - Articulated Trucks (cont.)

725 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	600	2,190	5,200				2097.3	1.3455
4	420	1,400	3,200	5,000	6,820		1329.1	1.2109
6	400	1,080	2,390	3,630	4,950	6,200	1091.2	1.0904
8	380	880	1,850	2,850	3,850	4,820	928.59	1.0158
10	300	729	1,450	2,250	3,020	3,800	741.09	1.0076
15	200	500	1,000	1,570	2,100	2,620	504.55	1.0225

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35

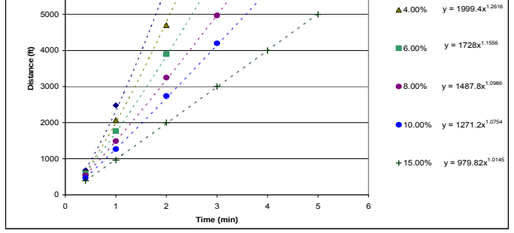


725 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	680	2,480	5,570				2326.3	1.3122
4	620	2,070	4,700				1999.4	1.2616
6	590	1,770	3,900	6,020			1728	1.1556
8	540	1,490	3,250	4,970	6,730		1487.8	1.0986
10	470	1,270	2,740	4,200	5,600	7,050	1271.2	1.0754
15	390	960	2,000	3,000	4,000	5,000	979.82	1.0145

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

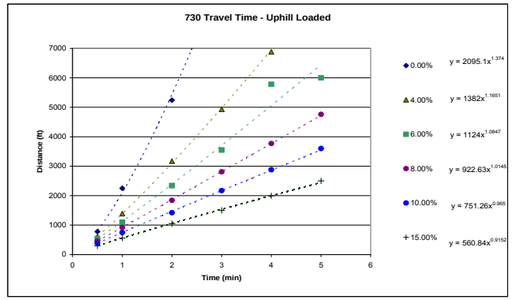
Productivity - Articulated Trucks (cont.)

730 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	780	2,250	5,240				2095	1.374
4	610	1,390	3,170	4,930	6,880		1382	1.1651
6	540	1,100	2,340	3,550	5,780	6,000	112	1.0847
8	460	920	1,840	2,810	3,770	4,760	922.63	1.0145
10	390	750	1,420	2,170	2,880	3,600	751.26	0.965
15	300	560	1,050	1,500	1,995	2,500	560.84	0.9152

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35

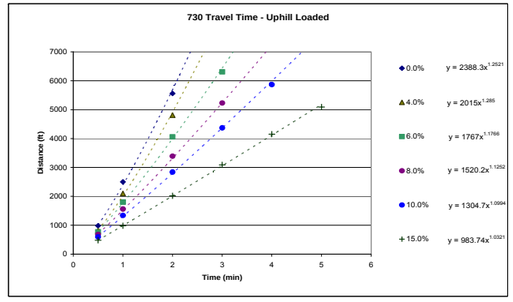


730 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	980	2,500	5,560				2388	1.25621
4	810	2,100	4,810				2015	1.285
6	770	1,800	4,060	6,310			1767	1.1766
8	680	1,560	3,390	5,230	7,070		1520.2	1.1252
10	595	1,340	2,840	4,370	5,870		1304.7	1.0994
15	480	980	2,020	3,090	4,150	5,090	983.74	1.0321

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

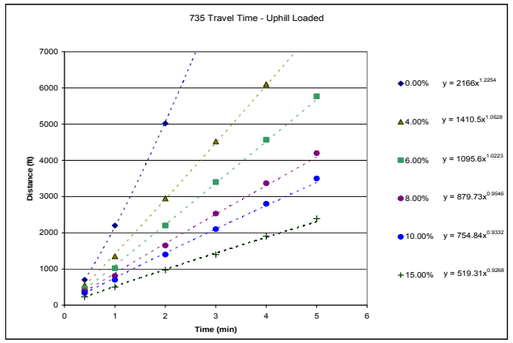
Productivity - Articulated Trucks (cont.)

735 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	700	2,200	5,020				2166	1.2254
4	550	1,350	2,950	4,520	6,100		1410.5	1.0528
6	450	1,020	2,200	3,400	4,570	5,770	1095.6	1.0223
8	390	810	1,650	2,530	3,370	4,200	879.73	0.9546
10	340	700	1,400	2,100	2,800	3,500	754.84	0.9332
15	230	500	970	1,400	1,900	2,390	519.31	0.9268

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35

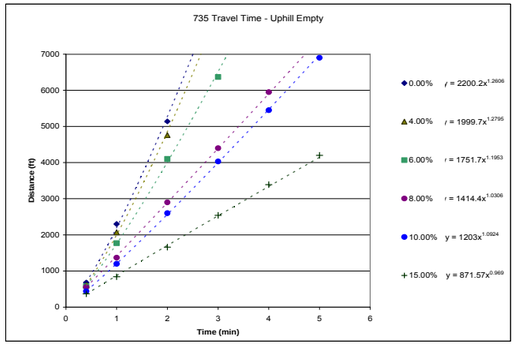


735 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	680	2,300	5,140				2200.2	1.2606
4	610	2,070	4,760				1999.7	1.2795
6	580	1,770	4,100	6,370			1751.7	1.1953
8	560	1,370	2,900	4,400	5,950		1414.4	1.0306
10	440	1,200	2,600	4,030	5,450	6,900	1203	1.0924
15	370	840	1,660	2,540	3,390	4,200	871.57	0.969

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

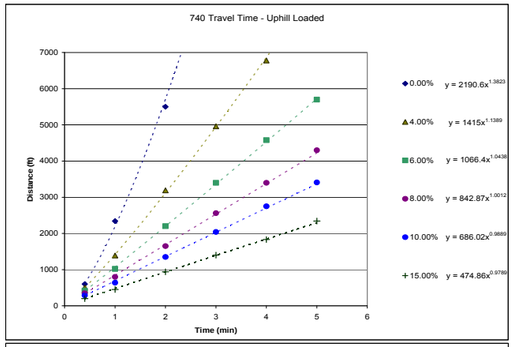
Productivity - Articulated Trucks (cont.)

740 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	600	2,340	5,500				2190.6	1.3823
4	500	1,390	3,190	4,960	6,780		1415	1.1389
6	420	1,020	2,200	3,400	4,580	5,700	1066.4	1.0438
8	350	800	1,650	2,560	3,400	4,300	842.87	1.0012
10	290	640	1,350	2,040	2,750	3,410	686.02	0.9889
15	200	450	940	1,400	1,830	2,340	474.86	0.9789

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35

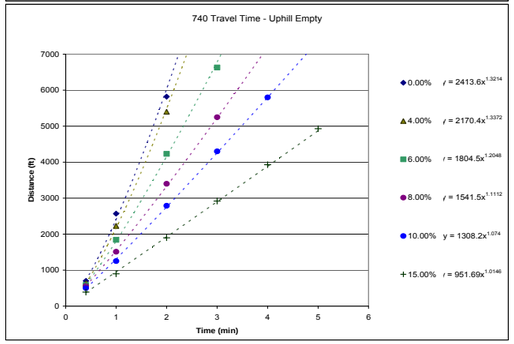


740 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	700	2,570	5,820				2413.6	1.3214
4	630	2,230	5,400				2170.4	1.3372
6	590	1,840	4,230	6,630			1804.5	1.2048
8	560	1,510	3,400	5,250	7,120		1541.5	1.1112
10	500	1,250	2,790	4,300	5,800		1308.2	1.074
15	390	900	1,900	2,920	3,930	4,930	951.69	1.0146

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Wheel Loaders

Wheel Loader Specifications

Description	924G	928G	950G	966G	972G	972G (2)	980G	988G	988G(2)	990	992G	992G(2)	994D	L2350
Payload Capacity (cy)														
Struck	2.2	2.5	3.46	4.46	4.71	4.71	6.34	6.9	6.9	9.5	13.2	13.2	18	
Heaped	2.7	3.25	4	5.25	5.5	5.5	7.25	8.33	8.33	11.25	16	16	22.5	
Average	2.45	2.875	3.73	4.855	5.105	5.105	6.795	7.615	7.615	10.375	14.6	14.6	20.25	53
Matched Truck	N/A	N/A	N/A	725	730	735	N/A	740	769D	773D	777D	785C	793C	797B
Average Cycle Time (min)	0.45	0.45	0.5	0.5	0.5	0.5	0.55	0.55	0.55	0.55	0.6	0.6	0.6	0.75
Passes to Fill Truck	N/A	N/A	N/A	3	4	5	N/A	4	3	4	5	6	7	5
Altitude Deration Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Operator Efficiency	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Time to Fill Truck	N/A	N/A	N/A	1.5	2	2.5	N/A	2.2	1.65	2.2	3	3.6	4.2	3.75
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Loader matched to small truck fleet
Loader matched to medium truck fleet
Loader matched to large truck fleet
Loader matched to extra large truck fleet

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered
992G (2) - can be used to load 785 with 6 passes

Source: Caterpillar Performance Handbook Edition 35; LeTourneau/actual Chilean mine operating data for L2350.

Wheeled Loaders	General Purpose	Spade Nose-Rock
928G	3.25 cubic yard	not available
966G	5.0 cubic yard	not available
972G	5.5 cubic yard	not available
988G	not available	8.3 cubic yard
992G	not available	16.0 cubic yard

note: capacities are 2:1 heaped, SAE standards
NOTES: Buckets for both Track Excavators and Wheel Loaders are offered by CECo & available for the rental rates quoted. Bucket sizes and capacities obtained from CATERPILLAR PERFORMANCE HANDBOOK, ED 34; Section 12, Wheel Loader and Section 4, Excavators

Bucket capacity and width dictated by material weight and configuration, ie., shot, loose, tight bank, stockpile, rock, etc. Typical Nevada applications were used to determine above bucket capacities as related to materials & densities. Job site specifics may alter specific bucket requirements. (Cashman Equipment, Elko, Nevada - February 21, 2005)

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Shovels

Shovel Specifications (Komatsu equivalent)

Description	PC2000	PC3000	PC4000	PC5500	PC8000
Payload Capacity (cy)					
Struck	10.46	18.84	26.16	33.48	47.09
Heaped	14.39	25.9	35.97	46.04	64.75
Average	12.43	22.37	31.07	39.76	55.92
Matched Truck	740	777D	785C	793C	797B
Average Cycle Time (min)	0.49	0.49	0.59	0.59	0.69
Passes to Fill Truck	2.05	2.84	3.38	4.69	5.11
Altitude Deration Factor	1	1	0.9	1	1
Operator Efficiency	1	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83	0.83
Time to Fill Truck	1.68	2.33	3.32	4.61	5.86
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5

Shovel matched to small truck fleet
Shovel matched to medium truck fleet
Shovel matched to large truck fleet
Shovel matched to extra large truck fleet

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered
992G (2) - can be used to load 785 with 6 passes
Source: Caterpillar Performance Handbook Edition 35; Komatsu actual Peruvian mine (Lagunas Norte) operating data for PC4000.

Productivity - Motor Graders

Motor Grader Specifications

Description	120H	14G/H	16G/H	24M
Grader Width (ft)	8	9.25	10.08	14.04
Blade Width (ft)	12	14	16	16
Ripper Width (7 shanks) (ft)	7.6	8.5	9.75	12.83
Road Maintence Speed (mph)				
Minimum	3	3	3	3
Maximum	9.5	9.5	9.5	9.5
Average	6.25	6.25	6.25	6.25
Hourly Production	33,000	33,000	33,000	33,000
Ripping Speed (mph)	1	1	1	1
Minimum	0	0	0	0
Maximum	3	3	3	3
Average	1.5	1.5	1.5	1.5
Altitude Deration Factor	1	1	1	1
Hourly Production (with job efficiency correction & altitude deration factors) (excluding manuever time)	6,574	6,574	6,574	6,574
Maneuver time per pass (min)	0.5	0.5	0.5	0.5
Operator Efficiency	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Excavators

Track Excavator Specifications

Description	312C	320C	325C	330C	345B	365BL	385BL
Bucket Capacity (cy)	0.68	1.57	2.22	2.22	3	4.6	7.3
Fill Factor	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Average Bucket Load (cy)	0.612	1.413	1.998	1.998	2.7	4.14	6.57
Soil Type	packed earth	hard clay	hard clay	hard clay	hard clay	hard clay	hard clay
Job Condition	med-hard	med-hard	med-hard	med-hard	med-hard	med-hard	med-hard
Cycle Times (minutes) - based on hard clay							
Load Bucket	0.07	0.09	0.09	0.09	0.13	0.1	0.19
Swing Loaded	0.06	0.06	0.06	0.07	0.07	0.09	0.06
Dump Bucket	0.03	0.03	0.04	0.04	0.02	0.04	0.03
Swing Empty	0.05	0.05	0.06	0.07	0.06	0.07	0.07
Total Cycle Time	0.21	0.23	0.25	0.27	0.28	0.3	0.35
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Operator Efficiency	1	1	1	1	1	1	1
Altitude Deration Factor	1	1	1	1	1	1	1
Corrected Productivity (LCY/hr)	145	306	398	369	480	687	935
Exploration Road Cycle Time [1] (min)	N/A	0.38	0.4	N/A	0.42	N/A	N/A
Exploration Road Corr Prod (LCY/hr)	N/A	185	249	N/A	320	N/A	N/A
Track Width (ft)	8.17	9.17	9.83	10.5	11.42	11.5	11.5
Ditch/Trench Excavation							
Bucket Capacity (cy)	0.42	0.58	0.88	0.89	2.09	3.27	2.75
Fill Factor	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Corrected Productivity (LCY/hr)	50	63	88	82	186	271	196

Source: Caterpillar Performance Handbook Edition 35

Track Excavators	Hvy Duty Rock	Extreme Service Exc (e.g. haulroad recontour)	Hvy Duty Trench
312C	30", 0.68 cubic yd	47", 0.94 cubic yd	22", .42 cubic yd
320C	30", 0.90 cubic yd	55.1", 1.57 cubic yd	23.6", .58 cubic yd
325C	36", 1.25 cubic yd	60", 2.22 cubic yd	30", .88 cubic yd
330C	36", 1.25 cubic yd	60", 2.22 cubic yd	30", .89 cubic yd
345B	43.2", 1.69 cubic yd	65", 3.0 cubic yd	48", 2.09 cubic yd
365BL	60", 3.25 cubic yd	82", 4.6 cubic yd	59", 3.27 cubic yd
385BL	85", 6.30 cubic yd.	96.0, 7.30 cubic yd	57", 2.75 cubic yd

Note: capacities are 2:1 heaped, SAE standards
NOTES: Buckets for both Track Excavators and Wheel Loaders are offered by CECo &

available for the rental rates quoted. Bucket sizes and capacities obtained from CATERPILLAR PERFORMANCE HANDBOOK, ED 34, Section 12, Wheel Loader and Section 4, Excavators
Bucket capacity and width dictated by material weight and configuration, ie., shot, loose, tight bank, stockpile, rock, etc. Typical Nevada applications were used to determine above bucket capacities as related to materials & densities. Job site specifics may alter specific bucket requirements (Cashman Equipment, Elko, Nevada - February 21, 2005)

(1) Exploration cycle time assumes feathering/smoothing performed by excavator

Concrete Breaking Production

Track Excavator w/Hammer Specifications

Description	325C	345B	385BL
Hydraulic Hammer	H120D s	H160D s	H180D s
Material	reinforced concrete		
Min Shift Production (yd3/8hr)	160	300	350
Max Shift Production (yd3/8hr)	300	850	1,550
Avg Shift Production (8hr)	230	575	950
Job Efficiency	0.83	0.83	0.83
Altitude Deration Factor	1	1	1

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Drill Hole Plugging Productivity

Drill Hole Plugging Productivity

Description	Drill Rig	Pump Rig
Move-to-hole, set-up, tear-down [1]	2	2
Trip in tremmie pipe [1]	500	
Pulling casing (threaded, not cemented)	200	
Single-pass perforating (water wells)	Productivity(all p	Passes
4	60	4
6	60	4
8	50	4
12	45	6
18	40	9
24	28	12
Perforation setup,trip in/out,tear-down	2	
Perforation tool cost (wear cost) [2]	2.5	
Inert Material Placement (backfill)		
Grouting/Cement [3] (cy/hr)		5.33
Cuttings (see below) (cy/hr)		3.5

Sources:
1. Drillers daily logs from Newmont, Barrick, New West Gold, Agnico Eagle, Idaho General Mines Inc.
2. Drillers daily logs from Newmont, Barrick, Target Minerals
3. Drillers daily logs from Newmont
4. WDC Exploration, Dec 2005

Sournce: WDC Exploration, Dec 2005

Cuttings Placement Productivity

Shift productivity (Means 02210-700-0120; Crew B11M)	28	cy / shift
Shift length	8	hours
Estimated Hourly Productivity	3.5	cy / hour

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
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Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Altitude Deration Table

	Elevation											
	0-760 m (0-2500')		760-1500 m (2500-5000')		1500-2300 m (5000-7000')		2300-3000 m (7500-10,000')		3000-3800 m (10,000-12,000')		3800-4600 m (12,500-15,000')	
MODEL	CAT	User	CAT	User	CAT	User	CAT	User	CAT	User	CAT	User
Bulldozers												
D6R	100		100		100		100		92		84	
D6R w/ Winch	100		100		100		100		92		84	
D7R	100		100		100		100		100		96	
D8R	100		100		100		93		85		77	
D9R	100		100		100		93		85		77	
D10R	100		100		100		100		97		89	
D11R	100		100		100		93		85		77	
Wheeled Dozers												
824G	100		100		100		100		92		84	
834G	100		100		100		100		92		84	
844	100		100		100		100		100		96	
854G	100		100		100		93		85		77	
Graders												
120H	100		100		100		100		96		93	
14G/H	100		100		100		100		98		96	
16G/H	100		100		100		100		98		96	
24M	100		100		100		100		98		96	
Excavators												
312C	100		100		100		83		78		73	
320C	100		100		90		87		83		76	
325C	100		100		100		100		100		100	
330C	100		100		100		100		100		100	
345B	100		100		100		100		93		93	
365BL	100		100		100		86		86		86	
385BL	100		100		100		93		85		78	
Scrapers												
631G	100		100		100		100		97		90	
637G	100		100		100		95		87		80	
Loaders												
924G	100		100		100		100		97		89	
928G	100		100		100		100		92		85	
950G	100		100		100		100		100		100	
966G	100		100		100		100		96		88	
972G	100		100		92		84		77		70	
980G	100		100		100		100		96		88	
988G	100		100		100		95		85		75	
990	100		100		100		100		92		85	
992G	100		100		100		100		93		87	
994D	100		100		100		100		96		88	
L2350	100		100		100		100		96		90	
Shovels												
PC2000	100		100		100		100		96		90	
PC3000	100		100		100		100		96		90	
PC4000	100		100		100		100		96		90	
PC5500	100		100		100		100		96		90	
PC8000	100		100		100		100		96		90	
Other Equipment												
420D 4WD Backhoe	99		97		95		91		91		91	
428D 4WD Backhoe	99		97		95		91		91		91	
CS533E Vibratory Roller	100		100		98		95		91		86	
CS633E Vibratory Roller	100		100		100		100		91		86	
CP533E Sheepsfoot Compactor	100		100		98		95		91		100	
CP633E Sheepsfoot Compactor	100		100		100		100		91		86	
Light Truck - 1.5 Ton												
Supervisor's Truck												
Flatbed Truck												
Air Compressor + tools												
Welding Equipment												
Heavy Duty Drill Rig												
Pump (plugging) Drill Rig												
Concrete Pump												
Gas Engine Vibrator												
Generator 5KW												
HDEP Welder (pipe or liner)												
5 Ton Crane												
20 Ton Crane												
50 Ton Crane												
120 Ton Crane												
Trucks												
725	100		100		100		100		100		95	
730	100		100		100		100		100		95	
735	100		100		100		100		99		91	
740	100		100		100		100		99		91	
769D	100		100		100		93		88		82	
773E	100		100		100		100		93		85	
777D	100		100		100		100		93		87	
785C	100		100		100		93		86		80	
793C	100		100		100		100		100		93	
797B	100		100		100		100		100		93	
613E (5,000 gal) Water Wagon	100		100		100		100		95		87	
621E (8,000 gal) Water Wagon	100		100		100		100		97		90	
777D Water Truck	100		100		100		100		93		87	
785C Water Truck	100		100		100		93		86		80	
Dump Truck (10-12 yd^3) (5)												

Notes:
User entered deration value will override values from CAT Performance Handbook, except L2350 Loader: data from actual mine performance in Chile.
Komatsu altitude deration assumed from LeTourneau L2350

Closure Cost Estimate
User 1

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Haul distances	
OSLA stockpile to:	ft
Cat 1 stockpile	9,973
East pit	8,782
Cat 2/3 stockpile	7,988
Cat 4 stockpile	6,304
Source: Haul Distances_rev_20160616.pdf	

From	Starting Elevation	To	End	Total Length
Liner	1610	East Pit	1620	7554
Cat. 4	1610	East Pit	1620	4611
Cat. 2/3	1600	East Pit	1620	9039

Closure Cost Estimate
User 2

:t NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
)tember, 2016
onstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
n 1.4.1

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urety Cost Basis: Polymet

Structure Demolition
Demo Data Needed rev 15 Universal Waste Cost Updates.xlsx

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates					Mavo	Arrowhead Consulting & Testing		
Scope of Work Description	Demo Specification Section Number	Reference Information / Drawings	Miscellaneous	Universal Waste Collection	Galbestos Removal	Demolition	Site Restoration	Asbestos Lead Paint Mold	Pre - Demo Building Inspection	Subtotal	Construction Year 2
Pre-Demolition Services			$54,400								
Legacy - demoed as part of construction											
Additive Building & Heating Plant						$1,593,300.00		Included in Lakehead's total demo		$1,593,300	
Bentonite silos	8.1.14					inc in above		n/a		$0	
Area 2 Water Tower (price separate from Heating & Additives buildings)	8.1.29					$30,000.00	$2,500.00	n/a		$32,500	
Legacy Tailings Basin Buildings - Demoed as part of construction										$0	
Foreman's Office (Bldg. 718)	8.1.28	No ACT report				$9,350	$400	$6,500	$1,100	$17,350	
Reporting Building (Bldg. 719)	8.1.28	No ACT report				$9,900	$400	$6,500	$1,100	$17,900	
Lube House (Bldg. 720)	8.1.28	No ACT report				$2,500	$400	$2,500	$850	$6,250	
Reporting Building (Bldg. 724)	8.1.28	No ACT report				$3,300	$400	$2,500	$900	$7,100	
Lube Oil Building (Bldg. 725)	8.1.28	No ACT report				$2,500	$400	$2,500	$850	$6,250	
										$0	
										$0	
Legacy Area 1 - used by project											
Area 1 Shop and Truck Storage (Bldg. 220)	8.1.6	ACT Report Zone H		$2,900.00	$106,900	$103,332	$74,669	$82,500		$370,301	x
Area 1 Cold Storage (Bldg. 221)	8.1.6	ACT Report Zone H		$400.00	$48,970	$10,860	$13,400	$5,000		$78,630	x
Area 1 Reporting Building (Bldg. 231)	8.1.6	No ACT report				$9,900		$5,000	$850	$15,750	x
Area 1 Boiler House (Bldg. 226)	8.1.6	ACT Report Zone H		$200.00	$13,500	$9,875	$3,000	$2,500		$29,075	x
Area 1 Fire Pump House & Water Tank (Bldg. 228)	8.1.6	TE-8-142 and TE-8-144, ACT Report Zone H		$410.00		$11,250		$2,500		$14,160	x
Area 1 Locomotive Fueling	8.1.6	ACT Report Zone H		$500.00	$22,500	$10,100	$6,250	n/a		$39,350	x
										$0	x
Legacy Area 2 - used by project											
Area 2 Service Shop (Bldg. 201)	8.1.7	ACT Report Zone I		$2,200.00	$160,900	$38,990	$37,334	$93,050		$332,474	x
Area 2 Truck Storage (Bldg. 202)	8.1.7	ACT Report Zone I		$2,000.00	$63,190	$9,175	$13,988	$3,000		$91,353	x
Area 2 Cold Storage (204)	8.1.7	ACT Report Zone I		$697.00	$42,560	$13,080	$14,100	$3,000		$73,437	x
Area 2 Shop Locomotive Service Shop (Bldg. 203)	8.1.7	ACT Report Zone I		$3,400.00	$20,500	$12,300	$11,113	$52,150		$99,463	x
Area 2 Locomotive Fueling	8.1.7	ACT Report Zone I		$2,000.00	$20,900	$11,800	$6,250	$2,500		$43,450	x
Hose House (Bldg. 209) Not to be used in project	8.1.7	No ACT report			$3,000	$9,150		$2,500	$850	$15,500	x
Sample House (Bldg. 208) Not to be used in project	8.1.7	No ACT report			$25,400	$20,300		$5,000	$950	$51,650	x
Reporting Building (Bldg. 425) Not to be used in project	8.1.7	No ACT report			$3,300	$9,200		$3,500	$850	$16,850	x
Legacy Plant Area - used by project											
Rebuild Shop (Bldg 602)	8.1.9	ACT Report Zone A		$3,000.00	$70,200	$125,600	$27,560	$85,000		$311,360	x
General Shop (Bldg. 601) Includes Acetylene Building (Bldg.604)	8.1.8	ACT Report Zone A		$15,000.00	$199,190	$353,600	$182,300	$480,800		$1,230,890	x
Carpenter Shop (Bldg. 603)	8.1.21	ACT Report Zone A		$2,000.00	$10,200	$13,250	$3,300	$2,500		$31,250	x
Coarse Crusher	8.1.1			$10,000.00	$313,345	$1,551,800	$593,890	$1,070,618		$3,539,653	x
Drive House 1 conv and housings	8.1.2	Drive Houses 1 & 2 and conveyors are all considered	$133,200	$7,500.00	$165,569	$141,540	$46,900	incl. in above		$494,709	x
Drive House 2 inc conv and housings	8.1.3	to be one structure for demo purposes.	inc in above		inc in above	inc in above	inc in above	incl. in Fines Crusher		$0	x
Fine Crusher	8.1.4			$45,000.00	$302,430	$1,373,460	$203,400	$439,686		$2,363,976	x
Warehouse 49 (Bldg. 920)	8.1.16	ACT Report Zone A		$6,500.00	$27,586	$82,800	$15,947	$49,000		$181,833	x
Warehouse 45 (Bldg. 921, Electrical)	8.1.15	ACT Report Zone A		$2,500.00	$35,159	$72,700	$15,947	$13,500		$139,806	x
Lube House (Bldg. 926)	8.1.10	ACT Report Lubricant Storage Building		$578.00	$17,000	$20,550	$7,385	$52,000		$97,513	x
Rubber Shop (Bldg. 605)	8.1.26	ACT Report Rubber Storage Building		$1,000.00	$30,464	$36,550	$11,269	$24,000		$103,283	x
Concentrator Building and Thickeners	8.1.5 AND 8.1.25			$100,000.00	$1,248,260	$5,895,850	$1,145,998	$1,535,236		$9,925,344	x
A-Lab	8.1.11			$500.00	$9,400	$14,560	$2,940	included in Concentrator		$27,400	x
Hinsdale Bridge	8.1.24			$0.00	$16,700	$616,300	$15,200	n/a		$648,200	x
Water Reservoir	8.1.12			$5,000.00		$98,100	$914,400	n/a		$1,017,500	x
Plant Site Water Tower	8.1.12	TG-7-005, Similar to Area 2 water tower				$30,000	$2,500	n/a		$32,500	x
Water Treatment Plant & Storage Tanks	8.1.27	TG-6-021		$1,000.00	$20,000	$72,600	$2,250	$45,000		$140,850	x
Colby Pump House	8.1.13				$41,000	$8,260	$1,500	$2,500	$1,000	$54,260	x
Administration Building	8.1.17			$3,900.00		$157,935	$18,200	$850,000		$1,030,035	x
Main Gate	8.1.18			$100.00		$11,400	$875	$5,000	$900	$18,275	x
Booster Pump House #1	8.1.19			$300.00		$23,500	$9,200	included in Concentrator		$33,000	x
Sewage Treatment Plant	8.1.20	No ACT report		$0.00		$62,700	$19,520	$5,000	$900	$88,120	x
Portable Pump Houses	8.1.22	No ACM materials - See Dwg. TB-7-095		$0.00		$9,890	$3,400	n/a		$13,290	x
Return Water Barge	8.1.23	No ACT report		$0.00		$44,900		$5,000	$1,300	$51,200	x
General Infrastructure (railroads, tunnels, roadways, etc)						$4,988,921	$1,504,000			$6,492,921	x
Railroads	8.2.5	Figure 7 and Krech & Ojard Dwg. C1		$0.00		$380,000				$380,000	x
Tunnels (Service & Electrical)	8.2.2	TJ-63		$0.00		$1,856,000		$2,127,767		$3,983,767	x
Galleries	8.2.2	Was estimated as a portion of the concentrator						included in Concentrator		$0	x
Sanitary Systems and Wells	8.2.1					$17,500	included in associated areas			$17,500	x
Pipelines				$0.00		$2,190,000	$591,000			$2,781,000	x
Colby Lake water supply	8.2.2					$900,000	$98,000			$998,000	x
Inter pit pipeline	8.2.2					$562,000				$562,000	x
Natural Gas line	8.2.2					$150,000				$150,000	x
Tailings management above ground	8.2.2					$378,000				$378,000	x
Tailings management underground						$200,000				$200,000	x
Power Lines	8.2.3	Figures 5 & 5.1		$0.00		$97,810.00				$97,810	x
Roads and Parking Lots	8.2.6	Figure 9		$0.00		$465,000	$195,000			$660,000	x

Closure Cost Estimate
User 2

:t NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
)tember, 2016
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urety Cost Basis: Polymet

New - Phase 1 - Plant Site											
Flotation Plant and Reagent Building	9.1.1			$75,000		$621,800	$147,600			$844,400	x
Concentrate Storage and Loadout Facility	9.1.2			$12,000		$273,760	$48,100			$333,860	x
Plant Site Sewage Treatment Plant	9.1.3	See Barr SOW 23 & Dwg. TL-2		$1,000.00		$118,000	$30,000			$149,000	x
Railroads	9.3.3	See Barr SOW 19		$0.00		$185,000	$111,000			$296,000	x
Pipelines	9.3.1	SOW 12 and 14		$0.00		$1,555,000	$375,000			$1,930,000	x
Power Lines	9.3.2	SK-11-255		$0.00						$0	x
Roads and Parking Lots	9.3.4			$0.00						$0	x
Plant Site Wastewater Treatment Plant (WWTP)	9.5.2	See Barr SOW 20		$0.00		$245,000				$245,000	x
New - Phase 1 - Mine Site											
Maintenance Service and Fueling Facility	9.2.1			$1,100		$19,210	$7,300			$27,610	x
Rail Transfer Hopper	9.2.2	See Barr SOW 15		$1,100.00		$40,000	$45,000			$86,100	x
Rail Transfer Hopper Control Bldg	9.2.2	See Barr SOW 15		$100.00		$18,600				$18,700	x
Rail Transfer Hopper Platform	9.2.2	See Barr SOW 15				$60,000				$60,000	x
Central Pumping Station	9.2.3	See Barr SOW 7		$500.00		$14,000	$1,200			$15,700	x
Railroads	9.2.4	See Barr SOW's 16, 17, 18		$0.00		$45,000	$33,750			$78,750	x
Pipelines	9.3.1	See Barr SOW'S 05, 06, and 08		$0.00		$580,133	$217,000			$797,133	x
Power Lines	9.3.2	See Barr SOW 13		$0.00		$83,900				$83,900	x
Roads and Parking Lots	9.3.4	See Barr SOW 1		$0.00		$392,000	$132,000			$524,000	x
Mine Site Wastewater Treatment Facility (WWTF)	9.5.1	See Barr SOW 06		$0		$498,000	$14,000			$512,000	x
New - Phase 2											
Reagent Building	9.4.1	Bldg. Dims: 270' x 85' x 75' tall		$15,000.00		$820,000	$4,100			$839,100	
Oxygen Plant	9.4.1	310' x 310' x 75' tall		$65,000.00		$4,238,600	$16,600			$4,320,200	
Limestone Preparation	9.4.1	125' x 70' x 60' tall		$7,500.00		$345,000	$1,750			$354,250	
Hydrometallurgical Plant	9.4.1	525' x 144' x 90' tall		$49,000.00		$4,365,000	$13,500			$4,427,500	
Hydrometallurgical Reagents	9.4.1	144' x 90' x 90' tall		$15,000.00		$815,000	$2,200			$832,200	
Railroads	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00						$0	
Pipelines	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$1,450,000				$1,450,000	
Power Lines	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00						$0	
Roads and Parking Lots	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$156,000	$59,225			$215,225	

$ 45,548,841

Closure Cost Estimate
User 2

NorthMet Contingency Reclamation Estimate

9/4/2014

Above Ground Storage Tanks

Name	Tank #	Fluid	Gallons	Location	Fluid Removal/ Disposal	Demolition/ Removal	Asbestos Lead Paint	Site Restoration	~~Assets Recovery~~	Notes	Subtotal	Construction Year 2
Legacy - Area 1 Shop					$0	$24,100	$0	$3,000		**to Demo tab**		
Portable tank on skids (silver)	048	Fuel Oil	1,800	E of Area 1 Shop		$600				Out of Service - Disconnected, Labeled lube oil, Silver tank	$ 600.00	x
Storage Tank	080		20,000	Area 1 - South of Rail Road Grade		$1,000				BASIS: Costs based on conceptual plan, site experience and historical knowledge.	$ 1,000.00	x
Storage Tank	358	Used Anti-freeze		N. Side Area 1 Shop		$0				Included as part of Area 1 Shop demo	$ -	x
Storage Tank	420	Used Anti-freeze		N. Side Area 1 Shop		$0				Included as part of Area 1 Shop demo	$ -	x
Black Tank	n/a		20,000	N of Area 1 Shop		$7,500		$1,000.00			$ 8,500.00	x
Black Tank	n/a		20,000	N of Area 1 Shop		$7,500		$1,000.00			$ 8,500.00	x
3 Blue			20,000	N of Area 1 Shop		$7,500		$1,000.00		Out of Service. Disconnected, Labeled "save for conc."	$ 8,500.00	
~~Locomotive Fueling~~		~~# 1,2 Fuel Oil~~		~~West end of Panel Yard~~		-				This tank is no longer on site.	$ -	
Legacy - Area 2 Shop					$0	$0	$0	$0		**to Demo tab**	$ -	
Locomotive Fueling		# 1,2 Fuel Oil									$ -	x
Legacy - Plant Area					$0	$199,525	$0	$25,700		**to Demo tab**	$ 225,225.00	
Storage Tank	015	# 1,2 Fuel Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	032	# 2, 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00	x
Storage Tank	033	# 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00	x
Storage Tank	034	# 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00	x
Storage Tank	304	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	305	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	306	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	408	Lube oil	20,000	SW of Tailings Basin Reporting Area		$0				Out of Service, but piping still in place and no signs are posted	$ -	x
Storage Tank	421	Alcohol	10,000	E side Concentrator		$500					$ 500.00	x
Storage Tank	506	Fuel Oil	500	Heating Plant		$25					$ 25.00	x
WTP Backwash (green)			16,000	NE of Drivehouse 1		$5,000		$700.00			$ 5,700.00	x
Tank (white)			14,000	SE of Tailings Basin Reporting Area		$5,000		$700.00		Out of Service. Disconnected, no visible labels	$ 5,700.00	x
Dispensing Tanks at Main Gate	121	Gasoline	6,000	See gas station dwg's for reference		$600					$ 600.00	x
Dispensing Tanks at Main Gate	122	Gasoline	6,000	See gas station dwg's for reference		$600					$ 600.00	x
New - Phase 1 - Plant Site					$0	$0	$0	$0		**to Demo tab**	$ -	
Storage Tank	TBD	CuSO4				$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Magnafloc 10	10,600			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	PAX	3,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Lime	22,500			$0				tanks provided by supplier	$ -	
New - Phase 1 - Mine Site					$0	$0	$0	$0		**to Demo tab**	$ -	
Mine Site Truck Fueling	TBD	# 1,2 Fuel Oil		Fueling and Maintenance Facility		$0					$ -	
New - Phase 2 - Plant Site					$0	$0	$0	$0		**to Demo tab**	$ -	
Storage Tank	TBD	H2SO4	40,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	HCl	60,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Liquid SO2	21,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Magnafloc 342/351				$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Mg(OH)	80,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	NaHS	13,200			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	NaOH	40,000			$0				tanks provided by supplier	$ -	
Removed											$ -	
Day Tanks	083	# 6 Fuel Oil	20,000	Tank Farm							$ -	
Day Tanks	084	# 6 Fuel Oil	20,000	Tank Farm							$ -	
Day Tanks	085	# 6 Fuel Oil	20,000	Tank Farm							$ -	
Blue		Waste oil		W side of Coarse Crusher							$ -	
Blue		Lube oil		NE cor. Fine Crusher							$ -	
White		Anti-Freeze		NW cor. Fine Crusher							$ -	

subtotal $ 244,425

Closure Cost Estimate
User 4

Project Name: PolyMet NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
Date of Submittal: September, 2016
File Name: PolyMet_ConstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v6.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

AOCs - Cost Per Phase/Task (see separate sheet for details and assumptions)

AoC No.	Site Name	Phase I ESA/ SAP	Implement SAP	Complete Phase II	Remediation	Total Cost	Updated	Used by Project
01	Area 1 Shops	$7,500	$208,615	$235,615	$380,000	$831,730	06/10/14	Y
06	Oily Waste Disposal Area	$7,500	$53,190	$100,450	$73,270	$234,410	06/10/14	N
07	Bull Gear Disposal	$7,500	$35,600	$0	$0	$43,100	06/10/14	N
09	Railroad Panel Yard	$0	$0	$23,010	$1,352,397	$1,375,407	06/10/14	N
10	Airport	$7,500	$29,180	$57,580	$60,240	$154,500	06/10/14	N
11	Stoker Coal Ash Disposal	$7,500	$30,180	$38,868	$245,120	$321,668	06/10/14	N
13	2001 Storage Area	$7,500	$29,180	$57,580	$0	$94,260	06/10/14	N
14	Sandblasting and large Equipment Painitng Area	$7,500	$57,796	$29,460	$43,570	$138,326	06/10/14	N
35	Dunka Water Treatment Plant Sludge	$4,000	$20,800	$37,800	$0	$62,600	06/10/14	N
37	Line 9 Area 5 Petroleum Contaminated Soil	$7,500	$0	$0	$0	$7,500	03/23/16	N
38	Area 2 Shops	$0	$0	$242,110	$179,796	$421,906	06/10/14	Y
40	Heavy Duty Garage	$7,500	$21,000	$40,000	$0	$68,500	06/10/14	N
42	Bunker C Tank Farm	$415,000	$276,667	$0	$138,333	$830,000	3/1/2016	N
43	Administration Building	$7,500	$20,600	$0	$0	$28,100	06/10/14	Y
44	Main Gate Vehicle Fueling Area	$7,500	$17,000	$34,900	$24,200	$83,600	06/10/14	Y
46	Plant Site and General Shops	$7,500	$59,344	$189,760	$644,690	$901,294	06/10/14	Y
47	Tailings Basin Reporting	$7,500	$0	$0	$0	$7,500	06/10/14	Y
48	Booster Pump House with Transformer	$7,500	$20,900	$38,700	$0	$67,100	06/10/14	Y
49	Coarse Crusher Petroleum Contaminated Soil	$7,500	$16,700	$35,100	$0	$59,300	06/10/14	Y
51	Tailings Basin Salvage and Scrap Areas	$7,500	$83,308	$22,450	$408,244	$521,502	06/10/14	Y
52	Cell 2W Salvage Area	$7,500	$21,000	$0	$0	$28,500	06/10/14	N
53	Hornfels Burial	$7,500	$0	$0	$0	$7,500	06/10/14	N
59	Colby Lake Pumping Station	$7,500	$21,000	$0	$0	$28,500	06/10/14	Y
61	Pellet Plant	$7,500	$98,926	$58,425	$258,546	$423,397	06/10/14	N
		$569,000	$1,120,986	$1,241,808	$3,808,406	$6,740,200		

Used/Impacted by NorthMet Project $2,950,532
Not Used/Impacted by NorthMet Project $3,789,668

Source: Stage 1 Construction.xlsx

Closure Cost Estimate
User 11

:t NorthMet Mine, Construction Year 2 Bond Cost Estimate - Reclamation Plan
)tember, 2016
:onstYr2_SRCE_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
n 1.4.1

:t_cost_data_file_177900.020_ft_v6.xlsm
urety Cost Basis: Polymet

	Units that Vary by Closure Year																					
Year of Closure	0 - Stage 1	0 - Stage 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Category 2/3 Stockpile Liner (acres)	63	63	63	63	119	119	119	181	181	181	181	181	181	181	181	181	150	120	90	60	30	0
Category 2/3 Stockpile Piping (LF)	8,000	8,000	8,000	8,000	10,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0	0
Category 2/3 Stockpile Sump/Pond (acres)	6.7	6.7	6.7	6.7	9.2	9.2	9.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	9.2	9.2	6.7	6.7	6.7	0.0
Category 2/3 Stockpile Pumps	2	2	2	2	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Category 2/3 Stockpile Overliner and Underdrain Piping (LF)	45,300	45,300	45,300	45,300	76,500	76,500	76,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	94,800	71,100	47,400	23,700	0
Category 2/3 Stockpile Relocation (tons)	0	0	5,238,766	9,671,631	13,968,736	17,624,295	20,039,335	24,388,312	26,954,315	31,286,526	35,946,676	40,017,183	44,021,108	44,021,108	38,281,584	32,542,061	26,802,537	21,063,014	15,323,491	9,583,967	3,844,444	0
Category 4 Stockpile Liner (acres)	29	29	29	29	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Piping (LF)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Sump/Pond (acres)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Overliner and Underdrain Piping (LF)	21,590	21,590	21,590	21,590	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Relocation (tons)	0	0	1,489,201	2,251,698	3,379,412	4,206,959	4,648,816	5,314,412	5,863,428	5,974,068	6,107,575	6,184,408	6,206,813	0	0	0	0	0	0	0	0	0
OSP Liner (acres)	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
OSP Piping (LF)	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
OSP Sump/Pond (acres)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
OSP Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OSP Overliner and Underdrain Piping (LF)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
OSP Relocation (tons)	0	0	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Footprint to Reclaim (acres)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Cover (acres)	0	0	205	205	369	369	458	526	526	526	526	526	526	526	526	460	394	328	262	196	130	64
Category 1 Stockpile Containment System Completion (LF)	0	0	2,800	2,800	2,800	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Containment System Breach & Reclaim (acres)	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Exposed/Unblasted Rock to Reclaim (Acres)	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Wall Unreclaimed (Acres)	0	0.0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
West Pit Exposed/Unblasted Rock to Reclaim (Acres)	0	0	0	0	0	4	40	0	0	0	0	52	65	0	0	0	0	0	0	0	0	0
West Pit Wall Unreclaimed (Acres)	0	0	0	8.7	8.7	8.7	8.9	8.9	8.9	11.0	11.0	16.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Central Pit Wall Unreclaimed (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Fence - 4 strand barb wire (LF)	0	0	1,100	1,400	1,400	1,400	1,400	1,400	1,400	1,700	1,700	1,600	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	1,400
Fence - non climbable (LF)	0	0	11,000	19,900	19,900	21,200	20,700	20,700	20,700	22,100	22,100	30,100	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	33,700
Pit Access Gates	0	0	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Mine Drainage Pond (acres)	19.4	19.4	19.4	19.4	21.6	21.6	21.6	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Mine Drainage Pond Liner (acres)	12.4	12.4	12.4	12.4	14.6	14.6	14.6	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Mine Drainage Pond Pumps	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Mine Drainage Pond Pipe (LF)	9,000	9,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Mine Drainage Pond Underdrains	4,500	4,500	4,500	5,200	6,000	6,000	6,000	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
Stormwater Pond (acres)	17.4	17.4	17.4	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
Stormwater Ditch (LF)	5,200	5,200	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	8,300	8,300
Unreclaimed Haul Road (LF)	22,000	22,000	22,000	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	31,500	31,500	31,500	29,500	27,500	27,500	27,500	27,500	21,500	21,500
FTB Beach to Reclaim (acres)	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTB Beach to Amend with Bentonite (acres)	0	0	95	95	93	92	91	89	87	203	207	211	212	212	212	212	216	219	222	225	420	428
FTB Pond Bottom to Amend with Bentonite (acres)	0	0	421	424	427	430	432	434	443	1068	1093	1118	1124	1130	1136	1142	1136	1129	1122	1116	905	905
FTB Borrow Area to Reclaim (acres)	31.6	31.6	44.7	16.9	16.5	16.5	15.9	15.9	12.0	12.0	12.0	12.0	18.0	22.4	22.4	22.4	26.8	26.8	26.8	26.8	21.5	19.5
HRF Disturbed Acres to Reclaim (acres)	5	5	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HRF cover (acres)	0	0	0	0	49	49	49	49	49	49	49	49	49	54	60	65	71	76	82	87	93	98
HRF drainage (years)	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9

Closure Cost Estimate
User 11

SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization/Demobilization	LS	1	See Comments and Notes		$ 25,000	$ 25,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Assume Environmental Protection Measures from Year 0 Site Work Remain In Place and Are Effective
3	Construction QA/QC	LS	1	See Comments and Notes		$ 5,000	$ 5,000	See Note 1.
4	Final Sloping of Category 1 Stockpile	AC	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Final Sloping
5	Furnish and Install 6-inch Geomembrane Bedding Layer	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geomembrane Bedding Layer
6	Furnish and Install 1-foot Granular Soil Cover above Geomembrane	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Granular Soil Cover above Geomembrane
7	Furnish and Install 1.5-foot Rooting Zone above Granular Cover	CY	32,000	See Comments and Notes		$ 5.5	$ 176,000	Year 0 - 13 acre Area of Disturbance; assume 25% of 127,000 Cubic Yards Excavated is Replaced/Regraded to Facilitate Vegetation Establishment.
8	Furnish and Install 6-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
9	Furnish and Install 9-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
10	Furnish and Install 12-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
11	Furnish and Install 18-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
12	Furnish and Install Vegetation (grass) on Stockpile Cover Systems	Acre	13	See Comments and Notes		$ 635	$ 8,255	Year 0 - Assume Furnish and Install Vegetation on 13-acre Disturbed Area [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
	Cat 1 Stockpile Footprint Restoration		13			**$ 14,173**	$ 184,255	
13	Reseeding 5% of Vegetation on Stockpile Cover Systems	Acre	1	See Comments and Notes		$ 635	$ 445	Year 0 - Assume Furnish and Install Vegetation on 1-acre of 13-acre Restored Area for Vegetation that Does Not Establish Initially [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
14	Procure and Install 40-mil Geomembrane - Textured	SF	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geomembrane Cover
15	Furnish and Install Geotextile above and below Geomembrane	SF	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geotextile Required
							$ 398,955	

Notes:
1) Limited QA/QC required. Assume limited amount of surveying for grade confirmation and site review and submittal review to confirm compliance of site restoration activities with specifications.

Closure Cost Estimate
User 11

SOW 3: Category 1 Cover System: End of Year 1

May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization/Demobilization	LS	1	See Comments and Notes		$ 1,345,000.00	$ 1,345,000	
2	Environmental Protection Measures	LS	1	See Comments and Notes		$ 10,000.00	$ 10,000	
3	Construction QA/QC	LS	1	See Comments and Notes		$ 275,000.00	$ 275,000	See Note 1
~~4~~	~~Final Sloping of Category 1 Stockpile~~	~~CY~~	~~260,000~~	~~See Comments and Notes~~				~~Estimated as 15,000' Stockpile Perimeter by 1.4H:1V Slope Flattened to 3.75H:1V Slope for 40' High Pile (ref. Golder Stockpile Design Drawings for Typical Section).~~ Estimate of Area Covered by CAT 1
5	Subgrade Grading	AC	190	See Comments and Notes		$ 2,100.00	$ 399,000	Waste Rock at End of Year 1
6	Furnish and Install 6-inch Geomembrane Bedding Layer	CY	150,000	See Comments and Notes		$ 8.00	$ 1,200,000	
~~7~~	~~Furnish and Install 1-foot Granular Soil Cover above Geomembrane~~	~~CY~~	~~300,000~~	~~See Comments and Notes~~		~~$ 8.00~~		
~~8~~	~~Furnish and Install 1.5-foot Rooting Zone above Granular Cover~~	~~CY~~	~~450,000~~	~~See Comments and Notes~~		~~$ 5.50~~		
9	Furnish and Install 9-Inch Riprap Systems on Stockpile Covers	CY	900	See Comments and Notes		$ 65.00	$ 58,500	See Note 2
10	Furnish and Install 12-Inch Riprap Systems on Stockpile Covers	CY	1,700	See Comments and Notes		$ 77.00	$ 130,900	See Note 2
11	Furnish and Install 18-Inch Riprap Systems on Stockpile Covers	CY	400	See Comments and Notes		$ 89.00	$ 35,600	See Note 2
~~12~~	~~Furnish and Install Vegetation (grass) on Stockpile Cover Systems~~	~~AC~~	~~190~~	~~See Comments and Notes~~		~~$ 635.00~~		~~[$1985 replaced by D&T $295 seed/fertilize + $340 mulch]~~
	Unit Cost Earthwork Variable		190			**$ 9,600.00**	$ 1,824,000	
13	Reseeding 5% of Vegetation on Stockpile Cover Systems	AC	10	See Comments and Notes		$ 1,985.00	$ 18,858	
14	Procure and Install 40-mil Geomembrane - Textured	SF	8,280,000	See Comments and Notes		$ 0.35	$ 2,898,000	Assume LLDPE Geomembrane for Improved Interface Friction Angle.
15	Furnish and Install Geotextile above and below Geomembrane	SF	16,560,000	See Comments and Notes		$ 0.15	$ 2,484,000	Requirement for Geotextile Dependent on Gradation and Particle Shape for Materials Above and Below Geomembrane.
	Unit Cost Membrane/Textile Variable		190			**$ 28,326.32**	$ 5,382,000	
							$ 10,678,858	

Closure Cost Estimate
User 11

Notes:
1) Assume surveying for grade and cover layer thickness confirmation, material testing to confirm that materials comply with specifications, and site review and submittal review to confirm compliance of site restoration activities with specifications.

2) Per Document Referenced in Note 1; Entire CAT 1Stockpile Footprint is 526 Acres. Portion Constructed by End of Year 1 is Estimated and Riprap System Needs are Taken as Proportion of (Total Riprap x Year 1 Acreage/Total Acreage) x (Year 1 Height/Total Height) to Account for Stockpile Footprint and Height at End of Year 1.

Year 0		
SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)	$	398,955
SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)	$	42,644
SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)	$	713,551
SOW 21: Category 1 Groundwater Containment System: Year 0	$	1,207,244
	$	**2,362,394**
Year 1		
SOW 3: Category 1 Cover System: End of Year 1	$	10,678,858
SOW 11: Hydromet Residue Facility: End of Year 1 (no residue, only grading/seeding)	$	299,255
SOW 14: Flotation Tailings Basin: End of Year 1 (with PolyMet Tails)	$	15,472,723
SOW 21: Category 1 Groundwater Containment System: End of Year 1	$	2,341,414
	$	**28,792,250**

Closure Cost Estimate
User 11

SOW 11: Hydromet Residue Facility: End of Year 1 (no residue, only grading/seeding)

May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 25,000.00	$ 25,000	To Be Determined By Contractor - Mob for General Earthwork and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Assume Environmental Protection Measures for One-Third (assume northwest segment where discharge from site could occur) Perimeter of 25-acre Disturbed Area Associated with Future HRF Area Pre-Load
3	Construction QA/QC	LS	1	See Comments and Notes		$ 5,000.00	$ 5,000	See Note 2
4	Regrade Pre-Load Fill	CY	62,000	See Comments and Notes		$ 2.50	$ 155,000	Assumes 25-percent of Year 1 Pre-load Fill Requires Regrading to Flatten Perimeter Slopes Prior to Restoration.
5	Common Borrow for Pre-Load Fill Area Restoration	CY	6,000	See Comments and Notes		$ 8.00	$ 48,000	Assume 6,000 CY of Misc. Earthwork/Common Borrow for Miscellaneous Restoration.
6	Furnish and Install Vegetation on Disturbed Areas	Acre	25	See Comments and Notes		$ 2,524.00	$ 63,100	
7	Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	1.25	See Comments and Notes		$ 2,524.00	$ 3,155	
							$ 299,255	

Notes:
1) Quantity Estimates by TJR based in part on May 9, 2016 using "2013 Updated Bid Form Quantities Combined 18NOV2013 with All Costs 12-3-2013v7.xlsx" in Barr File "2369C29 PolyMet NorthMet Engineering_Work Authorization 13_Bid Form_Jan 2014 percent of Ames"; amended as needed to include CRE scope not addressed by previous estimates.

2) Limited QA/QC required. Assume limited amount of surveying for grade confirmation and site review and submittal review to confirm compliance of site restoration activities with specifications.

Closure Cost Estimate
User 11

SOW 14: Flotation Tailings Basin: End of Year 1 (with PolyMet Tails)

May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1.00	See Comments and Notes		$ 1,225,000.00	$ 1,225,000	To Be Determined By Contractor - Mob for General Earthwork, Bentonite Placement, Site Grading and Vegetation Establishment Construction is within FTB Footprint. Assume Dust Control is Ancillary to Earthwork Items and no Additional Environmental Protection Measures are Required.
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	See Note 1
3	LTVSMC Coarse Tailings Borrow Area Regrading Quantity	CY	105,000.00	See Comments and Notes		$ 2.50	$ 262,500	See Note 2 [$2524 replaced by $730 D&T]
4	LTVSMC Coarse Tailings Borrow Area - Seed, Mulch and Fertilize	Acre	65.00	See Comments and Notes		$ 730.00	$ 47,450	
	Borrow Area Restoration Unit Cost		65.00			**$ 4,768.46**	$ 309,950	
5	LTVSMC Coarse Tailings Borrow Area - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	3.25	See Comments and Notes		$ 2,524.00	$ 8,203	Performed Incrementally as Routine Construction Item Through-out Year 1; Already Complete - No Additional Action Required
6	Dam - Exterior Face Bentonite Augmentation	Acre	-	See Comments and Notes		$ -	$ -	Performed Incrementally as Routine Construction Item Through-out Year 1; Already Complete - No Additional Action Required
7	Dam - Exterior Face Seed, Mulch and Fertilize	Acre	-	See Comments and Notes		$ -	$ -	Beach and Dam Crest Area at End of Year 1 is Estimated
8	Beach Area and Dam Crest - Remove and Replace 30" Tailings Cover Layer to Facilitate Bentonite Augmentation of Soil Layer 30" Below Beach Surface	Acre	100.00	See Comments and Notes		$ 13,000.00	$ 1,300,000	Beach and Dam Crest Area at End of Year 1 is Estimated
9	Beach Area and Dam Crest - Till Bentonite to 18" Depth	Acre	100.00	See Comments and Notes		$ 1,750.00	$ 175,000	Beach and Dam Crest Area at End of Year 1 is Estimated
10	Beach Area and Dam Crest - Compact 18" Layer of Bentonite Amended Soil	Acre	100.00	See Comments and Notes		$ 800.00	$ 80,000	Beach and Dam Crest Area at End of Year 1 is Estimated
11	Beach Area and Dam Crest - Lightly Compact Upper Cover Layer	Acre	100.00	See Comments and Notes		$ 800.00	$ 80,000	
12	Beach Area and Dam Crest - Seed, Fertilize and Mulch	Acre	100.00	See Comments and Notes		$ 2,524.00	$ 252,400	Beach and Dam Crest Area at End of Year 1 is Estimated [$2524 replaced by D&T $880]
	Beach Bentonite Ammendment Unit Cost		100.00			**$ 18,874.00**	$ 1,887,400	
13	Beach Area and Dam Crest - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	5.00	See Comments and Notes		$ 2,524.00	$ 12,620	Beach and Dam Crest Area at End of Year 1 is Estimated
14	Pond Bottom - Bentonite Amended Pond Bottom	Acre	350.00	See Comments and Notes		$ 28,092.00	$ 9,832,200	Pond Area at End of Year 1 is Estimated
							$ 15,472,723	

Notes:
2) Tailings Borrow Area Regrading Quantity Based on Assumed Borrow Area Disturbance times Average 1.0-foot Re-Grading Thickness Through-out to Facilitate Turf Establishment.

Closure Cost Estimate
User 11

SOW 21: Category 1 Groundwater Containment System: End of Year 1

May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 125,000	$ 125,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment
2	Environmental Protection Measures	LS	1	See Comments and Notes		$ 10,000	$ 10,000	Assume Environmental Protection Measures from Year 0 Construction Remain in Place and Are Effective. Assume Dust Control is Ancillary to Earthwork Activities.
3	Construction QA/QC	LS	1	See Comments and Notes		$ 45,000	$ 45,000	Includes General Confirmatory Survey, Construction Observation, Material Testing, Test Data and Submittal Review, and Construction Documentation
4	Grubbing	AC	3	See Comments and Notes		$ 2,500	$ 7,500	
5	Temporary Dewatering and Pumping	LS	1	See Comments and Notes		$ 75,000	$ 75,000	
6	Common Excavation and Stockpile	N/A	-	See Comments and Notes		$ -	$ -	
7	Portion that is Assumed to be Peat Excavation	CY	5,900	See Comments and Notes		$ 8	$ 44,250	
8	Portion that is Assumed to be Saturated Overburden Excavation	CY	11,600	See Comments and Notes		$ 5	$ 58,000	
9	Portion that is Assumed to be Unsaturated Overburden Excavation	CY	9,400	See Comments and Notes		$ 5	$ 47,000	
10	Portion that is Assumed to be Rock Excavation	CY	2,600	See Comments and Notes		$ 46	$ 119,600	
11	Clay Borrow, Backfill and Compaction	CY	5,200	See Comments and Notes		$ 12	$ 62,400	
12	Common Borrow Backfill and Compaction	CY	4,300	See Comments and Notes		$ 5	$ 21,500	
13	1-Inch Minus Rock	CY	6,200	See Comments and Notes		$ 20	$ 124,000	
14	Surface Runoff and Seepage Collection Trench	N/A	-	See Comments and Notes		$ -	$ -	
15	Furnish and Install 36-inch Dia. Perforated HDPE Pipe	LF	2,300	See Comments and Notes		$ 150	$ 345,000	
16	Furnish and Install 12-inch Dia. Solid HDPE Pipe	LF	60	See Comments and Notes		$ 36	$ 2,160	
17	Furnish and Install 12-inch Dia. Perforated HDPE Pipe	LF	35	See Comments and Notes		$ 45	$ 1,575	
18	Furnish and install 12-inch HDPE end cap	EA	12	See Comments and Notes		$ 275	$ 3,300	
19	Furnish and install 12x36-inch HDPE Tee	EA	12	See Comments and Notes		$ 2,600	$ 31,200	
20	Furnish and install 12-inch HDPE connection	EA	12	See Comments and Notes		$ 200	$ 2,400	
21	Granular Drainage Material	CY	4,700	See Comments and Notes		$ 16	$ 75,200	
22	Furnish and install 60-inch I.D. precast manhole	LS	2	See Comments and Notes		$ 16,000	$ 32,000	Assume Total Manhole Height of 16' Each with Concrete Base, Steps, Concrete Top and Cast/Locking Manway Hatch.
23	Furnish and Install Vegetation on Disturbed Areas	AC	41	See Comments and Notes		$ 635	$ 26,035	Assume Average Width of Restoration Zone is 100' and add 20% Additional for Misc. Restoration Areas; 100'x15,000' +20% = 1,800,000 SF = 41 Acre [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
	Cat 1 Cont Sys Ext Variable $/LF		2,300			**$ 469**	$ 1,078,120	
24	Reseeding 5% of Vegetation to Correct for Limited Growth	AC	2	See Comments and Notes		$ 2,524	$ 5,174	
							$ 2,341,414	

Closure Cost Estimate
User 12

			Quantity		Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year	$/year	Unit Cost		Activity Group	Activity Group Year
A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals														
Exploration	$ -	$ -														
Exploration Roads & Drill Pads	$ -	$ -														
Roads	$ -	$ -														
Grading Costs		$ -	-	cy		-	-	1	-					MMJ		1
Cover Placement Cost		$ -	-	cy		-	-	1	-					MMJ		1
Ripping/Scarifying Cost		$ -	-	acres		-	-	1	-					MMJ		1
Well Abandonment	$ -	$ 20,825														
Production, Dewatering, Infiltration Wells		$ -	-	ct	0.25	-	-	1	-	528				CCC		1
Monitoring Wells		$ 20,825	48	ct	0.25	192	0.09	1	0.09	528	$ 229,075	$	433.85	CPC		3
Pits	$ -	$ -														
Quarries & Borrow Areas	$ -	$ 669,310														
Grading Costs		$ -		cy			-	1	-					MMA		1
Cover Placement Cost		$ -		cy			-	1	-					MMA		1
Topsoil Placement Cost		$ 669,310	231,914	cy	485	478	0.23	1	0.23	1,024,691	$ 2,957,286	$	2.89	MMA		1
Ripping/Scarifying Cost		$ -	96	acres			-	1	-			$	-	MMA		1
Safety Berm Construction Cost		$ -		cy			-	1	-					MMA		1
Underground Openings	$ -	$ -														
Process Ponds	$ -	$ 562,089														
Backfilling - Mine Site WWTF Pond - 1		$ 20,157	11,217	LCY	546	21	0.01	1	0.01	1,153,152	$ 2,072,219	$	1.80	MMF		1
Liner Cut & Fold - Mine Site WWTF Pond - 1		$ 380	820	ft	500	1.6	0.00	1	0.00	1,056,000	$ 489,366	$	0.46	MMF		1
Backfilling - Mine Site WWTF Pond - 2		$ 62,390	35,704	LCY	546	65	0.03	1	0.03	1,153,152	$ 2,015,045	$	1.75	MMF		1
Liner Cut & Fold - Mine Site WWTF Pond - 2		$ 630	1360	ft	500	2.7	0.00	1	0.00	1,056,000	$ 489,176	$	0.46	MMF		1
Backfilling - Mine Site WWTF Pond - 3		$ 120,941	68,815	LCY	546	126	0.06	1	0.06	1,153,152	$ 2,026,642	$	1.76	MMF		1
Liner Cut & Fold - Mine Site WWTF Pond - 3		$ 917	1980	ft	500	4.0	0.00	1	0.00	1,056,000	$ 489,067	$	0.46	MMF		1
Backfilling - Mine Site CPS Pond		$ 28,796	16,444	LCY	546	30	0.01	1	0.01	1,153,152	$ 2,019,348	$	1.75	MMF		1
Liner Cut & Fold - Mine Site CPS Pond		$ 445	960	ft	500	1.9	0.00	1	0.00	1,056,000	$ 489,500	$	0.46	MMF		1
Backfilling - Mine Site PW-OSLA		$ 41,273	23,393	LCY	546	43	0.02	1	0.02	1,153,152	$ 2,034,542	$	1.76	MMF		1
Liner Cut & Fold - Mine Site PW-OSLA		$ 602	1300	ft	500	2.6	0.00	1	0.00	1,056,000	$ 489,009	$	0.46	MMF		1
Backfilling - Mine Site PW-HRE		$ 30,715	17,263	LCY	546	32	0.02	1	0.02	1,153,152	$ 2,051,733	$	1.78	MMF		1
Liner Cut & Fold - Mine Site PW-HRE		$ 509	1100	ft	500	2.2	0.00	1	0.00	1,056,000	$ 488,640	$	0.46	MMF		1
Backfilling - Mine Site PW-RTH		$ 1,919	1,129	LCY	546	2	0.00	1	0.00	1,153,152	$ 1,960,052	$	1.70	MMF		1
Liner Cut & Fold - Mine Site PW-RTH		$ 370	800	ft	500	1.6	0.00	1	0.00	1,056,000	$ 488,400	$	0.46	MMF		1
Backfilling - Mine Site Temporary pond		$ 22,077	12,673	LCY	546	23	0.01	1	0.01	1,153,152	$ 2,008,848	$	1.74	MMF		1
Liner Cut & Fold - Mine Site Temporary pond		$ 445	960	ft	500	1.9	0.00	1	0.00	1,056,000	$ 489,500	$	0.46	MMF		1
Backfilling - Mine Site S4, PW-S4		$ 63,350	36,139	LCY	546	66	0.03	1	0.03	1,153,152	$ 2,021,422	$	1.75	MMF		1
Liner Cut & Fold - Mine Site S4, PW-S4		$ 815	1760	ft	500	3.5	0.00	1	0.00	1,056,000	$ 489,000	$	0.46	MMF		1
Backfilling - Mine Site SOSP, PW-SOSP		$ 39,354	22,587	LCY	546	41	0.02	1	0.02	1,153,152	$ 2,009,171	$	1.74	MMF		1
Liner Cut & Fold - Mine Site SOSP, PW-SOSP		$ 640	1380	ft	500	2.8	0.00	1	0.00	1,056,000	$ 489,739	$	0.46	MMF		1
Backfilling - Mine Site PW-HRC		$ 19,197	11,132	LCY	546	20	0.01	1	0.01	1,153,152	$ 1,988,597	$	1.72	MMF		1
Liner Cut & Fold - Mine Site PW-HRC		$ 436	940	ft	500	1.9	0.00	1	0.00	1,056,000	$ 489,804	$	0.46	MMF		1
Backfilling - Mine Site S23-1		$ 42,233	24,039	LCY	546	44	0.02	1	0.02	1,153,152	$ 2,025,919	$	1.76	MMF		1
Liner Cut & Fold - Mine Site S23-1		$ 872	1880	ft	500	3.8	0.00	1	0.00	1,056,000	$ 489,804	$	0.46	MMF		1
Backfilling - Mine Site PW-S23-1		$ 61,431	34,687	LCY	546	64	0.03	1	0.03	1,153,152	$ 2,042,243	$	1.77	MMF		1
Liner Cut & Fold - Mine Site PW-S23-1		$ 1,195	0	ft	-	5.2	0.00	1	0.00	-				MMF		1
check:		PASS														
Heaps	$ -	$ -														
Waste Rock Dumps	$ -	$ -														
Grading Costs		$ -	-	cy	-	-	-	1	-	-				MMD		1
Cover Placement Cost		$ -	-	cy	0	-	-	1	-	-				MMD		1
Topsoil Placement Cost		$ -	-	cy	-	-	-	1	-	-				MMD		1
Ripping/Scarifying Cost		$ -	-	acres	#DIV/0!	-	-	1	-	#DIV/0!				MMD		1
Landfills	$ -	$ -														
Tailings	$ -	$ 2,208														
Embankment Regrading Cost		$ -		cy			-	1	-	-				PFA		1
Tailings Surface Grading Cost		$ -		cy			-	1	-	-				PFA		1
Cover Placement Cost		$ -		cy			-	1	-	-				PFA		1
Topsoil Placement Cost		$ -		cy			-	1	-	-				PFA		1
Ripping/Scarifying Cost		$ 2,208	17	acres	#VALUE!	#VALUE!	#VALUE!	1	#VALUE!			$	131.12	PFA		1
Foundation & Buildings Areas	$ -	$ -														
Yards, Etc.	$ -	$ 118,972														
Regrading Cost		$ 118,972	75,827	cy	119	637	0.30	1	0.30	251,406	$ 394,457	$	1.57	MMK		1
Cover Placement Cost		$ -		cy			-	1	-	-				MMK		1
Growth Media Placement Cost		$ -		cy			-	1	-	-				MMK		1
Ripping/Scarifying Cost		$ -		acres			-	1	-	-				MMK		1
Drainage & Sediment Control	$ -	$ -														
0		$ -		LCY			-	1	-					MMA		1
0		$ -		LCY			-	1	-					MMA		1
Generic Material Hauling	$ -	$ 302,950														
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to East Pit				cy			-	1	-	-				MMD		1
Cover Placement Cost - Category 2/3 stockpile relocation to East Pit				cy			-	1	-	-				MMD		1
Topsoil Placement Cost - Category 2/3 stockpile relocation to East Pit		$ 161,974	50,820	cy	578	88	0.04	1	0.04	1,220,736	$ 3,890,742	$	3.19	MMD		1
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)				cy			-	1	-	-				MMD		1
Cover Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1) (Rock and Overburden 7.4.2.2)				cy			-	1	-	-				MMD		1
Topsoil Placement Cost - Category 4 stockpile relocation to East Pit (quantities in User 1)		$ 66,437	23,393	cy	564	41	0.02	1	0.02	1,191,168	$ 3,382,962	$	2.84	MMD		
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2				cy			-	1	-	-				MMD		1
Cover Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and Overburden - 7.4.1.2				cy			-	1	-	-				MMD		1
Topsoil Placement Cost - Ore Surge Stockpile to East Pit (quantities in User 1) - Rock and		$ 74,539	25,813	cy	564	46	0.02	1	0.02	1,191,168	$ 3,439,680	$	2.89	MMD		
Hauling/Crush/Screen/Compact - East pit - assume depth of excavation before bedrock backfilled				cy			-	1	-	-				MMD		1
Cover Placement Cost - East pit - assume depth of excavation before bedrock backfilled				cy			-	1	-	-				MMD		1
Topsoil Placement Cost - East pit - assume depth of excavation before bedrock backfilled		$ -	-	cy			-	1	-	-				MMD		
check:		PASS														

Closure Cost Estimate
User 12

					Quantity	Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year	$/year	Unit Cost		Activity Group	Activity Group Year
	A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals														
	Exploration	$ -	$ -														
	Exploration Roads & Drill Pads	$ -	$ -														
	Roads	$ -	$ -														
	Other User Costs (from Other User sheet)	$ -	$ 2,362,394														
	SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)		$ 398,955														
	SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)		$ 42,644														
	SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)		$ 713,551														
	SOW 21: Category 1 Groundwater Containment System: Year 0		$ 1,207,244														
	check:		PASS														
	Other**	$ -	$ -						-	1	-	-				MMD	1
	Mob/Demob if included in Other User sheet	$ -	$ -														
	Mob/Demob	$ -	$ -														
	Subtotal "A"	$ -	$ 4,038,748														
	B. Revegetation/Stabilization	"Cost Schedule" sheet variance	Subtotals														
	Exploration	$ -	$ -														
	Exploration Roads & Drill Pads	$ -	$ -														
	Roads	$ -	$ -														
	Well Abandonment																
	Pits	$ -	$ -														
	Quarries & Borrow Areas	$ -	$ 30,188		96	acres	1.0	96	0.05	1	0.05	2,112	$ 665,299	$ 315.01		MMA	1
	Underground Openings																
	Process Ponds	$ -	$ 8,965		28	acres	1	28	0.01	1	0.01	2,112	$ 673,811	$ 319.04		MMA	1
	Heaps	$ -	$ -														
	Waste Rock Dumps	$ -	$ -													MMD	1
	Landfills	$ -	$ -														
	Tailings	$ -	$ 9,775		17	acres	1.0	17	0.01	1	0.01	2,112	$ 1,225,938	$ 580.46		PFA	1
	Foundation & Buildings Areas	$ -	$ -														
	Yards, Etc.	$ -	$ 19,599		47	acres	1.0	47	0.02	1	0.02	2,112	$ 880,704	$ 417.00		MMK	1
	Drainage & Sediment Control																
	Generic Material Hauling	$ -	$ 39,060		124	acres	1.0	124	0.06	1	0.06	2,112	$ 664,744	$ 314.75		MMD	1
	Other User Costs (from Other User sheet)	$ -	$ -														
	Other**	$ -	$ -						-	1	-	-					
	Subtotal "B"	$ -	$ 107,587														
	check:		PASS														
	C. Detoxification/Water Treatment/Disposal of Wastes	"Cost Schedule" sheet variance	Subtotals														
	Process Ponds/Sludge	$ -	$ -													CCC	1
	Heaps	$ -	$ -													CCC	1
	Dumps (Waste & Landfill)	$ -	$ -													CCC	1
	Tailings	$ -	$ -													CCC	1
	Surplus Water Disposal	$ -	$ -													CCC	1
	Monitoring	$ -	$ -													CCC	1
	Miscellaneous	$ -	$ -													CCC	1
	Solid Waste - On Site	$ -	$ -													CCC	1
	Solid Waste - Off Site	$ -	$ -													CCC	1
	Hazardous Materials	$ -	$ -													CCC	1
	Hydrocarbon Contaminated Soils	$ -	$ -													CCC	1
	Pumping (from Solution Mgmt sheet)	$ -	$ -														
	check:		PASS														
	Evaporation (from Solution Mgmt sheet)	$ -	$ -														
	Treatment (from Solution Mgmt sheet)	$ -	$ -														
	check:		PASS														
	Decontamination (from Solution Mgmt sheet)	$ -	$ -														
	Other User Costs (from Other User sheet)	$ -	$ 2,950,532														
34	Areas of concern, legacy remediation (quote from NTS)		$ 2,950,532		1	ea	1	1	1.00	1	1	1	$ 2,950,532	$ 2,950,532.00		MMD	1
	check:		PASS														
	Other**	$ -	$ -														
	Subtotal "C"	$ -	$ 2,950,532														
	D. Structure, Equipment and Facility Removal, and M	"Cost Schedule" sheet variance	Subtotals														
	Foundation & Buildings Areas	$ -	$ -														
	Other Demolition	$ -	$ 45,854,091														
1	Demo and Asbestos Abatement Cost Summary - User 2		$ 45,548,841		1	LS	1	1	1.00	1	$ 45,548,841	$ 45,548,841.00	PPA	1			
2	Above Ground Storage Tanks - User 2		$ 244,425		1	LS	1	1	1.00	1	$ 244,425	$ 244,425.00	PPA	1			
3	Remove & Dispose of Stockpile/Pond Liners - OSP		$ 9,600		32	acres	1	1	1.00	32	$ 9,600	$ 300.00	PPA	1			
4	Remove & Dispose of Collection pipe - OSP		$ 6,975		3,100	LF	1	1	1.00	3,100	$ 6,975	$ 2.25	PPA	1			
5	Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile		$ 18,900		63	acres	1	1	1.00	63	$ 18,900	$ 300.00	PPA	1			
6	Remove & Dispose of Collection pipe - Category 2/3 Stockpile		$ 10,800		4,800	LF	1	1	1.00	4,800	$ 10,800	$ 2.25	PPA	1			
7	Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile		$ 8,700		29	acres	1	1	1.00	29	$ 8,700	$ 300.00	PPA	1			
8	Remove & Dispose of Collection pipe - Category 4 Stockpile		$ 5,850		2,600	LF	1	1	1.00	2,600	$ 5,850	$ 2.25	MMF	1			
	check:		PASS														
	Equipment Removal	$ -	$ -														
	check:		PASS														

Closure Cost Estimate
User 12

				Quantity	Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year	$/year	Unit Cost	Activity Group	Activity Group Year
A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals													
Exploration	$ -	$ -													
Exploration Roads & Drill Pads	$ -	$ -													
Roads	$ -	$ -													
Fence Removal	$ -	$ -													
Fence Installation	$ -	$ -													
Culvert Removal	$ -	$ -													
Pipe Removal	$ -	$ -													
check:		PASS													
Powerline Removal	$ -	$ -													
check:		PASS													
Transformer Removal	$ -	$ -													
check:		PASS													
Rip-rap, rock lining, gabions	$ -	$ -													
Other Misc. Costs	$ -	$ -													
Other User Costs (from Other User sheet)	$ -	$ -													
check:		PASS													
Other**	$ -	$ -													
Subtotal "D"	$ -	$ 45,854,091													
E. Monitoring	"Cost Schedule" sheet variance	Subtotals													
Reclamation Monitoring and Maintenance	$ -	$ 6,501													
Revegetation Maintenance		$ 6,501		1	time	0.0200	50	0.02	1	0.02	42	$ 274,602	$ 6,501.00	CCC	1
Erosion Maintenance		$ -		-	cy			-	1	-	-			CCC	1
Reclamation Monitoring		$ -						-	1	-	-			CCC	1
Ground and Surface Water Monitoring (calculated fror (this one schedules automatically)	$ -	$ -													
Other User Costs (from Other User sheet)	$ -	$ -													
check:		PASS													
Subtotal "E"	$ -	$ 6,501													

Closure Cost Estimate
User 12

				Quantity	Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year	$/year	Unit Cost		Activity Group	Activity Group Year
	A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals													
	Exploration	$ -	$ -													
	Exploration Roads & Drill Pads	$ -	$ -													
	Roads	$ -	$ -													
	F. Construction Management & Support	"Cost Schedule" sheet variance	Subtotals													
	Construction Management	$ -	$ -													
	Construction Support	$ -	$ -													
	Road Maintenance	$ -	$ 79,644													
	Active Reclamation		$ 28,962													
	Monitoring & Maintenance		$ 50,682													
	Other User Costs (from Other User sheet)	$ -	$ -													
	Other**	$ -	$ -													
	Subtotal "F"	$ -	$ 79,644													
	G. Closure Planning, G&A, Human Resources	"Cost Schedule" sheet variance	Subtotals													
	Closure Planning	$ -	$ -													
	General & Administration	$ -	$ -													
	Human Resources	$ -	$ 2,378,900													
	Other User Costs (from Other User sheet)	$ -	$ 111,351													
1	Closure - Pickup Trucks - Closure Year 1		$ 5,360	2	each	0	4,224	2.00	1	2.00	1	$ 2,680	2,680		MMD	1
2	Closure - Pickup Trucks - Closure Year 2		$ 5,360	2	each	0	4,224	2.00	1	2.00	1	$ 2,680	2,680		MMD	1
3	Closure - Snow Plowing - Closure Year 1		$ 11,545	1	each	0	2,112	1.00	1	1.00	1	$ 11,545	11,545		MMD	1
4	Closure - Snow Plowing - Closure Year 2		$ 11,545	1	each	0	2,112	1.00	1	1.00	1	$ 11,545	11,545		MMD	1
5	Closure - Pickup Trucks - Post-Closure Year 1		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
6	Closure - Pickup Trucks - Post-Closure Year 2		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
7	Closure - Pickup Trucks - Post-Closure Year 3		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
8	Closure - Pickup Trucks - Post-Closure Year 4		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
9	Closure - Pickup Trucks - Post-Closure Year 5		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
10	Closure - Pickup Trucks - Post-Closure Year 6		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
11	Closure - Pickup Trucks - Post-Closure Year 7		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
12	Closure - Pickup Trucks - Post-Closure Year 8		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
13	Closure - Pickup Trucks - Post-Closure Year 9		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
14	Closure - Pickup Trucks - Post-Closure Year 10		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
15	Closure - Pickup Trucks - Post-Closure Year 11		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
16	Closure - Pickup Trucks - Post-Closure Year 12		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
17	Closure - Pickup Trucks - Post-Closure Year 13		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
18	Closure - Pickup Trucks - Post-Closure Year 14		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
19	Closure - Pickup Trucks - Post-Closure Year 15		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
20	Closure - Pickup Trucks - Post-Closure Year 16		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
21	Closure - Pickup Trucks - Post-Closure Year 17		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
22	Closure - Pickup Trucks - Post-Closure Year 18		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
23	Closure - Pickup Trucks - Post-Closure Year 19		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
24	Closure - Pickup Trucks - Post-Closure Year 20		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
25	Closure - Pickup Trucks - Post-Closure Year 21		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
26	Closure - Pickup Trucks - Post-Closure Year 22		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
27	Closure - Pickup Trucks - Post-Closure Year 23		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
28	Closure - Pickup Trucks - Post-Closure Year 24		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
29	Closure - Pickup Trucks - Post-Closure Year 25		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
30	Closure - Pickup Trucks - Post-Closure Year 26		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
31	Closure - Pickup Trucks - Post-Closure Year 27		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
32	Closure - Pickup Trucks - Post-Closure Year 28		$ 2,680	1	each	0	2,112	1.00	1	1.00	1	$ 2,680	$ 2,680.05		MMD	1
33	Post-Closure - Plow attachment for Vehicles		$ 2,500	1	ea	9,000	0	0.00	1	0.00	19,008,000	$ 95,040,000,000	$ 5,000.00		MMD	1

	check:		PASS
	Other**	$ -	$ -
	Subtotal "G"	$ -	$ 2,490,251
	Subtotal Operational & Maintenance Costs		
	Subtotal A through G	$ -	$ 55,527,354

Closure Cost Estimate
User 12

	Add Year Before Item Starts	Activity Beginning Year		Check	- 2016	1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10 2026	11 2027	12 2028	13 2029	14 2030
A. Earthwork/Recontouring																			
Exploration																			
Exploration Roads & Drill Pads																			
Roads								$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Grading Costs	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost	1	2		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Ripping/Scarifying Cost	2	3		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Well Abandonment								$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Production, Dewatering, Infiltration Wells	1	2		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Monitoring Wells	27	30		PASS															
Pits																			
Quarries & Borrow Areas								$	669,310 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Grading Costs	1	2		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Topsoil Placement Cost	-	1		PASS				$	669,310 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Ripping/Scarifying Cost	2	3		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Safety Berm Construction Cost	3	4		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Underground Openings																			
Process Ponds								$	562,089 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site WWTF Pond - 1	-	1		PASS				$	20,157 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site WWTF Pond - 1	-	1		PASS				$	380 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site WWTF Pond - 2	-	1		PASS				$	62,390 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site WWTF Pond - 2	-	1		PASS				$	630 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site WWTF Pond - 3	-	1		PASS				$	120,941 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site WWTF Pond - 3	-	1		PASS				$	917 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site CPS Pond	-	1		PASS				$	28,796 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site CPS Pond	-	1		PASS				$	445 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site PW-OSLA	-	1		PASS				$	41,273 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site PW-OSLA	-	1		PASS				$	602 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site PW-HRE	-	1		PASS				$	30,715 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site PW-HRE	-	1		PASS				$	509 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site PW-RTH	-	1		PASS				$	1,919 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site PW-RTH	-	1		PASS				$	370 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site Temporary pond	-	1		PASS				$	22,077 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site Temporary pond	-	1		PASS				$	445 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site S4, PW-S4	-	1		PASS				$	63,350 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site S4, PW-S4	-	1		PASS				$	815 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site SOSP, PW-SOSP	-	1		PASS				$	39,354 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	-	1		PASS				$	640 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site PW-HRC	-	1		PASS				$	19,197 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site PW-HRC	-	1		PASS				$	436 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site S23-1	-	1		PASS				$	42,233 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site S23-1	-	1		PASS				$	872 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Backfilling - Mine Site PW-S23-1	-	1		PASS				$	61,431 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Liner Cut & Fold - Mine Site PW-S23-1	-	1		PASS				$	1,195 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
check:																			
Heaps																			
Waste Rock Dumps								$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Grading Costs	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost	1	2		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Topsoil Placement Cost	2	3		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Ripping/Scarifying Cost	3	4		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Landfills																			
Tailings								$	2,208.00 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Embankment Regrading Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Tailings Surface Grading Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Topsoil Placement Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Ripping/Scarifying Cost	-	1		PASS				$	2,208 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Foundation & Buildings Areas																			
Yards, Etc.								$	118,972.00 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Regrading Cost	-	1		PASS				$	118,972 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Growth Media Placement Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Ripping/Scarifying Cost	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Drainage & Sediment Control								$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
0	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
0	-	1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Generic Material Hauling								$	302,950 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Hauling/Crush/Screen/Compact - Category 2/3 stockp		1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost - Category 2/3 stockpile reloca	1	2		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Topsoil Placement Cost - Category 2/3 stockpile reloc	1	2		PASS				$	161,974 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Hauling/Crush/Screen/Compact - Category 4 stockpile		1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost - Category 4 stockpile relocatio	3	4		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Topsoil Placement Cost - Category 4 stockpile relocat	3	3		PASS				$	66,437 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Hauling/Crush/Screen/Compact - Ore Surge Stockpile		1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost - Ore Surge Stockpile to East F		1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Topsoil Placement Cost - Ore Surge Stockpile to East	-			PASS				$	74,539 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Hauling/Crush/Screen/Compact - East pit - assume de		1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Cover Placement Cost - East pit - assume depth of ex		1		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Topsoil Placement Cost - East pit - assume depth of e		-		PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
check:																			

Closure Cost Estimate
User 12

	Add Year Before Item Starts	Activity Beginning Year	Check	- 2016	1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10 2026	11 2027	12 2028	13 2029	14 2030
A. Earthwork/Recontouring																		
Exploration																		
Exploration Roads & Drill Pads																		
Roads							$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Other User Costs (from Other User sheet)							$	2,362,393.95 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
SOW 3: Category 1 Cover System: Year 0 (no waste r			PASS				$	398,954.50										
SOW 11: Hydroment Residue Facility: Year 0 (no resi			PASS				$	42,644.00										
SOW 14: Flotation Tailings Basin: Year 0 (without Pol			PASS				$	713,551.25										
SOW 21: Category 1 Groundwater Containment Syste			PASS				$	1,207,244.20										
check:																		
Other**	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Mob/Demob if included in Other User sheet							$	-			$ -							
Mob/Demob																		
Subtotal "A"																		
B. Revegetation/Stabilization																		
Exploration																		
Exploration Roads & Drill Pads																		
Roads																		
Well Abandonment																		
Pits																		
Quarries & Borrow Areas	-	1	PASS				$	30,188										
Underground Openings			PASS															
Process Ponds			PASS				$	8,965										
Heaps			PASS															
Waste Rock Dumps	-	1	PASS															
Landfills			PASS															
Tailings	-	1	PASS				$	9,775										
Foundation & Buildings Areas			PASS															
Yards, Etc.	-	1	PASS				$	19,599 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Drainage & Sediment Control	-	-	PASS															
Generic Material Hauling	-	1	PASS				$	39,060 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Other User Costs (from Other User sheet)	-	-	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Other**	-	-	PASS															
Subtotal "B"																		
check:																		
C. Detoxification/Water Treatment/Disposal of Wastes																		
Process Ponds/Sludge	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Heaps	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Dumps (Waste & Landfill)	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Tailings	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Surplus Water Disposal	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Monitoring	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Miscellaneous	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Solid Waste - On Site	2	3	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Solid Waste - Off Site	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Hazardous Materials	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Hydrocarbon Contaminated Soils	-	1	PASS				$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Pumping (from Solution Mgmt sheet)																		
check:																		
Evaporation (from Solution Mgmt sheet)																		
Treatment (from Solution Mgmt sheet)							$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
check:																		
Decontamination (from Solution Mgmt sheet)																		
Other User Costs (from Other User sheet)							$	2,950,532.00 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Areas of concern, legacy remediation (quote from NTS	-	1	PASS				$	2,950,532 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
check:																		
Other**																		
Subtotal "C"																		
D. Structure, Equipment and Facility Removal, and M																		
Foundation & Buildings Areas																		
Other Demolition							$	45,854,091 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Demo and Asbestos Abatement Cost Summary - Use	-	1	PASS				$	45,548,841 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Above Ground Storage Tanks - User 2	-	1	PASS				$	244,425 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Remove & Dispose of Stockpile/Pond Liners - OSP	-	1	PASS				$	9,600 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Remove & Dispose of Collection pipe - OSP	-	1	PASS				$	6,975 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Remove & Dispose of Stockpile/Pond Liners - Catego	-	1	PASS				$	18,900 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Remove & Dispose of Collection pipe - Category 2/3 S	-	1	PASS				$	10,800 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Remove & Dispose of Stockpile/Pond Liners - Catego	-	1	PASS				$	8,700 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
Remove & Dispose of Collection pipe - Category 4 Sto	-	1	PASS				$	5,850 $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
check:																		
Equipment Removal							$	- $	- $	- $	- $	- $	- $	- $	- $	- $	- $	-
check:																		

Closure Cost Estimate
User 12

	Add Year Before Item Starts	Activity Beginning Year	Check	- 2016	1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10 2026	11 2027	12 2028	13 2029	14 2030
A. Earthwork/Recontouring																		
Exploration																		
Exploration Roads & Drill Pads																		
Roads							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fence Removal																		
Fence Installation							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Culvert Removal																		
Pipe Removal							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																	
Powerline Removal							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																	
Transformer Removal							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																	
Rip-rap, rock lining, gabions							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs																		
Other User Costs (from Other User sheet)							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																	
Other**																		
Subtotal "D"																		
E. Monitoring																		
Reclamation Monitoring and Maintenance							$	6,501.00 $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance	-	1	PASS				$	6,501 $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance	-	1	PASS				$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring	-	1	PASS				$	- $ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated fror (this one schedules automatically)																		
Other User Costs (from Other User sheet)							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:																	
Subtotal "E"																		

Closure Cost Estimate
User 12

	Add Year Before Item Starts	Activity Beginning Year		Check	- 2016	1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10 2026	11 2027	12 2028	13 2029	14 2030
A. Earthwork/Recontouring																			
Exploration																			
Exploration Roads & Drill Pads																			
Roads								$	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support																			
Construction Management				PASS															
Construction Support																			
Road Maintenance								$	$ 14,481	$ 14,481.00	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07
Active Reclamation				PASS				$	$ 14,481	$ 14,481									
Monitoring & Maintenance										$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
Other User Costs (from Other User sheet)									0										
Other**																			
Subtotal "F"																			
G. Closure Planning, G&A, Human Resources																			
Closure Planning																			
General & Administration																			
Human Resources								$	$ 168,576	$ 168,576	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920
Other User Costs (from Other User sheet)								$	$ 41,669.58	$ 8,040.15	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05
Closure - Pickup Trucks - Closure Year 1	-		1	PASS					2680.05	2680.05	0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Closure Year 2	1		2	PASS					2680.05	2680.05	0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 1	-		1	PASS					11544.6375	0	0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 2	1		2	PASS					11544.6375	0	0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Post-Closure Year 1	-		1	PASS				$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 2	1		2	PASS				$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 3	2		3	PASS				$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 4	3		4	PASS				$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 5	4		5	PASS					$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 6	5		6	PASS						$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 7	6		7	PASS							$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 8	7		8	PASS								$	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 9	8		9	PASS									$	$ 2,680	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 10	9		10	PASS										$	$ 2,680	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 11	10		11	PASS											$	$ 2,680	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 12	11		12	PASS												$	$ 2,680	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 13	12		13	PASS													$	$ 2,680	$ -
Closure - Pickup Trucks - Post-Closure Year 14	13		14	PASS														$	$ 2,680
Closure - Pickup Trucks - Post-Closure Year 15	14		15	PASS															
Closure - Pickup Trucks - Post-Closure Year 16	15		16	PASS															
Closure - Pickup Trucks - Post-Closure Year 17	16		17	PASS															
Closure - Pickup Trucks - Post-Closure Year 18	17		18	PASS															
Closure - Pickup Trucks - Post-Closure Year 19	18		19	PASS															
Closure - Pickup Trucks - Post-Closure Year 20	19		20	PASS															
Closure - Pickup Trucks - Post-Closure Year 21	20		21	PASS															
Closure - Pickup Trucks - Post-Closure Year 22	21		22	PASS															
Closure - Pickup Trucks - Post-Closure Year 23	22		23	PASS															
Closure - Pickup Trucks - Post-Closure Year 24	23		24	PASS															
Closure - Pickup Trucks - Post-Closure Year 25	24		25	PASS															
Closure - Pickup Trucks - Post-Closure Year 26	25		26	PASS															
Closure - Pickup Trucks - Post-Closure Year 27	26		27	PASS															
Closure - Pickup Trucks - Post-Closure Year 28	27		28	PASS															
Post-Closure - Plow attachment for Vehicles	-		1	PASS				$	$ 2,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

check:

Other**
Subtotal "G"

Subtotal Operational & Maintenance Costs
Subtotal A through G

Inflation Rate (r) (%):	**1.1%**
Discount Rate (i)(%):	**8%**

		0 2016	1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10 2026	11 2027	12 2028	13 2029	14 2030
Grand total	**$ 58,303,721**	$ -	$ -	$ -	$ -	$ 55,819,428	$ 200,652	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280
Grand Total (Inflation Adjusted) (FV)	**$ 61,366,881**	$ -	$ -	$ -	$ -	$ 58,316,306	$ 211,933	$ 86,794	$ 87,749	$ 88,714	$ 89,690	$ 90,677	$ 91,674	$ 92,683	$ 93,702	$ 94,733
Grand Total Net Present Value (NPV)	**$ 43,730,954**	$ -	$ -	$ -	$ -	$ 42,864,226	$ 144,238	$ 54,695	$ 51,201	$ 47,930	$ 44,867	$ 42,001	$ 39,318	$ 36,806	$ 34,454	$ 32,253

Closure Cost Estimate
User 12

	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
A. Earthwork/Recontouring																			
Exploration																			
Exploration Roads & Drill Pads																			
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,825.00	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Wells															$ -	$ 20,825	$ -	$ -	$ -
Pits																			
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings																			
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																			
Heaps																			
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills																			
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas																			
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockp	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile reloca	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile reloc	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocatic	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocat	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to East I	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Ore Surge Stockpile to East	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - East pit - assume de	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - East pit - assume depth of ex	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - East pit - assume depth of e	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																			

Closure Cost Estimate
User 12

	15 2031	16 2032	17 2033	18 2034	19 2035	20 2036	21 2037	22 2038	23 2039	24 2040	25 2041	26 2042	27 2043	28 2044	29 2045	30 2046	31 2047	32 2048	33 2049
A. Earthwork/Recontouring																			
Exploration																			
Exploration Roads & Drill Pads																			
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 0 (no waste r																			
SOW 11: Hydroment Residue Facility: Year 0 (no resi																			
SOW 14: Flotation Tailings Basin: Year 0 (without Pol																			
SOW 21: Category 1 Groundwater Containment Syste																			
check:																			
Other**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet																			
Mob/Demob																			
Subtotal "A"																			
B. Revegetation/Stabilization																			
Exploration																			
Exploration Roads & Drill Pads																			
Roads																			
Well Abandonment																			
Pits																			
Quarries & Borrow Areas																			
Underground Openings																			
Process Ponds																			
Heaps																			
Waste Rock Dumps																			
Landfills																			
Tailings																			
Foundation & Buildings Areas																			
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control																			
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**																			
Subtotal "B"																			
check:																			
C. Detoxification/Water Treatment/Disposal of Wastes																			
Process Ponds/Sludge	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)																			
check:																			
Evaporation (from Solution Mgmt sheet)																			
Treatment (from Solution Mgmt sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																			
Decontamination (from Solution Mgmt sheet)																			
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Areas of concern, legacy remediation (quote from NT:	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																			
Other**																			
Subtotal "C"																			
D. Structure, Equipment and Facility Removal, and M																			
Foundation & Buildings Areas																			
Other Demolition	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - Use	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Catego	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 S	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Catego	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Sto	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																			
Equipment Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:																			

Closure Cost Estimate
User 12

		15 2031	16 2032	17 2033	18 2034	19 2035	20 2036	21 2037	22 2038	23 2039	24 2040	25 2041	26 2042	27 2043	28 2044	29 2045	30 2046	31 2047	32 2048	33 2049
A. Earthwork/Recontouring																				
Exploration																				
Exploration Roads & Drill Pads																				
Roads		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
Fence Removal																				
Fence Installation		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
Culvert Removal																				
Pipe Removal		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
	check:																			
Powerline Removal		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
	check:																			
Transformer Removal		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
	check:																			
Rip-rap, rock lining, gabions		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
Other Misc. Costs																				
Other User Costs (from Other User sheet)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
	check:																			
Other**																				
Subtotal "D"																				
E. Monitoring																				
Reclamation Monitoring and Maintenance		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
Revegetation Maintenance		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
Erosion Maintenance		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
Reclamation Monitoring		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
Ground and Surface Water Monitoring (calculated fror (this one schedules automatically)																				
Other User Costs (from Other User sheet)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
	check:																			
Subtotal "E"																				

Closure Cost Estimate
User 12

	15 2031	16 2032	17 2033	18 2034	19 2035	20 2036	21 2037	22 2038	23 2039	24 2040	25 2041	26 2042	27 2043	28 2044	29 2045	30 2046	31 2047	32 2048	33 2049
A. Earthwork/Recontouring																			
Exploration																			
Exploration Roads & Drill Pads																			
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
F. Construction Management & Support																			
Construction Management																			
Construction Support																			
Road Maintenance	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07	$ 1,810.07
Active Reclamation																			
Monitoring & Maintenance	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810	$ 1,810
Other User Costs (from Other User sheet)																			
Other**																			
Subtotal "F"																			
G. Closure Planning, G&A, Human Resources																			
Closure Planning																			
General & Administration																			
Human Resources	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920	$ 72,920
Other User Costs (from Other User sheet)	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ 2,680.05	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Closure Year 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Snow Plowing - Closure Year 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure - Pickup Trucks - Post-Closure Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 5	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 6	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 7	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 8	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 9	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 12	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 13	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 14	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 15	$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 16		$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 17			$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 18				$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 19					$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 20						$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 21							$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 22								$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 23									$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 24										$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 25											$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 26												$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 27													$ 2,680	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Post-Closure Year 28														$ 2,680	$ -	$ -	$ -	$ -	$ -
Post-Closure - Plow attachment for Vehicles	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

check:

Other**
Subtotal "G"

Subtotal Operational & Maintenance Costs
Subtotal A through G

15 2031	16 2032	17 2033	18 2034	19 2035	20 2036	21 2037	22 2038	23 2039	24 2040	25 2041	26 2042	27 2043	28 2044	29 2045	30 2046	31 2047	32 2048	33 2049
$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 81,280	$ 78,466	$ 100,332	$ 78,466	$ 78,466	$ 78,466
$ 95,775	$ 96,829	$ 97,894	$ 98,970	$ 100,059	$ 101,160	$ 102,273	$ 103,398	$ 104,535	$ 105,685	$ 106,847	$ 108,023	$ 109,211	$ 110,412	$ 107,762	$ 139,308	$ 110,146	$ 111,357	$ 112,582
$ 30,192	$ 28,263	$ 26,458	$ 24,767	$ 23,185	$ 21,704	$ 20,317	$ 19,019	$ 17,804	$ 16,666	$ 15,602	$ 14,605	$ 13,672	$ 12,798	$ 11,566	$ 13,844	$ 10,135	$ 9,488	$ 8,882

Attachment 2.

Cost Data File

Format Version:	***SRCE Data File v1.12***
File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Type:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Units of Measure:	**Imperial**

No. of Bases/Regions:	4

Basis/Region	Basis/Region Name	Basis/Region Description
Basis 1	***Northern Nevada***	Churchill, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 2	***Southern Nevada***	Clark, Esmeralda, Lincoln and Nye Counties
Basis 3	***do not use***	From 2014 NDEP Cost Data file and labor from InfoMine 2013 Labor Survey of non-union Surface metal and industrial mines in Western US.
Basis 4	***Polymet***	MN prevailing wages, CAT equipment rates
Basis 5		
Basis 6		
Basis 7		
Basis 8		
Basis 9		
Basis 10		
Basis 11		
Basis 12		
Basis 13		
Basis 14		
Basis 15		

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

MONTHLY EQUIPMENT RATE TABLE [Cost Per Month] (1)

EQUIPMENT TYPE (2)	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$10,800	$10,800	$10,800	$12,220	Caterpillar rental rates
D6R w/ Winch				$13,060	Caterpillar rental rates
D7R	$13,500	$13,500	$13,500	$16,640	Caterpillar rental rates
D8R	$19,000	$19,000	$19,000	$19,890	Caterpillar rental rates
D9R	$22,900	$22,900	$22,900	$27,500	Caterpillar rental rates
D10R	$31,000	$31,000	$31,000	$33,340	Caterpillar rental rates
D11R	$62,000	$62,000	$62,000	$62,000	NV cost
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$9,600	$9,600	$9,600	$10,430	Caterpillar rental rates
14G/H	$14,500	$14,500	$14,500	$16,910	Caterpillar rental rates
16G/H	$21,600	$21,600	$21,600	$23,530	Caterpillar rental rates
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$5,700	$5,700	$5,700	$6,250	Caterpillar rental rates
320C	$7,000	$7,000	$7,000	$7,490	Caterpillar rental rates
325C	$8,200	$8,200	$8,200	$8,920	Caterpillar rental rates
330C	$10,800	$10,800	$10,800	$10,730	Caterpillar rental rates
345B	$9,500	$9,500	$9,500	$17,110	Caterpillar rental rates
365BL				$26,050	Caterpillar rental rates
385BL	$22,500	$22,500	$22,500	$32,700	Caterpillar rental rates
Scrapers					
631G	$16,500	$16,500	$16,500	$33,930	Caterpillar rental rates
637G PP	$34,500	$34,500	$34,500	$34,500.00	NV cost
Wheeled Loaders					
924G	$5,100	$5,100	$5,100	$5,730	Caterpillar rental rates
928G	$5,400	$5,400	$5,400	$6,840	Caterpillar rental rates
950G	$7,600	$7,600	$7,600	$9,690	Caterpillar rental rates
966G	$10,900	$10,900	$10,900	$13,890	Caterpillar rental rates
972G	$13,000	$13,000	$13,000	$15,060	Caterpillar rental rates
980G	$13,000	$13,000	$13,000	$19,260	Caterpillar rental rates
988G	$21,000	$21,000	$21,000	$30,340	Caterpillar rental rates
990				$47,670	average
992G	$65,000	$65,000	$65,000	$65,000	NV cost
994D				$71,500	extrapolated
L-2350				$78,650	extrapolated

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	$7,000	$7,000	$7,000	$3,120	Caterpillar rental rates
H-160 (fits 345)	$8,600	$8,600	$8,600	$4,140	Caterpillar rental rates
H-180 (fits 365/385)	$12,400	$12,400	$12,400	$4,060	Caterpillar rental rates
Demolition Shears					
S340 (fits 322/325/330)					
S365 (fits 330/345)					
S390 (fits 365/385)					
Demolition Grapples					
G315 (fits 322/325)					
G320 (fits 325/330)					
G330 (fits 345/365)					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$3,600	$3,600	$3,600	$3,220	Caterpillar rental rates
428D 4WD Backhoe	$4,200	$4,200	$4,200	$5,220	average
CS533E Vibratory Roller	$7,590	$7,590	$7,590	$7,220	Caterpillar rental rates
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton	$5,804	$5,804	$5,804	$5,804	NV cost
Supervisor's Truck	$3,586	$3,586	$3,586	$3,586	NV cost
Flatbed Truck	$5,804	$5,804	$5,804	$5,804	NV cost
Air Compressor + tools	$4,643	$4,643	$4,643	$4,643	NV cost
Welding Equipment	$3,025	$3,025	$3,025	$3,025	NV cost
Heavy Duty Drill Rig	$61,380	$61,380	$61,380	$61,380	NV cost
Pump (plugging) Drill Rig	$61,380	$61,380	$61,380	$61,380	NV cost
Concrete Pump	$15,224	$15,224	$15,224	$15,224	NV cost
Gas Engine Vibrator	$704	$704	$704	$704	NV cost
Generator 5KW	$1,065	$1,065	$1,065	$1,065	NV cost
HDEP Welder (pipe or liner)	$8,162	$8,162	$8,162	$8,162	NV cost
5 Ton Crane	$5,975	$5,975	$5,975	$5,975	NV cost
20 Ton Crane	$15,884	$15,884	$15,884	$4,220	Caterpillar rental rates
50 Ton Crane	$15,884	$15,884	$15,884	$15,884	NV cost
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$9,900	$9,900	$9,900	$11,000	Caterpillar rental rates
730 (articulated)	$9,900	$9,900	$9,900	$13,460	Caterpillar rental rates
735 (articulated)	$9,900	$9,900	$9,900	$16,970	Caterpillar rental rates
740 (articulated)	$15,000	$15,000	$15,000	$18,110	Caterpillar rental rates
769D	$21,000	$21,000	$21,000	$21,000	NV cost
773E	$27,000	$27,000	$27,000	$27,000	NV cost
777D	$54,000	$54,000	$54,000	$54,000	NV cost
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$7,700	$7,700	$7,700	$7,700	NV cost
621E (8,000 gal) Water Wagon	$13,000	$13,000	$13,000	$13,000	NV cost
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd^3) (5)	$14,762	$14,762	$14,762	$14,762	NV cost

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

NOTES:

(1) Power Equipment Source:	Cashman Equipment Company (July 2014) unless noted	Cashman Equipment Company (July 2014) unless noted	Cashman Equipment Company (July 2014) unless noted		
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)		
(4) Other Equipment Source:	Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)		

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

PREVENTATIVE MAINTENANCE COST [Cost Per Hour] (1)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$5.21	$5.21	$5.21	$5.21	
D6R w/ Winch					
D7R	$3.18	$3.18	$3.18	$3.18	
D8R	$5.75	$5.75	$5.75	$5.75	
D9R	$7.99	$7.99	$7.99	$7.99	
D10R	$9.82	$9.82	$9.82	$9.82	
D11R	$12.48	$12.48	$12.48	$12.48	
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$6.11	$6.11	$6.11	$6.11	
14G/H	$6.68	$6.68	$6.68	$6.68	
16G/H	$5.37	$5.37	$5.37	$5.37	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$3.89	$3.89	$3.89	$3.89	
320C	$4.15	$4.15	$4.15	$4.15	
325C	$4.02	$4.02	$4.02	$4.02	
330C	$5.19	$5.19	$5.19	$5.19	
345B	$7.08	$7.08	$7.08	$7.08	
365BL					
385BL	$6.11	$6.11	$6.11	$6.11	
Scrapers					
631G	$7.02	$7.02	$7.02	$7.02	
637G PP	$11.61	$11.61	$11.61	$11.61	
Wheeled Loaders					
924G	$3.79	$3.79	$3.79	$3.79	
928G	$4.12	$4.12	$4.12	$4.12	
950G	$4.93	$4.93	$4.93	$4.93	
966G	$6.75	$6.75	$6.75	$6.75	
972G	$5.27	$5.27	$5.27	$5.27	
980G	$5.27	$5.27	$5.27	$5.27	
988G	$9.76	$9.76	$9.76	$9.76	
990					
992G	$11.62	$11.62	$11.62	$11.62	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	N/A	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Shears					
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Grapples					
G315 (fits 322/325)	N/A	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A	N/A

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

Other Equipment					
420D 4WD Backhoe	$3.36	$3.36	$3.36	$3.36	
428D 4WD Backhoe	$3.37	$3.37	$3.37	$3.37	
CS533E Vibratory Roller					
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton					
Supervisor's Truck					
Flatbed Truck					
Air Compressor + tools					
Welding Equipment					
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump					
Gas Engine Vibrator					
Generator 5KW					
HDEP Welder (pipe or liner)					
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$7.32	$7.32	$7.32	$7.32	
730 (articulated)	$7.32	$7.32	$7.32	$7.32	
735 (articulated)	$7.32	$7.32	$7.32	$7.32	
740 (articulated)	$7.32	$7.32	$7.32	$7.32	
769D	$8.46	$8.46	$8.46	$8.46	
773E	$7.23	$7.23	$7.23	$7.23	
777D	$10.48	$10.48	$10.48	$10.48	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$5.79	$5.79	$5.79	$5.79	
621E (8,000 gal) Water Wagon	$6.76	$6.76	$6.76	$6.76	
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$7.32	$7.32	$7.32	$7.32	
(1) PM Source:	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)		

G.E.T CONSUMPTION [Cost Per Hour] (1) (Wear Items)

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$4.63	$4.63	$4.63	$4.63	
D6R w/ Winch					
D7R	$6.88	$6.88	$6.88	$6.88	
D8R	$8.94	$8.94	$8.94	$8.94	
D9R	$13.90	$13.90	$13.90	$13.90	
D10R	$19.46	$19.46	$19.46	$19.46	
D11R	$28.92	$28.92	$28.92	$28.92	
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$9.60	$9.60	$9.60	$9.60	
14G/H	$13.87	$13.87	$13.87	$13.87	
16G/H	$18.95	$18.95	$18.95	$18.95	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$3.62	$3.62	$3.62	$3.62	
320C	$4.18	$4.18	$4.18	$4.18	
325C	$5.27	$5.27	$5.27	$5.27	
330C	$5.81	$5.81	$5.81	$5.81	
345B	$6.68	$6.68	$6.68	$6.68	
365BL					
385BL	$12.15	$12.15	$12.15	$12.15	
Scrapers					
631G	$7.59	$7.59	$7.59	$7.59	
637G PP	$9.54	$9.54	$9.54	$9.54	
Wheeled Loaders					
924G	$3.99	$3.99	$3.99	$3.99	
928G	$4.13	$4.13	$4.13	$4.13	
950G	$7.68	$7.68	$7.68	$7.68	
966G	$9.64	$9.64	$9.64	$9.64	
972G	$12.21	$12.21	$12.21	$12.21	
980G	$12.21	$12.21	$12.21	$12.21	
988G	$13.07	$13.07	$13.07	$13.07	
990					
992G	$30.03	$30.03	$30.03	$30.03	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	$5.29	$5.29	$5.29	$5.29	
H-160 (fits 345)	$10.35	$10.35	$10.35	$10.35	
H-180 (fits 365/385)	$12.02	$12.02	$12.02	$12.02	
Demolition Shears					
S340 (fits 322/325/330)					
S365 (fits 330/345)					
S390 (fits 365/385)					
Demolition Grapples					
G315 (fits 322/325)					
G320 (fits 325/330)					
G330 (fits 345/365)					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$3.22	$3.22	$3.22	$3.22	
428D 4WD Backhoe	$3.32	$3.32	$3.32	$3.32	
CS533E Vibratory Roller					
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton					
Supervisor's Truck					
Flatbed Truck					
Air Compressor + tools	N/A	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump	N/A	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A	N/A
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$2.87	$2.87	$2.87	$2.87	
730 (articulated)	$2.87	$2.87	$2.87	$2.87	
735 (articulated)	$2.87	$2.87	$2.87	$2.87	
740 (articulated)	$2.97	$2.97	$2.97	$2.97	
769D	$3.22	$3.22	$3.22	$3.22	
773E	$3.61	$3.61	$3.61	$3.61	
777D	$4.04	$4.04	$4.04	$4.04	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon					
621E (8,000 gal) Water Wagon					
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$2.91	$2.91	$2.91	$2.91	
Notes:					
(1) G.E.T. Source:	Cashman Equipment Compan (July 2014) unless noted	Cashman Equipment Compan (July 2014) unless noted	Cashman Equipment Compan (July 2014) unless noted	NV costs	

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

TIRE COST TABLE [Cost Per Tire(1,2,3)]

EQUIPMENT TYPE	Basis 1 *Northern Nevada*	Basis 2 *Southern Nevada*	Basis 3 *do not use*	Basis 4 *Polymet*	Basis 5
Bulldozers					
D6R	N/A	N/A	N/A	N/A	N/A
D6R w/ Winch	N/A	N/A	N/A	N/A	N/A
D7R	N/A	N/A	N/A	N/A	N/A
D8R	N/A	N/A	N/A	N/A	N/A
D9R	N/A	N/A	N/A	N/A	N/A
D10R	N/A	N/A	N/A	N/A	N/A
D11R	N/A	N/A	N/A	N/A	N/A
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$2,419.20	$2,419.20	$2,419.20	$2,419.20	
14G/H	$3,311.84	$3,311.84	$3,311.84	$3,311.84	
16G/H	$4,480.00	$4,480.00	$4,480.00	$4,480.00	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	N/A	N/A	N/A	N/A	N/A
320C	N/A	N/A	N/A	N/A	N/A
325C	N/A	N/A	N/A	N/A	N/A
330C	N/A	N/A	N/A	N/A	N/A
345B	N/A	N/A	N/A	N/A	N/A
365BL	N/A	N/A	N/A	N/A	N/A
385BL	N/A	N/A	N/A	N/A	N/A
Scrapers					
631G	$9,840.32	$9,840.32	$9,840.32	$9,840.32	
637G PP	$9,840.32	$9,840.32	$9,840.32	$9,840.32	
Wheeled Loaders					
924G	$3,337.60	$3,337.60	$3,337.60	$3,337.60	
928G	$3,337.60	$3,337.60	$3,337.60	$3,337.60	
950G	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
966G	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
972G	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
980G	$8,428.00	$8,428.00	$8,428.00	$8,428.00	
988G	$13,235.60	$13,235.60	$13,235.60	$13,235.60	
990					
992G	$29,513.12	$29,513.12	$29,513.12	$29,513.12	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000	N/A	N/A	N/A	N/A	N/A
KOM PC3000	N/A	N/A	N/A	N/A	N/A
KOM PC4000	N/A	N/A	N/A	N/A	N/A
KOM PC5500	N/A	N/A	N/A	N/A	N/A
KOM PC8000	N/A	N/A	N/A	N/A	N/A
Hydraulic Hammers					
H-120 (fits 325)	N/A	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Shears					
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Grapples					
G315 (fits 322/325)	N/A	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A	N/A

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$1,145.03	$1,145.03	$1,145.03	$1,145.03	
428D 4WD Backhoe	$1,145.03	$1,145.03	$1,145.03	$1,145.03	
CS533E Vibratory Roller	N/A	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	$154.00	$154.00	$154.00	$154.00	
Supervisor's Truck	$154.00	$154.00	$154.00	$154.00	
Flatbed Truck	$154.00	$154.00	$154.00	$154.00	
Air Compressor + tools	N/A	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump	N/A	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A	N/A
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
730 (articulated)	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
735 (articulated)	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
740 (articulated)	$8,428.00	$8,428.00	$8,428.00	$8,428.00	
769D	$4,607.46	$4,607.46	$4,607.46	$4,607.46	
773E	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
777D	$14,348.96	$14,348.96	$14,348.96	$14,348.96	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$3,979.50	$3,979.50	$3,979.50	$3,979.50	
621E (8,000 gal) Water Wagon	$10,247.83	$10,247.83	$10,247.83	$10,247.83	
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$544.88	$544.88	$544.88	$544.88	
Notes:					
(1) Unit Cost Basis:	Cost per tire	Cost per tire	Cost per tire	NV costs	
(2) Cost Basis:	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.	NV costs	
(3) Tire Cost Source:	Purcell Tire Quote 07/28/2014	Purcell Tire Quote 07/28/2014	Purcell Tire Quote 07/28/2014	NV costs	
(4) Tire Wear Source (defined in model):	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	NV costs	

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
EQUIPMENT OPERATORS - Labor Groups and Base Pay Rate ($/hr) (2)								
Bulldozers								
D6R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D6R w/ Winch					Heavy equip op	$23.78	69-201	$35.48
D7R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D8R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D9R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D10R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D11R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Wheeled Dozers								
824G								
834G								
844								
854G								
Motor Graders								
120H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
14G/H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
16G/H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
24M					Heavy equip op	$23.78	69-201	$35.48
Track Excavators								
312C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
320C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
325C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
330C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
345B	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
365BL					Heavy equip op	$23.78	69-201	$35.48
385BL	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
Scrapers								
631G	Group 10	$49.36	Group 15	$59.23	Heavy equip op	$23.78	69-201	$35.48
637G PP	Group 11	$49.79	Group 15	$59.23	Heavy equip op	$23.78	69-201	$35.48
Wheeled Loaders								
924G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
928G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
950G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
966G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
972G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
980G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
988G	Group 11	$49.79	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
990					Heavy equip op	$23.78	69-201	$35.48
992G	Group 11A	$51.43	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
994D							69-201	$35.48
L-2350							69-201	$35.48

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Shovels								
KOM PC2000							69-201	$35.48
KOM PC3000							69-201	$35.48
KOM PC4000							69-201	$35.48
KOM PC5500							69-201	$35.48
KOM PC8000							69-201	$35.48
Hydrauilc Hammers								
H-120 (fits 325)								
H-160 (fits 345)								
H-180 (fits 365/385)								
Demolition Shears								
S340 (fits 322/325/330)								
S365 (fits 330/345)								
S390 (fits 365/385)								
Demolition Grapples								
G315 (fits 322/325)								
G320 (fits 325/330)								
G330 (fits 345/365)								

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Other Equipment								
420D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
428D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
CS533E Vibratory Roller	Group 6	$47.85	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
CS663E Vibratory Roller					Heavy equip op	$23.78	69-201	$35.48
CP533E Sheepsfoot Compactor					Heavy equip op	$23.78	69-201	$35.48
CP663E Sheepsfoot Compactor					Heavy equip op	$23.78	69-201	$35.48
Light Truck - 1.5 Ton					Heavy equip op	$23.78	69-201	$35.48
Supervisor's Truck					Heavy equip op	$23.78	69-201	$35.48
Flatbed Truck					Heavy equip op	$23.78	69-201	$35.48
Air Compressor + tools	Group 3	$46.64	Group 1	$55.67	Heavy equip op	$23.78	69-201	$35.48
Welding Equipment	Group 9	$49.01	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Heavy Duty Drill Rig	Group 10	$49.36	Group 2	$56.62	Driller	$27.01	69-201	$35.48
Pump (plugging) Drill Rig	Group 10	$49.36	Group 2	$56.62	Driller	$27.01	69-201	$35.48
Concrete Pump								
Gas Engine Vibrator	Group 6	$47.85	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Generator 5KW								
HDEP Welder (pipe or liner)								
5 Ton Crane	Group 10A	$49.55	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
20 Ton Crane	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
50 Ton Crane	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
120 Ton Crane					Heavy equip op	$23.78	69-201	$35.48
Fringe Benefits								
Equip Op Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$17.15
Zone and Area Adjustments - Miles and Rates ($/hr) (3)								
Equipment Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Equipment Zone 2	< 50 miles	$0.00	< 20 Miles	$0.00				
Equipment Zone 3	50 to 150 miles	$2.00	20 to 40 miles	$2.00				
Equipment Zone 4	151 to 300 miles	$3.00	40 to 60 miles	$3.00				
Equipment Zone 5	> 300 miles	$4.00	> 60 miles	$3.50				
Equipment Zone 6								
Equipment Zone 7								
NOTES:								
(1) Equipment Type:	Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent	
(2) Equipment Operator Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010					
(3) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE [1] OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
TRUCK DRIVERS - Labor Groups and Base Pay Rate ($/hr) [4]								
725 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
730 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
735 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
740 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
769D	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
773E					Truck operator	$20.01	69-201	$35.48
777D	Dump Truck	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
785C					Truck operator	$20.01	69-201	$35.48
793C					Truck operator	$20.01	69-201	$35.48
797B					Truck operator	$20.01	69-201	$35.48
613E (5,000 gal) Water Wagon	Water Truck > 2,500 gallons	$28.61	Group 3	$46.44	Truck operator	$20.01	69-201	$35.48
621E (8,000 gal) Water Wagon	Water Truck > 2,500 gallons	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
777D Water Truck					Truck operator	$20.01	69-201	$35.48
785C Water Truck					Truck operator	$20.01	69-201	$35.48
Dump Truck (10-12 yd3)	Dump Truck Driver > 8 yds < 18 yds	$29.04	Group 2	$46.23	Truck operator	$20.01	69-201	$35.48
Fringe Benefits								
Truck Driver Fringe Benefits ($/hr)		$13.64		$0.00		$0.00		$17.15

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Zone and Area Adjustments (5)								
Truck Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Truck Zone 2	< 50 miles	$0.00	< 30 miles	$0.00				
Truck Zone 3	50 to 150 miles	$2.00	30-50 miles	$1.50				
Truck Zone 4	151 to 300 miles	$3.00	50-70 miles	$2.50				
Truck Zone 5	> 300 miles	$4.00	>70 miles	$3.50				
Truck Zone 6								
Truck Zone 7								
NOTES:								
(4) Truck Driver Source:	D-B TEAM0533-002		D-B NV20100064 10/01/2010					
(5) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					
LABORERS - Labor Groups and Base Pay Rate ($/hr) (6,7)								
General Laborer	Group 1	$30.82	Group 1	$42.94	Mill laborer	$17.62	69-101	$24.34
Skilled Laborer	Group 4	$31.32	Group 3	$43.25	Mine laborer	$17.77	69-102	$24.34
Driller's Helper	Group 3	$31.07	Group 2	$43.15	Driller	$27.01		$24.34
Rodmen (reinforcing concrete)	Group 2	$30.92	Group 3A	$43.34	Electrician	$28.83		$24.34
Cement finisher	Group 3	$31.07	Group 3A	$43.34	Electrician	$28.83		$24.34
Carpenter		$38.80		$37.76	Electrician	$28.83	69-704	$30.85
Fringe Benefits								
Laborer Fringe Benefits ($/hr)		$0.00		$0.00				$16.87
Carpenter Fringe Benefits ($/hr)		$0.00		$13.35				$16.08
Zone and Area Adjustments (8)								
Laborer Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Laborer Zone 2	< 50 miles	$0.00	< 30 miles	$0.00				
Laborer Zone 3	50 to 150 miles	$2.00	30-50 miles	$1.50				
Laborer Zone 4	151 to 300 miles	$3.00	50-70 miles	$2.50				
Laborer Zone 5	> 300 miles	$4.00	>70 miles	$3.50				
Laborer Zone 6			Laughlin	$2.25				
Laborer Zone 7								
NOTES:								
(6) Laborer Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010					
(7) Carpenter Source:	D-B NV120038 1/6/2012		D-B CARP1780-011					
(8) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					

Labor Rates

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Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
PROJECT MANAGEMENT AND TECHNICAL LABOR - Base Pay Rate ($/hr) (9)								
Project Manager		$66.38		$66.38		$51.87		$76.25
Foreman		$61.88		$61.88		$53.09		$78.04
Field Geologist/Engineer		$96.31		$96.31		$33.00		$48.51
Field Tech/Sampler		$83.75		$83.75		$24.74		$36.37
Range Scientist		$96.31		$96.31		$33.00		$48.51
Senior Planning Engineer								
Project Engineer								
Mechanic/Fitter								
Surveyor								$39.96
Electrician								$56.28
NOTES:								
(9) Project Manager:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31					
(9) Foreman Source:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31					
(9) Techical Labor Source:	SRK Consulting 2012 (Total		SRK Consulting 2012 (Total					
INDIRECT COSTS								
SOCIAL SECURITY, WORKMAN'S COMP, INSURANCE, ETC.								
Unemployment (%)		3.00%		3.00%				1.49%
Retirement/SS/Medicare (%)		7.65%		7.65%				7.65%
Workman's Compensation (%)		8.75%		8.75%				11.00%
Total cost of benefits						40.00%		
NOTES:								
(10) Workman's Comp Source:	RS Means R013113-60 NV		RS Means R013113-60 NV				RS Means R013113-60 MN	
Unemployment tax	NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606				experience rating industry	

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Author/Source:	***SRK Consulting, 2016***

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4	Basis 5	Basis 6
		Northern Nevada	*Southern Nevada*	*do not use*	*Polymet*		
Revegetation Materials							
Seed Mixes							
Seed Mix	Units						
None							
Mix 1	Cost/Acre	$302.50	$302.50	$475.00	$139.00	atrix_20160511.xlsx	
Mix 2	Cost/Acre	$332.75	$332.75	$570.00	$299.00	atrix_20160511.xlsx	
Mix 3	Cost/Acre	$363.00	$363.00	$275.00	$37.00	atrix_20160511.xlsx	
Mix 4	Cost/Acre	$393.25	$393.25	$812.50			
User Mix 1	Cost/Acre						
User Mix 2	Cost/Acre						
User Mix 3	Cost/Acre						
User Mix 4	Cost/Acre						
User Mix 5 (see Seed Mix sheet)	Cost/Acre						
	Notes:						
Mulch							
Item	Units						
None							
Straw Mulch	Cost/lb	$0.15	$0.15	$0.15	$0.18	atrix_20160511.xlsx	
Hydro Mulch	Cost/lb	$0.25	$0.25	$0.25			
Timber Mulch	Cost/lb						
	Cost/lb						
	Cost/lb						
	Notes:	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)			
		Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)			
Amendments							
Item	Units						
None							
Organic Matter	Cost/lb	$0.70	$0.70	$0.70			
Treated Sludge	Cost/lb						
Chemical	Cost/lb	$0.54	$0.54	$0.54			
	Cost/lb						
	Cost/lb						
	Cost/lb						
	Notes:	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)			
		Western Nevada Supply $27.11 per 50 # bag (July 2014)	Western Nevada Supply $27.11 per 50 # bag (July 2014)	Western Nevada Supply $27.11 per 50 # bag (July 2014)			

Well Abandonment Materials

Description	Units						
Cement	50lb bag	$7.18	$7.18	$7.18	$7.18		
Grout (Low Grade Bentonite)	50lb bag	$9.96	$9.96	$9.96	$9.96		
Inert Material/Cuttings	cy						
	Notes:	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)			
		(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added	(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added	(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added			

Monitoring Costs

Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Monitor Well Pump	ea.	$2,140.00	$2,140.00	$2,140.00	$2,140.00		
Sampling Supplies	ea.	$5.00	$5.00	$5.00	$0.00		
Water Analysis	ea.	$380.00	$380.00	$380.00	$331.00	s draft 050316.docx	
Water treatment analyses	ea.	$450.00	$450.00	$450.00	$100.00		
	ea.	$150.00	$150.00	$150.00			
	ea.	$50.00	$50.00	$50.00			
	ea.	$430.00	$430.00	$430.00			
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	Notes:	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)		

Fuel, Etc.

Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Off-road Diesel - delivered [1]	$/gal	$3.39	$3.39	$3.39	$2.99	y 12, 2015 9:48 AM	
Pickup Truck Travel	$/mi	$0.56	$0.56	$0.56	$0.56	NV costs	
Electical Power	$/kWh	$0.0853	$0.0853	$0.0853	$0.0780	MP CommercialRates.pdf	
	Notes:	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)			
		Source: Federal Government Vehicle Allowance Rate January 1, 2014	Source: Federal Government Vehicle Allowance Rate January 1, 2014	Source: Federal Government Vehicle Allowance Rate January 1, 2014			
		Source: NVEnergy (July 2014)	Source: NVEnergy (July 2014)	Source: NVEnergy (July 2014)			

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
REVEGETATION									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Seeding - Broadcast Manual [1]	$/acres	$270.00	$0.00	$270.00	$0.00				
Seeding - Broadcast Mechanical [1]	$/acres	$70.00	$30.00	$70.00	$30.00			$139.00	$139.00
Seeding - Drill [1]	$/acres	$140.00	$83.00	$140.00	$83.00				
Seeding - Hydroseeding [1]	$/acres	$250.00	$125.00	$250.00	$125.00				
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Shrub Planting - bare root 6-10 in (150- 250mm) [2]	ea.								
Tree Planting - bare root 11-16 in (270- 400mm) [3]	ea.								
Cactus Planting [4]	ea.								
NOTES:									
(1) Seeding Source:		Kelley Erosion Control (July 2014)		Kelley Erosion Control (July 2014)		Kelley Erosion Control (July 2014)			
(2) Shrub Source:									
(3) Tree Source:									
(4) Cactus Source:									
BUILDING and WALL DEMOLITION									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Building Demolition									
Lg. steel	C.F.								
Lg. concrete	C.F.								
Lg. masonry	C.F.								
Lg. mixed	C.F.								
Sm. steel	C.F.								
Sm. concrete	C.F.								
Sm. masonry	C.F.								
Sm. wood	C.F.								
Wall Demolition									
Block 4 in thick	S.F.		20%		20%		20%		20%
Block 6 in thick	S.F.		20%		20%		20%		20%
Block 8 in thick	S.F.		20%		20%		20%		20%
Block 12 in thick	S.F.		20%		20%		20%		20%
Conc 6 in thick	S.F.		10%		10%		10%		10%
Conc 8 in thick	S.F.		10%		10%		10%		10%
Conc 10 in thick	S.F.		10%		10%		10%		10%
Conc 12 in thick	S.F.		10%		10%		10%		10%
WASTE DISPOSAL									

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	*Southern Nevada*	*do not use*	*Polymet*
Item	**Units**	**Materials**	**Materials**	**Materials**	**Materials**
Rubbish and Waste Handling					
Dumpster delivery (average for all sizes)	ea.	$47.50	$47.50	$47.50	$47.50
Haul (average for all sizes)	ea.	$149.00	$149.00	$149.00	$149.00
Rent per month (average for all sizes)	ea.	$51.00	$51.00	$51.00	$51.00
Disposal fee per ton (tonne) (average for all sizes)	ton	$56.00	$56.00	$56.00	$56.00
NOTES:					
Dumpster Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Disposal Fee Source:		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Hazardous Material Handling - Solids					
Pickup fees 55 gal. drums	ea.	$247.00	$247.00	$247.00	$247.00
Bulk material (average)	ton	$403.00	$403.00	$403.00	$403.00
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	mile	$5.50	$5.50	$5.50	$5.50
Dump site disposal fee	ton	$285.00	$285.00	$285.00	$285.00
NOTES:					
Solid Handling Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Solid Disposal Fee Source:		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Hazardous Material Handling - Liquids					
Vacuum Truck Pickup (2200 gal or 9,700 litres)	hr.	$145.00	$145.00	$145.00	$145.00
Vacuum Truck Pickup (5000 gal or 2,000 litres)	hr.	$210.00	$210.00	$210.00	$210.00
Dump site disposal fee	ton	$285.00	$285.00	$285.00	$285.00
NOTES:					
Liquid Handling Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Liquid Disposal Fee Source:		2014 Means Heavy Construction, ave. 02 11	2014 Means Heavy Construction, ave. 02 11	2014 Means Heavy Construction, ave. 02 11	
Hydrocarbon Contaminated Soils (HCS)					
Insitu Biotreatment	C.Y	$18.32	$18.32	$18.32	$8.00
HCS disposal fee	C.Y	$275.00	$275.00	$275.00	$8.00
NOTES:					
Insitu Treatement Cost Source		2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	
HCS Disposal Fee Source:		2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
UNDERGROUND OPENING CLOSURE									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Reinforced Concrete Bulkheads and Shaft Covers									
Grade walls - 15 in thick, 8 ft high	C.Y	$139.00		$139.00		$139.00		$139.00	
Grade walls - 15 in thick, 12 ft high	C.Y	$139.00		$139.00		$139.00		$139.00	
Elevated conc, 1-way beam & slab - 15ft span	C.Y	$257.00		$257.00		$257.00		$257.00	
Elevated conc, 1-way beam & slab - 25ft span	C.Y	$245.00		$245.00		$245.00		$245.00	
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Small Adit Plugging									
Bat Gate [5]	ea.	$2,870.42		$2,870.42		$2,870.42		$2,870.42	
Culvert Gate [5]	C.Y	$5,740.85		$5,740.85		$5,740.85		$5,740.85	
Adit Foam Plug [6]	C.Y	$287.04		$287.04		$287.04		$287.04	
Production Opening Foam Plug [6]	C.Y	$287.04		$287.04		$287.04		$287.04	
NOTES:									
(5) Bat Gate Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)			
(6) Foam Plug Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)			
MISC. LINEAR PROJECTS									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Fencing Installation									
Barbed 3-strand	ft	$0.39		$0.39		$0.39		$0.39	
Barbed 4-strand	ft	$0.52		$0.52		$0.52		$0.52	
Barbed 5-strand	ft	$0.65		$0.65		$0.65		$0.65	
Chain link 8 ft -10 ft Install	ft	$33.00		$33.00		$33.00		$33.00	
Wood stockade fence 6 ft high - Install	ft	$12.70		$12.70		$12.70		$12.70	
	ft								
	ft								
Fencing Removal									
Barbed 3-strand Removal	ft								
Barbed 4-strand Removal	ft								
Barbed 5-strand Removal	ft								
Chain link 8 ft -10 ft Removal	ft								
Wood, all types 4 ft -6 ft high Removal	ft								
	ft								
	ft								
Culvert Removal									
12 in (300 mm) Diameter	ft								
18 in (450 mm) Diameter	ft								
24 in (600 mm) Diameter	ft								
36 in (1m) Diameter	ft								
Pipeline Removal									
Plastic Pipe 3/4 in (mm) - 4 in (100 mm) diameter	ft								
6 in (150 mm) - 8 in (200 mm)	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
10 in (250 mm) - 18 in (450 mm)	ft								
20 in (500 mm) - 36 in (1 m)	ft								
Pipe and Drainpipe Installation									
Water 4in (100mm) 40ft (12m) length, welded HDPE	ft	$3.74		$3.74		$3.74		$3.74	
Water 6in (150mm) 40ft (12m) length, welded HDPE	ft	$7.45		$7.45		$7.45		$7.45	
Water 12in (300mm) 40ft (12m) length, welded HDPE	ft								
Drain 4in (100mm) perforated PVC	ft	$1.32		$1.32		$1.32		$1.32	
Drain 6in (150mm) perforated PVC	ft	$2.98		$2.98		$2.98		$2.98	
Drain 4in (100mm) corrugated, perf or plain	ft	$0.46		$0.46		$0.46		$0.46	
Drain 6in (150mm) corrugated., perf or plain	ft	$1.33		$1.33		$1.33		$1.33	
Drain Rock Preparation									
Item	**Units**		**Total**		**Total**		**Total**		**Total**
Crushing	C.Y		$0.50		$0.50		$0.50		$0.50
Screening	C.Y		$0.50		$0.50		$0.50		$0.50
Misc.									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Backhoe work	C.Y								
Powerline and Transformer Removal			**Total**		**Total**		**Total**		**Total**
Single Pole Powerlines [7]	mile		$39,894		$39,894		$39,894		$39,894
Double Pole Powerlines [8]	mile		$45,593		$45,593		$45,593		$45,593
Substation [9]	unit		$28,591		$28,591		$5,000		$5,000
NOTES:									
(7) Single Pole Source:		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014			
(8) Double Pole Source:		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014			
(9) Transformer Source:		Sierra Pacific Power Co. estimate (2004) Adjusted to 2013		Sierra Pacific Power Co. estimate (2004) Adjusted to 2013		PolyMet AOC Schedule #63			

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
EROSION, EVAPORATION and SEDIMENTATION CONTROL									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Rip-Rap & Rock Lining									
Rip-Rap 3/8 to 1/4 C.Y. pieces, grouted	S.Y.	$17.70		$17.70		$17.70		$17.70	
Rip-Rap 18 in min thick, no grout	S.Y.	$5.85		$5.85		$5.85		$5.85	
Gabions, 6 in deep	S.Y.	$8.35		$8.35		$8.35		$8.35	
Gabions, 9 in deep	S.Y.	$12.15		$12.15		$12.15		$12.15	
Gabions, 12 in deep	S.Y.	$16.45		$16.45		$16.45		$16.45	
Gabions, 18 in deep	S.Y.	$23.00		$23.00		$23.00		$23.00	
Gabions, 36 in deep	S.Y.	$31.00		$31.00		$31.00		$31.00	
Liner Installation									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Site grading	S.F.								
Compaction	S.F.								
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
60 mil HDPE Liner	S.F.		$0.53		$0.53		$0.53		$0.53
Construction Management Support									
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
Office Trailer, Furnished, no hook-ups	month		$167.00		$167.00		$167.00		$167.00
Toilet Portable, chemical	month		$132.00		$132.00		$132.00		$132.00
PRODUCTION OR DEWATERING WELL PUMP REMOVAL									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Pump Type									
Submersible [10]	ft to pump	$2.51	$5.45	$2.51	$5.45	$2.51	$5.45	$2.51	$5.45
Line Shaft [10]	ft to pump	$5.85	$12.72	$5.85	$12.72	$5.85	$12.72	$5.85	$12.72
NOTES:									
(10) Pump Removal Source:		WDC Exploration 12/2005 (adjusted to 2014)		WDC Exploration 12/2005 (adjusted to 2014)		WDC Exploration 12/2005 (adjusted to 2014)			

File Name:	***CostData STD 3.xls***
Date:	***December 1, 2005***
Cost Basis:	***Standardized Data***
Author/Source:	***SRK Consulting, 2016***

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate					
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	5%	5%	5%	5%	
3. Insurance (9)		of labor costs			
4. Bond (10)		of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)		of the O&M costs			
	<=	<=	<=	>	
Variable Rate					

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

Attachment 3.

Labor rates

MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY PREVAILING WAGES FOR STATE FUNDED CONSTRUCTION PROJECTS

THIS NOTICE MUST BE POSTED ON THE JOBSITE IN A CONSPICUOUS PLACE

Construction Type: Commercial

County Number: 69

County Name: ST. LOUIS

Effective: 2015-12-21 Revised: 2016-04-25

This project is covered by Minnesota prevailing wage statutes. Wage rates listed below are the minimum hourly rates to be paid on this project.

All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at a rate of one and one half (1 1/2) times the basic hourly rate.

Violations should be reported to:

Department of Labor and Industry
Prevailing Wage Section
443 Lafayette Road N
St Paul, MN 55155
(651) 284-5091
DLI.PrevWage@state.mn.us

* Indicates that adjacent county rates were used for the labor class listed.

County: ST. LOUIS (69)

LABOR CODE AND CLASS		EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
LABORERS (101 - 112) (SPECIAL CRAFTS 701 - 730)					
101	LABORER, COMMON (GENERAL LABOR WORK)	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
102	LABORER, SKILLED (ASSISTING SKILLED CRAFT JOURNEYMAN)	2015-12-21	23.54	16.42	39.96

		2016-05-01	24.34	16.87	41.21
103	LABORER, LANDSCAPING (GARDENER, SOD LAYER AND NURSERY OPERATOR)	2015-12-21	11.00	0.00	11.00
104*	FLAG PERSON	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
105*	WATCH PERSON	2015-12-21	21.19	16.42	37.61
		2016-05-01	21.99	16.87	38.86
106	BLASTER	2015-12-21	24.24	16.42	40.66
		2016-05-01	25.04	16.87	41.91
107	PIPELAYER (WATER, SEWER AND GAS)	2015-12-21	30.61	16.57	47.18
		2016-05-01	31.73	17.02	48.75
108	TUNNEL MINER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
109	UNDERGROUND AND OPEN DITCH LABORER (EIGHT FEET BELOW STARTING GRADE LEVEL)	2015-12-21	28.81	16.57	45.38
		2016-05-01	29.93	17.02	46.95
110	SURVEY FIELD TECHNICIAN (OPERATE TOTAL STATION, GPS RECEIVER, LEVEL, ROD OR RANGE POLES, STEEL TAPE MEASUREMENT; MARK AND DRIVE STAKES; HAND OR POWER DIGGING FOR AND IDENTIFICATION OF MARKERS OR MONUMENTS; PERFORM AND CHECK CALCULATIONS; REVIEW AND UNDERSTAND CONSTRUCTION PLANS AND LAND SURVEY MATERIALS). THIS CLASSIFICATION DOES NOT APPLY TO THE WORK PERFORMED ON A PREVAILING WAGE PROJECT BY A LAND SURVEYOR WHO IS LICENSED PURSUANT TO MINNESOTA STATUTES, SECTIONS 326.02 TO 326.15.	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
111		2015-12-21	23.54	16.42	39.96

	TRAFFIC CONTROL PERSON (TEMPORARY SIGNAGE)				
		2016-05-01	24.34	16.87	41.21
SPECIAL EQUIPMENT (201 - 204)					
201	ARTICULATED HAULER	2015-12-21	35.48	17.15	52.63
202	BOOM TRUCK	2015-12-21	35.48	17.15	52.63
203*	LANDSCAPING EQUIPMENT, INCLUDES HYDRO SEEDER OR MULCHER, SOD ROLLER, FARM TRACTOR WITH ATTACHMENT SPECIFICALLY SEEDING, SODDING, OR PLANT, AND TWO-FRAMED FORKLIFT (EXCLUDING FRONT, POSIT-TRACK, AND SKID STEER LOADERS), NO EARTHWORK OR GRADING FOR ELEVATIONS	2015-12-21	33.97	17.15	51.12
204	OFF-ROAD TRUCK	2015-12-21	35.48	17.15	52.63
205	PAVEMENT MARKING OR MARKING REMOVAL EQUIPMENT (ONE OR TWO PERSON OPERATORS); SELF-PROPELLED TRUCK OR TRAILER MOUNTED UNITS.	2015-12-21	26.66	18.77	45.43
		2016-05-02	28.01	18.77	46.78
HIGHWAY/HEAVY POWER EQUIPMENT OPERATOR					
GROUP 2		2015-12-21	32.92	17.20	50.12
306	GRADER OR MOTOR PATROL				
308	TUGBOAT 100 H.P. AND OVER WHEN LICENSE REQUIRED (HIGHWAY AND HEAVY ONLY)				
GROUP 3		2015-12-21	33.23	17.90	51.13
		2016-05-01	33.84	18.90	52.74
309	ASPHALT BITUMINOUS STABILIZER PLANT				
310	CABLEWAY				
312	DERRICK (GUY OR STIFFLEG)(POWER)(SKIDS OR STATIONARY) (HIGHWAY AND HEAVY ONLY)				

314 DREDGE OR ENGINEERS, DREDGE (POWER) AND ENGINEER

316 LOCOMOTIVE CRANE OPERATOR

320 TANDEM SCRAPER

322 TUGBOAT 100 H.P AND OVER (HIGHWAY AND HEAVY ONLY)

GROUP 4	2015-12-21	32.93	17.90	50.83
	2016-05-01	33.54	18.90	52.44

323 AIR TRACK ROCK DRILL

324 AUTOMATIC ROAD MACHINE (CMI OR SIMILAR) (HIGHWAY AND HEAVY ONLY)

325 BACKFILLER OPERATOR

327 BITUMINOUS ROLLERS, RUBBER TIRED OR STEEL DRUMMED (EIGHT TONS AND OVER)

328 BITUMINOUS SPREADER AND FINISHING MACHINES (POWER), INCLUDING PAVERS, MACRO SURFACING AND MICRO SURFACING, OR SIMILAR TYPES (OPERATOR AND SCREED PERSON)

329 BROKK OR R.T.C. REMOTE CONTROL OR SIMILAR TYPE WITH ALL ATTACHMENTS

330 CAT CHALLENGER TRACTORS OR SIMILAR TYPES PULLING ROCK WAGONS, BULLDOZERS AND SCRAPERS

331 CHIP HARVESTER AND TREE CUTTER

332 CONCRETE DISTRIBUTOR AND SPREADER FINISHING MACHINE, LONGITUDINAL FLOAT, JOINT MACHINE, AND SPRAY MACHINE

334 CONCRETE MOBIL (HIGHWAY AND HEAVY ONLY)

335 CRUSHING PLANT (GRAVEL AND STONE) OR GRAVEL WASHING, CRUSHING AND SCREENING PLANT

336 CURB MACHINE

337 DIRECTIONAL BORING MACHINE

338 DOPE MACHINE (PIPELINE)

340 DUAL TRACTOR

341 ELEVATING GRADER

345 GPS REMOTE OPERATING OF EQUIPMENT

347 HYDRAULIC TREE PLANTER

348 LAUNCHER PERSON (TANKER PERSON OR PILOT LICENSE)

349 LOCOMOTIVE (HIGHWAY AND HEAVY ONLY)

350 MILLING, GRINDING, PLANNING, FINE GRADE, OR TRIMMER MACHINE

352 PAVEMENT BREAKER OR TAMPING MACHINE (POWER DRIVEN) MIGHTY MITE OR SIMILAR TYPE

354 PIPELINE WRAPPING, CLEANING OR BENDING MACHINE

356 POWER ACTUATED HORIZONTAL BORING MACHINE, OVER SIX INCHES

357 PUGMILL

359 RUBBER-TIRED FARM TRACTOR WITH BACKHOE INCLUDING ATTACHMENTS (HIGHWAY AND HEAVY ONLY)

360 SCRAPER

361 SELF-PROPELLED SOIL STABILIZER

362 SLIP FORM (POWER DRIVEN) (PAVING)

363 TIE TAMPER AND BALLAST MACHINE

365 TRACTOR, WHEEL TYPE, OVER 50 H.P. WITH PTO UNRELATED TO LANDSCAPING (HIGHWAY AND HEAVY ONLY)

367 TUB GRINDER, MORBARK, OR SIMILAR TYPE

GROUP 5 *	2015-12-21	18.77	8.18	26.95

370 BITUMINOUS ROLLER (UNDER EIGHT TONS)

371 CONCRETE SAW (MULTIPLE BLADE) (POWER OPERATED)

372 FORM TRENCH DIGGER (POWER)

375 HYDRAULIC LOG SPLITTER

376 LOADER (BARBER GREENE OR SIMILAR TYPE)

377 POST HOLE DRIVING MACHINE/POST HOLE AUGER

379 POWER ACTUATED JACK

381 SELF-PROPELLED CHIP SPREADER (FLAHERTY OR SIMILAR)

382 SHEEP FOOT COMPACTOR WITH BLADE . 200 H.P. AND OVER

383 SHOULDERING MACHINE (POWER) APSCO OR SIMILAR TYPE INCLUDING SELF-PROPELLED SAND AND CHIP SPREADER

384 STUMP CHIPPER AND TREE CHIPPER

385 TREE FARMER (MACHINE)

GROUP 6	2015-12-21	28.68	17.90	46.58
	2016-05-01	29.29	18.90	48.19

387 CAT, CHALLENGER, OR SIMILAR TYPE OF TRACTORS, WHEN PULLING DISK OR ROLLER

389 DREDGE DECK HAND

391 GRAVEL SCREENING PLANT (PORTABLE NOT CRUSHING OR WASHING)

393 LEVER PERSON

395 POWER SWEEPER

396 SHEEP FOOT ROLLER AND ROLLERS ON GRAVEL COMPACTION, INCLUDING VIBRATING ROLLERS

397 TRACTOR, WHEEL TYPE, OVER 50 H.P., UNRELATED TO LANDSCAPING

COMMERCIAL POWER EQUIPMENT OPERATOR

GROUP 1		2015-12-21	37.74	17.15	54.89
501	HELICOPTER PILOT (COMMERCIAL CONSTRUCTION ONLY)				
502	TOWER CRANE 250 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
503	TRUCK CRAWLER CRANE WITH 200 FEET OF BOOM AND OVER, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 2		2015-12-21	37.40	17.15	54.55
504	CONCRETE PUMP WITH 50 METERS/164 FEET OF BOOM AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
505	PILE DRIVING WHEN THREE DRUMS IN USE (COMMERCIAL CONSTRUCTION ONLY)				
506	TOWER CRANE 200 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
507	TRUCK OR CRAWLER CRANE WITH 150 FEET OF BOOM UP TO AND NOT INCLUDING 200 FEET, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 3		2015-12-21	35.99	17.15	53.14
508	ALL-TERRAIN VEHICLE CRANES (COMMERCIAL CONSTRUCTION ONLY)				
509	CONCRETE PUMP 32-49 METERS/102-164 FEET (COMMERCIAL CONSTRUCTION ONLY)				
510	DERRICK (GUY & STIFFLEG) (COMMERCIAL CONSTRUCTION ONLY)				
511	STATIONARY TOWER CRANE UP TO 200 FEET				
512	SELF-ERECTING TOWER CRANE 100 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)				
513	TRAVELING TOWER CRANE (COMMERCIAL CONSTRUCTION ONLY)				
514	TRUCK OR CRAWLER CRANE UP TO AND NOT INCLUDING 150 FEET OF BOOM, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 4		2015-12-21	35.65	17.15	52.80
515	CRAWLER BACKHOE INCLUDING ATTACHMENTS (COMMERCIAL CONSTRUCTION ONLY)				
516	FIREPERSON, CHIEF BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
517	HOIST ENGINEER (THREE DRUMS OR MORE) (COMMERCIAL CONSTRUCTION ONLY)				
518	LOCOMOTIVE (COMMERCIAL CONSTRUCTION ONLY)				
519	OVERHEAD CRANE (INSIDE BUILDING PERIMETER) (COMMERCIAL CONSTRUCTION ONLY)				
520	TRACTOR . BOOM TYPE (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 5		2015-12-21	35.48	17.15	52.63
521	AIR COMPRESSOR 450 CFM OR OVER (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)				

522 CONCRETE MIXER (COMMERCIAL CONSTRUCTION ONLY)

523 CONCRETE PUMP UP TO 31 METERS/101 FEET OF BOOM

524 DRILL RIGS, HEAVY ROTARY OR CHURN OR CABLE DRILL WHEN USED FOR CAISSON FOR ELEVATOR OR BUILDING CONSTRUCTION (COMMERCIAL CONSTRUCTION ONLY)

525 FORKLIFT (COMMERCIAL CONSTRUCTION ONLY)

526 FRONT END, SKID STEER 1 C YD AND OVER

527 HOIST ENGINEER (ONE OR TWO DRUMS) (COMMERCIAL CONSTRUCTION ONLY)

528 MECHANIC-WELDER (ON POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)

529 POWER PLANT (100 KW AND OVER OR MULTIPLES EQUAL TO 100KW AND OVER) (COMMERCIAL CONSTRUCTION ONLY)

530 PUMP OPERATOR AND/OR CONVEYOR (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)

531 SELF-ERECTING TOWER CRANE UNDER 100 FEET MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)

532 STRADDLE CARRIER (COMMERCIAL CONSTRUCTION ONLY)

533 TRACTOR OVER D2 (COMMERCIAL CONSTRUCTION ONLY)

534 WELL POINT PUMP (COMMERCIAL CONSTRUCTION ONLY)

GROUP 6	2015-12-21	33.97	17.15	51.12

535 CONCRETE BATCH PLANT (COMMERCIAL CONSTRUCTION ONLY)

536 FIREPERSON, FIRST CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)

537 FRONT END, SKID STEER UP TO 1 C YD

538 GUNITE MACHINE (COMMERCIAL CONSTRUCTION ONLY)

539 TRACTOR OPERATOR D2 OR SIMILAR SIZE (COMMERCIAL CONSTRUCTION ONLY)

540 TRENCHING MACHINE (SEWER, WATER, GAS) EXCLUDES WALK BEHIND TRENCHER

GROUP 7	2015-12-21	32.85	17.15	50.00

541 AIR COMPRESSOR 600 CFM OR OVER (COMMERCIAL CONSTRUCTION ONLY)

542 BRAKEPERSON (COMMERCIAL CONSTRUCTION ONLY)

543 CONCRETE PUMP/PUMPCRETE OR COMPLACO TYPE (COMMERCIAL CONSTRUCTION ONLY)

544 FIREPERSON, TEMPORARY HEAT SECOND CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)

545 OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS AND MILLING MACHINES, OR OTHER SIMILAR POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)

546 PICK UP SWEEPER (ONE CUBIC YARD HOPPER CAPACITY) (COMMERCIAL CONSTRUCTION ONLY)

547 PUMP AND/OR CONVEYOR (COMMERCIAL CONSTRUCTION ONLY)

GROUP 8 *		2015-12-21	30.84	17.15	47.99
548	ELEVATOR OPERATOR (COMMERCIAL CONSTRUCTION ONLY)				
549	GREASER (COMMERCIAL CONSTRUCTION ONLY)				
550	MECHANICAL SPACE HEATER (TEMPORARY HEAT NO BOILER LICENSE REQUIRED) (COMMERCIAL CONSTRUCTION ONLY)				

TRUCK DRIVERS

GROUP 1		2015-12-21	28.70	15.20	43.90
		2016-05-01	30.15	15.20	45.35
601	MECHANIC . WELDER				
602	TRACTOR TRAILER DRIVER				
603	TRUCK DRIVER (HAULING MACHINERY INCLUDING OPERATION OF HAND AND POWER OPERATED WINCHES)				
GROUP 2		2015-12-21	28.15	15.20	43.35
		2016-05-01	29.60	15.20	44.80
604	FOUR OR MORE AXLE UNIT, STRAIGHT BODY TRUCK				
GROUP 3		2015-12-21	28.15	15.20	43.35
		2016-05-01	29.60	15.20	44.80
605	BITUMINOUS DISTRIBUTOR DRIVER				
606	BITUMINOUS DISTRIBUTOR (ONE PERSON OPERATION)				
607	THREE AXLE UNITS				
GROUP 4 *		2015-12-21	27.80	15.20	43.00
		2016-05-01	29.25	15.20	44.45
608	BITUMINOUS DISTRIBUTOR SPRAY OPERATOR (REAR AND OILER)				
609	DUMP PERSON				
610	GREASER				
611	PILOT CAR DRIVER				
612	RUBBER-TIRED, SELF-PROPELLED PACKER UNDER 8 TONS				
613	TWO AXLE UNIT				
614	SLURRY OPERATOR				
615	TANK TRUCK HELPER (GAS, OIL, ROAD OIL, AND WATER)				
616	TRACTOR OPERATOR, UNDER 50 H.P.				

SPECIAL CRAFTS

701	HEATING AND FROST INSULATORS	2015-12-21	39.31	16.20	55.51
		2016-06-06	41.26	15.80	57.06
702	BOILERMAKERS	2015-12-21	34.15	26.37	60.52
		2016-01-01	35.55	26.52	62.07
703	BRICKLAYERS	2015-12-21	32.87	20.96	53.83
704	CARPENTERS	2015-12-21	29.55	16.08	45.63
		2016-05-01	30.85	16.08	46.93
705	CARPET LAYERS (LINOLEUM)	2015-12-21	32.74	13.25	45.99
706	CEMENT MASONS	2015-12-21	30.61	16.88	47.49
		2016-05-01	31.11	16.88	47.99
707	ELECTRICIANS	2015-12-21	33.90	24.13	58.03
		2016-05-29	35.01	24.62	59.63
708	ELEVATOR CONSTRUCTORS	2015-12-21	44.93	33.36	78.29
		2016-01-01	45.87	35.07	80.94
709	GLAZIERS	2015-12-21	27.37	19.02	46.39
		2016-05-02	28.72	19.02	47.74
710*	LATHERS	2015-12-21	29.55	16.08	45.63
		2016-04-30	30.85	16.08	46.93
712	IRONWORKERS	2015-12-21	31.04	23.45	54.49
714	MILLWRIGHT	2015-12-21	32.57	14.73	47.30
		2016-05-01	34.42	14.73	49.15

715	PAINTERS (INCLUDING HAND BRUSHED, HAND SPRAYED, AND THE TAPING OF PAVEMENT MARKINGS)	2015-12-21	26.66	18.77	45.43
		2016-05-02	28.01	18.77	46.78
716	PILEDRIVER (INCLUDING VIBRATORY DRIVER OR EXTRACTOR FOR PILING AND SHEETING OPERATIONS)	2015-12-21	34.11	17.08	51.19
		2016-05-01	35.65	17.08	52.73
717	PIPEFITTERS . STEAMFITTERS	2015-12-21	38.17	18.13	56.30
		2016-05-02	39.67	18.13	57.80
718	PLASTERERS	2015-12-21	31.24	17.63	48.87
		2016-05-01	31.74	17.63	49.37
719	PLUMBERS	2015-12-21	38.17	18.13	56.30
		2016-05-02	39.67	18.13	57.80
720	ROOFER	2015-12-21	29.65	17.14	46.79
721	SHEET METAL WORKERS	2015-12-21	29.56	26.32	55.88
722	SPRINKLER FITTERS	2015-12-21	33.83	17.37	51.20
		2016-01-01	33.83	17.77	51.60
723	TERRAZZO WORKERS	2015-12-21	30.77	19.74	50.51
724	TILE SETTERS	2015-12-21	24.09	21.94	46.03
725	TILE FINISHERS	2015-12-21	17.09	17.44	34.53
726	DRYWALL TAPER	2015-12-21	30.66	15.37	46.03
727	WIRING SYSTEM TECHNICIAN	2015-12-21	36.00	14.43	50.43
		2016-07-01	36.90	14.43	51.33

728	WIRING SYSTEMS INSTALLER	2015-12-21	25.21	12.02	37.23
		2016-07-01	25.84	12.02	37.86
729	ASBESTOS ABATEMENT WORKER	2015-12-21	28.50	16.88	45.38
		2016-01-01	29.30	17.33	46.63
730	SIGN ERECTOR	2015-12-21	26.44	12.93	39.37
		2016-05-01	27.59	12.93	40.52

Fee Schedule—2016

Rev. 01/01/16

Description	Rate* (U.S. dollars)
Principal	$145-295
Consultant/Advisor	$155-250
Engineer/Scientist/Specialist III	$125-150
Engineer/Scientist/Specialist II	$95-120
Engineer/Scientist/Specialist I	$65-90
Technician III	$125-150
Technician II	$95-120
Technician I	$50-90
Support Personnel II	$95-150
Support Personnel I	$50-90

Rates for litigation support services will include a 30% surcharge.

A ten percent (10%) markup will be added to subcontracts for professional support and construction services to cover overhead and insurance surcharge expenses.

Invoices are payable within 30 days of the date of the invoice. Any amount not paid within 30 days shall bear interest from the date 10 days after the date of the invoice at a rate equal to the lesser of 18 percent per annum or the highest rate allowed by applicable law.

Reimbursable expenses including, but not limited to, the actual and reasonable costs of transportation, meals, lodging, parking costs, postage, and shipping charges will be billed at actual cost. Materials and supplies charges, printing charges, and equipment rental charges will be billed in accordance with Barr's standard rate schedules. Mileage will be billed at the IRS-allowable rate.

Principal category includes consultants, advisors, engineers, scientists, and specialists who are officers of the company.

Consultant/Advisor category includes experienced personnel in a variety of fields. These professionals typically have advanced background in their areas of practice and include engineers, engineering specialists, scientists, related technical professionals, and professionals in complementary service areas such as communications and public affairs.

Engineer/Scientist/Specialist categories include registered professionals and professionals in training (e.g. engineers, geologists, and landscape architects), and graduates of engineering and science degree programs.

Technician category includes CADD operators, construction observers, cost estimators, data management technicians, designers, drafters, engineering technicians, interns, safety technicians, surveyors, and water, air, and waste samplers.

Support Personnel category includes information management, project accounting, report production, word processing, and other project support personnel.

*Rates do not include sales tax on services that may be required in some jurisdictions.

April 22, 2016

PolyMet Mining, Inc.
Attn. Steve DeVaney
Via Email
sdevaney@polymetmining.com

Environmental Science & Engineering

RE: Cost Estimates on Several Items

Attached are the cost estimates that will be used in the Contingency Reclamation Estimate (CRE) as part of the application for the permit to mine with the State of Minnesota. Included are the following items:

1. Hourly labor rates by staff type
2. Hourly rate for surveying
3. Wetland data collection, data entry and quality assurance, per annum cost estimate
4. DMR data collection, data entry, quality assurance and report preparation, per annum cost estimate
5. Water quality report preparation, per annum cost estimate
6. SW-619 industrial landfill monitoring and maintenance, per annum cost estimate (closed state)
7. Tailings basin instrumentation inspection and data collection, per annum cost estimate (current activity)
8. Tailings basin instrumentation report preparation, per annum cost estimate (current activity)
9. Tailings basin instrumentation inspection and data collection, per annum cost estimate (operating activity)
10. Tailings basin instrumentation report preparation, per annum cost estimate (operating activity)
11. Reverse osmosis treatment plants operation, per annum cost estimate

The cost estimates for items 3-8 are based on our experience performing these duties in years past. We have a high degree of certainty in terms of level of effort and unit rates for these items. For items 9 and 10 we lack detail as to how operating conditions would affect the level of effort, therefore we roughly estimated double the level of effort of current, non-operating conditions. For Item 11 we based our cost estimate on our experience elsewhere, however with the absence of design criteria and operating requirements, we estimated what typical plants of this size may cost to operate.

Please note that all pricing is valid for the remainder of calendar year 2016. Pricing is subject to an increase not to exceed 2.5% each year thereafter, effective on Jan 1st, for a period of 10 years. If you should have any questions, please feel free to contact Mr. Bruce Trebnick at 218-742-1051 (office) or 218-780-2006 (cell).

Sincerely,

Richard H. Crum, P

NTS, President

PRICING REQUEST FOR SEVERAL ITEMS FOR THE CONTINGENCY RECLAMATION ESTIMATE (CRE)

AS PART OF THE APPLICATION FOR THE PERMIT TO MINE WITH THE STATE OF MINNESOTA

Prepared For

Steve DeVaney

PolyMet Mining, Inc.

Prepared By

Northeast Technical Services, Inc. (NTS)

526 Chestnut Street

Virginia, Minnesota 55792

218.741.4290

April 21, 2016

Environmental Science & Engineering

Table of Contents

1. Hourly labor rates by staff type

Staff Type	Hourly Rate
Entry Level Professional (I)	88
Middle Level Professional (II)	108
Senior Level Professional (III)	128
Principal Level Professional (IV)	148
WWTP Operator, Class B, C & D	58
WWTP Operator, Class A	128
Field Scientist	78
Project Support (Clerical)	58
Laborer/Intern	48

2. Hourly rate for surveying

$98/hour; includes Professional Engineer or EIT along with survey equipment. NTS is not permitted to survey property boundaries at this time.

3. Wetland data collection, data entry and quality assurance, per annum cost estimate

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	2220.00	/lump	1	2220
Misc. Consumable Items	504.00	/lump	1	504
Pickup Truck 4x4	0.70	/mile	2000	1,400
Staff, Data Collection (Avg Rate)	83.00	/hour	520	43,160
			Total:	$47,284

Per annum cost estimate *per monitoring point* (21 points): $2,252

4. **DMR data collection, data entry, quality assurance and report preparation, per annum cost estimate**

Facility #1) Hoyt Lakes Tailings Basin

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	7,276.00	/lump	1	7,276
Misc. Consumable Items	3,000.00	/lump	1	3,000
Pickup Truck 4x4	0.70	/mile	3400	2,380
Staff, Data Collection (Avg Rate)	83.00	/hour	560	46,480
Staff, Reporting (Avg Rate)	92.00	/hour	240	22,080
			Total:	$81,216

Facility #2) Hoyt Lakes Mining Area

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	4,957.00	/lump	1	4,957
Misc. Consumable Items	648.00	/lump	1	648
Pickup Truck 4x4	0.70	/mile	1600	1,120
Staff, Data Collection (Avg Rate)	83.00	/hour	260	21,580
Staff, Reporting (Avg Rate)	92.00	/hour	264	24,288
			Total:	$52,593

Per Annum Cost Estimate, Total for *Both Facilities*: $133,809

5. **Water quality report preparation, per annum cost estimate**

Item	Rate	Unit	Quantity	Subtotal
Staff, Reporting (Avg Rate)	97.00	/hour	36	3,492
			Total:	$3,492

6. **SW-619 industrial landfill monitoring and maintenance, per annum cost estimate (closed state)**

Item	Rate	Unit	Quantity	Subtotal
Landfill Inspection	400.00	/ea	3	1,200
Cover Mowing	5327.00	/lump	1	5,327
Groundwater Monitoring	850.00	/well	7	5,950
Gas Vent Monitoring	600.00	/vent	7	4,200
Staff, Reporting (Avg Rate)	88.00	/day	60	5,280
			Total:	$21,957

Actual cost for maintenance will vary year-to-year. Costs shown are 3 year average.

NTS recommends that if the landfill leachate plume is proven to be stable, the number of groundwater sampling events/locations be reduced after five years.

7. **Tailings basin instrumentation inspection and data collection, per annum cost estimate (current activity)**

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	2360.00	/lump	1	2360
Misc. Consumable Items	76.00	/lump	1	76
Pickup Truck 4x4	0.70	/mile	400	280
Staff, Data Collection (Average Rate)	113.00	/hour	112	12,656
			Total:	$15,372

Per Annum Cost Estimate, *per event* (2 events): $7,686

8. **Tailings basin instrumentation report preparation, per annum cost estimate (current activity)**

Item	Rate	Unit	Quantity	Subtotal
Staff, Reporting (Average Rate)	114.00	/hour	50	5,700
			Total:	$5,700

Per Annum Cost Estimate, *per event* (2 events): $2,850

9. **Tailings basin instrumentation inspection and data collection, per annum cost estimate (operating activity)**

Assumed Double Effort of Current Activity (Item #7)

Per Annum Cost Estimate, *per event* (2 events): $15,372

10. **Tailings basin instrumentation report preparation, per annum cost estimate (operating activity)**

Assumed Double Effort of Current Activity (Item #8)

Per Annum Cost Estimate, *per event* (2 events): $5,700

11. **Reverse osmosis treatment plants operation, per annum cost estimate**

Operation of RO treatment systems is dependent upon numerous variables. Proposed cost estimates are subject to the following variables and qualifying statements:

- Typical hours of plant operation required, assuming not continuous.
- Typical level of capacity required, assuming not maximum.
- Typical influent water quality and expected variability.
- Treatment objectives.
- Operational Strategies and SCADA Capabilities: Automation, remote monitoring, remote control capabilities, etc
- Are we to include membrane filter replacement in the estimate?
- How will reject water be stored or otherwise handled?

The following per annum cost estimate is based on this set of assumptions:

- Plants are operational 24/7 at 50% of capacity.
- Two RO plants (500gpm and 2000gpm) are both in operation; the cost estimate below is for combined operation and maintenance.
- Operator required 1 site visit per day.
- Operator scheduled 8 hours per day, 7 days a week.
- Operators are paid flat rate $40 per 8 hours "on-call".
- Not charging travel time for routine operation.
- Class A operator oversight 8 hours per week on average.
- Initial water quality is moderately impaired and moderately variable.
- Membrane filter replacement is not included.
- Potential reject water handling costs are not included.
- See Appendix A for detailed assumed design parameters.

Wastewater Treatment:

Item	Rate	Unit	Quantity	Subtotal
Energy Costs*	112,000.00	/lump	1	112,000
Chemical Costs*	599,000.00	/lump	1	599,000
Maintenance Costs*	124,000.00	/lump	1	124,000
Pickup Truck 4x4	0.70	/mi	32,000	22,400
Operator "on-call" charge	40.00	/8 hours	730	29,200
Operator, Class B, C or D	58.00	/hour	3,800	220,400
Operator, Class A	128.00	/hour	416	53,248
			Total:	$1,160,248

*See Appendix B for detailed breakdown of costs.

Wastewater Pretreatment:

Item	Rate	Unit	Quantity	Subtotal
Coagulation/Flocculation/Settling	245,000.00	/lump	1	245,000
Ultrafiltration	105,000.00	/lump	1	105,000
			Total:	$350,000

Pretreatment may be optional depending on influent water quality and effluent objectives.

Treatment costs may increase/decrease dependent on pretreatment options.

Appendix A: Assumed design parameters for WWTP's

Design Parameters:		
Percent Recovery	75%	
Design Feed Flow (Max)	3.6	mgd
Design Permeate Flow (Max)	2.70	mgd
Design Concentrate Flow (Max)	0.90	mgd
Average Feed Flow	1.80	mgd
Average Permeate Flow	1.35	mgd
Average Concentrate Flow	0.45	mgd
No. of Skids	3	skids
Size of RO Skids	0.90	mgd
RO Flux Rate	10	gfd
RO Area per Element	400	ft/elements
Number of Pressure Vessels per Skid	7	PV/skid
Number of RO Elements per Skid	231.00	elements/skid
Number of Cartridge Filters	157.00	

Appendix B: Detailed operation & maintenance costs for WWTP's

Annual Energy Cost	$112,000.00	$/year
Annual Energy Rate	$0.08	/kwh
Annual Feed Energy Cost	$97,700.24	$/year
Feed Pressure	200	psi
Interstage Boost Pressure	0	psi
Pump Motor Efficiency	78%	
Energy Consumption	3,345.90	kwh/day
Annual Concentrate Pump Energy Cost	14,000.00	$/year
Head	150.00	
Pump Horsepower	25.00	hp
Hours in Operation	24.00	hours/day
Energy Consumption	447.60	kwh/day

Annual Chemical Costs	$599,000.00	$/year
Antiscalant	$102,738.38	$/year
Dose	5.00	mg/L
Unit Cost	$3.75	$/lb
CIP Chemicals	$395,416.67	$/year
Acid CIP Frequency	30.00	days
Acid CIP Cost (2011 Cost)	$6,500.00	$/CIP
Caustic CIP Frequency	45.00	days
Caustic CIP Cost (2011 Cost)	$6,500.00	$/CIP
Miscellaneous Chemical	$99,631.01	$/year
Percentage of Non-CIP Chemicals	20%	
Final pH adjustment	$616.43	$/year
NaOH	0.25	mg/L
Strength	50%	% Concentration
Cost	$0.30	$/lb

Annual Maintenance Cost	$124,000.00	$/year
Annual Cartridge Filter Replacement Cost	$4,775.42	$/year
Filters to be Replaced	78.50	filters
Filter Replacement Frequency	90.00	days
Filter Cost	$15.00	$/filter
Annual RO Element Replacement Cost	$103,950.00	$/year
RO Elements to be Replaced	346.50	elements
RO Element Replacement Frequency	2.00	years
RO Element Cost	$600.00	$/element
Annual Maintenance Cost	$15,000.00	$/year
RO Capital Cost	$3,000,000	$
Maintenance Cost Percentage	0.50%	of capital cost/year

NorthMet CRE – Staff and Services Basis

August 4, 2016

The CRE is being developed for Stage 1 and Stage 2 of construction and Mine Year 1. The Stage 1 CRE will cover legacy liabilities plus liabilities due to NorthMet construction up to the point where Duluth Complex rock is blasted at the Mine Site. The Stage 2 CRE will cover Stage 1 plus Mine Year 1 NorthMet operating liabilities at the Mine Site but not NorthMet operating liabilities at the Plant Site. The Mine Year 1 CRE will cover legacy, NorthMet construction and NorthMet Mine Year 1 operating liabilities.

Staff - Closure

During the Closure period the large one time activities of structure removal and cover system construction will be done and contracts established for longer term, ongoing Closure and Post Closure activities. The State Project Manager would hire Reclamation, Demolition, Accounting/Purchasing and Site Managers. These managers would be sourced from local firms with personnel familiar with the site (Lakehead, NTS or Barr or former PolyMet employees). Security provided by limited access via manned gate and patrol of active working areas. See Attachment A for Staff Schedule and Attachment B for annual cost development for Stage 1, Stage 2 and Mine Year 1.

1. State Project Manager (State price)
    a. Manage funds and overall process
    b. Hire Site Manager, Project Engineer and Accountant/Purchaser
2. Site Manager (cost from Barr price list)
    a. Manage initial reclamation and initiate and plan for post closure
    b. Manage water treatment/utility personnel
    c. Manage water quality monitoring and water treatment facilities
    d. Manage dam safety monitoring
    e. Provide required water quality, dam safety and permit to mine reporting
    f. Manage site services – security, snow plowing
3. Project Engineer (cost from Barr price list)
    a. Manage structure demolition and AOC remediation
    b. Manage construction of the Tailings Basin Non Mechanical Treatment System (Stage 1 and Stage 2 only)
    c. Manage construction of Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only), FTB Beach Cover System (Mine Year 1 only)
    d. Develop plans for FTB Pond Bottom Cover System (Mine Year 1 only) to be implemented later
    e. Provide required reclamation and closure reporting
4. Accountant /Purchaser (cost from Barr price list)
    a. Initiate contracts for reclamation and demolition work
    b. Initiate contractors for dam safety monitoring and site services
    c. Set up process for post closure activities
    d. Manage purchase/payment process
5. Security (cost from NorthTek Security)
    a. Man the Main Gate 24/7
    b. Patrol the site on day shift

6. Water Treatment/Utility (cost from Express Employment)
    a. Operate and provide routine maintenance for tailings basin non mechanical treatment system (Stage 1 and Stage 2 only)
    b. Operate and provide routine maintenance for Mine Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Stage 2 and Mine Year 1 only)
    c. Operate and provide routine maintenance for Plant Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Mine Year 1 only)
    d. Collect Mine Site water quality samples (Stage 2 and Mine Year 1 only)
    e. Collect Plant Site water quality samples
    f. Inspect and provide routine maintenance for Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only)
    g. Inspect and provide routine maintenance for FTB Beach and Pond Bottom Cover Systems (Mine Year 1 only)
    h. Inspect and provide routine maintenance for storm water systems (ditches, culverts)
    i. Inspect and provide routine maintenance for reclamation vegetation (pit walls, stockpile/pond footprints, structure footprints, roads, railroads)
    j. Inspect and repair pit perimeter barrier fence and gates (Stage 2 and Mine Year 1 only)

Staff – Post Closure

During the Post Closure period the one remaining one time construction activity (FTB Pond Bottom Cover System which was designed and planned during the Closure period) will be initiated and completed. Security provided by locked gates at FTB and Mine Site. See Attachment A for Staff Schedule and Attachment B for annual cost development for Stage 1, Stage 2 and Mine Year 1..

1. Site Manager (cost from NTS price list)
    a. Manage water treatment/utility personnel
    b. Manage water quality monitoring and water treatment facilities
    c. Manage dam safety monitoring
    d. Provide required water quality, dam safety and permit to mine reporting
    e. Manage site services – snow plowing
2. Water Treatment/Utility (cost from Express Employment)
    a. Operate and provide routine maintenance for tailings basin non mechanical treatment system (Stage 1 and Stage 2 only)
    b. Operate and provide routine maintenance for Mine Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Stage 2 and Mine Year 1 only)
    c. Operate and provide routine maintenance for Plant Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Mine Year 1 only)
    d. Collect Mine Site water quality samples (Stage 2 and Mine Year 1 only)

e. Collect Plant Site water quality samples
f. Inspect and provide routine maintenance for Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only)
g. Inspect and provide routine maintenance for FTB Beach and Pond Bottom Cover Systems (Mine Year 1 only)
h. Inspect and provide routine maintenance for storm water systems (ditches, culverts)
i. Inspect and provide routine maintenance for reclamation vegetation (pit walls, stockpile/pond footprints, structure footprints, roads, railroads)
j. Inspect and repair pit perimeter barrier fence and gates (Stage 2 and Mine Year 1 only)
k. Snow plowing

Vehicles

Staff will require vehicles to accomplish their activities. See Attachment C for Vehicle Schedule for Closure and Post Closure with annual cost development for Stage 1, Stage 2 and Mine Year 1.

Services – Closure and Post Closure

There are ongoing activities that will be performed by a combination of Utility Staff and specialized consultant. These activities have been ongoing at this site since 2001 and, in general, decrease over time as conditions stabilize, which include:

1. Water Monitoring (b and d below assumed to decrease over time to reflect transition from monthly surface water sampling to quarterly and quarterly groundwater sampling to annual – first 10 years is full monitoring, next 5 years at 50% full and then 25% of full on an ongoing basis)
    a. water quality (surface and well) samples collected by Water treatment/Utility Staff
    b. water quality analysis by local laboratory (cost from Pace Analytical)
    c. wetland water level data from loggers collected by Water Treatment/Utility Staff
    d. periodic water data review, QA/QC and required NPDES reporting by Site Manager
    e. annual NPDES report (cost from NTS)
2. Dam Safety Monitoring
    a. dam instrumentation data collection and exception report (cost from NTS)
    b. dam instrument annual report (cost from NTS)
    c. geotechnical inspection (cost from Barr)
    d. annual dam safety report (cost from Barr)
3. SW-619 Private Landfill Monitoring for 30 years from closure as required by Minnesota Solid Waste Landfill (assume closed in 2017)
    a. Inspection by Water treatment/Utility Staff
    b. Annual Water Quality and Gas Monitoring (from NTS)
    c. Annual Report (from NTS)
4. Coal Ash Disposal Site Monitoring for 30 years from closure as required by Minnesota Solid Waste Landfill (closed in 2000)
    a. Inspection by Water Treatment/Utility Staff
    b. Annual Report (from NTS)

5. Snowplowing (Closure Only – Utility via snow plow equipped 4WD pick up for Post Closure)
    a. Annual snow plowing to provide access to areas active during closure (based on current annual)

Reclamation Vegetation Establishment and Long Term Care

Initial reclamation seeding is done with a seed mix and fertilizer mix that will typically develop into a permanent self-sustaining vegetation cover. Because there will be some seeding failures and some erosion due to storm events before the permanent self-sustaining vegetation cover develops, an allowance of cost for all seeding is included.

Once a permanent self-sustaining vegetation cover is established Site Water treatment/Utility Staff will inspect, make minor repairs and arrange for erosion repairs using small earth moving equipment.

Open channel water conveyance systems (ditches, channels, etc.) will need to be kept clear and flowing. Site Water treatment/Utility Staff will inspect, clear minor blockages and arrange for removal of major blockages using small earth moving equipment.

Cover systems will need to be kept free of woody vegetation and borrowing animal/erosion damage will need to be repaired. Site Water treatment/Utility Staff will inspect, make minor repairs and arrange for major erosion repairs using small earth moving equipment as wells as arrange for herbicide spraying as needed.

Water Treatment Facility Repair/Replacement

The major wear component of the water treatment plants is the filter membranes. Because the annual cost of replacement membranes is a function of the degree of water treatment and the amount of water treated, replacement membrane cost is included in the water treatment unit cost ($/1000 gal). The Water Treatment/Utility Staff will change membranes and perform other routine maintenance.

Long term facility and equipment replacement cost has been developed by using EPA equipment life values and NorthMet Project capital equipment cost to calculate an annual cost (cost/life). The sum of all of the annual costs for the water treatment plants and pumps and pipe to move water to and from the treatment plants is the total annual cost for facility and equipment repair/replacement. This is fully explained in another document.

List of sources for costs (see Attachment B)

1. NTS Letter of 4/22/16 (site manager, water quality reporting, land fill monitoring and reporting, tailings basin instrumentation)
2. Barr Engineering 2016 Fee Schedule (demo/reclamation/accounting managers)
3. NorthTek Security Services letter of 4/5/16 (security staff)
4. Express Employment Professionals letter of 4/4/16 (utility staff)
5. Pace Analytical 2016 Price List (water quality sample analysis) – Attachment D
6. Barr Engineering letter of 4/1/16 (dam safety)
7. Snow Plowing Analysis spreadsheet (snow plowing)

Attachment A – Staff Schedules

Staff Schedule - Closure												
	FTE											
	Stage 1	Stage 2	Mine Year 1	shift	M	T	W	Th	F	S	S	Notes
State Project Manager	1	1	1	day	1	1	1	1	1			
Site Manager	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Project Engineer	0.5	0.75	1	day	1	1	1	1	1			Stage 1 1/2 time, Stage 2 3/4 time, MY 1 FT
Accountant/Purchaser	0.5	0.75	1	day	1	1	1	1	1			Stage 1 1/2 time, Stage 2 3/4 time, MY 1 FT
Security Chief	1	1	1	day	1	1	1	1	1	0	0	
Security Officer	1.4	1.4	1.4	day	1	1	1	1	1	1	1	
Security Officer	1.4	1.4	1.4	aft	1	1	1	1	1	1	1	
Security Officer	1.4	1.4	1.4	nite	1	1	1	1	1	1	1	
Security Officer Total	4.2	4.2	4.2									
Water Treatment	0	0.7	1.4	day	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	aft	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	nite	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Utility	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment/Utility Total	0.835	2.935	5.035									

Staff Schedule - Post Closure												
	FTE											
	Stage 1	Stage 2	Mine Year 1	shift	M	T	W	Th	F	S	S	Notes
Site Manager	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment	0	0.7	1.4	day	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	aft	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	nite	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Utility	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment/Utility Total	0.835	2.935	5.035									

Attachment B – Sources and Annual Cost Development

List of Sources for Staff and Services							
Staff	**Annual $ / FTE**	**Stage 1 Annual $**	**Stage 2 Annual $**	**Mine Year 1 Annual $**	**Source**	**Basis Document Reference**	**SRCE**
Closure							
State Project Manager	TBD	TBD	TBD	TBD		Staff - Closure 1	Human Resources
Site Manager	$224,640	$187,574	$187,574	$187,574	NTS 4/22/16 letter #1 Mid Level Professional	Staff - Closure 2	Human Resources
Project Engineer	$223,600	$111,800	$167,700	$223,600	Barr 1/1/16 price list Engineer/Scientist/Specialist II average	Staff - Closure 3	Human Resources
Accountant/Purchaser	$187,200	$93,600	$140,400	$187,200	Barr 1/1/16 price list Support Personnel I maximum	Staff - Closure 4	Human Resources
Security Chief	$56,160	$56,160	$56,160	$56,160	NorthTek Security Services 4/5/16 letter	Staff - Closure 5	Human Resources
Security Officer	$31,595	$132,700	$132,700	$132,700	NorthTek Security Services 4/5/16 letter	Staff - Closure 5	Human Resources
Water Treatment/Utility	$67,038	$55,977	$196,758	$337,538	Express Employment 4/4/16 letter Maintenance 1	Staff - Closure 6	Human Resources
Post Closure							Human Resources
Site Manager	$224,640	$187,574	$187,574	$187,574	NTS 4/22/16 letter #1 Mid Level Professional	Staff - Post Closure 1	Human Resources
Water Treatment/Utility	$67,038	$55,977	$196,758	$337,538	Express Employment 4/4/16 letter Maintenance 1	Staff - Post Closure 2	Human Resources
Services	**Unit $**	**Unit**					
Water Monitoring							
- sample analysis	$331	sample			Pace Analytical 2016 Price Sheet (see Attachment C Water Analysis)	Services 1b	Material Cost Water Analysis
- annual report	$3,492	year			NTS 4/22/16 letter #5 Water Quality Report Preparation	Services 1e	?
Dam Safety Monitoring							
- instrumentation data collection	$7,686	event			NTS 4/22/16 letter #7 Tailings Basin Instrumentation Inspection and Data Collection	Services 2a	Other User
- instrumentation report	$2,850	event			NTS 4/22/16 letter #8 Tailings Basin Instrumentation Report Preparation	Services 2b	Other User
- geotechnical inspection	$7,000	year			Barr 4/1/16 letter	Services 2c	Other User
- annual report	$10,500	year			Barr 4/1/16 letter	Services 2d	Other User
SW-619 Landfill Monitoring							
- water and gas monitoring	$10,150	year			NTS 4/22/16 letter #6 SW-619 Groundwater + Gas Vent Monitoring	Services 3b	Other User
- annual report	$5,280	year			NTS 4/22/16 letter #6 SW-619 Staff Reporting	Services 3c	Other User
Coal Ash Landfill Monitoring							
- annual report	$2,640	year			NTS 4/22/16 letter #6 SW-619 Staff Reporting (assume 50% no gas/water monitoring)	Services 4b	Other User
Snow Plowing							
- average annual	$22,203				Average of 2013 to 2015	Services 5ab	Other User

Attachment C – Vehicle Schedule

Vehicle Schedule - Closure									
	Stage 1	Stage 2	Mine Year 1	Cost	Service Life	Stage 1 Annual $	Stage 2 Annual $	Mine Year 1 Annual $	Notes
State Project Manager	0	0	0						
Site Manager	0.5	1	1	$35,000	7	$2,500	$5,000	$5,000	pick up - 4WD
Project Engineer	0.5	1	1	$35,000	7	$2,500	$5,000	$5,000	pick up - 4WD
Accountant/Purchaser	0	0	0						
Security	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Water Treatment	0	1	1	$35,000	7	$0	$5,000	$5,000	pick up - 4WD
Utility	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Total	3	5	5			$15,000	$25,000	$25,000	

Vehicle Schedule - Post Closure									
	Stage 1	Stage 2	Mine Year 1	Cost	Service Life	Stage 1 Annual $	Stage 2 Annual $	Mine Year 1 Annual $	Notes
Site Manager	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Water Treatment	0	1	1	$35,000	7	$0	$5,000	$5,000	pick up - 4WD
Utility	1	1	1	$40,000	7	$5,714	$5,714	$5,714	pick up - 4WD with snow plow
Total	2	3	3			$10,714	$15,714	$15,714	

Attachment D –Water Analysis

Water Analysis - From Pace Analytical 2016 Price List			
Analyte	**Price**	**Qty/sample**	**Sample Cost**
Alkalinity	$18.75	1	$18.75
Arsenic	$20.00	1	$20.00
Calcium	$20.00	1	$20.00
Copper	$20.00	1	$20.00
Cobalt	$20.00	1	$20.00
Iron	$20.00	1	$20.00
Hardness Calc	$12.50	1	$12.50
Magnesium	$20.00	1	$20.00
Mercury Low Level	$112.50	0.25	$28.13
Nickel	$20.00	1	$20.00
pH	$6.25	1	$6.25
Specific Conductance	$12.50	1	$12.50
Sulfate	$25.00	1	$25.00
Total Dissolved Solids	$12.50	1	$12.50
Total Suspended Solids	$12.50	1	$12.50
Zinc	$20.00	1	$20.00
SubTotal			$288.13
Level 3 QC*		15%	$43.22
Total			$331.34
* Data Reporting, Complete Quality Control plus QC Limits and Batch Cross reference			

April 4th, 2016

To Whom It May Concern:

This letter serves as a verification of what Express Employment Professionals has been charging PolyMet for two building maintenance personnel and one janitor. All personnel started working for Express Employment Professionals on November 28th, 2011 and rates are as follows:

- Maintenance 1 - $32.23/hour
- Maintenance 2 - $30.77/hour
- Janitor - $14.51/hour

Our rates include the following:

- Weekly pay for the employees
- Workers' Compensation Insurance
- Social Security Tax
- Bonding of Employees
- General Liability Insurance coverage
- Advertising, recruiting, testing, interviewing and reference checks for new employee's
- Employee Coaching
- Weekly invoicing to client
- Benefits for employees
    - Vacation (typically 5 days/year for a full-time employee)
    - Holiday pay (recognized holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving, Christmas Day) based on eligibility
    - Health Insurance (Minimum Essential Coverage under the federal healthcare reform required by the ACA)
    - 401K Retirement savings plan
    - Direct deposit

Other Highlights of Using Express Employment:

- All employee benefits are paid out by Express, at no additional charge to the client company.
- We bill for services rendered on a pay-per-hour basis (ex: if a person works 15 hour/wk, you'll only be charged 15 hrs for that week).
- Locally owned & operated with offices in Hibbing, Grand Rapids, and Duluth.
- We assist with any employee issues that may arise.
- We deal with any unemployment issues that may arise.
- Personalized service and support by local employment specialists.

Please contact one of our offices if you have any future questions or request.

Sincerely,

Kala Linder

Kala Linder
Branch Manager
Kala.Linder@ExpressPros.com

Attachment 4.

Caterpillar Equipment Rates

EQUIPMENT RENTAL RATE TABLE

EQUIPMENT TYPE (1)	Monthly Owner/Rental Rate	PREVENTATIVE MAINTENANCE COST [Cost Per Hour]	GROUND ENGAGING TOOLS CONSUMPTION [Cost Per Hour] (Wear Items)	TIRE COST TABLE [Cost Per Tire]
Bulldozers				
D6T	12,220			
D6T w/ Ripper	13,060			
D7E	16,640			
D8T	19,890			
D9T	$27,500			
D10T	33,340			
D11R				
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$ 10,430.00			
14M	16,910			
16M	23,530			
24M				
Track Excavators				
312E L	6,250			
320E L	7,490			
326F L	8,920			
329F L	10,730			
349F L	17,110			
374F L	26,050			
390F L	32,700			
Scrapers				
631G	33,930			
637G	N/A			
Wheeled Loaders				
924K	5,730			
930K	6,840			
950M	9,690			
966M	13,890			
972M	15,060			
980M	19,260			
988K	30,340			
990				
992G				
994D				
L2350				
Shovels				
PC2000				

PC3000				
PC4000				
PC5500				
PC8000				
Hydraulic Hammers				
H-120 (fits 325) w/ Machine	12,040			
H-160 (fits 345) w/ Machine	21,250			
H-180 (fits 365/385) w/ Machine	30,110			
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$ 3,220.00			
428D 4WD Backhoe				
CS533E Vibratory Roller	$ 7,220.00			
CS633E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP633E Sheepsfoot Compactor				
Light Truck - 1.5 Ton				
Supervisor's Truck				
Flatbed Truck				
Air Compressor + tools				
Welding Equipment				
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump				
Gas Engine Vibrator				
Generator 5KW				
HDEP Welder (pipe or liner)				
5 Ton Crane				
20 Ton Crane	$ 4,220.00			
50 Ton Crane				
120 Ton Crane				
Trucks				
725	11,000			
730	13,460			
735	16,970			
740	18,110			
773E				
777D				
785C				
793C				
797B				
613E (5,000 gal) Water Wagon				
621E (8,000 gal) Water Wagon				

777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd^3)				
NOTES:				
(1) Power Equipment Source:				
(2) Power Equipment Type:				
(3) Drilliing Equipment Source:				
(4) Other Equipment Source:				
(5) Drill rig includes support (pipe) truck				

Attachment 5.

Nevada standard rates (2015)

Nevada Standardized Bond Calculation
Source Data

Format Version:	***SRCE Data File v1.12***
File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Type:	***User Data***
Author/Source:	**Nevada Division of Environmental Protection (NDEP) & NV BLM**

Units of Measure:	**Imperial**

No. of Bases/Regions:	4

Basis/Region	Basis/Region Name	Basis/Region Description
Basis 1	**Northern Nevada**	Churchill, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 2	**Southern Nevada**	Clark, Esmeralda, Lincoln and Nye Counties
Basis 3	**N. Nevada Notice Level**	Notice Level Cost Basis for Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 4	**S. Nevada Notice Level**	Clark, Esmeralda, Lincoln and Nye Counties
Basis 5		
Basis 6		
Basis 7		
Basis 8		
Basis 9		
Basis 10		
Basis 11		
Basis 12		
Basis 13		
Basis 14		
Basis 15		

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

MONTHLY EQUIPMENT RATE TABLE [Cost Per Month] (1)

EQUIPMENT TYPE (2)	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	*Southern Nevada*	*N. Nevada Notice Level*	*S. Nevada Notice Level*
Bulldozers				
D6R	$9,900	$9,900	$3,300	$3,300
D6R w/ Winch				
D7R	$13,200	$13,200	$4,400	$4,400
D8R	$19,000	$19,000	$6,400	$6,400
D9R	$23,100	$23,100	$7,700	$7,700
D10R	$32,000	$32,000	$10,700	$10,700
D11R	$71,000	$71,000	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$9,600	$9,600	$3,200	$3,200
14G/H	$14,500	$14,500	$4,900	$4,900
16G/H	$21,000	$21,000	$7,000	$7,000
24M				
Track Excavators				
312C	$5,700	$5,700	$1,900	$1,900
320C	$7,440	$7,440	$2,480	$2,480
325C	$8,200	$8,200	$2,800	$2,800
330C	$10,800	$10,800	$3,600	$3,600
345B	$9,000	$9,000	$3,000	$3,000
365BL				
385BL	$22,500	$22,500	$7,500	$7,500
Scrapers				
631G	$16,000	$16,000	$5,400	$5,400
637G PP	$35,700	$35,700	N/A	N/A
Wheeled Loaders				
924G	$5,400	$5,400	$1,800	$1,800
928G	$6,000	$6,000	$2,000	$2,000
950G	$7,600	$7,600	$2,600	$2,600
966G	$10,900	$10,900	$3,700	$3,700
972G	$13,000	$13,000	$4,400	$4,400
980G	$13,000	$13,000	$4,400	$4,400
988G	$21,000	$21,000	$7,000	$7,000
990				
992G	$65,000	$65,000	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	$7,000	$7,000	$2,400	$2,400
H-160 (fits 345)	$8,600	$8,600	$2,800	$2,800
H-180 (fits 365/385)	$12,400	$12,400	$4,133	$4,133

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$3,420	$3,420	$1,140	$1,140
428D 4WD Backhoe	$4,200	$4,200	$1,400	$1,400
CS533E Vibratory Roller	$7,260	$7,260	$1,650	$1,650
CS663E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP663E Sheepsfoot Compactor				
Light Truck - 1.5 Ton	$5,073	$5,073	$1,153	$1,153
Supervisor's Truck	$3,225	$3,225	$733	$733
Flatbed Truck	$5,073	$5,073	$1,153	$1,153
Air Compressor + tools	$4,492	$4,492	$1,021	$1,021
Welding Equipment	$3,025	$3,025	$688	$688
Heavy Duty Drill Rig	$59,070	$59,070	$13,425	$13,425
Pump (plugging) Drill Rig	$59,070	$59,070	$13,425	$13,425
Concrete Pump	$14,916	$14,916	$3,390	$3,390
Gas Engine Vibrator	$647	$647	$147	$147
Generator 5KW	$987	$987	$224	$224
HDEP Welder (pipe or liner)	$7,898	$7,898	$1,795	$1,795
5 Ton Crane	$5,707	$5,707	$1,297	$1,297
20 Ton Crane	$15,290	$15,290	$3,475	$3,475
50 Ton Crane	$15,290	$15,290	$3,475	$3,475
120 Ton Crane				
Trucks				
725 (articulated)	$9,900	$9,900	$3,300	$3,300
730 (articulated)	$9,900	$9,900	$3,300	$3,300
735 (articulated)	$9,900	$9,900	$3,300	$3,300
740 (articulated)	$15,000	$15,000	$5,000	$5,000
769D	$21,000	$21,000	N/A	N/A
773E	$33,000	$33,000	N/A	N/A
777D	$54,000	$54,000	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$6,000	$6,000	$2,000	$2,000
621E (8,000 gal) Water Wagon	$11,000	$11,000	$3,700	$3,700
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd^3) (5)	$14,322	$14,322	$3,255	$3,255

NOTES:

(1) Power Equipment Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)
(4) Other Equipment Source:	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

PREVENTATIVE MAINTENANCE COST [Cost Per Hour] (1)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Bulldozers				
D6R	$5.18	$5.18	$5.18	$5.18
D6R w/ Winch				
D7R	$3.31	$3.31	$3.31	$3.31
D8R	$5.71	$5.71	$5.71	$5.71
D9R	$7.92	$7.92	$7.92	$7.92
D10R	$9.68	$9.68	$9.68	$9.68
D11R	$12.22	$12.22	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$6.08	$6.08	$6.08	$6.08
14G/H	$6.62	$6.62	$6.62	$6.62
16G/H	$5.33	$5.33	$5.33	$5.33
24M				
Track Excavators				
312C	$3.90	$3.90	$3.90	$3.90
320C	$4.16	$4.16	$4.16	$4.16
325C	$3.38	$3.38	$3.38	$3.38
330C	$5.19	$5.19	$5.19	$5.19
345B	$7.04	$7.04	$7.04	$7.04
365BL				
385BL	$6.07	$6.07	$6.07	$6.07
Scrapers				
631G	$7.01	$7.01	$7.01	$7.01
637G PP	$11.55	$11.55	N/A	N/A
Wheeled Loaders				
924G	$3.80	$3.80	$3.80	$3.80
928G	$4.00	$4.00	$4.00	$4.00
950G	$5.01	$5.01	$5.01	$5.01
966G	$6.69	$6.69	$6.69	$6.69
972G	$5.28	$5.28	$5.28	$5.28
980G	$5.28	$5.28	$5.28	$5.28
988G	$9.65	$9.65	$9.65	$9.65
990				
992G	$11.46	$11.46	$11.46	$11.46
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A
Demolition Grapples				
G315 (fits 322/325)	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A
Other Equipment				
420D 4WD Backhoe	$3.39	$3.39	$3.39	$3.39
428D 4WD Backhoe	$3.40	$3.40	$3.40	$3.40
CS533E Vibratory Roller				
CS663E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP663E Sheepsfoot Compactor				
Light Truck - 1.5 Ton				
Supervisor's Truck				
Flatbed Truck				
Air Compressor + tools				
Welding Equipment				
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump				
Gas Engine Vibrator				
Generator 5KW				
HDEP Welder (pipe or liner)				
5 Ton Crane				
20 Ton Crane				
50 Ton Crane				
120 Ton Crane				
Trucks				
725 (articulated)	$7.55	$7.55	$7.55	$7.55
730 (articulated)	$7.55	$7.55	$7.55	$7.55
735 (articulated)	$7.55	$7.55	$7.55	$7.55
740 (articulated)	$7.18	$7.18	$7.18	$7.18
769D	$8.37	$8.37	N/A	N/A
773E	$7.28	$7.28	N/A	N/A
777D	$10.40	$10.40	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$5.75	$5.75	$5.75	$5.75
621E (8,000 gal) Water Wagon	$6.75	$6.75	$6.75	$6.75
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$7.55	$7.55	$7.55	$7.55
(1) PM Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

G.E.T CONSUMPTION [Cost Per Hour] (1) (Wear Items)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Bulldozers				
D6R	$4.72	$4.72	$4.72	$4.72
D6R w/ Winch				
D7R	$7.01	$7.01	$7.01	$7.01
D8R	$9.12	$9.12	$9.12	$9.12
D9R	$14.19	$14.19	$14.19	$14.19
D10R	$19.86	$19.86	$19.86	$19.86
D11R	$29.51	$29.51	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$9.79	$9.79	$9.79	$9.79
14G/H	$14.15	$14.15	$14.15	$14.15
16G/H	$19.33	$19.33	$19.33	$19.33
24M				
Track Excavators				
312C	$3.69	$3.69	$3.69	$3.69
320C	$4.26	$4.26	$4.26	$4.26
325C	$5.37	$5.37	$5.37	$5.37
330C	$5.92	$5.92	$5.92	$5.92
345B	$6.99	$6.99	$6.99	$6.99
365BL				
385BL	$12.38	$12.38	$12.38	$12.38
Scrapers				
631G	$7.74	$7.74	$7.74	$7.74
637G PP	$9.72	$9.72	N/A	N/A
Wheeled Loaders				
924G	$4.07	$4.07	$4.07	$4.07
928G	$4.21	$4.21	$4.21	$4.21
950G	$7.83	$7.83	$7.83	$7.83
966G	$9.83	$9.83	$9.83	$9.83
972G	$12.45	$12.45	$12.45	$12.45
980G	$12.45	$12.45	$12.45	$12.45
988G	$13.33	$13.33	$13.33	$13.33
990				
992G	$30.62	$30.62	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	$5.34	$5.34	$5.34	$5.34
H-160 (fits 345)	$10.41	$10.41	$10.41	$10.41
H-180 (fits 365/385)	$12.02	$12.02	$12.02	$12.02

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$3.28	$3.28	$3.28	$3.28
428D 4WD Backhoe	$3.38	$3.38	$3.38	$3.38
CS533E Vibratory Roller	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	N/A	N/A	N/A	N/A
Supervisor's Truck	N/A	N/A	N/A	N/A
Flatbed Truck	N/A	N/A	N/A	N/A
Air Compressor + tools	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig	N/A	N/A	N/A	N/A
Pump (plugging) Drill Rig	N/A	N/A	N/A	N/A
Concrete Pump	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A
5 Ton Crane	N/A	N/A	N/A	N/A
20 Ton Crane	N/A	N/A	N/A	N/A
50 Ton Crane	N/A	N/A	N/A	N/A
120 Ton Crane	N/A	N/A	N/A	N/A
Trucks				
725 (articulated)	$2.93	$2.93	$2.93	$2.93
730 (articulated)	$2.93	$2.93	$2.93	$2.93
735 (articulated)	$2.93	$2.93	$2.93	$2.93
740 (articulated)	$3.03	$3.03	$3.03	$3.03
769D	$3.28	$3.28	N/A	N/A
773E	$3.68	$3.68	N/A	N/A
777D	$4.12	$4.12	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon				
621E (8,000 gal) Water Wagon				
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$2.93	$2.93	$2.93	$2.93
Notes:				
(1) G.E.T. Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

TIRE COST TABLE [Cost Per Tire(1,2,3)]

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	*Southern Nevada*	*N. Nevada Notice Level*	*S. Nevada Notice Level*
Bulldozers				
D6R	N/A	N/A	N/A	N/A
D6R w/ Winch	N/A	N/A	N/A	N/A
D7R	N/A	N/A	N/A	N/A
D8R	N/A	N/A	N/A	N/A
D9R	N/A	N/A	N/A	N/A
D10R	N/A	N/A	N/A	N/A
D11R	N/A	N/A	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$2,056.32	$2,056.32	$2,056.32	$2,056.32
14G/H	$2,815.06	$2,815.06	$2,815.06	$2,815.06
16G/H	$3,808.00	$3,808.00	$3,808.00	$3,808.00
24M				
Track Excavators				
312C	N/A	N/A	N/A	N/A
320C	N/A	N/A	N/A	N/A
325C	N/A	N/A	N/A	N/A
330C	N/A	N/A	N/A	N/A
345B	N/A	N/A	N/A	N/A
365BL	N/A	N/A	N/A	N/A
385BL	N/A	N/A	N/A	N/A
Scrapers				
631G	$8,364.27	$8,364.27	$8,364.27	$8,364.27
637G PP	$8,364.27	$8,364.27	N/A	N/A
Wheeled Loaders				
924G	$2,836.96	$2,836.96	$2,836.96	$2,836.96
928G	$2,836.96	$2,836.96	$2,836.96	$2,836.96
950G	$4,274.00	$4,274.00	$4,274.00	$4,274.00
966G	$6,804.90	$6,804.90	$6,804.90	$6,804.90
972G	$6,804.90	$6,804.90	$6,804.90	$6,804.90
980G	$7,163.80	$7,163.80	$7,163.80	$7,163.80
988G	$11,250.26	$11,250.26	$11,250.26	$11,250.26
990				
992G	$25,086.15	$25,086.15	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000	N/A	N/A	N/A	N/A
KOM PC3000	N/A	N/A	N/A	N/A
KOM PC4000	N/A	N/A	N/A	N/A
KOM PC5500	N/A	N/A	N/A	N/A
KOM PC8000	N/A	N/A	N/A	N/A
Hydraulic Hammers				
H-120 (fits 325)	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A
Demolition Grapples				
G315 (fits 322/325)	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A
Other Equipment				
420D 4WD Backhoe	$431.73	$431.73	$431.73	$431.73
428D 4WD Backhoe	$431.73	$431.73	$431.73	$431.73
CS533E Vibratory Roller	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	$130.90	$130.90	$130.90	$130.90
Supervisor's Truck	$130.90	$130.90	$130.90	$130.90
Flatbed Truck	$130.90	$130.90	$130.90	$130.90
Air Compressor + tools	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A
5 Ton Crane				
20 Ton Crane				
50 Ton Crane				
120 Ton Crane				
Trucks				
725 (articulated)	$4,274.00	$4,274.00	$4,274.00	$4,274.00
730 (articulated)	$4,274.00	$4,274.00	$4,274.00	$4,274.00
735 (articulated)	$6,804.90	$6,804.90	$6,804.90	$6,804.90
740 (articulated)	$7,163.80	$7,163.80	$7,163.80	$7,163.80
769D	$3,916.34	$3,916.34	N/A	N/A
773E	$6,868.68	$6,868.68	N/A	N/A
777D	$12,196.62	$12,196.62	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$3,382.58	$3,382.58	$3,382.58	$3,382.58
621E (8,000 gal) Water Wagon	$8,710.66	$8,710.66	$8,710.66	$8,710.66
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$463.15	$463.15	$463.15	$463.15
Notes:				
(1) Unit Cost Basis:	Cost per set	Cost per set	Cost per set	Cost per set
(2) Cost Basis:	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.
(3) Tire Cost Source:	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015
(4) Tire Wear Source (defined in model):	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20

Nevada Standardized Bond Calculation
Labor Rates

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xl***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
EQUIPMENT OPERATORS - Labor Groups and Base Pay Rate ($/hr) (2)								
Bulldozers								
D6R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D6R w/ Winch								
D7R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D8R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D9R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D10R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D11R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
Wheeled Dozers								
824G								
834G								
844								
854G								
Motor Graders								
120H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
14G/H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
16G/H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
24M								
Track Excavators								
312C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
320C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
325C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
330C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
345B	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
365BL								
385BL	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
Scrapers								
631G	Group 10	$49.36	Group 15	$59.23	Group 10	$49.36	Group 15	$59.23
637G PP	Group 11	$49.79	Group 15	$59.23	Group 11	$49.79	Group 15	$59.23
Wheeled Loaders								
924G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
928G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
950G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
966G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
972G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
980G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
988G	Group 11	$49.79	Group 10	$58.85	Group 11	$49.79	Group 10	$58.85
990								
992G	Group 11A	$51.43	Group 10	$58.85	Group 11A	$51.43	Group 10	$58.85
994D								
L-2350								
Shovels								
KOM PC2000								
KOM PC3000								
KOM PC4000								
KOM PC5500								
KOM PC8000								
Hydrauilc Hammers								
H-120 (fits 325)								
H-160 (fits 345)								
H-180 (fits 365/385)								
Demolition Shears								
S340 (fits 322/325/330)								
S365 (fits 330/345)								
S390 (fits 365/385)								
Demolition Grapples								
G315 (fits 322/325)								
G320 (fits 325/330)								
G330 (fits 345/365)								

Nevada Standardized Bond Calculation
Labor Rates

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xl***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
Other Equipment								
420D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Group 10A	$49.55	Group 4	$58.40
428D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Group 10A	$49.55	Group 4	$58.40
CS533E Vibratory Roller	Group 6	$47.85	Group 4	$58.40	Group 6	$47.85	Group 4	$58.40
CS663E Vibratory Roller								
CP533E Sheepsfoot Compactor								
CP663E Sheepsfoot Compactor								
Light Truck - 1.5 Ton								
Supervisor's Truck								
Flatbed Truck								
Air Compressor + tools	Group 3	$46.64	Group 1	$55.67	Group 3	$46.64	Group 1	$55.67
Welding Equipment	Group 9	$49.01	Group 6	$58.62	Group 9	$49.01	Group 6	$58.62
Heavy Duty Drill Rig	Group 10	$49.36	Group 2	$56.62	Group 10	$49.36	Group 2	$56.62
Pump (plugging) Drill Rig	Group 10	$49.36	Group 2	$56.62	Group 10	$49.36	Group 2	$56.62
Concrete Pump								
Gas Engine Vibrator	Group 6	$47.85	Group 6	$58.62	Group 6	$47.85	Group 6	$58.62
Generator 5KW								
HDEP Welder (pipe or liner)								
5 Ton Crane	Group 10A	$49.55	Group 8	$58.73	Group 10A	$49.55	Group 8	$58.73
20 Ton Crane	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
50 Ton Crane	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
120 Ton Crane								
Fringe Benefits								
Equip Op Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$0.00
Zone and Area Adjustments - Miles and Rates ($hr) (3)								
Equipment Zone 1	< 50 miles	$0.00	< 20 Miles	$0.00	< 50 miles	$0.00	< 20 Miles	$0.00
Equipment Zone 2	50 to 150 miles	$2.00	20 to 40 miles	$2.00	50 to 150 miles	$2.00	20 to 40 miles	$2.00
Equipment Zone 3	151 to 300 miles	$3.00	40 to 60 miles	$3.00	151 to 300 miles	$3.00	40 to 60 miles	$3.00
Equipment Zone 4	> 300 miles	$4.00	> 60 miles	$3.50	> 300 miles	$4.00	> 60 miles	$3.50
Equipment Zone 5								
Equipment Zone 6								
Equipment Zone 7								
NOTES:								
(1) Equipment Type:	Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent	
(2) Equipment Operator Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010		D-B NV120038 1/6/2012		D-B NV100064 10/01/2010	
(3) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
TRUCK DRIVERS - Labor Groups and Base Pay Rate ($/hr) (4)								
725 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
730 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
735 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
740 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
769D	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
773E								
777D	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
785C								
793C								
797B								
613E (5,000 gal) Water Wagon	Water Truck > 2	$28.61	Group 3	$46.44	Water Truck > 2	$28.61	Group 3	$46.44
621E (8,000 gal) Water Wagon	Water Truck > 2	$28.61	Group 4	$46.62	Water Truck > 2	$28.61	Group 4	$46.62
777D Water Truck								
785C Water Truck								
Dump Truck (10-12 yd3)	Dump Truck Driv	$29.04	Group 2	$46.23	Dump Truck Driv	$29.04	Group 2	$46.23
Fringe Benefits								
Truck Driver Fringe Benefits ($/hr)		$13.64		$0.00		$13.64		$0.00
Zone and Area Adjustments (5)								
Truck Zone 1	< 50 miles	$0.00	< 30 miles	$0.00	< 50 miles	$0.00	< 30 miles	$0.00
Truck Zone 2	50 to 150 miles	$2.00	30-50 miles	$1.50	50 to 150 miles	$2.00	30-50 miles	$1.50
Truck Zone 3	151 to 300 miles	$3.00	50-70 miles	$2.50	151 to 300 miles	$3.00	50-70 miles	$2.50
Truck Zone 4	> 300 miles	$4.00	>70 miles	$3.50	> 300 miles	$4.00	>70 miles	$3.50
Truck Zone 5								
Truck Zone 6								
Truck Zone 7								
NOTES:								
(4) Truck Driver Source:	D-B TEAM0533-002 12/01/2010		D-B NV20100064 10/01/2010		D-B TEAM0533-002 12/01/2010		D-B NV20100064 10/01/2010	

Nevada Standardized Bond Calculation
Labor Rates

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xl***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
(5) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
LABORERS - Labor Groups and Base Pay Rate ($/hr) (6,7)								
General Laborer	Group 1	$30.82	Group 1	$42.94	Group 1	$30.82	Group 1	$42.94
Skilled Laborer	Group 4	$31.32	Group 3	$43.25	Group 4	$31.32	Group 3	$43.25
Driller's Helper	Group 3	$31.07	Group 2	$43.15	Group 3	$31.07	Group 2	$43.15
Rodmen (reinforcing concrete)	Group 2	$30.92	Group 3A	$43.34	Group 2	$30.92	Group 3A	$43.34
Cement finisher	Group 3	$31.07	Group 3A	$43.34	Group 3	$31.07	Group 3A	$43.34
Carpenter		$38.80		$39.56		$38.80		$39.56
Fringe Benefits								
Laborer Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$0.00
Carpenter Fringe Benefits ($/hr)		$0.00		$14.05		$0.00		$14.05
Zone and Area Adjustments (8)								
Laborer Zone 1	< 50 miles	$0.00	< 30 miles	$0.00	< 50 miles	$0.00	< 30 miles	$0.00
Laborer Zone 2	50 to 150 miles	$2.00	30-50 miles	$1.50	50 to 150 miles	$2.00	30-50 miles	$1.50
Laborer Zone 3	151 to 300 miles	$3.00	50-70 miles	$2.50	151 to 300 miles	$3.00	50-70 miles	$2.50
Laborer Zone 4	> 300 miles	$4.00	>70 miles	$3.50	> 300 miles	$4.00	>70 miles	$3.50
Laborer Zone 5			Laughlin	$2.25			Laughlin	$2.25
Laborer Zone 6								
Laborer Zone 7								
NOTES:								
(6) Laborer Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010		D-B NV120038 1/6/2012		D-B NV100064 10/01/2010	
(7) Carpenter Source:	D-B NV120038 1/6/2012		D-B CARP1780-011 07/01/2011		D-B NV120038 1/6/2012		D-B CARP1780-011 07/01/2011	
(8) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
PROJECT MANAGEMENT AND TECHNICAL LABOR - Base Pay Rate ($/hr) (9)								
Project Manager		$65.25		$65.25		$65.25		$65.25
Foreman		$60.75		$60.75		$60.75		$60.75
Field Geologist/Engineer		$92.13		$92.13		$92.13		$92.13
Field Tech/Sampler		$83.75		$83.75		$83.75		$83.75
Range Scientist		$92.13		$92.13		$92.13		$92.13
Senior Planning Engineer								
Project Engineer								
Mechanic/Fitter								
NOTES:								
(9) Project Manager:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31	
(9) Foreman Source:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31	
(9) Techical Labor Source:	SRK Consulting 2012 (Total		SRK Consulting 2012 (Total		SRK Consulting 2012 (Total		SRK Consulting 2012 (Total	
INDIRECT COSTS								
SOCIAL SECURITY, WORKMAN'S COMP, INSURANCE, ETC.								
Unemployment (%)		3.00%		3.00%		3.00%		3.00%
Retirement/SS/Medicare (%)		7.65%		7.65%		7.65%		7.65%
Workman's Compensation (%)		8.75%		8.75%		8.75%		8.75%
State Payroll Tax (13),(15),(17),(18)								
NOTES:								
(10) Workman's Comp Source:	RS Means R013113-60 NV		RS Means R013113-60 NV		RS Means R013113-60 NV		RS Means R013113-60 NV	
Unemployment Tax	NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606	

Nevada Standardized Bond Calculation
Reclamation Material Costs

File Name:	***SRCE_Cost_Data_File_1_12_Stc***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Revegetation Materials					
Seed Mixes					
Seed Mix	Units				
None					
Mix 1	Cost/Acre	$302.50	$302.50	$302.50	$302.50
Mix 2	Cost/Acre	$332.75	$332.75	$332.75	$332.75
Mix 3	Cost/Acre	$363.00	$363.00	$363.00	$363.00
Mix 4	Cost/Acre	$393.25	$393.25	$393.25	$393.25
User Mix 1	Cost/Acre				
User Mix 2	Cost/Acre				
User Mix 3	Cost/Acre				
User Mix 4	Cost/Acre				
User Mix 5 (see Seed Mix sheet)	Cost/Acre				
	Notes:				
Mulch					
Item	Units				
None					
Straw Mulch	Cost/lb	$0.15	$0.15	$0.15	$0.15
Hydro Mulch	Cost/lb	$0.25	$0.25	$0.25	$0.25
Timber Mulch	Cost/lb				
	Cost/lb				
	Cost/lb				
	Notes:	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)
		Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)
Amendments					
Item	Units				
None					
Organic Matter	Cost/lb	$0.70	$0.70	$0.70	$0.70
Treated Sludge	Cost/lb				
Chemical	Cost/lb	$0.46	$0.46	$0.46	$0.46
	Cost/lb				
	Cost/lb				
	Cost/lb				
	Notes:	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)
		Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)

Nevada Standardized Bond Calculation
Reclamation Material Costs

File Name:	***SRCE_Cost_Data_File_1_12_Stc***
Date:	***August 1, 2015***
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Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	*Southern Nevada*	*N. Nevada Notice Level*	*S. Nevada Notice Level*
Well Abandonment Materials					
Description	Units				
Cement	50lb bag	$6.78	$6.78	$6.78	$6.78
Grout (Low Grade Bentonite)	50lb bag	$7.13	$7.13	$7.13	$7.13
Inert Material/Cuttings	cy				
	Notes:	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag
		(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added
Monitoring Costs					
Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Monitor Well Pump	ea.	$2,140.00	$2,140.00	$2,140.00	$2,140.00
Sampling Supplies	ea.	$5.00	$5.00	$5.00	$5.00
Water Analysis (Profile I) (1)	ea.	$380.00	$380.00	$380.00	$380.00
Leach Test (MWMP) w/ analysis	ea.	$450.00	$450.00	$450.00	$450.00
ABA + S speciation	ea.	$150.00	$150.00	$150.00	$150.00
WAD Cyanide in water	ea.	$50.00	$50.00	$50.00	$50.00
Water Analysis (Profile II) (1)	ea.	$430.00	$430.00	$430.00	$430.00
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	Notes:	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)

Nevada Standardized Bond Calculation
Reclamation Material Costs

File Name:	***SRCE_Cost_Data_File_1_12_Stc***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Fuel, Etc.					
Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Off-road Diesel - delivered (1)	$/gal	$2.66	$2.66	$2.66	$2.66
Pickup Truck Travel	$/mi	$0.58	$0.58	$0.58	$0.58
Electical Power	$/kWh	$0.08	$0.08	$0.08	$0.08
Notes:		(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).
		Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015
		Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
REVEGETATION									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Seeding - Broadcast Manual[1]	$/acres	$135.00	$50.00	$135.00	$50.00	$135.00	$50.00	$135.00	$50.00
Seeding - Broadcast Mechanical[1]	$/acres	$93.33	$27.00	$93.33	$27.00	$93.33	$27.00	$93.33	$27.00
Seeding - Drill[1]	$/acres	$140.00	$100.00	$140.00	$100.00	$140.00	$100.00	$140.00	$100.00
Seeding - Hydroseeding[1]	$/acres	$250.00	$125.00	$250.00	$125.00	$250.00	$125.00	$250.00	$125.00
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Shrub Planting - bare root 6-10 in (150- 250mm)[2]	ea.								
Tree Planting - bare root 11-16 in (270- 400mm)[3]	ea.								
Cactus Planting[4]	ea.								
NOTES:									
(1) Seeding Source:		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)	
(2) Shrub Source:									
(3) Tree Source:									
(4) Cactus Source:									
BUILDING and WALL DEMOLITION									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Building Demolition									
Lg. steel	C.F.								
Lg. concrete	C.F.								
Lg. masonry	C.F.								
Lg. mixed	C.F.								
Sm. steel	C.F.								
Sm. concrete	C.F.								
Sm. masonry	C.F.								
Sm. wood	C.F.								
Wall Demolition									
Block 4 in thick	S.F.		20%		20%		20%		20%
Block 6 in thick	S.F.		20%		20%		20%		20%
Block 8 in thick	S.F.		20%		20%		20%		20%
Block 12 in thick	S.F.		20%		20%		20%		20%
Conc 6 in thick	S.F.		10%		10%		10%		10%
Conc 8 in thick	S.F.		10%		10%		10%		10%
Conc 10 in thick	S.F.		10%		10%		10%		10%
Conc 12 in thick	S.F.		10%		10%		10%		10%
WASTE DISPOSAL									
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Rubbish and Waste Handling									
Dumpster delivery (average for all sizes)	ea.	$52.50		$52.50		$52.50		$52.50	
Haul (average for all sizes)	ea.	$165.00		$165.00		$165.00		$165.00	
Rent per month (average for all sizes)	ea.	$56.00		$56.00		$56.00		$56.00	
Disposal fee per ton (tonne) (average for all sizes)	ton	$62.00		$62.00		$62.00		$62.00	
NOTES:									
Dumpster Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Disposal Fee Source:		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Hazardous Material Handling - Solids									
Pickup fees 55 gal. drums	ea.	$245.00		$245.00		$245.00		$245.00	
Bulk material (average)	ton	$399.50		$399.50		$399.50		$399.50	
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	mile	$5.46		$5.46		$5.46		$5.46	
Dump site disposal fee	ton	$281.50		$281.50		$281.50		$281.50	
NOTES:									
Solid Handling Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Solid Disposal Fee Source:		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
Hazardous Material Handling - Liquids									
Vacuum Truck Pickup (2200 gal or 9,700 litres)	hr.	$143.00		$143.00		$143.00		$143.00	
Vacuum Truck Pickup (5000 gal or 2,000 litres)	hr.	$208.00		$208.00		$208.00		$208.00	
Dump site disposal fee	ton	$281.50		$281.50		$281.50		$281.50	
NOTES:									
Liquid Handling Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Liquid Disposal Fee Source:		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11	
Hydrocarbon Contaminated Soils (HCS)									
Insitu Biotreatment	C.Y	$18.18		$18.18		$18.18		$18.18	
HCS disposal fee	C.Y	$271.50		$271.50		$271.50		$271.50	
NOTES:									
Insitu Treatement Cost Source		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65	
HCS Disposal Fee Source:		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65	
UNDERGROUND OPENING CLOSURE									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Reinforced Concrete Bulkheads and Shaft Covers									
Grade walls - 15 in thick, 8 ft high	C.Y	$133.00		$133.00		$133.00		$133.00	
Grade walls - 15 in thick, 12 ft high	C.Y	$133.00		$133.00		$133.00		$133.00	
Elevated conc, 1-way beam & slab - 15ft span	C.Y	$247.00		$247.00		$247.00		$247.00	
Elevated conc, 1-way beam & slab - 25ft span	C.Y	$234.00		$234.00		$234.00		$234.00	
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Small Adit Plugging									
Bat Gate [5]	ea.	$2,911.27		$2,911.27		$2,911.27		$2,911.27	
Culvert Gate [5]	C.Y	$5,822.54		$5,822.54		$5,822.54		$5,822.54	
Adit Foam Plug [6]	C.Y	$291.13		$291.13		$291.13		$291.13	
Production Opening Foam Plug [6]	C.Y	$291.13		$291.13		$291.13		$291.13	
NOTES:									
(5) Bat Gate Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)	
(6) Foam Plug Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)	
MISC. LINEAR PROJECTS									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Fencing Installation									
Barbed 3-strand	ft	$0.45		$0.45		$0.45		$0.45	
Barbed 4-strand	ft	$0.60		$0.60		$0.60		$0.60	
Barbed 5-strand	ft	$0.75		$0.75		$0.75		$0.75	
Chain link 8 ft -10 ft Install	ft	$36.50		$36.50		$36.50		$36.50	
Wood stockade fence 6 ft high - Install	ft	$14.15		$14.15		$14.15		$14.15	
	ft								
	ft								
Fencing Removal									
Barbed 3-strand Removal	ft								
Barbed 4-strand Removal	ft								
Barbed 5-strand Removal	ft								
Chain link 8 ft -10 ft Removal	ft								
Wood, all types 4 ft -6 ft high Removal	ft								
	ft								
	ft								
Culvert Removal									
12 in (300 mm) Diameter	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
18 in (450 mm) Diameter	ft								
24 in (600 mm) Diameter	ft								
36 in (1m) Diameter	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
Pipeline Removal									
Plastic Pipe 3/4 in (mm) - 4 in (100 mm) diameter	ft								
6 in (150 mm) - 8 in (200 mm)	ft								
10 in (250 mm) - 18 in (450 mm)	ft								
20 in (500 mm) - 36 in (1 m)	ft								
Pipe and Drainpipe Installation									
Water 4in (100mm) 40ft (12m) length, welded HDPE	ft	$2.18		$2.18		$2.18		$2.18	
Water 6in (150mm) 40ft (12m) length, welded HDPE	ft	$5.15		$5.15		$5.15		$5.15	
Water 12in (300mm) 40ft (12m) length, welded HDPE	ft								
Drain 4in (100mm) perforated PVC	ft	$1.28		$1.28		$1.28		$1.28	
Drain 6in (150mm) perforated PVC	ft	$2.89		$2.89		$2.89		$2.89	
Drain 4in (100mm) corrugated, perf or plain	ft	$0.44		$0.44		$0.44		$0.44	
Drain 6in (150mm) corrugated., perf or plain	ft	$1.26		$1.26		$1.26		$1.26	
Drain Rock Preparation									
Item	**Units**		**Total**		**Total**		**Total**		**Total**
Crushing	C.Y		$0.50		$0.50		$0.50		$0.50
Screening	C.Y		$0.50		$0.50		$0.50		$0.50
Misc.									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Backhoe work	C.Y								
Powerline and Transformer Removal			**Total**		**Total**		**Total**		**Total**
Single Pole Powerlines [7]	mile		$40,461		$40,461		$40,461		$40,461
Double Pole Powerlines [8]	mile		$46,242		$46,242		$46,242		$46,242
Substation [9]	unit		$28,997		$28,997		$28,997		$28,997
NOTES:									
(7) Single Pole Source:		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015	
(8) Double Pole Source:		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015	
(9) Transformer Source:		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015	
EROSION, EVAPORATION and SEDIMENTATION CONTROL									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Rip-Rap & Rock Lining									
Rip-Rap 3/8 to 1/4 C.Y. pieces, grouted	S.Y.	$25.50		$25.50		$25.50		$25.50	
Rip-Rap 18 in min thick, no grout	S.Y.	$8.05		$8.05		$8.05		$8.05	
Gabions, 6 in deep	S.Y.	$11.25		$11.25		$11.25		$11.25	
Gabions, 9 in deep	S.Y.	$16.55		$16.55		$16.55		$16.55	
Gabions, 12 in deep	S.Y.	$22.50		$22.50		$22.50		$22.50	
Gabions, 18 in deep	S.Y.	$30.50		$30.50		$30.50		$30.50	
Gabions, 36 in deep	S.Y.	$41.50		$41.50		$41.50		$41.50	
Liner Installation									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Site grading	S.F.								
Compaction	S.F.								
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
60 mil HDPE Liner	S.F.		$0.50		$0.50		$0.50		$0.50
Construction Management Support									
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
Office Trailer, Furnished, no hook-ups	month		$188.00		$188.00		$188.00		$188.00
Toilet Portable, chemical	month		$130.75		$130.75		$130.75		$130.75
PRODUCTION OR DEWATERING WELL PUMP REMOVAL									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Pump Type									
Submersible [10]	ft to pump	$2.54	$5.53	$2.54	$5.53	$2.54	$5.53	$2.54	$5.53
Line Shaft [10]	ft to pump	$5.93	$12.91	$5.93	$12.91	$5.93	$12.91	$5.93	$12.91
NOTES:									
(10) Pump Removal Source:		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)	

Nevada Standardized Bond Calculation
Indirect Costs

File Name:	***CostData STD 3.xls***
Date:	***December 1, 2005***
Cost Basis:	***Standardized Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate	8.00%	6.00%		4.00%	
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	10.00%	8.00%	6.00%	4.00%	
3. Insurance (9)	1.50%	of labor costs			
4. Bond (10)	3.00%	of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)	10.00%	of the O&M costs			
	<=	<=	<=	>	
6. Contract Administration (12)	$1,000,000	$25,000,000		$25,000,000	
Variable Rate	10.00%	8.00%		6.00%	
Government Indirect Cost (13)	21.00%	of contract administration			

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

1. Federal construction contracts require Davis-Bacon wage rates for contracts over $2,000. Wage rate estimates may include base pay, payroll loading, overhead and profit. To avoid double counting of any of the identified administrative costs the operator must itemize the components of their labor cost estimates or provide BLM with a signed statement, under penalty of USC 1001, that identifies what specific administrative costs are included in the quoted hourly rate.

2. The reclamation cost estimate must include the estimated plugging cost of at least one drill hole for each active drill rig in the project area. Where the submitted Notice or approved Plan of Operations calls for drill holes to be plugged, but doesn't specifically require the drill holes be plugged before the drill rig has been moved from the drill pad, the reclamation cost estimate must include the plugging cost for those drill holes. For all drill holes and wells scheduled to be left open, the estimated plugging cost must be included in the reclamation cost estimate. Where the approved Plan of Operations proposes immediate mining through an area where the drilling is to occur, and the cost of the post-mining reclamation is included in the reclamation cost estimate, the cost estimate does not need to include the plugging costs for those drill holes.

3. Miscellaneous items should be itemized on accompanying worksheets.

4. Fluid management should be calculated only when mineral processing activities are involved. Fluid management represents the costs of maintaining proper fluid management to prevent overflow of solution ponds through premature cessation or abandonment of operations. Calculate a minimum six month direct cost estimate which includes power, supplies, equipment, labor and maintenance.

5. Handling of hazardous materials includes the cost of decontaminating, neutralizing, disposing, treating and/or isolating all hazardous materials used, produced, or stored on the site.

6. Any mitigation measures required in the Plan of Operations must be included in the reclamation cost estimate. Mitigation may include measures to avoid, minimize, rectify and reduce or eliminate the impact, or compensate for the impact.

7. Engineering, design and construction (ED&C) plans are often necessary to provide details on the reclamation needed to contract for the required work. To estimate the cost to develop an ED&C plan use 4-8% of the O&M cost. Calculate the ED&C cost as a percentage of the O&M cost as follows: up to and including $1 million, use 8%; over $1 million to $25 million, use 6%; and over $25 million, use 4%. Inclusion of a line item for the development of an ED&C plan may not be necessary for small operations, such as notice-level exploration. With small, uncomplicated reclamation efforts contracting may be able to proceed without developing an ED&C plan. [ED&C is automatically eliminated if "Notice" is selected on the Property Information Sheet]

8. A contingency cost is included in the reclamation cost estimation to cover unforeseen cost elements. Calculate the contingency cost as a percentage of the O&M cost as follows: up to and including $500,000, use 10%; over $500,000 to $5 million, use 8%; over $5 million to $50 million, use 6%; and greater than $50 million, use 4%. As with the ED&C cost, inclusion of a contingency cost may not be necessary for small operations, such as notice-level exploration.

9. Insurance premiums are calculated at 1.5% of the total labor costs. Enter the premium amount if liability insurance is not included in the itemized unit costs.

10. Federal construction contracts exceeding $100,000 require both a performance and a payment bond (Miller Act, 40 USC 270et seq.). Each bond premium is figured at 1.5% of the O&M cost. Enter the sum of both premium costs on this line.

11. For Federal construction contracts, use 10% of estimated O&M cost for the contractor's profit.

12. To estimate the contract administration cost, use 6 to 10% of the operational and maintenance (O&M) cost. Calculate the contract administration cost as a percentage of the O&M cost as follows: up to and including $1 million, use 10%; over $1 million to $25 million, use 8%; and greater than $25 million use 6%.

13. Government indirect cost rate is 21% of the contract administration costs.

Attachment 6.

DandT Seeding Contingency Reclamation Estimate on Letterhead.doc

D & T Landscaping, Inc.
PO Box 65
Solway, MN 56678
Office Phone & Fax 218-467-9242
Email: dntwinge@paulbunyan.net

Dave's Cell 218-556-4560
Deb's Cell 218-760-0894
Tom's Cell 218-760-3795

4/5/16

PolyMet Mining, Inc.
PO Box 475, 6500 Co Rd 666
Hoyt Lakes, MN 55750

Att: Steve DeVaney,

Below, please find some rough estimates for the Contingency Reclamation Estimate:

1. **Commercial Fertilizer and Seed for Tailings Basin Flats – Supply/Apply/ Incorporate Unit Pricing per acre @ 500 lb/acre $390.00/Acre**
2. **Commercial Fertilizer and Seed for Tailings Basin Slopes – Supply/Apply/Incorporate Unit Pricing per acre @ 200 lb/Acre $540.00/Acre**
3. **Commercial Fertilizer and Seed for Overburden – Supply/Apply/Incorporate Unit Pricing per Acre @ 200 lb/Acre $295.00/Acre**
4. **4.) Mulch – Supply and Incorporate. Unit Pricing per Acre @ 2 ton/acre of Hay or Straw Mulch $340.00/Acre**

Thank You,

Deb Winge

Attachment 7.

Water analysis cost

Pace Analytical Services, Inc.
2016 Price List

Water		
Analyte	**Method Number**	**Unit Price**
Organics		
Gas Chromatography / Mass Spectrometry (GC/MS)		
VOCs (medium level)	8260B	$81.25
VOCs - Low Level	8260B	$87.50
1,4 Dioxane	8260B SIM	$118.75
VOCs 524.2 (drinking water)	524.2	$137.50
VOCs 624 (waste water)	624	$162.50
SVOC	8270C, D	$206.25
Acid Extractibles - Phenols	8270C,D	$156.25
Base Neutral (BN) Extractibles	8270C, D	$156.25
SVOC 625 (waste water)	625	$243.75
PAHs	8270C,D	$125.00
PAHs (low level)	8270C,D SIM	$87.50
cPAH	8270C,D SIM	$206.25
MN Dept of Ag List 1	8270D	$206.25
MN Dept of Ag List 2	8270D	$225.00
Pentachlorophenol (PCP)	8270C,D SIM	$218.75
Gas Chromatography (GC)		
DBCP, EDB	8011	$62.50
PCBs	8082/8082A	$75.00
Pesticides, Organochlorine	8081A, B	$137.50
Pesticides, Organochlorine and PCBs	8081A,B + 8082A	$225.00
Petroleum Hydrocarbons		
Total Purgeable Petroleum Hydrocarbons		
BTEX	8260B	$31.25
BTEX/MTBE	8260B	$33.75
BTEX/WI GRO	8260/WI GRO	$43.75
BTEX/TPH as Gas	8260/8015	$43.75
BTEX/MTBE/WI GRO	8260/WI GRO	$43.75
BTEX/MTBE/Naphthalene	8260B	$45.00
BTEX/MTBE/Naphthalene/1,2 DCA	8260B	$50.00
BTEX/MTBE/Trimethylbenzenes (PVOC)	8260B	$50.00
Gasoline Range Organics (GRO)	AK 101	$56.25
Gasoline Range Organics (GRO)	WI GRO	$28.75
NWTPH-Gx	NWTPH-Gx	$56.25
TPH as Gas	OA-1	$68.75
TPH as Gasoline (C6-C10)	8015B,C	$31.25
VPH	MA VPH	$93.75
Petroleum Hydrocarbons		
Total Extractible Petroleum Hydrocarbons		
Diesel Range Organics (DRO)	AK 102	$68.75
Residual Range Organics (RRO)	AK 103	$68.75
Diesel Range Organics (DRO)/Residual Range Organics (RRO)	AK 102/AK 103	$93.75
Diesel Range Organics (DRO)	WI DRO	$37.50
WI DRO w/silica gel clean-up on final run	WI DRO	$56.25
Extended Range Organics C10-C32 **or** C10-C36	WI DRO	$81.25
Extended Range Organics C10-C36	WI DRO	$81.25
EPH screen	MA EPH	$68.75
EPH fractions after screen	MA EPH	$125.00
TPH as Diesel (C10-C28)	8015B,C	$37.50
TPH as Diesel (C10-C28) with silica gel clean-up	8015B,C	$56.25
Motor Oil Range (C24-C36)	8015B,C	$50.00
Motor Oil Range (C24-C36) with silica gel clean-up	8015B,C	$68.75
Oil and Grease	1664A	$62.50
HEM - SGT (TPH)	1664A	$81.25
NWTPH-Dx	NWTPH-Dx	$75.00
NWTPH-Dx with silica gel clean-up	NWTPH-Dx	$93.75
TPH as Diesel	OA-2	$75.00

Water		
Analyte	**Method Number**	**One-time client**
Wet Chemistry / Inorganic Analysis		
Acidity	SM2310B	$18.75
Alkalinity, Total (includes carbonate, bicarbonate, hydroxide) reported as CaCO3	SM2320B	$18.75
BOD, 5 day	Hach 10360/SM5210B	$37.50
Bromide	300.0	$25.00

BTUs	ASTM D240, D5865	$22.50
Carbon, Total Organic (double run)	SM5310C	$56.25
Carbon, Total Organic (quad run)	9060A	$131.25
Cation/Anion Balance (Na, Ca, Mg, K, Alkalinity, Sulfate, Chloride, N+N, Fluoride) Calculation only	Calculation only, see indiv. methods	$12.50
CBOD	Hach 10360/SM5210B	$37.50
Chloride	300.0	$25.00
Chloride	SM4500-Cl-E	$12.50
Chlorine, Residual	SM4500Cl-G	$12.50
Chlorophyll a	SM10200H	$37.50
Chromium, hexavalent	SM3500-Cr B	$43.75
Chromium, trivalent	Calculation only	$12.50
COD	SM5220D	$25.00
Color	SM2120	$12.50
Cyanide, Total	SM4500CN-E	$37.50
Dissolved Oxygen	Hach 10360	$62.50
Wet Chemistry / Inorganic Analysis		
E. coli bacteria	Quantitray	$62.50
Eh	ASTM D1498	$37.50
Fecal coliform bacteria	SM9222D	$25.00
Fluoride	300.0	$25.00
Fluoride	SM4500F-C	$16.25
Formaldehyde	NIOSH 3500	$56.25
Hardness (calc only) (requires Ca and Mg at additional charge)	SM2340B/200.7	$12.50
Heterotrophic Plate Count (HPC)	SM 9215 B	$22.50
Nitrogen, Ammonia	SM4500NH3/350.1	$18.75
Nitrogen, Ammonia (if distillation is required)	SM4500NH3/350.1	$37.50
Nitrogen, Nitrate	SM4500 NO3-H/353.2/300.0	$17.50
Nitrogen, Nitrite	SM4500-NO2-B/353.2/300.0	$17.50
Nitrogen, Nitrate+Nitrite	SM4500 NO3-H/353.2/300.0	$17.50
Nitrogen, Total Kjeldahl	351.2	$31.25
Total Inorganic Nitrogen	Calculation only	$12.50
Total Organic Nitrogen (calc. only, requires 351.2, 350.1)	Calculation only	$12.50
Total Persulfate Nitrogen	SM 4500 N-C	$62.50
pH (Corrosivity)	SM4500H+B	$6.25
Phosphorus, Ortho	SM4500P-E	$31.25
Phosphorus, Ortho	365.3/300.0	$31.25
Phosphorus, Ortho, Low Level	SM4500P-E	$37.50
Phosphorus, Total or Dissolved	SM4500P-E	$25.00
Phosphorus, Total or Dissolved	365.1	$25.00
Phosphorus, Total, Low Level	SM4500P-E	$37.50
Phosphorus, Total or Dissolved, Low Level	365.1	$37.50
Specific Conductance	SM2510B/120.1	$12.50
Sulfate	ASTM D516/300.0	$25.00
Sulfide	SM4500S2D	$37.50
Surfactants (MBAS)	SM5540C	$93.75
Total Coliform (membrane filtration)	SM 9222 B (quantitative)	$28.75
Total Coliform & E. Coli	SM 9223 B (presence/absence)	$22.50
Total Dissolved Solids	SM2540C	$12.50
Total Phenolics (recoverable)	420.4	$31.25
Total Settleable Solids	SM 2540F	$12.50
Total Suspended Solids	SM2540D/USGS I-3765	$12.50
Total Suspended Solids - low level	SM2540D/USGS I-3765	$18.75
Total Volatile Solids	160.4	$25.00
Turbidity	SM2130B/180.1	$12.50
Water		
Metals		
Hexavalent Chromium (Cr VI)	SM3500-Cr-B	$43.75
Mercury (Hg)	7470A/245.1	$43.75
Mercury - Low Level	1631 E	$112.50
Methyl Mercury	1630	$218.75
Selenium Hydride	SM 3114C	$93.75
Sodium Absorption Ratio (includes Ca, Mg, Na)	6010B,C/6020/6020A	$56.25
Individual Metals by ICP (Inductively Coupled Plasma) EPA 6010B, C		
Metal Analysis	6010B,C/200.7	$13.75
RCRA metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag)	6010B,C/200.7/7470A	$87.50
Individual Metals by ICP/MS (Inductively Coupled Plasma/Mass Spectrometry) EPA 6020/6020A		
Metal Analysis	6020/6020A/200.8	$20.00
Dioxin and PCB Congeners		
2,3,7,8 TCDD (drinking water)	1613B/8290/8290A	$250.00
17 Dioxin Compounds	1613B/8290/8290A	$743.75
PCB Congeners - Food List (7 Congeners)	1668	$531.25
PCB Congeners - WHO List (12 Congeners)	1668	$600.00
PCB Congeners - 209 Congeners	1668	$981.25
Dissolved Gases		

Methane only	RSK 175	$72.50
Ethane, Ethene, Methane, Propane	RSK 175	$100.00
Other Charges		
Charges can include any/all of the items noted to the right - to be charged when applicable. Prices may vary		Cost of sample supplies Disposal of unused sample supplies Time for packing/shipping of sample supplies Shipping/courier charges Unused sample supplies
Additional compounds (added to method after analysis)		$75/hour + analysis
Composite of samples		$10/container
Copy of chromatogram (if not requested at time of sample submittal)		$15/analysis/sample
Data validation/technical review of data		$100/hour
Deionization (DI) water - laboratory grade		$25/Gallon
Deionization (DI) water - ultra pure		Cost + Shipping + 15%
Delivery of sample containers (<1 workday notice)		$100 + Shipping
Delivery of sample containers (<3 workday notice)		$50 + Shipping
Disposal of unanalyzed material		materials + handling
Electronic Data Deliverable (EDD)		request quote
Extract and hold or hold of sample		50% of cost of analysis
Hard copy of Final Report		$10
Minimum laboratory order (one-time client)		$250
Reporting in multiple formats		$35
Return shipping - if requesting other than standard carrier		Cost
Sample filtration		$10/container
Sample preparation fee		$75/hour
Summa canisters not returned in 2 weeks		$50/can per week
Unannounced short hold or samples received <50% of hold time		Applicable rush surcharge
Hourly Time & Material Rates		
Technician		$60/hour
Project Manager		$70/hour
Analyst		$75/hour
Supervisor		$105/hour
Lab Manager / Assistant General Manager		$125/hour
Senior General Manager		$150/hour
Officer		$200/hour
Turnaround Times and Rush Surcharges		
Standard (10 Working Business Days)	Not Applicable	No Surcharge
6-9 Business Days	Not Applicable	1.25x
5 Business Days	Not Applicable	1.5x
3-4 Business Days	Not Applicable	2x
2 Business Days	Not Applicable	2.5x
1 Business Day	Not Applicable	3x
Less than 1 Business Day	Not Applicable	Quote
Standard TAT is 10 Business days. All requested turnaround times less than 5 business days MUST be pre-arranged to insure on-time delivery. Day of sample receipt is day zero. Report due close of business on agreed upon day.		
Deliverables / Data Packages		
Level 1 Sample Data Reporting Only		No Surcharge
Level 2 Complete Quality Control (QC) Data Blanks, Spikes, duplicates (including matrix spike duplicates), laboratory control samples, relative percent difference (RPD), percent recovery		No Surcharge
Level 3 Items listed in Level 2 plus QC limits, QA batch cross reference table. Allow an additional two weeks for data package.		15% Surcharge ($50 minimum per Work Order)
Level 4 Items listed in Levels 2 and 3 including sample raw data and chromatograms. Allow an additional two weeks for data package.		20% Surcharge ($50 minimum per Work Order)

Pricing Notes

All prices include:

a) Containers, preservatives, coolers, labels, chain-of-custody forms, *except* terracore kits and encore sample containers

b) Standard Electronic Deliverables via email

c) Access to Data via PacePort

Items included represent services provided by Pace Analytical. Numerous additional services and certifications are available throughout our nationwide network of labs. The prices shown are for routine projects with standard turnaround times. Specific projects may be bid individually. These prices should be used as guidelines, as exact pricing will depend on project size and expected turnaround time. Please consult Pace Analytical for assistance.

· Pace Analytical will dispose of all non-hazardous samples. Pace Analytical reserves the right to return to the client any highly hazardous, acutely toxic, or radioactive samples and sample containers.

· The Client is responsible for informing Pace of any necessary certifications, reporting limits and/or methods at the time of initial project set-up.

· Pace Analytical reserves the right to subcontract any method listed with prior consent of the Client.

· Methods listed are EPA Methods unless otherwise noted.

Attachment 8.

MP CommercialRates.pdf

To Our Commercial/Industrial Customers

On December 10, 2012, Minnesota Power received approval of the rates contained herein from the Minnesota Public Utilities Commission. These rates will be applied to usage on or after January 1, 2013.

For your information and convenient reference, this folder contains the following electric service rates and rules:

- **GENERAL SERVICE**
- **LARGE LIGHT & POWER SERVICE**
- **COMMERCIAL/INDUSTRIAL DUAL FUEL INTERRUPTIBLE ELECTRIC SERVICE**
- **COMMERCIAL/INDUSTRIAL CONTROLLED ACCESS ELECTRIC SERVICE**

Should you desire any further information regarding these rates and how they apply to

your business, please visit **www.mnpower.com** or call **1-800-228-4966**.

minnesota power

AN ALLETE COMPANY

Form 4961A Rev. 2/13
J-59645 TCI

GENERAL SERVICE

APPLICATION

To any customer's electric service requirements when the total electric requirements are supplied through one meter. Service shall be delivered at one point from existing facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery. Service hereunder is limited to customers with total power requirements of less than 10,000 kW and is subject to Company's Electric Service Regulations and any applicable Riders.

Applicable to multiple metered service only in conjunction with the respective Rider for such service.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at one standard low voltage of 120/240 to 4160 volts; except that within the Low Voltage Network Area, service shall be three phase, four wire, 60 hertz, 277/480 volts.

RATE (Monthly)

Customers Without A Demand Meter

Service Charge	$10.50
Energy Charge for all kWh (¢/kWh)	7.836¢

Customers With A Demand Meter

Service Charge	$10.50
Demand Charge for all kW	$5.86
Energy Charge for all kWh (¢/kWh)	5.288¢

There shall be added to the monthly bill, as computed above, an Affordability Surcharge determined in accordance with the Pilot Rider for Customer Affordability of Residential Electricity (CARE).

Plus any applicable adjustments.

MINIMUM CHARGE (Monthly)

The appropriate service charge plus any applicable adjustments; however, in no event will the Minimum Charge (Monthly) for three phase service be less than $25.00.

HIGH VOLTAGE SERVICE

Where customer contracts for service delivered and metered at (or compensated to) the available primary voltage of 13,000 volts or higher, the monthly bill, before Adjustments, will be subject to a discount of $1.75 per kW of Billing Demand. In addition, where customer contracts for service delivered and metered at (or compensated to) the available transmission voltage of 115,000 volts or higher, the monthly bill, before Adjustments, will be further subject to a discount of 0.284¢ per kWh of Energy.

High Voltage Service shall not be available from the Low Voltage Network Area as designated by the Company.

DETERMINATION OF THE BILLING DEMAND

When customer's use exceeds 2500 kWh for three consecutive months or where the connected load indicates

customer's demand may be greater than 10 kW, the customer may be placed on a demand rate.

The Billing Demand will then be the kW measured during the 15-minute period of the customer's greatest use during the month, as adjusted for power factor, but not less than the minimum demand specified in the customer's contract.

Demand will be adjusted by multiplying by 85% and dividing by the average monthly power factor in percent when the average monthly power factor is less than 85% lagging. However, in no event shall the average monthly power factor used for calculation in this paragraph be less than 45%.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

LARGE LIGHT AND POWER SERVICE

APPLICATION

To the entire electrical service requirements on the customer's premises delivered at one point from existing facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery.

Service hereunder is limited to customers with total power requirements of less than 50,000 kW and is subject to the Company's Electric Service Regulations and any applicable Riders. Customers with total power requirements in excess of 10,000 kW shall be served under this rate only where the customer and the Company have executed an electric service agreement having an initial minimum term of ten (10) years with a minimum cancellation provision of four (4) years.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at one standard low voltage of 120/240 to 4160 volts; except that within the Low Voltage Network Area service shall be three phase, four wire, 60 hertz, 277/480 volts.

RATE (Monthly)

Demand Charge		
For the first 100 kW or less of Billing Demand	$1,100.00	
All additional kW of Billing Demand ($/kW)		$9.30
Energy Charge		
All kWh (¢/kWh)		3.722¢

There shall be added to the monthly bill, as computed above, an Affordability Surcharge determined in accordance with the Pilot Rider for Customer Affordability of Residential Electricity (CARE).

Plus any applicable adjustments.

HIGH VOLTAGE SERVICE

When service is delivered and metered at (or compensated to) the available primary voltage of 13,000 volts or higher, the Demand Charge will be subject to a discount of $1.75 per kW of Billing Demand. In addition, where service is delivered and metered at (or compensated to) the available transmission voltage of 115,000 volts or higher, the Energy Charge will also be subject to a discount of 0.284¢ per kWh of Energy.

High voltage service shall not be available from the Low Voltage Network Area as designated by the Company.

DETERMINATION OF THE BILLING DEMAND

Billing Demand is the kW measured during the 15-minute period of customer's greatest use during the month, as adjusted for power factor, except that the Billing Demand will not be less than the amount by which the greatest adjustment demand during the preceding eleven months exceeds 100 kW, but no more than 75% of such adjusted demand. However, the Billing Demand shall not be less than the minimum demand specified in the customer's contract.

Demand will be adjusted by multiplying by 85% and dividing by the average monthly power factor in percent when the average monthly power factor is less than 85% lagging. However, in no event shall the average monthly power factor used for calculation in this paragraph be less than 45%.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

COMMERCIAL/INDUSTRIAL DUAL FUEL INTERRUPTIBLE SERVICE

APPLICATION

To the interruptible electric service requirements of Commercial/Industrial Customers where an alternative source of energy is available to satisfy these requirements during period of interruption. Service shall be delivered at one point from facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery. Service is subject to the Company's Electric Service Regulations and any applicable Riders.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at low voltage (voltage level lower than that available from the Company's 13,000 volt system) or high voltage (voltage level equal to or greater than that available from the Company's 13,000 volt system).

RATE (Monthly)

Service Charge

Low Voltage Service $10.50	
High Voltage Service	$10.50

Energy Charge

Low Voltage Service (¢/kWh)	5.178¢
High Voltage Service (¢/kWh)	4.791¢

Plus any applicable adjustments.

The High Voltage Service Rate is applicable where service is delivered and metered at (or compensated to) the available high voltage level (13,000 volt system or higher).

MINIMUM CHARGE (Monthly)

The Minimum Charge shall be the Service Charge plus any applicable Adjustments.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

CONTRACT PERIOD

Not less than 1 year or such longer period as may be required under an Electric Service Agreement.

SERVICE CONDITIONS

1. The primary energy source for the Company-approved Dual Fuel installation must be electric. An approved Dual Fuel installation requires that the secondary or backup energy source be capable of continuous operation. Under no circumstances will firm electric service qualify as the secondary or backup energy source.
2. The interruptible load of the approved Dual Fuel installation shall be separately served and metered and shall at no time be connected to facilities serving customer's firm load.
3. The duration and frequency of interruptions shall be at the discretion of the Company. Interruption will normally occur at such times:
   a. when the Company is required to purchase or generate power at a cost higher than the customer's energy charge,
   b. when the Company expects to incur a system peak in excess of its Mid-Continent Area Power Pool (MAPP) accredited generating capability,
   c. when in the Company's opinion the reliability of the system is endangered, or
   d. when the Company performs necessary testing of interruptibility of the customer's load.

Interruptions shall normally occur for capacity related needs before interruptions for any certified interruptible loads for Large Power, Large Light and Power, and General Service (those loads that meet the requirements specified in the MAPP Procedure for the Certification of Interruptible Demand).

4. The Company shall not be liable for any loss or damage caused by or resulting from any interruption of service except in the case of gross negligence on the part of the Company.
5. The customer must be prepared to supply all of the interruptible load from an alternative energy source for up to 30% of the customer's Dual Fuel requirements during any annual period.
6. The customer will install, at its expense, a load-break switch, circuit breaker, or other means of allowing the Company to automatically interrupt the customer's Dual Fuel load by sending a command or signal. The Company reserves the right to inspect and approve the installation to ensure compliance and consistency with the Company's interruption system. If the Company's system cannot support automatic interruption, interruption shall be made in accordance with Service Condition 8. The customer must provide a continuous 120 volt AC power source at the Company's control point for operation of the Company's remote control equipment.
7. The rate contemplates that this service will utilize existing facilities with no additional major expenditures. The Customer shall pay the Company the installed cost of any additional facilities required which are not supported by this rate. Customers who have guaranteed annual revenue commitments to support line extension costs under a firm rate schedule that are not fully satisfied before switching to Dual Fuel service may be required to have their extension cost contributions recalculated.
8. Upon receiving a control signal from the Company, the customer must shed its interruptible load in ten (10) minutes or less, and for a duration as required by the Company, whenever the Company determines such interruption is necessary. Customers with existing provisions in their Electric Service Agreements for longer notice before interruption shall continue to have thirty (30) minutes to shed their interruptible loads through the term of their existing contracts or December 31, 1998, whichever is later.
9. Those customers who fail to interrupt their interruptible load after being notified to do so by the Company shall be responsible for all costs incurred by the Company due to such failure, including but not limited to penalties assessed the Company by the Mid-Continent Area Power Pool in the event the Company experiences a system capacity deficiency. Those costs shall be charged on a pro rata basis to all customers who did not interrupt as requested. Such customer shall also be billed as follows:
   a. The first failure to interrupt shall result in the customer being billed for the entire month on the standard applicable General Service or Large Light and Power Service Schedule (thereby not receiving an interruptible discount).
   b. If a second such failure to interrupt occurs, in addition to billing as specified in (a) above, the Company reserves

the right to discontinue the customer's service under the Dual Fuel Interruptible Electric Service Schedule.

COMMERCIAL/INDUSTRIAL CONTROLLED ACCESS ELECTRIC SERVICE

APPLICATION

To any electric service for commercial/industrial customers for controlled storage or loads which will be energized only for the time period between 11 p.m. and 7 a.m. daily. Service is subject to Company's Electric Service Regulations and any applicable Riders.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at low voltage (voltage level lower than that available from Company's 13,000 volt system) or high voltage (voltage level equal to or greater than that available from the Company's 13,000 volt system, supplied through one meter at one point of delivery.

RATE (Monthly)

Service Charge	
High Voltage Service	$10.50
Low Voltage Service	$10.50
Energy Charge	
High Voltage Service	4.032¢
Low Voltage Service	4.332¢

Plus any applicable adjustments.

The High Voltage Service Rate is applicable where service is delivered and metered at (or compensated to) the available high voltage level (13,000 volt system or higher).

MINIMUM CHARGE (Monthly)

The Minimum Charge shall be the Service charge plus any applicable Adjustments.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

CONTRACT PERIOD

Not less than 30 days or such longer period as may be required under an Electric Service Agreement.

SERVICE CONDITIONS

1. The controlled load shall be separately served and metered and shall at no time be connected to facilities servicing the customer's other loads.
2. The total connected controlled load shall not exceed 200 kW.
3. Any controlled energy storage load to which this service schedule applies must have sufficient capacity to satisfy the customer's energy needs during the non-energized period.
4. The Company shall not be liable for any loss or damage caused by or resulting from any interruption of service except in the case of gross negligence on the part of the Company.
5. The customer's load shall be controlled by a switching device approved or supplied by the Company and paid for and installed by the customer. The customer must provide a continuous 120 volt AC power source at the Company's control point for operation of the Company's control equipment.
6. The rate contemplates that this service will utilize existing facilities with no additional major expenditures. The customer shall pay the Company the installed cost of any additional facilities required which are not supported by this rate.

ADJUSTMENTS APPLICABLE TO ALL ELECTRIC SERVICE RATES LISTED

1. There shall be added to or deducted from the monthly bill, as computed above, a fuel and purchased energy adjustment determined in accordance with the Rider for Fuel and Purchased Energy Adjustment.
2. There shall be added to the monthly bill, as computed above, an emissions-reduction adjustment determined in accordance with the Rider for Arrowhead Regional Emission Abatement (AREA).
3. There shall be added to the monthly bill, as computed above, a transmission investment adjustment determined in accordance with the Rider for Transmission Cost Recovery.
4. There shall be added to the monthly bill, as computed above, a renewable resources adjustment determined in accordance with the Rider for Renewable Resources.
5. There shall be added to the monthly bill a conservation program adjustment determined in accordance with the Rider for Conservation Program Adjustment. The combination of the fuel adjustment and the Conservation Program Adjustment shall be shown on the customer's bill as the Resource Adjustment.
6. There shall be added to the monthly bill the applicable proportionate part of any taxes and assessments imposed by any governmental authority which are assessed on the basis of meters or customers, or the price of or revenues from electric energy or service sold, or the volume of energy generated, transmitted or purchased for sale or sold.
7. Bills for service within the corporate limits of the cities of Aurora, Duluth, Hermantown, Little Falls, Long Prairie, Nashwauk, Park Rapids, Staples and other cities with approved franchise fee riders shall include an upward adjustment as specified in the applicable franchise fee rider for each city.
8. Minnesota Power will assess a Late Payment Charge of 1.50% or $1.00 per monthly billing period, whichever is greater, on that portion of a retail customer's account representing charges for utility service(s) past due, if the unpaid utility balance exceeds $10.00. Any portion of a utility bill under dispute will not be charged a Late Payment Charge while the dispute is being resolved. At the Company's discretion, any Late Payment Charge, or portion thereof, will be waived in accordance with the Minnesota Public Utilities Act.

Attachment 9.

Changes over time

resourceful. naturally.
engineering and environmental consultants

BARR

Memorandum

To: Jennifer Saran
From: Pete Kero and Nancy Dent
Subject: NorthMet Project Feature Changes Over Time
Date: October 7, 2016
c: Jim Scott

1.0 Introduction

Some NorthMet Project (Project) features change over the Project's 20-year Life of Mine (LOM). Under Minnesota Rules, PolyMet will update its Contingency Reclamation Estimate (CRE) annually based on these changes to Project features, as well as other regulatory and technological changes that may occur. The purpose of this document is to describe the planned changes in mine features over time, quantify those changes, and provide a basis for the quantities.

Generally, the size and number of Project features grow to a peak in Mine Year 11, then decrease as mining and progressive reclamation take place concurrently through Mine Year 20. After Mine Year 20 (during the reclamation phase), Project features and quantities will change only as a result of closure activities. This memorandum accordingly provides data for only Mine Years 0 through 20, and does not address post-mining reclamation. The changes to facilities over the life of the mine that are described in this memorandum are based on permit-level designs. This document may be updated after final design to reflect any refinements.

Table 1 summarizes the features at several key points in the Project's life: Mine Years 1, 3, 11 and 20. Mine Year 1 is the year Phase 1 operations begin. Mine Year 3 is the year the Hydrometallurgical Plant (Phase 2) begins operations. Mine Year 11 is the year that stockpiles reach their maximum extent. Mine Year 20 is the end of mine life. Data in Table 1 is summarized for Stage 1 and Stage 2 of Pre-Operation Construction. Stage 1 represents the reclamation liability that would exist with all new facilities constructed but no mining operations started (no Duluth Complex rock blasted) and Stage 2 is the reclamation liability that would exist by adding the legacy building demolition to Stage 1. Large Figure 1 illustrates the Pre-Operation Construction features at the Mine Site for both Stage 1 and 2. Large Figure 2 illustrates the Pre-Operation Construction features at the Plant Site for both Stages 1 and 2.

Large Table 1 provides the changes in Project features on a year-by-year basis and is the source for Table 1, except for items related to Water Treatment. Section 2.0 discusses the changes in Project features over time and Section 3.0 provides the basis for how Large Table 1 was developed.

2.0 Changes in Project Features over time

2.1 Mine Site Features

The temporary waste rock stockpiles increase in size until Mine Year 11 at which point the East Pit becomes available for direct disposal of mined Category 2/3 and Category 4 Waste Rock and relocation of the waste rock in the Category 2/3 and Category 4 Waste Rock Stockpiles. The liner acres, collection piping length, the number sumps, and number of pumps/piping length to the WWTF increase during

operations as the stockpile footprints increase. The amount of rock to be relocated increases as mining progresses.

The Category 1 Waste Rock Stockpile footprint increases in size until Mine Year 6 at which point the Category 1 Stockpile has sufficient capacity for disposal of all mined Category 1 Waste Rock. The acres to be covered increase as mining progresses and decrease as progressive reclamation occurs. In the early years of operation while the footprint of the stockpile is being established, the west end of the containment system is open. This means that if there is a contingency closure during those years, closure of the west end of the containment system must be provided. The length of this extension increases as mining progresses and is eliminated when the footprint is fully established in Mine Year 6.

Table 1 Project Feature Changes Over Time

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Category 2/3 Waste Rock Stockpile						
Liner Acres to be Removed and Footprint Reclaimed[4]	Mine Year 1	Mine Year 1	63	119	181	0
Liner Collection Piping Feet to be Removed[3]	Mine Year 1	Mine Year 1	45,300	76,500	118,500	0
Sump/Pond Acres to be Reclaimed[4]	Mine Year 1	Mine Year 1	6.7	9.2	12.2	0
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2	4	6	0
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	8,000	10,000	12,000	0
Tons to Relocate[1]	none	Stage 1	5,238,766	13,968,736	44,021,108	0
Category 4 Waste Rock Stockpile						
Liner Acres to be Removed and Footprint Reclaimed[4]	Mine Year 1	Mine Year 1	29	57	57	0
Liner Collection Piping Feet to be Removed[3]	Mine Year 1	Mine Year 1	21,590	41,690	41,690	0
Sump/Pond Acres to be Reclaimed[4]	Mine Year 1	Mine Year 1	4.5	4.5	4.5	0
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2	2	2	0
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2,500	2,500	2,500	0
Tons to Relocate[1]	none	Stage 1	1,489,201	3,379,412	6,206,813	0
Ore Surge Pile						
Liner Acres to be Removed and Footprint Reclaimed	Mine Year 1	Mine Year 1	32	32	32	32
Liner Collection Piping Feet to be Removed	Mine Year 1	Mine Year 1	30,000	30,000	30,000	30,000
Sump/Pond Acres to be Reclaimed	Mine Year 1	Mine Year 1	2.3	2.3	2.3	2.3
Pumps to WWTF to be Removed	Mine Year 1	Mine Year 1	2	2	2	2

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Piping Feet to WWTF to be Removed	Mine Year 1	Mine Year 1	1,600	1,600	1,600	1,600
Tons to Relocate	none	Stage 1	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Waste Rock Stockpile						
Footprint Acres to Reclaim	13	Stage 1	0	0	0	0
Acres to Cover[5]	none	Stage 1	205	369	526	64
Containment System Feet to Extend[4]	none	Stage 1	2,800	2,800	0	0
Containment System Acres to Breach & Reclaim	41	Stage 1	0	0	0	0
Pits						
East Exposed/Unblasted Rock Acres to Reclaim	95	Stage 1	0	0	0	0
East Pit Wall Acres to Reclaim[1]	none	Stage 1	10.1	10.1	9.2	9.2
West Pit Exposed/Unblasted Rock Acres to Reclaim	none	Stage 1	0	0	65	0
West Pit Wall Acres to Reclaim[1]	none	Stage 1	0	8.7	13.5	13.5
Central Pit Wall Acres to Reclaim[1]	none	Stage 1	0	0	8.9	8.9
Pit Perimeter Fence - Barb Wire[2]	none	Stage 1	1,100	1,400	2,300	1,400
Pit Perimeter Fence - Non-Climbable[2]	none	Stage 1	11,000	19,900	32,800	33,700
Pit Access Gates[1]	none	Stage 1	1	2	2	3
Mine Water Ponds						
Pond Acres to be Reclaimed[3]	Mine Year 1	Mine Year 1	19.4	21.6	23.1	23.1
Liner Acres to be Removed (not all ponds lined) [3]	Mine Year 1	Mine Year 1	12.4	14.6	16.1	16.1
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	4	6	6	6

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	9,000	11,000	11,000	11,000
Pond Underdrain Piping Feet to be Removed	Mine Year 1	Mine Year 1	4,500	6,000	6,900	6,900
Stormwater Systems						
Pond Acres to Reclaim	Mine Year 1	Mine Year 1	17.4	21.7	21.7	21.7
Ditch Feet to Reclaim	Mine Year 1	Mine Year 1	10,700	10,700	10,700	8,300
Haul Roads						
Feet to be Reclaimed[1]	Mine Year 1	Mine Year 1	22,000	28,700	31,500	21,500
Flotation Tailings Basin (FTB)						
Beach Acres to Reclaim	40	Stage 1	0	0	0	0
Beach Acres to Amend[5]	none	Stage 1	95	93	212	428
Pond Acres to Amend[5]	none	Stage 1	421	427	1,124	905
Borrow Area Acres to Reclaim	31.6	Stage 1	44.7	16.5	18	19.5
Hydrometallurgical Residue Facility (HRF)						
Pre-Load Disturbed Acres to Reclaim	5	Stage 1	25	0	0	0
Acres to Cover[5]	none	Stage 1	0	49	49	98
Years to Drain[5]	none	Stage 1	0	1	5	9
Water Treatment						
Legacy Tailings Basin	non-mechanical	Stage 1	none	none	none	none
WWTF Pit Flushing Avg GPM	none	Stage 1	642[6]	899[7]	1,925[7]	1,925[8]
WWTF Pit Flushing Years	none	Stage 1	4[6]	6[7]	14[7]	14[8]
Years from Closure to Pit Overflow	none	Stage 1	9[6]	14[7]	32[7]	32[8][9]
WWTF Pit Overflow Avg GPM	none	Stage 1	0[6]	150[7]	321[7]	321[8]

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
WWTP Reclamation Avg GPM	none	Stage 1	2,957(6)	3,066(7)	3,500(7)	3,500(5)
WWTP Reclamation Years	none	Stage 1	8(6)	13(7)	35(7)	35(5)
WWTP Long-term Avg GPM	none	Stage 1	2,534(6)	2,450(7)	2,450(7)	2,450(5)

(1) Assumes Progressive Reclamation (Reference (1))
(2) For most years the total length of fence is based off AutoCAD drawings, except for year 11-20 where the total length was given from the GIS (Reference (1))
(3) Assumes Progressive Reclamation (Reference (2)
(4) Assumes Progressive Reclamation (Reference (3))
(5) Reference (4)
(6) Reference (5)
(7) See Section 2.3 for Mine Year 3 and Mine Year 11 data sources.
(8) Reference (6)
(9) Mine Year 20 value assumes pumping from Plant Site to West Pit to accelerate flooding, see Reference (6)) Section 6.1.2.3.2, Mine Year 1 assumes no Plant Site water.

The pits increase in size as mining progresses, initially mining from the East Pit only. The length of pit perimeter fence and number of pit lake access gates increase as the pits expand. The acres of pit wall to be reclaimed increase as mining progresses and decrease as progressive reclamation occurs.

The haul roads and associated mine water ditches increase in length as mining progresses and decrease as temporary stockpiles are no longer used and the associated roads become inactive.

The mine water management system increases in size as mining progresses. The pond acres, liner acres, number sumps and number of pumps/piping length to the WWTF increase as mining progresses.

The stormwater system increases over time as infrastructure expands. Stormwater ditches, perimeter dikes, ponds, and outlet structures are added as the existing system expands with new facilities. After Mine Year 20, Pond B and the associated portion of the North Perimeter Stormwater Ditch, Pond C-West, Pond C-East and the associated portion of the South Perimeter Stormwater Ditch and Pond D and Ditch D will be removed. Pond A will remain in long-term closure (regraded to drain to the East Pit) as well as the other stormwater ditches.

2.2 Plant Site Features

The Flotation Tailings Basin (FTB) changes as the exterior dams are raised and the tops move inward. The acres of beach and pond change over the Project life to reflect dam raises. The acres of existing tailings that are disturbed change over the Project life, reflecting their use as a borrow source.

The Hydrometallurgical Residue Facility (HRF) changes as the exterior dams are raised and the tops move inward. The acres to be covered change over the Project life to reflect dam raises. The time to drain the material in the facility for placement of the final cover increases with the amount of material in the facility. Because the HRF is planned to be constructed in Phase 2, it is not included in the CRE until Mine Year 3, except the wetlands restoration caused by pre-loading activities.

There are Phase 2 buildings that are also not included in the CRE until Mine Year 3 including the Oxygen Plant and the Hydrometallurgical Plant.

2.3 Water Treatment

Water treatment changes over the life of the Project in response to changes in Project features discussed above. Quantities for water treatment and unblasted rock acres to reclaim are described in detail, with basis for contingency closure in Mine Year 1 in the Technical Memorandum entitled "NorthMet Project – CRE O&M for water treatment during reclamation and long-term closure after Mine Year 1" (Reference (5)). The time-weighted average flow rates from that technical memo are listed in Table 1 as the water treatment flow rates for different periods of reclamation and closure (Reference (5)). Water treatment and unblasted rock acres to reclaim quantities for Mine Year 20 were calculated by water modeling efforts conducted for the Final Environmental Impact Statement (Reference (7)). Based on preliminary modeling of closure after Mine Year 11, water treatment quantities for Mine Year 11 were set equal to those calculated for Mine Year 20. Water treatment quantities for Mine Year 3 were interpolated from Mine Year 1 and Mine Year 11 values.

3.0 Basis for Changes in Project Features over time

Large Table 1 details the Project features that change on a year-to-year basis as the mine develops. It also shows how the quantities change over time (e.g., the acres of West Pit Wall that would need to be reclaimed every year, starting in Mine Year 0 and ending in Mine Year 20). The basis for the changes over time is described below. Drawings referenced below are compiled and attached to this memo.

3.1 Mine Pit

The NorthMet Project Mine Plan (Reference (1)) describes the development and progressive reclamation of mine features over time. Pit wall area needing reclamation (in acres) was determined from measurements using a 3-Dimensional Civil 3D model created by importing year-by-year pit dimensional AutoCAD drawings provided by PEG Engineering. The length of haul roads needing reclamation (in linear feet) and progressive reclamation was estimated by AutoCAD measurements using attached Mine Site and Dunka Road Earthwork Drawings EW-010 and EW-011, Mine Site and Dunka Road Earthwork Haul Road Reclamation Plans A (Mine Years 1-11) and B (Mine Years 11-20). The number of pit access gates relates to the number of active mine pits over time (e.g., one while only the East Pit is active, two when both the East and West Pits are active, etc.). Fencing requirements (4-strand barbed wire and non-climbable fence) were based on the pit perimeter measurements from the AutoCAD drawings for Mine Years 0 through 11, and GIS figures for Mine Years 11 through 20.

3.2 Category 1, 2/3 and 4 Stockpiles and Ore Surge Pile, and associated Liners, Underdrains, Sumps and Ponds

The progressive construction of the Category 1 Waste Rock Stockpile groundwater containment system over the first five years of mining is described in the Rock and Overburden Management Plan (ROMP, Reference (3)). For Mine Years 1 through 4 (prior to full completion of the groundwater containment system in Mine Year 5), the additional length of groundwater containment system that would need to be constructed to close the loop was estimated by AutoCAD measurements using Groundwater Containment System Drawings GCS-003, GCS-004, GCS-005, and GCS-006 for the Category 1 Stockpile Groundwater Containment System Mine Years 0, 2, 3 and 5 Layouts, respectively. Breaching of the Containment System during pre-operation construction was also based on these drawings.

The construction and progressive reclamation of the Category 1 stockpile are described in the ROMP (Reference (3)) and it was assumed that progressive reclamation begins in Mine Year 14 at a rate of 66 acres per year. The construction and progressive reclamation of the Category 2/3 and 4 stockpile and Ore Surge Pile liner systems and associated mine water sumps and overflow ponds are described in the ROMP (Reference (3)). The acres of Category 2/3 and 4 or Ore Surge Pile stockpile liner systems were estimated by AutoCad measurements using Category 1, 2/3, and 4 Stockpile Drawings SKP-003, SKP-004, SKP-005, and SKP-006, Mine Year 1, 2, 11 and 21 Limits, respectively. It was assumed that deconstruction of the Category 4 stockpile liner will be completed by the end of Mine Year 11 and deconstruction of the Category 2/3 stockpile liner begins in Mine Year 14 at a rate of 30 acres per year. The acres of associated stockpile liner sumps/ponds were estimated by AutoCAD measurements for progressive construction and reclamation using Mine Site Mechanical Infrastructure Drawing MD-016 Mine Drainage Infrastructure Reclamation Plan. The length of Category 2/3 and 4 stockpile collection and Ore Surge Pile overliner and underdrain piping over time was estimated by AutoCAD measurements using Category 1, 2/3, and 4 Stockpile Drawings SKP-016, SKP-017, SKP-022, SKP-023, SKP-028 and SKP-029 related to the Category 2/3 and 4 stockpile and Ore Surge Pile underdrain and overliner piping plans.

The Category 2/3 and 4 stockpile and Ore Surge Pile piping and pumping system to the WWTF are detailed in the Water Management Plan - Mine (Reference (2)). The length of piping for the Category 2/3 and 4 stockpiles and Ore Surge Pile was estimated by AutoCAD measurements using Drawing MD-002 Mine Drainage Infrastructure Mine Year 11 General Layout from the Mine Site Mechanical Infrastructure drawing set. The number of stockpile pumps is shown on Mine Site Mechanical Infrastructure Drawing ME-003 Mechanical Infrastructure General Drawings, Mine Site, Mine Drainage Flow Diagram.

The tons of stockpile and Ore Surge Pile to relocate was calculated using year-by-year mining estimates for waste rock and ore as documented in the Mine Plan (Reference (1)).

3.3 Stormwater and Mine Water Ponds

Stormwater pond construction is detailed in the Water Management Plan - Mine (Reference (2)). Also, the construction of mine water ponds, liners, pumps and piping are detailed in the Water Management Plan - Mine (Reference (2)).

Stormwater pond acres to be reclaimed and stormwater ditches to be reclaimed were estimated by AutoCAD measurements for progressive construction and reclamation using Mine Site Stormwater Drawing SW-031 Dikes, Ditches, and Ponds, Reclamation Plan.

The acres of mine water ponds, liners and linear feet of mine water pond piping to be reclaimed was estimated by AutoCAD measurements using Drawing MD-002 Mine Drainage Infrastructure Mine Year 11 General Layout in the Mine Site Mechanical Infrastructure drawing set. The number of mine water pumps is shown on Drawing ME-003 Mechanical Infrastructure General Drawings, Mine Site, Mine Drainage Flow Diagram.

3.4 Flotation Tailings Basin

Acres of beach and pond bottom at the FTB to amend with bentonite was documented in Appendix B of the NorthMet Project Water Quality Modeling Data Package, Volume 1 – Mine Site (Reference (6)). The acreage of the borrow areas within the Tailings Basin that need to be reclaimed was computed using the borrow areas from FTB Support Drawing FTB-003; Existing Conditions.

3.5 Hydrometallurgical Residue Facility

The acres of HRF to cover and years to drain were calculated based on HRF development sequencing (footprint impacted) and timing, the year-by-year accumulation of hydrometallurgical residue, and assumed drainage rate of 115 gallons per cubic yard of material. The acres were estimated using HRF Drawings HRF-005, HRF-008 and HRF-010; Emergency Basin Excavations and Removals, Lift 1 Layout, and Lift 3 Layout, respectively.

References

1. **Poly Met Mining Inc.** NorthMet Project Mine Plan (v5). July 2016.

2. —. NorthMet Project Water Management Plan - Mine Site (v5). July 2016.

3. —. NorthMet Project Rock and Overburden Management Plan (v8). July 2016.

4. —. NorthMet Project Water Modeling Data Package Volume 2 - Plant Site (v11). March 2015.

5. **Barr Engineering Co.** NorthMet Project – CRE O&M for water treatment during reclamation and long-term closure after Mine Year 1 - 10 mg/L WWTP Sulfate Target Technical Memo to Jennifer Saran. October 2016.

6. **Poly Met Mining Inc.** NorthMet Project Water Modeling Data Package Volume 1 - Mine Site (v14). February 2015.

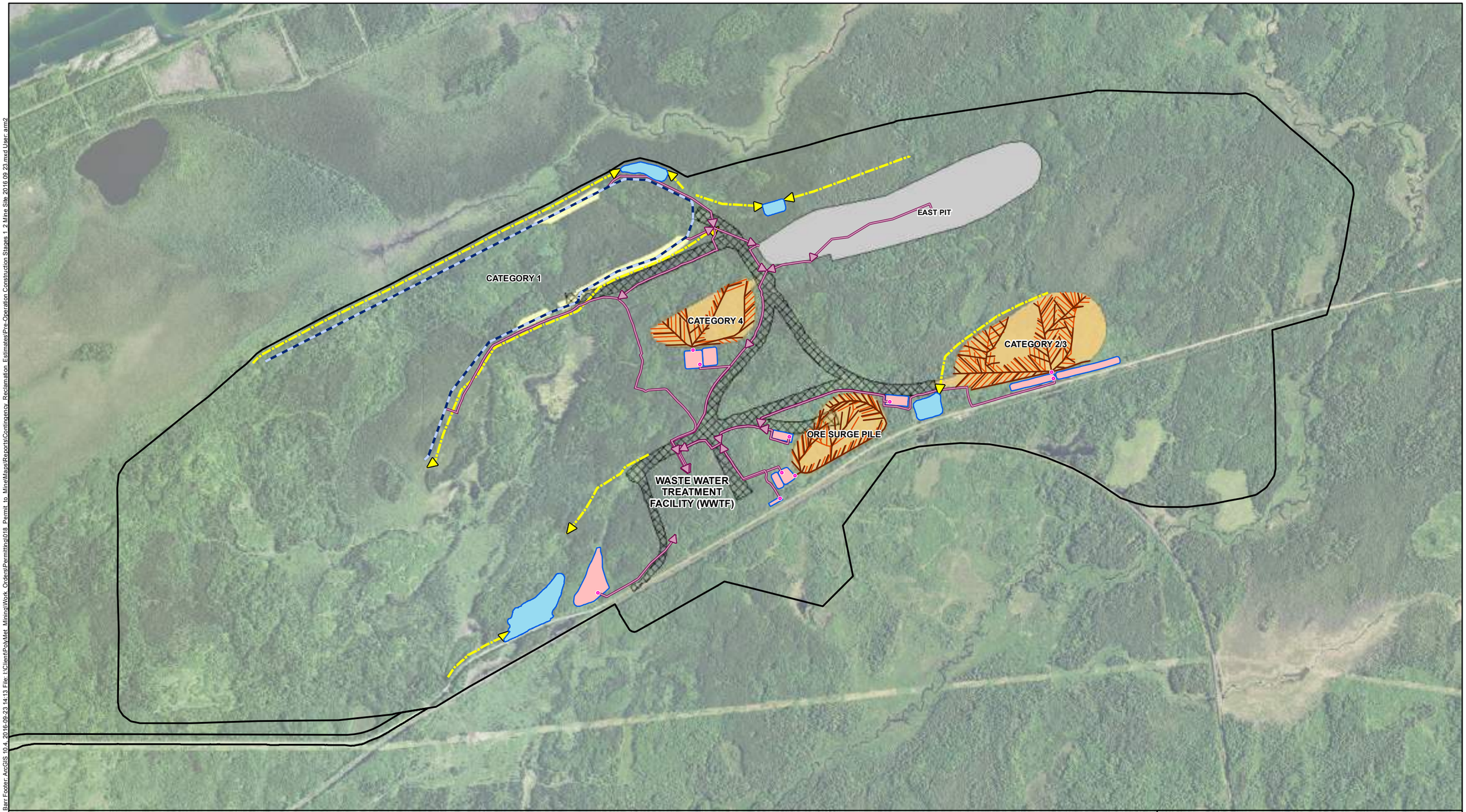
7. **Minnesota Department of Natural Resources, U.S. Army Corps of Engineers and U.S. Forest Service.** Final Environmental Impact Statement: NorthMet Mining Project and Land Exchange. November 2015.

Large Tables

Large Table 1 Reclamation Features that Vary by Closure Year

	Units that Vary by Closure Year																					
Year of Closure	0 - Stage 1	0 - Stage 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Category 2/3 Stockpile Liner (acres)	63	63	63	63	119	119	119	181	181	181	181	181	181	181	181	181	150	120	90	60	30	0
Category 2/3 Stockpile Piping (LF)	8,000	8,000	8,000	8,000	10,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0	0
Category 2/3 Stockpile Sump/Pond (acres)	6.7	6.7	6.7	6.7	9.2	9.2	9.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	9.2	9.2	6.7	6.7	6.7	0.0
Category 2/3 Stockpile Pumps	2	2	2	2	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Category 2/3 Stockpile Overliner and Underdrain Piping (LF)	45,300	45,300	45,300	45,300	76,500	76,500	76,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	94,800	71,100	47,400	23,700	0
Category 2/3 Stockpile Relocation (tons)	0	0	5,238,766	9,671,631	13,968,736	17,624,295	20,039,335	24,388,312	26,954,315	31,286,526	35,946,676	40,017,183	44,021,108	44,021,108	38,281,584	32,542,061	26,802,537	21,063,014	15,323,491	9,583,967	3,844,444	0
Category 4 Stockpile Liner (acres)	29	29	29	29	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Piping (LF)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Sump/Pond (acres)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Overliner and Underdrain Piping (LF)	21,590	21,590	21,590	21,590	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Relocation (tons)	0	0	1,489,201	2,251,698	3,379,412	4,206,959	4,648,816	5,314,412	5,863,428	5,974,068	6,107,575	6,184,408	6,206,813	0	0	0	0	0	0	0	0	0
OSP Liner (acres)	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
OSP Piping (LF)	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
OSP Sump/Pond (acres)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
OSP Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OSP Overliner and Underdrain Piping (LF)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
OSP Relocation (tons)	0	0	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Footprint to Reclaim (acres)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Cover (acres)	0	0	205	205	369	369	458	526	526	526	526	526	526	526	526	460	394	328	262	196	130	64
Category 1 Stockpile Containment System Completion (LF)	0	0	2,800	2,800	2,800	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Containment System Breach & Reclaim (acres)	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Exposed/Unblasted Rock to Reclaim (Acres)	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Wall Unreclaimed (Acres)	0	0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
West Pit Exposed/Unblasted Rock to Reclaim (Acres)	0	0	0	0	0	4	40	0	0	0	0	52	65	0	0	0	0	0	0	0	0	0
West Pit Wall Unreclaimed (Acres)	0	0	0	8.7	8.7	8.7	8.9	8.9	8.9	11.0	11.0	16.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Central Pit Wall Unreclaimed (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Fence - 4 strand barb wire (LF)	0	0	1,100	1,400	1,400	1,400	1,400	1,400	1,400	1,700	1,700	1,600	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	1,400
Fence - non climbable (LF)	0	0	11,000	19,900	19,900	21,200	20,700	20,700	20,700	22,100	22,100	30,100	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	33,700
Pit Access Gates	0	0	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Mine Drainage Pond (acres)	19.4	19.4	19.4	19.4	21.6	21.6	21.6	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Mine Drainage Pond Liner (acres)	12.4	12.4	12.4	12.4	14.6	14.6	14.6	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Mine Drainage Pond Pumps	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Mine Drainage Pond Pipe (LF)	9,000	9,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Mine Drainage Pond Underdrains	4,500	4,500	4,500	5,200	6,000	6,000	6,000	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
Stormwater Pond (acres)	17.4	17.4	17.4	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
Stormwater Ditch (LF)	5,200	5,200	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	8,300	8,300
Unreclaimed Haul Road (LF)	22,000	22,000	22,000	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	31,500	31,500	31,500	29,500	27,500	27,500	27,500	27,500	21,500	21,500
FTB Beach to Reclaim (acres)	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTB Beach to Amend with Bentonite (acres)	0	0	95	95	93	92	91	89	87	203	207	211	212	212	212	212	216	219	222	225	420	428
FTB Pond Bottom to Amend with Bentonite (acres)	0	0	421	424	427	430	432	434	443	1068	1093	1118	1124	1130	1136	1142	1136	1129	1122	1116	905	905
FTB Borrow Area to Reclaim (acres)	31.6	31.6	44.7	16.9	16.5	16.5	15.9	15.9	12.0	12.0	12.0	12.0	18.0	22.4	22.4	22.4	26.8	26.8	26.8	26.8	21.5	19.5
HRF Disturbed Acres to Reclaim (acres)	5	5	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HRF cover (acres)	0	0	0	0	49	49	49	49	49	49	49	49	49	54	60	65	71	76	82	87	93	98
HRF drainage (years)	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9

Large Figures



EIS Project Areas
East Pit Exposed/Unblasted Rock to Reclaim
Stockpile Footprint to Reclaim
Stockpile Liner Acres to be Removed and Footprint Reclaimed
Overliner Collection Piping
Underliner Collection Piping
Haul Roads to be Reclaimed
Stormwater Systems
Ditch to Reclaim
Pond Acres to Reclaim
Groundwater Containment System
Mine Water Systems
Pond/Liner to be Reclaimed (OSLA pond not lined)
Piping to WWTF to be Removed
Pumps to WWTF to be Removed

N

0 750 1,500 3,000
Feet

BARR

PRE-OPERATION CONSTRUCTION CHANGES OVER TIME STAGES 1 & 2 - MINE SITE
NorthMet Project
Poly Met Mining, Inc.

Large Figure 1
Contingency Reclamation Estimate

FLOTATION TAILINGS BASIN

CELL 2E

CELL 2W

CELL 1E

HYDROMETALLURGICAL RESIDUE FACILITY

Booster Pump House

Coarse Crusher

Concentrator

Drive House 1

Water Treatment Plant

Water Tower Plant Site

A-Lab

Rubber Shop

Drive House 2

Lube House

Fine Crusher

West of Concentrator

Warehouse 49

Rebuild Shop

Warehouse Electrical

General Shops

Carpenter's Shop

Area 2 Buildings

Imagery Source: FSA, 2013.

EIS Project Areas
Pre-Load Disturbed Acres to Reclaim
Beach Area to Reclaim
Borrow Area to Reclaim - Stage 1

0 750 1,500 3,000
Feet

BARR

PRE-OPERATION CONSTRUCTION CHANGES OVER TIME STAGES 1 & 2 - TAILINGS BASIN

NorthMet Project
Poly Met Mining, Inc.

Large Figure 2
Contingency Reclamation Estimate

Drawings

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

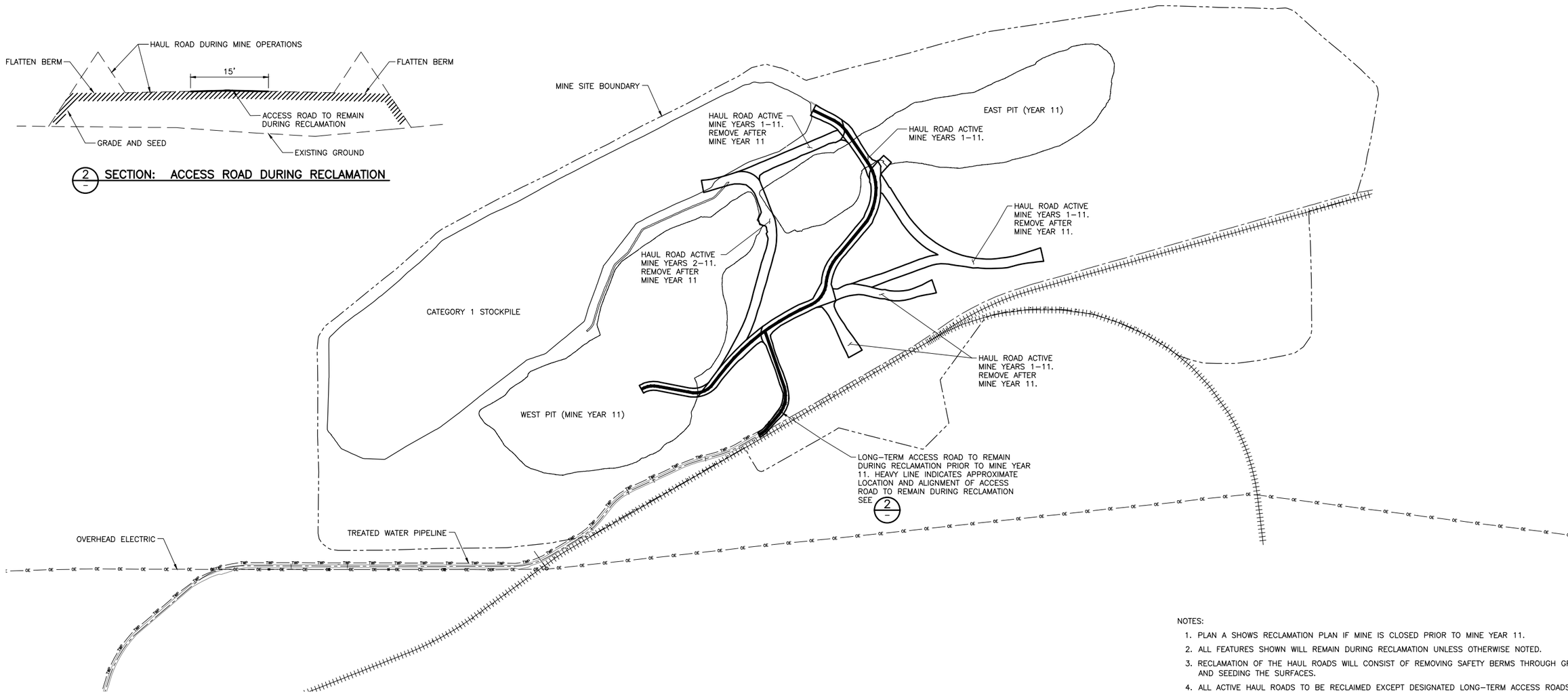
Permit Application Support Drawings: Mine Site and Dunka Road Earthwork

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology “mine drainage” as noted in these drawings will be changed to “mine water”.

2 SECTION: ACCESS ROAD DURING RECLAMATION



NOTES:

1. PLAN A SHOWS RECLAMATION PLAN IF MINE IS CLOSED PRIOR TO MINE YEAR 11.
2. ALL FEATURES SHOWN WILL REMAIN DURING RECLAMATION UNLESS OTHERWISE NOTED.
3. RECLAMATION OF THE HAUL ROADS WILL CONSIST OF REMOVING SAFETY BERMS THROUGH GRADING AND SEEDING THE SURFACES.
4. ALL ACTIVE HAUL ROADS TO BE RECLAIMED EXCEPT DESIGNATED LONG–TERM ACCESS ROADS.

1 PLAN: HAUL ROAD RECLAMATION PLAN A

0 1000 2000
SCALE IN FEET

N

VER NO	DATE	DESCRIPTION
1	5/21/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/21/15
FOR CONSTRUCTION		
NOT APPROVED FOR CONSTRUCTION.		

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PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/21/15 LICENSE# 20533

DRAWN: KKB
CHECKED: ATS
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

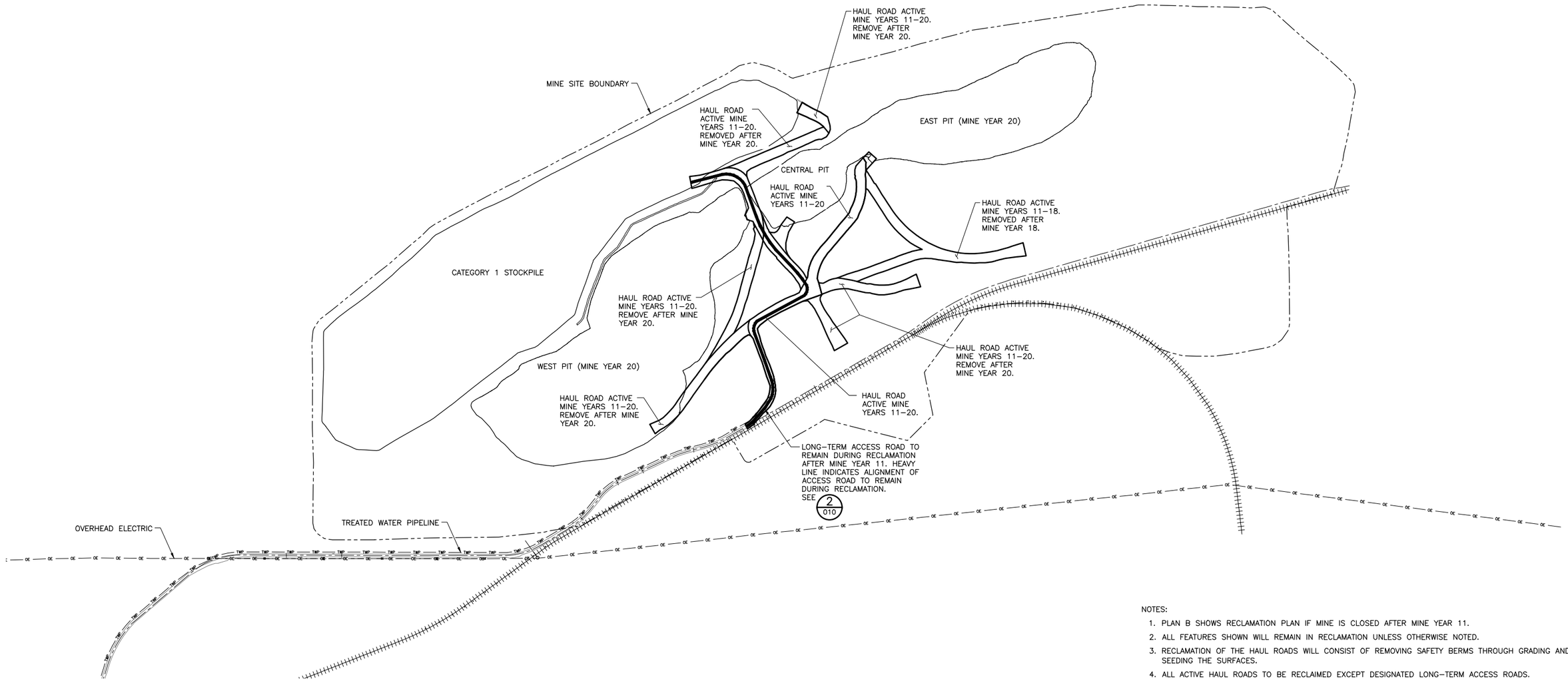
PLANT DRAWING NUMBER:

MINE SITE & DUNKA ROAD EARTHWORK HAUL ROAD RECLAMATION PLAN A MINE YEARS 1–11

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. EW–010
REV



NOTES:

1. PLAN B SHOWS RECLAMATION PLAN IF MINE IS CLOSED AFTER MINE YEAR 11.
2. ALL FEATURES SHOWN WILL REMAIN IN RECLAMATION UNLESS OTHERWISE NOTED.
3. RECLAMATION OF THE HAUL ROADS WILL CONSIST OF REMOVING SAFETY BERMS THROUGH GRADING AND SEEDING THE SURFACES.
4. ALL ACTIVE HAUL ROADS TO BE RECLAIMED EXCEPT DESIGNATED LONG–TERM ACCESS ROADS.

1/– PLAN: HAUL ROAD RECLAMATION PLAN B

0 1000 2000
SCALE IN FEET

N

VER NO	DATE	DESCRIPTION
1	5/21/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/21/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/21/15 LICENSE# 20533

DRAWN: KKB
CHECKED: ATS
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE SITE & DUNKA ROAD EARTHWORK
HAUL ROAD RECLAMATION PLAN B
MINE YEARS 11–20

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. EW–011
REV

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

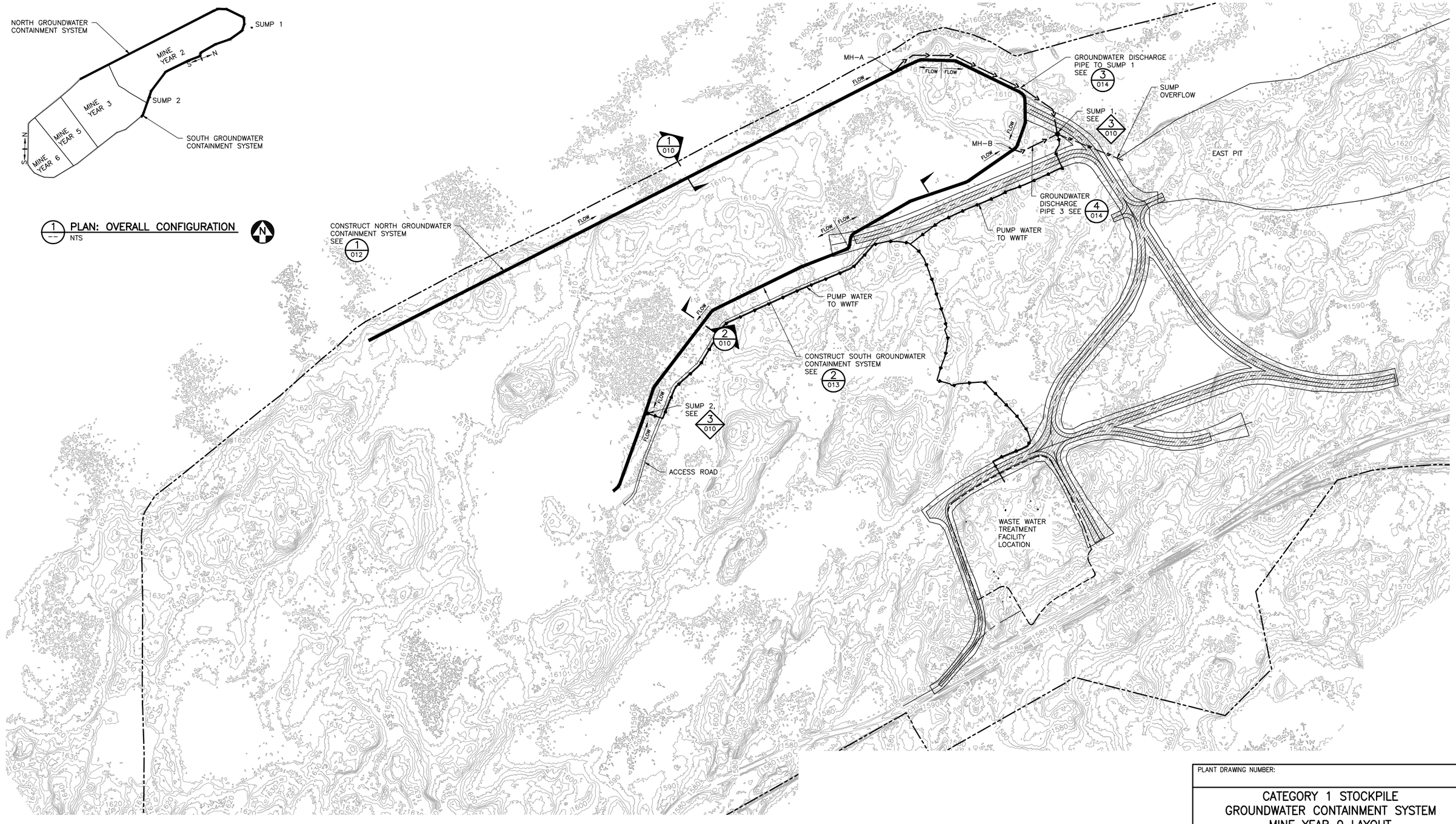
Permit Application Support Drawings: Category 1 Stockpile Groundwater Containment System

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
GCS-003	To meet construction stormwater requirements, a temporary berm will be added on the west side of the Mine Year 0 Category 1 Stockpile footprint to control mine water runoff as the stockpile is built out.

1 PLAN: OVERALL CONFIGURATION
NTS



2 PLAN: GCS – MINE YEAR 0 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

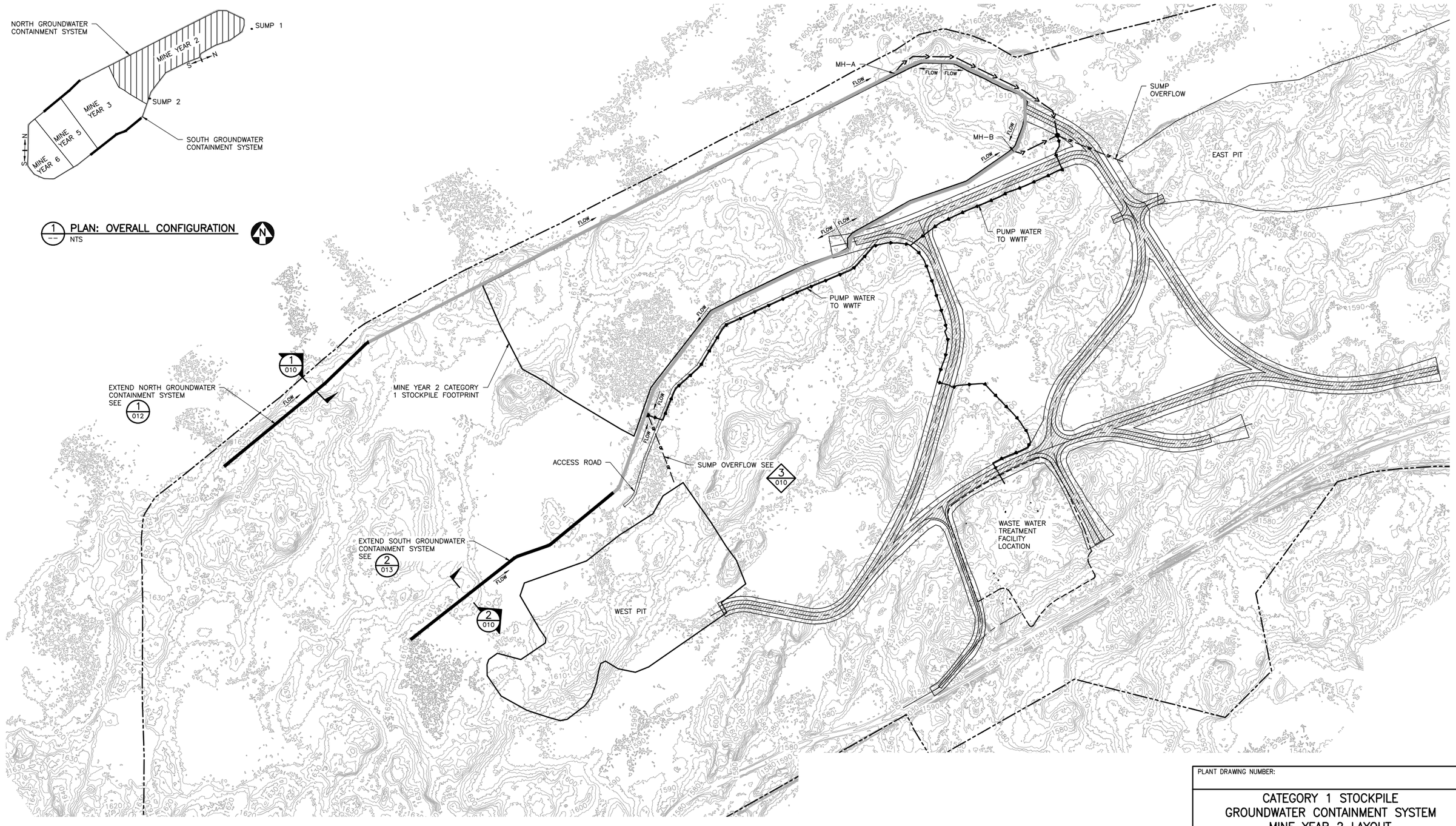
CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 0 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. GCS-003
REV

1 / -- PLAN: OVERALL CONFIGURATION
NTS



2 / -- PLAN: GCS – MINE YEAR 2 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

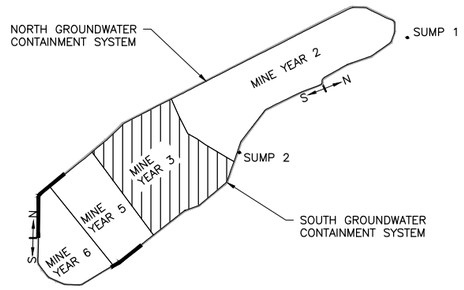
PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE
GROUNDWATER CONTAINMENT SYSTEM
MINE YEAR 2 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. GCS–004
REV



1 / -- PLAN: OVERALL CONFIGURATION
NTS

N

MH–A
MH–B
FLOW
SUMP OVERFLOW
EAST PIT
PUMP WATER TO WWTF
MINE YEAR 3 CATEGORY 1 STOCKPILE FOOTPRINT
ACCESS ROAD
SUMP OVERFLOW
WASTE WATER TREATMENT FACILITY LOCATION
WEST PIT
1 / 010
EXTEND NORTH GROUNDWATER CONTAINMENT SYSTEM SEE 1 / 012
2 / 010
EXTEND SOUTH GROUNDWATER CONTAINMENT SYSTEM SEE 2 / 013

2 / -- PLAN: GCS – MINE YEAR 3 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 3 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. GCS–005
REV

1 PLAN: OVERALL CONFIGURATION
NTS

2 PLAN: GCS – MINE YEAR 5 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 5 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. GCS-006
REV

Errata Sheet

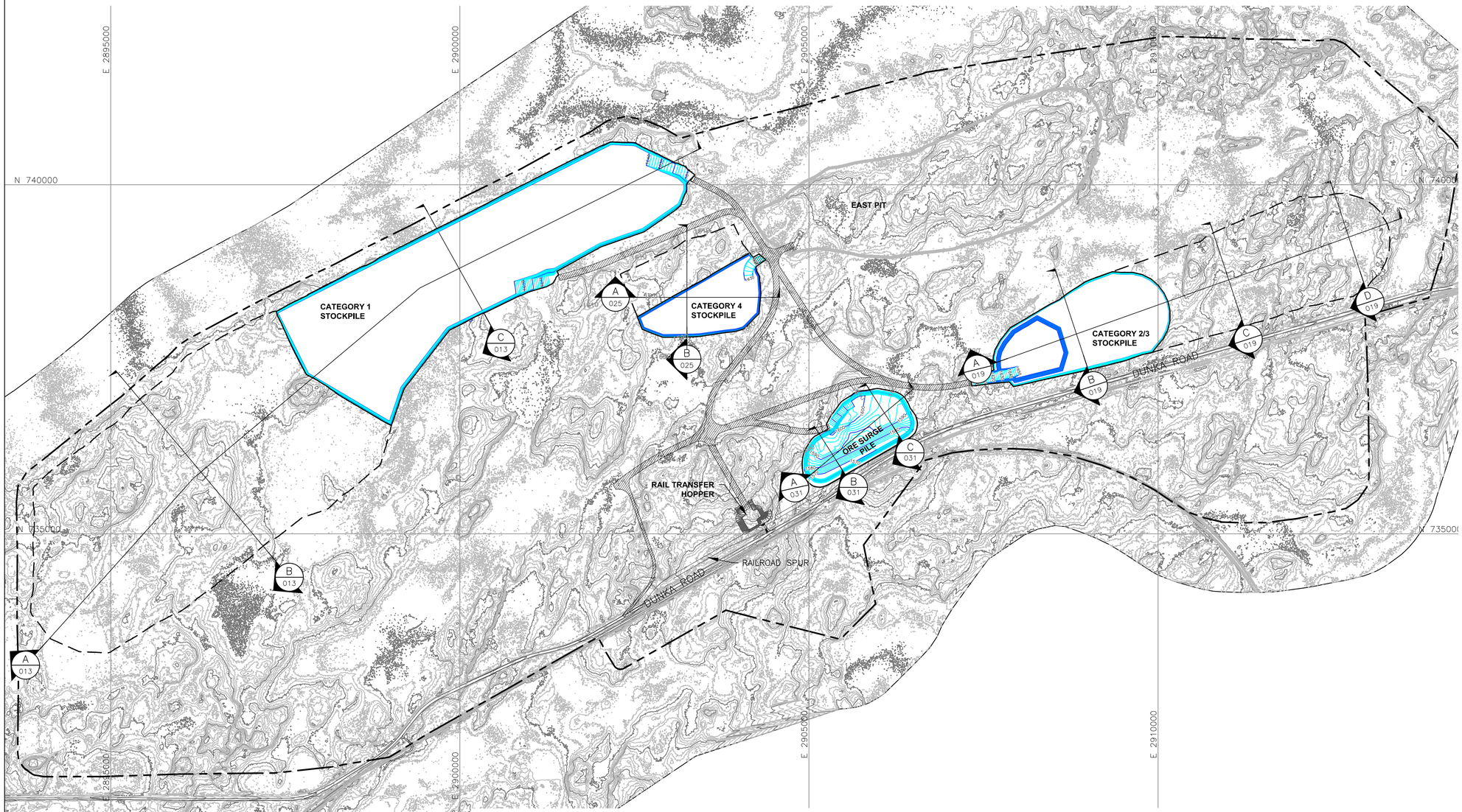
Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Categories 1, 2/3, and 4 Stockpiles and Ore Surge Pile Design

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology “mine drainage” as noted in these drawings will be changed to “mine water”.



□□□□□D

EXISTING GROUND TOPOGRAPHY (1590, 1580)

PROPOSED STOCKPILE LAYOUTS (1590, 1600)

HAUL ROADS

MINE SITE BOUNDARY

MINE YEAR 1 PIT BOUNDARY (SEE NOTE 1)

MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)

MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)

CROSS SECTION IDENTIFIER (A / 019)

SHEET WHERE SECTION IS LOCATED

□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 1 LIMITS

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-003 REV

□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED GRADING TOPOGRAPHY (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 2 (SEE NOTE 1)
- MINE YEAR 1 AND 2 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 019)
- SHEET WHERE SECTION IS LOCATED

□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

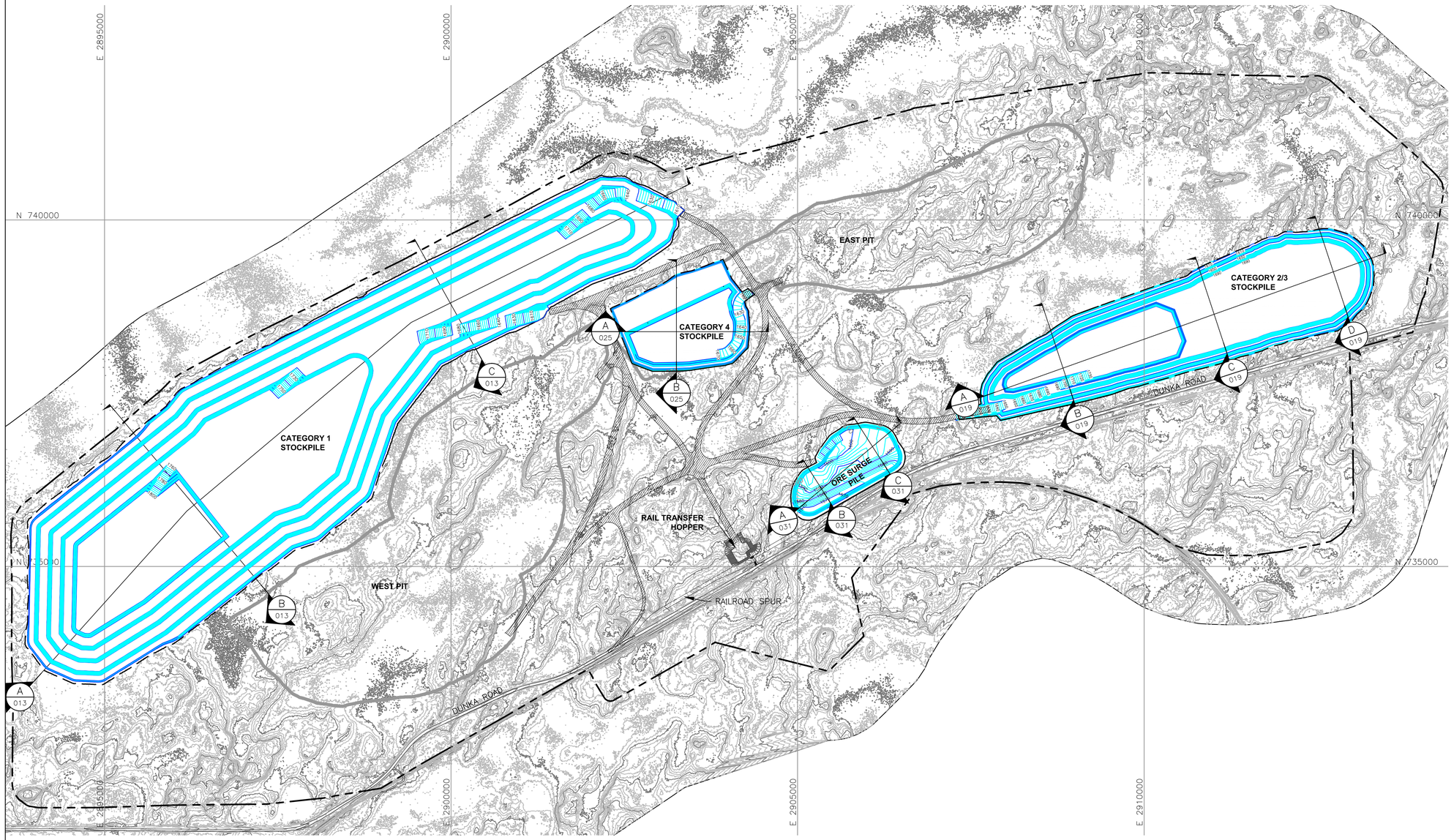
STOCKPILE LAYOUTS – MINE YEAR 2 LIMITS

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-004
REV



□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED LAYOUTS (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 11 (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 025)
- SHEET WHERE SECTION IS LOCATED

□□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 11 LIMITS

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

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SIGNATURE B Bronson
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
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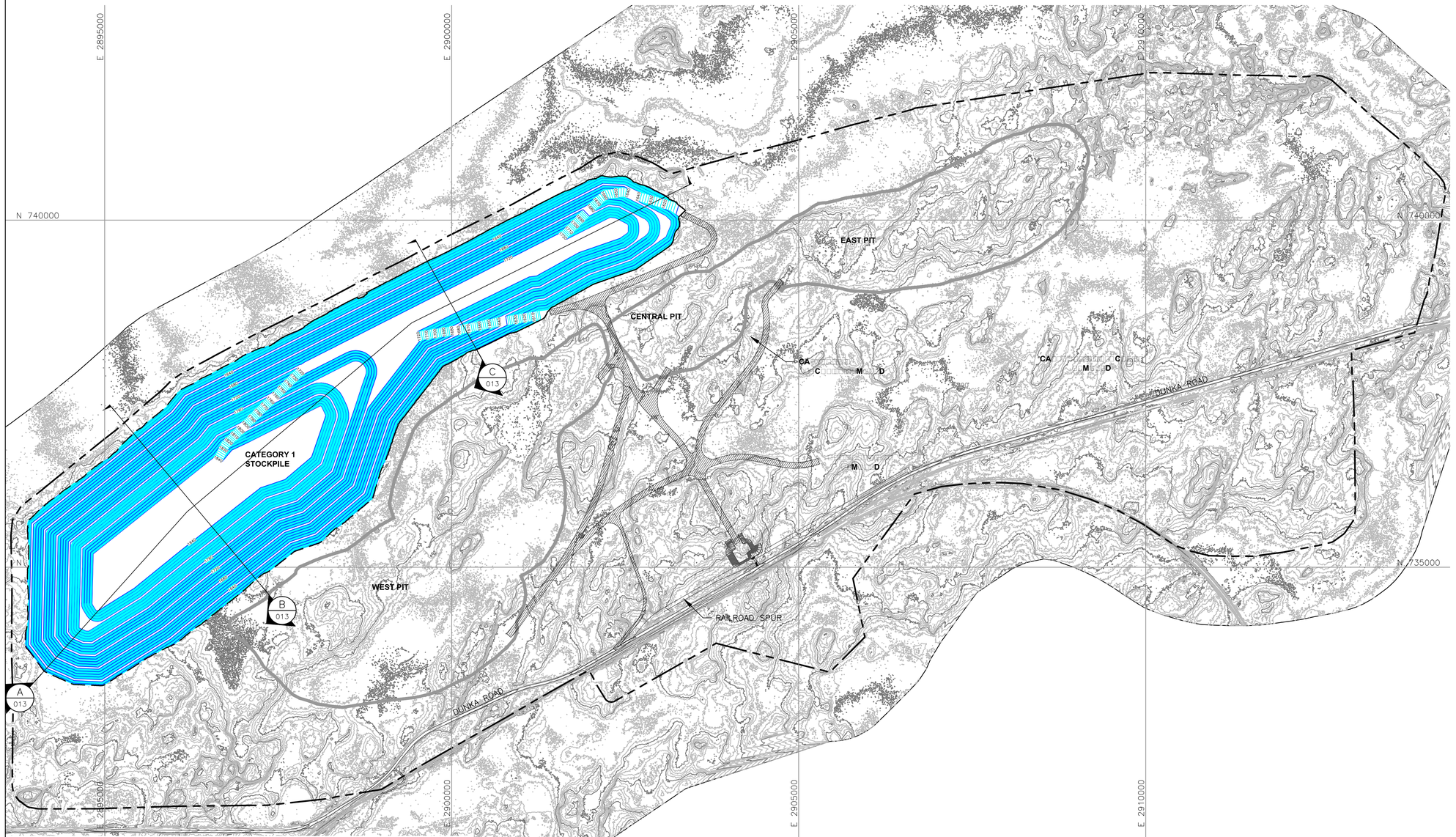

□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED LAYOUT CONTOURS (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- ULTIMATE PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 013)
- SHEET WHERE SECTION IS LOCATED

□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

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DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS MINE YEAR 21 LIMITS CLOSURE CONFIGURATION

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
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INCHES 1 2

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Mechanical Infrastructure

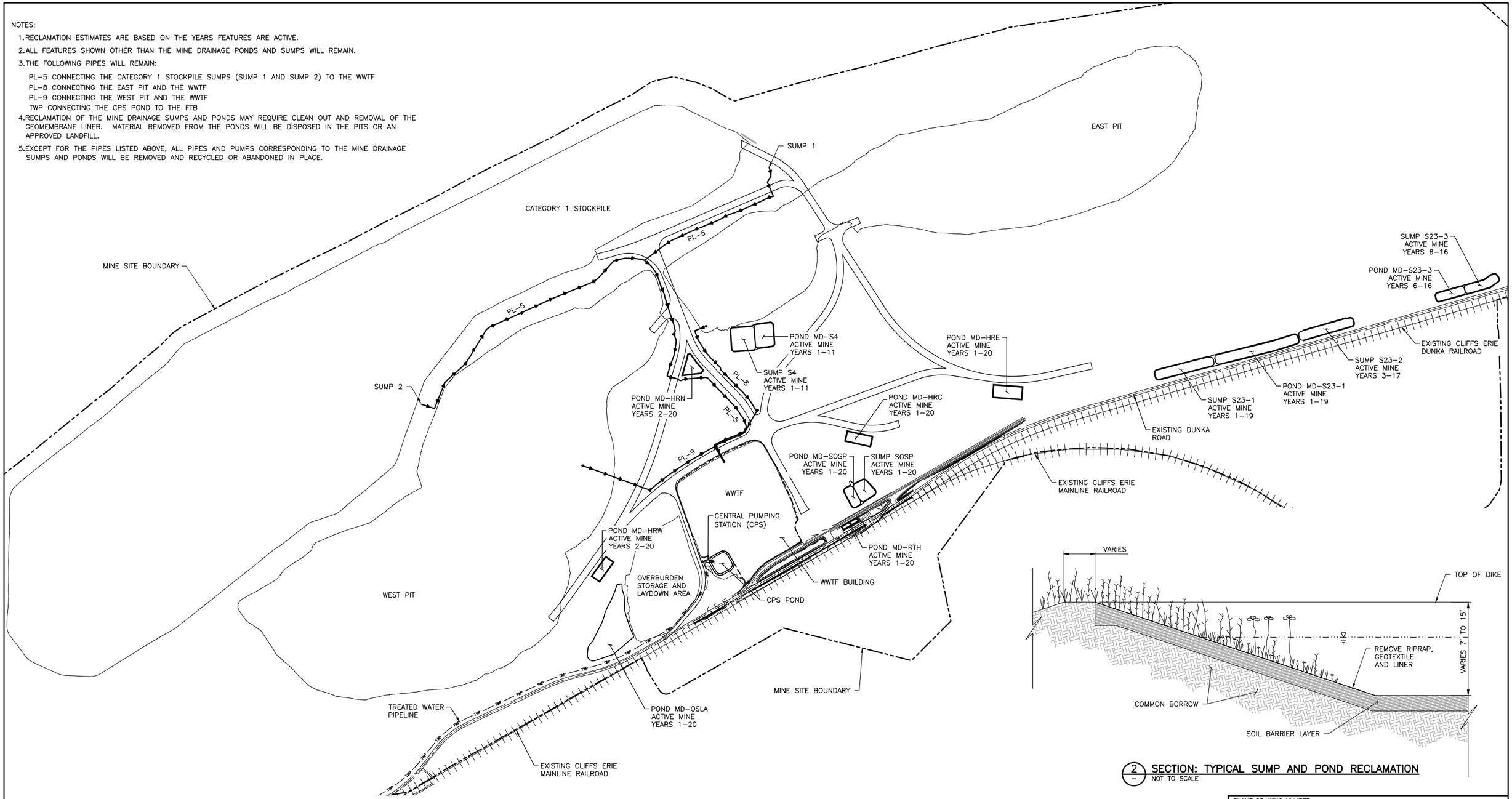
September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
MD-003	The grading for the access road from the Fueling and Maintenance Facility to Pond MD-SOSP & Sump SOSP will be revised to optimize drainage.

NOTES:

1. RECLAMATION ESTIMATES ARE BASED ON THE YEARS FEATURES ARE ACTIVE.
2. ALL FEATURES SHOWN OTHER THAN THE MINE DRAINAGE PONDS AND SUMPS WILL REMAIN.
3. THE FOLLOWING PIPES WILL REMAIN:
   - PL–5 CONNECTING THE CATEGORY 1 STOCKPILE SUMPS (SUMP 1 AND SUMP 2) TO THE WWTF
   - PL–8 CONNECTING THE EAST PIT AND THE WWTF
   - PL–9 CONNECTING THE WEST PIT AND THE WWTF
   - TWP CONNECTING THE CPS POND TO THE FTB
4. RECLAMATION OF THE MINE DRAINAGE SUMPS AND PONDS MAY REQUIRE CLEAN OUT AND REMOVAL OF THE GEOMEMBRANE LINER. MATERIAL REMOVED FROM THE PONDS WILL BE DISPOSED IN THE PITS OR AN APPROVED LANDFILL.
5. EXCEPT FOR THE PIPES LISTED ABOVE, ALL PIPES AND PUMPS CORRESPONDING TO THE MINE DRAINAGE SUMPS AND PONDS WILL BE REMOVED AND RECYCLED OR ABANDONED IN PLACE.



1 PLAN: GENERAL LAYOUT RECLAMATION

0 600 1200

SCALE IN FEET

2 SECTION: TYPICAL SUMP AND POND RECLAMATION

NOT TO SCALE

VER NO.	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: VJS

CHECKED: CMK2

BARR PROJECT NO.: 23/69–0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE RECLAMATION PLAN

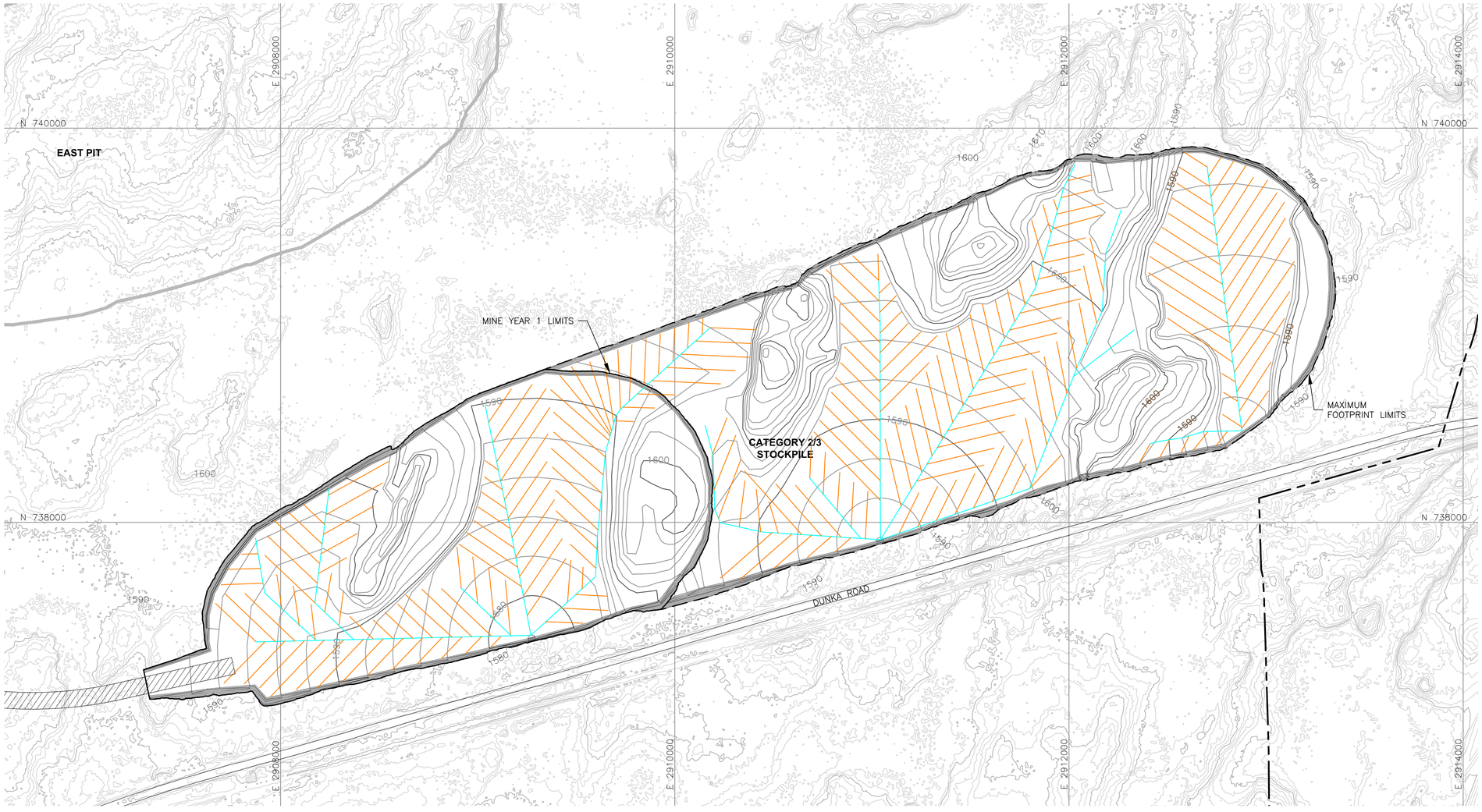
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. MD–016

REV

INCHES 1 2



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SCALE IN FEET

□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590, 1580)
- PROPOSED GRADING TOPOGRAPHY (1590, 1600)
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6–INCH

□□□□

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2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
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4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

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DATE 5/22/15 LICENSE # 46492

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CHECKED: GG
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 2/3 STOCKPILE UNDERDRAIN PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
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LAKEWOOD, CO USA 80233
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Fax: (303) 985-2080
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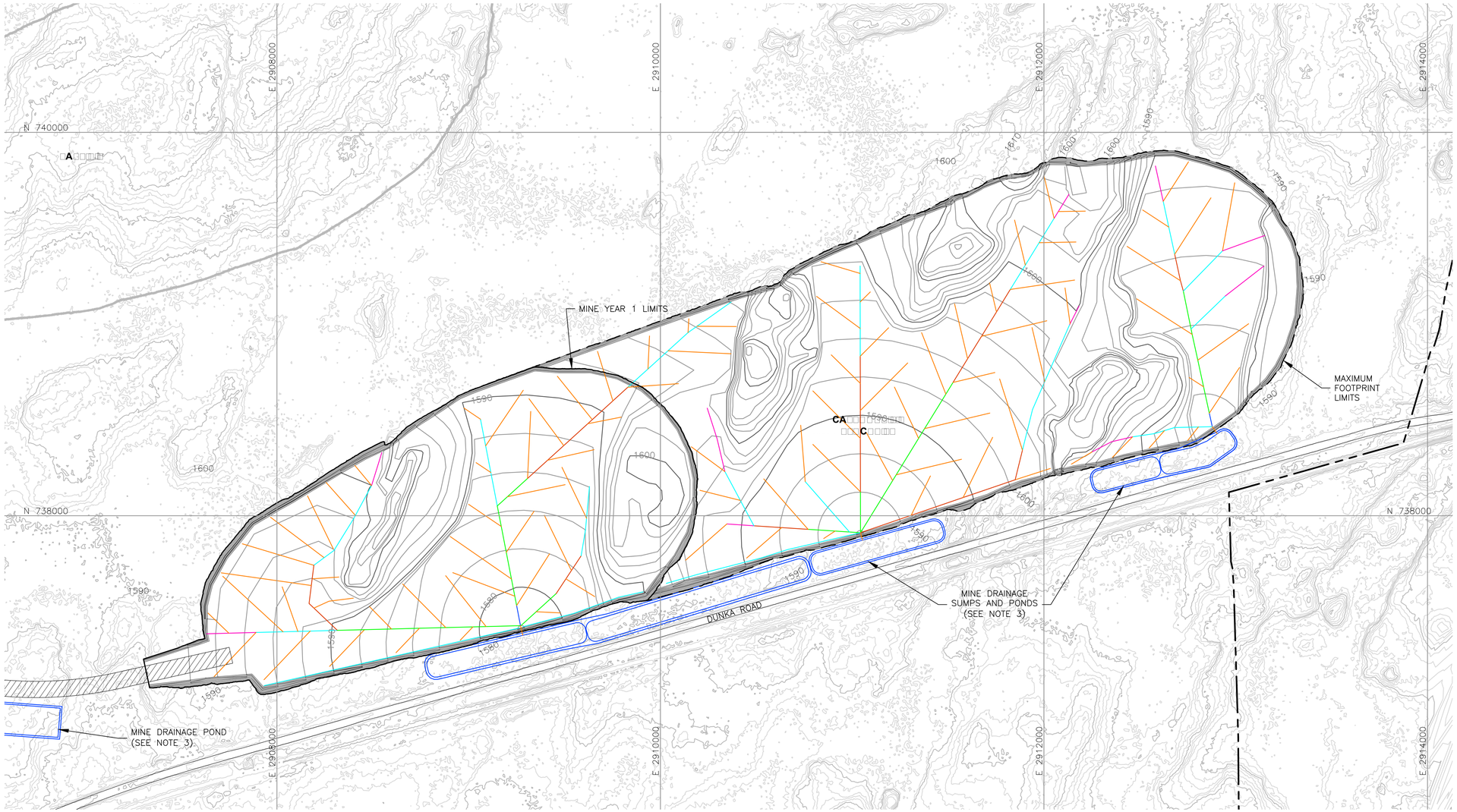
DWG. NO. SKP–016
REV

INCHES 1 2



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SCALE IN FEET

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- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

TERTIARY COLLECTION PIPING
- 4–INCH

PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

□□□□□

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2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

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GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 2/3 STOCKPILE OVERLINER DRAINAGE PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
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LAKEWOOD, CO USA 80233
Ph: (303) 980–0540
Fax: (303) 985–2080
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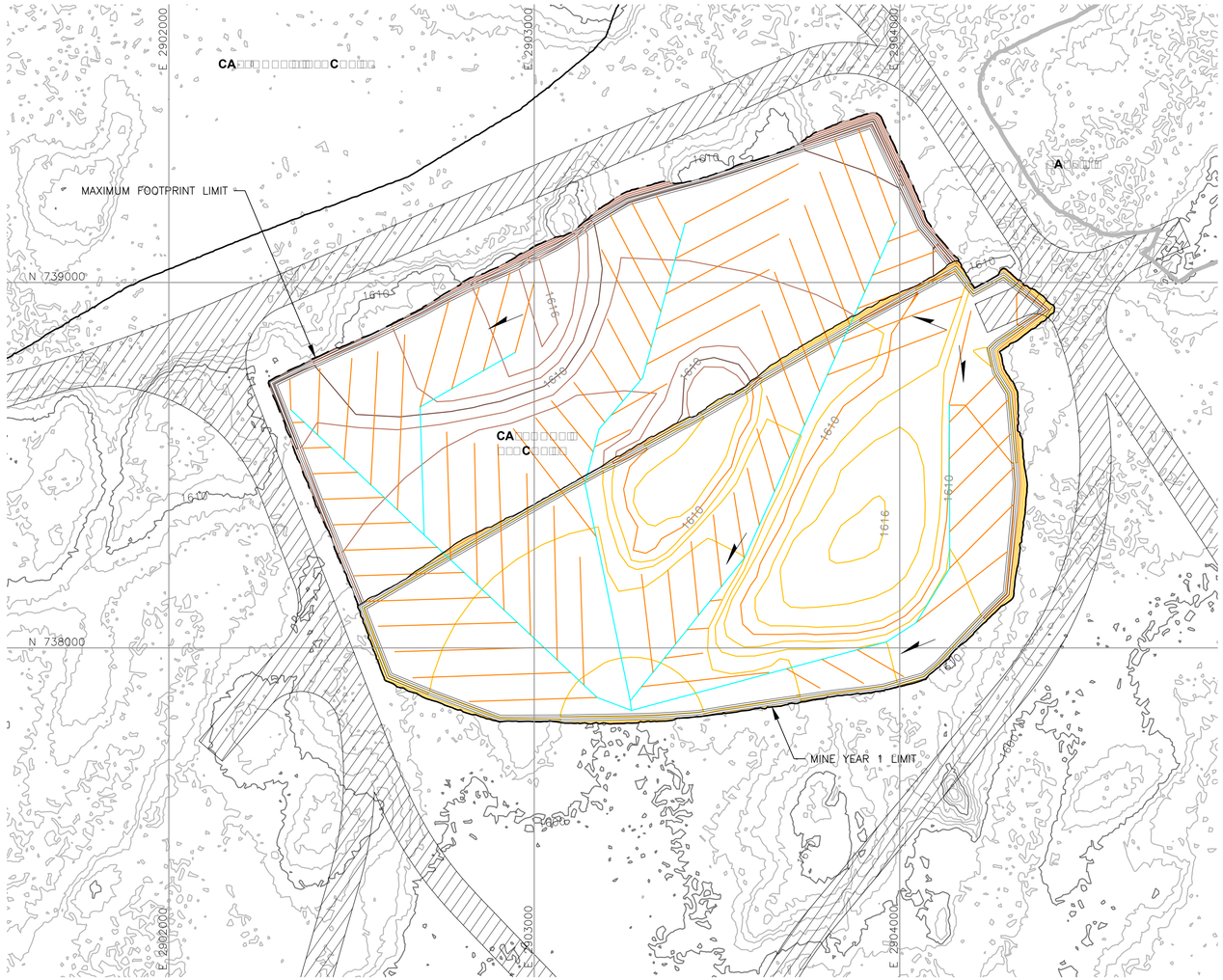

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SCALE IN FEET

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- EXISTING GROUND TOPOGRAPHY
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
6–INCH

□□□□□

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4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

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CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 4 STOCKPILE
UNDERDRAIN PIPING PLAN
MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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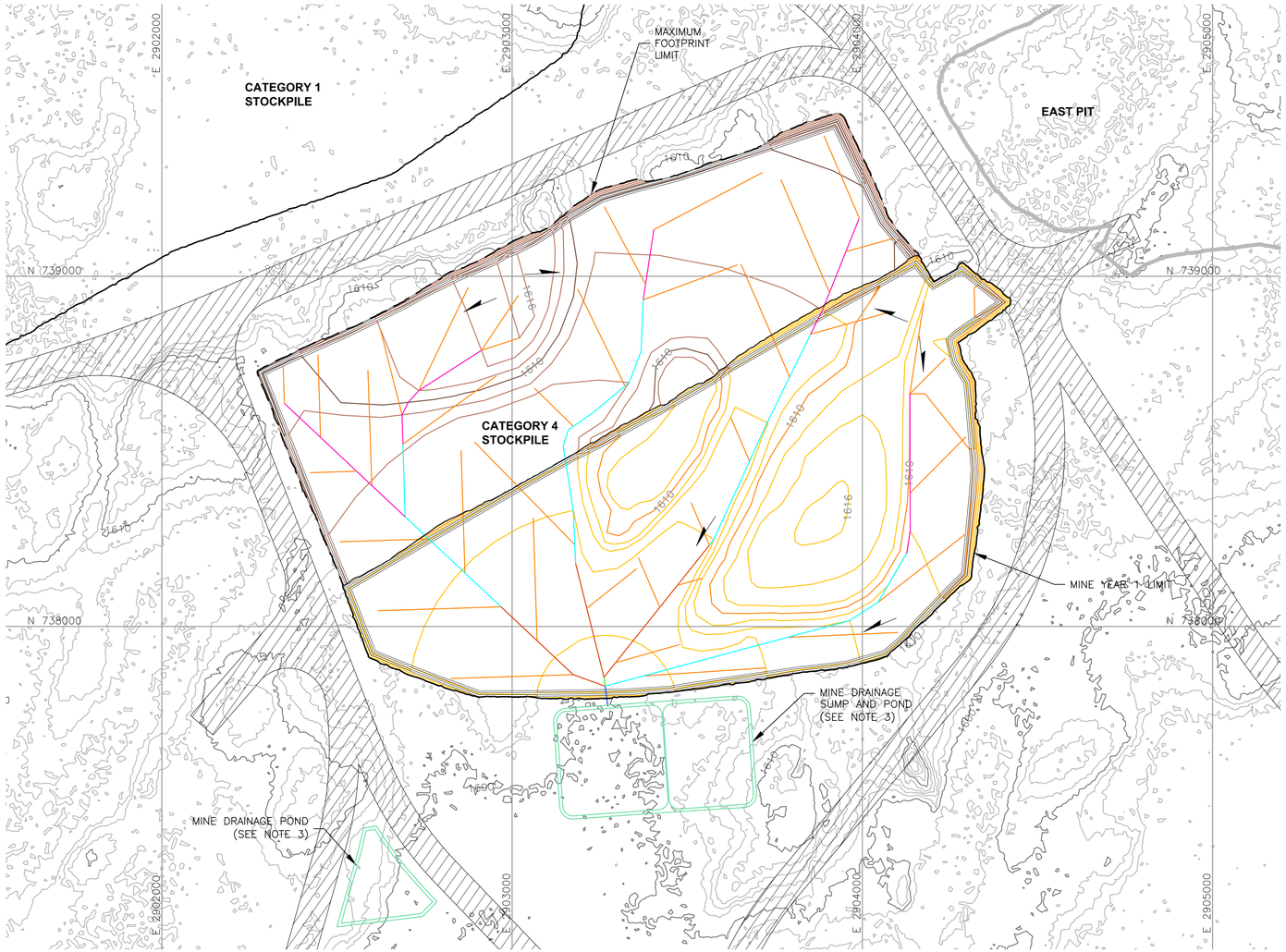

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- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY (1590 / 1600)
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY (1590 / 1600)
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

MINE YEAR 1 – TERTIARY COLLECTION PIPING
- 4–INCH

MINE YEAR 1 – PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

□□□□

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□□□□□□□C□□

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SCALE IN FEET

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DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 4 STOCKPILE OVERLINER DRAINAGE PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980–0540
Fax: (303) 985–2080
www.golder.com

DWG. NO. SKP–023
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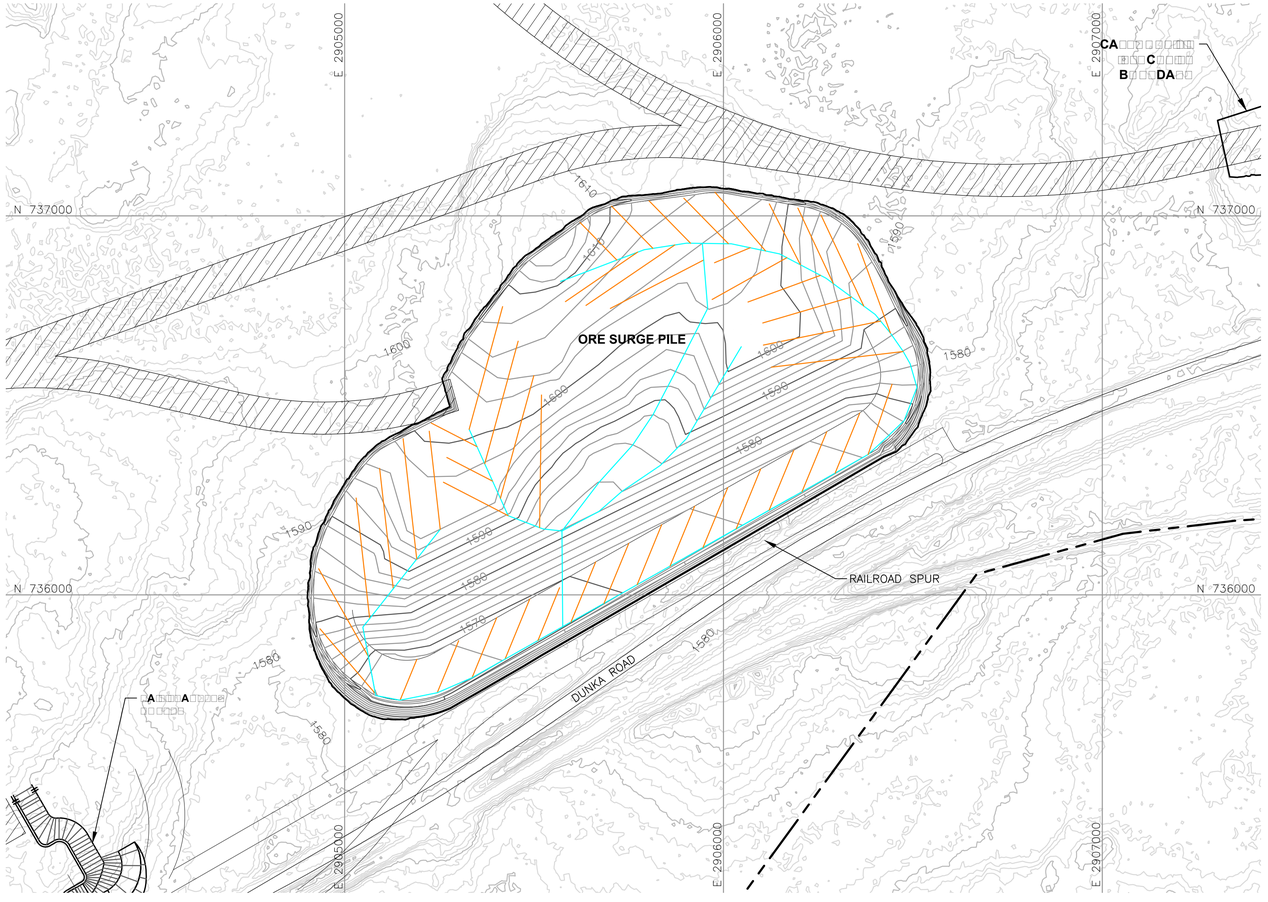

□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED GRADING TOPOGRAPHY (1590 / 1600)
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6–INCH

□□□□

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□□□□□□□C□□

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DATE 5/22/15 LICENSE # 46492

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CHECKED: GG
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

ORE SURGE PILE UNDERDRAIN PIPING PLAN

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
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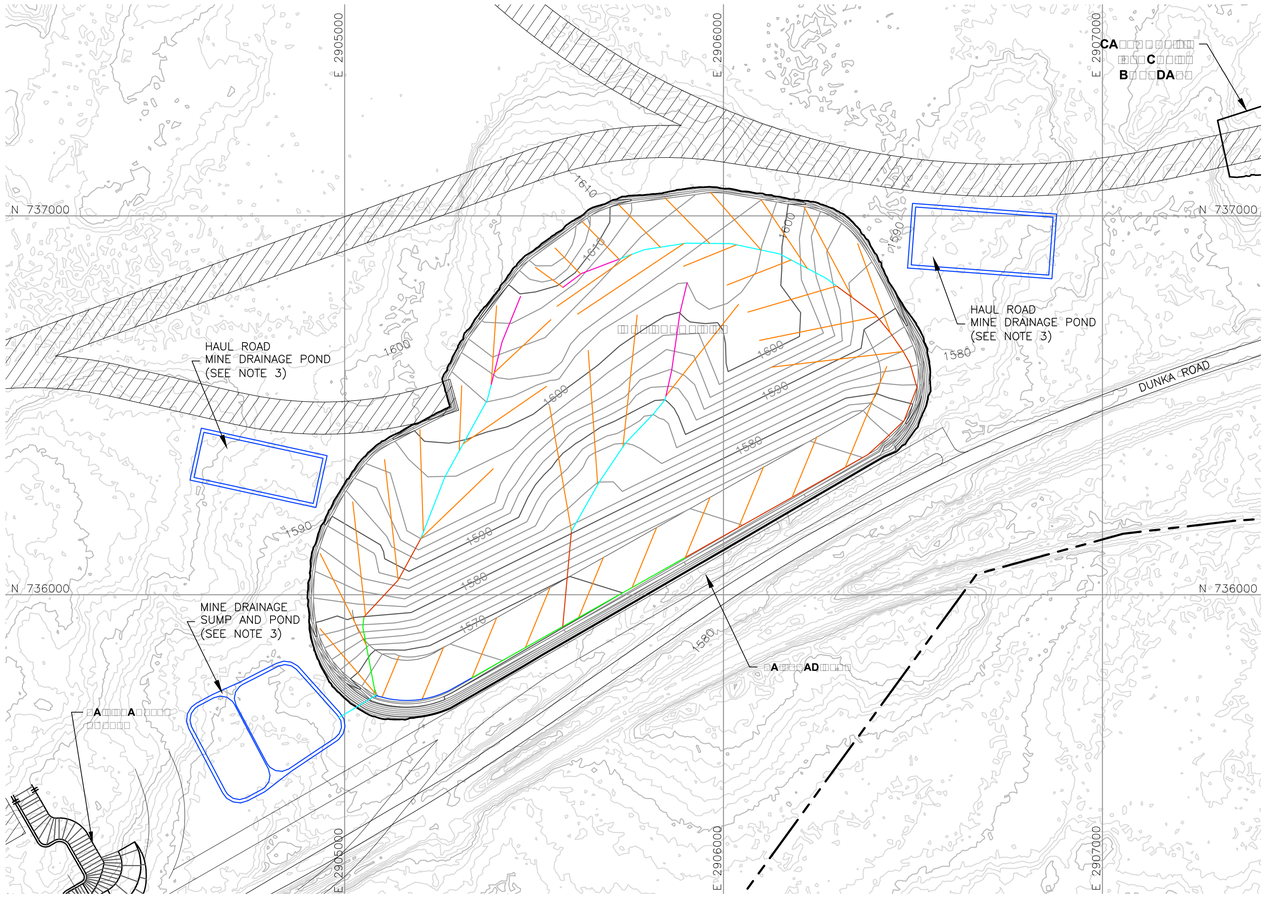

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SCALE IN FEET

D

- EXISTING GROUND TOPOGRAPHY (1590, 1580)
- PROPOSED GRADING TOPOGRAPHY (1590, 1600)
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

MINE YEAR 1 – TERTIARY COLLECTION PIPING
- 4–INCH

MINE YEAR 1 – PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

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4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

C

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUED	VERSION	DATE
FOR PERMITTING	F	5–22–15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE

PRINTED NAME BRENT R. BRONSON

DATE 5/22/15 LICENSE # 46492

DRAWN: MTM

CHECKED:

GOLDER PROJECT NO.: 113–2209

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

ORE SURGE PILE OVERLINER DRAINAGE PIPING PLAN

POLYMET MINING

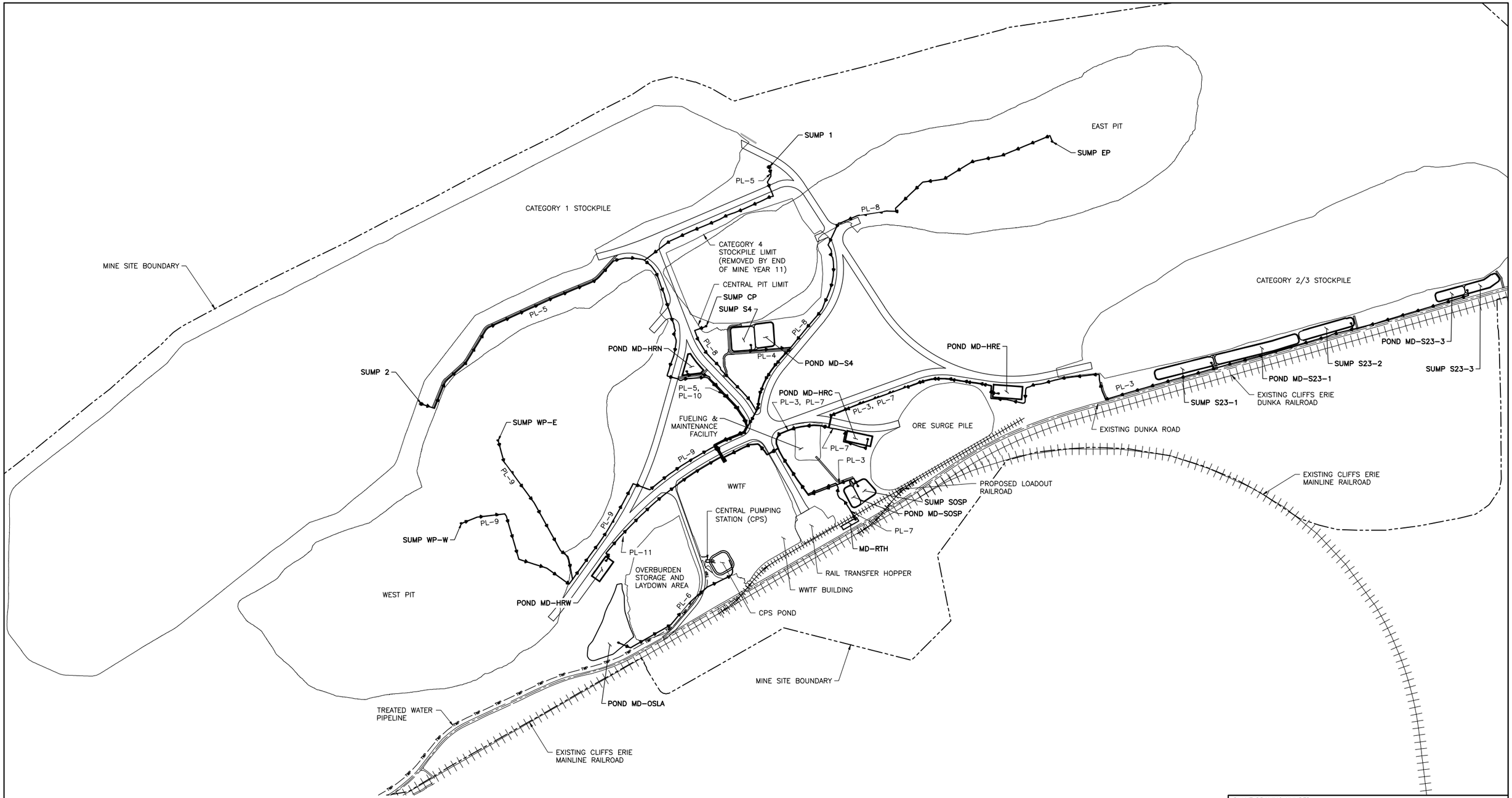
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980–0540
Fax: (303) 985–2080
www.golder.com

DWG. NO. SKP–029

REV

INCHES 1 2



1 PLAN: GENERAL LAYOUT MINE YEAR 11

0 600 1200

SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/18/15
FOR CONSTRUCTION		
NOT APPROVED FOR CONSTRUCTION		

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: KRM

CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE
MINE YEAR 11 GENERAL LAYOUT

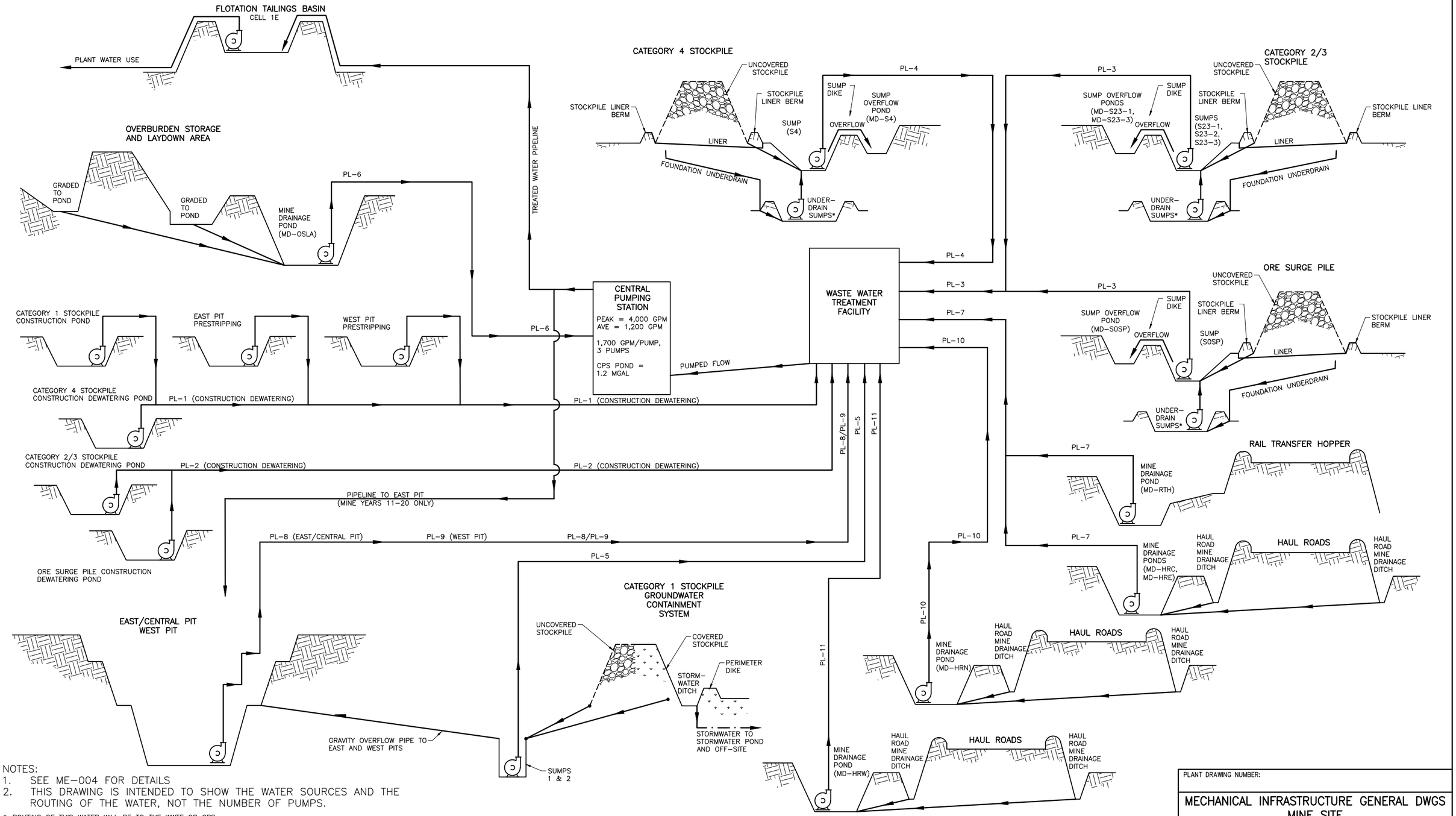
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. MD-002

REV

INCHES 1 2



NOTES:
1. SEE ME-004 FOR DETAILS
2. THIS DRAWING IS INTENDED TO SHOW THE WATER SOURCES AND THE ROUTING OF THE WATER, NOT THE NUMBER OF PUMPS.

* ROUTING OF THIS WATER WILL BE TO THE WWTF OR CPS DEPENDING ON WATER QUALITY TESTING RESULTS.

LEGEND

- STORMWATER FLOW
- SITE MINE DRAINAGE FLOW
- COVERED STOCKPILE/GRASS
- UNCOVERED STOCKPILE
- UNCOVERED EARTHWORK
- PUMP

VER NO	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/18/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: VJS

CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MECHANICAL INFRASTRUCTURE GENERAL DWGS
MINE SITE
MINE DRAINAGE FLOW DIAGRAM

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. ME-003

REV

INCHES 1 2

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Mine Site Stormwater

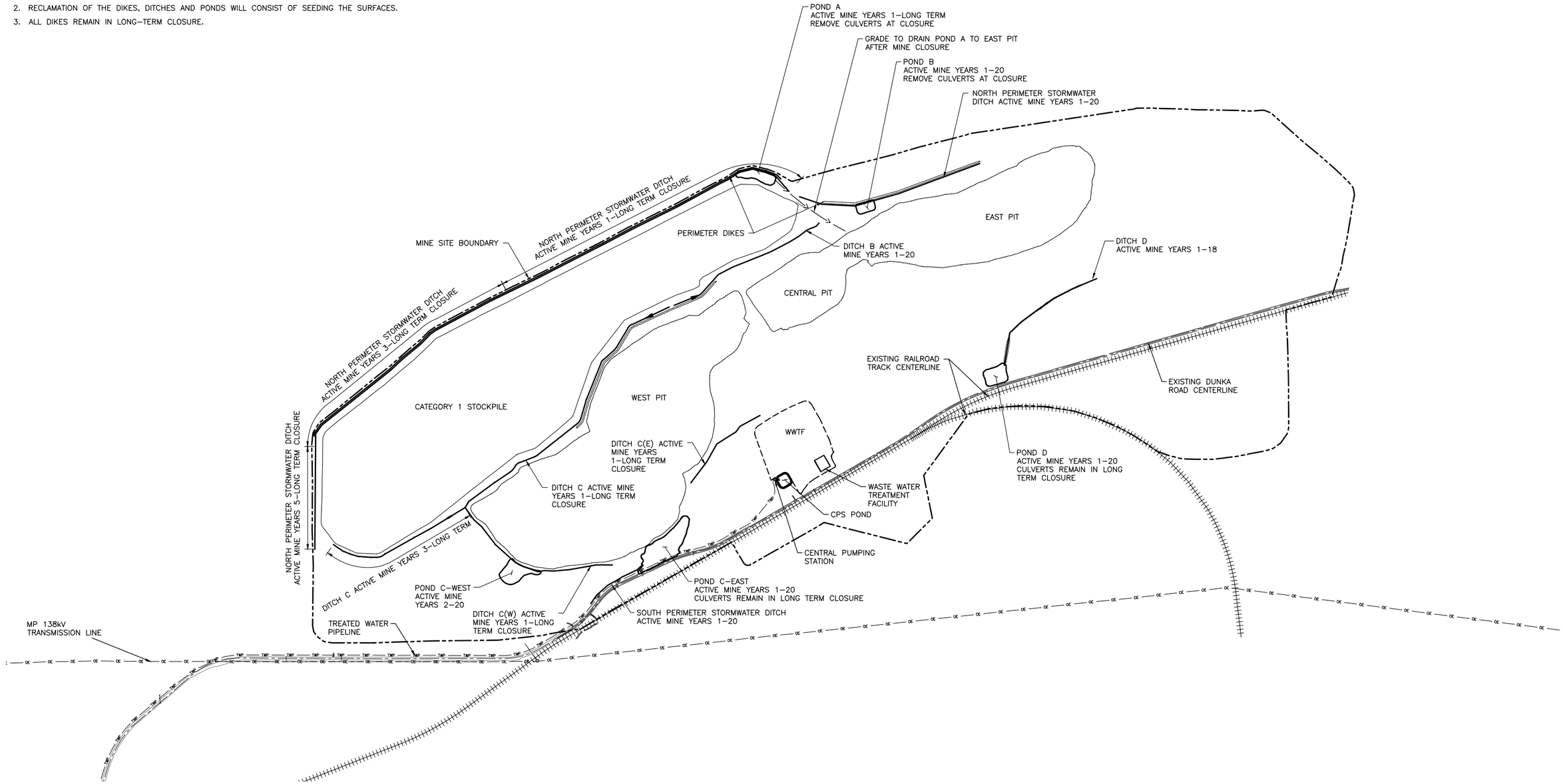
September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
SW-031	Temporary sedimentation basins or stormwater infiltration basins may be added to meet construction stormwater requirements. There is currently an infiltration basin shown on the Waste Water Treatment Facility drawings between the Ore Surge Pile and the Rail Transfer Hopper that is not shown on this Mine Site Stormwater drawing set. These construction stormwater features require additional site-specific data and will be evaluated in final design.

NOTES:

1. ALL FEATURES SHOWN WILL REMAIN IN LONG-TERM CLOSURE UNLESS OTHERWISE NOTED.
2. RECLAMATION OF THE DIKES, DITCHES AND PONDS WILL CONSIST OF SEEDING THE SURFACES.
3. ALL DIKES REMAIN IN LONG-TERM CLOSURE.



1 PLAN: STORMWATER DIKES, DITCHES, AND PONDS RECLAMATION PLAN

0 1000 2000
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	5/26/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/26/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/26/15 LICENSE# 20533

DRAWN: KKB/ATS
CHECKED: ATS
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE SITE STORMWATER
DIKES, DITCHES, AND PONDS
RECLAMATION PLAN

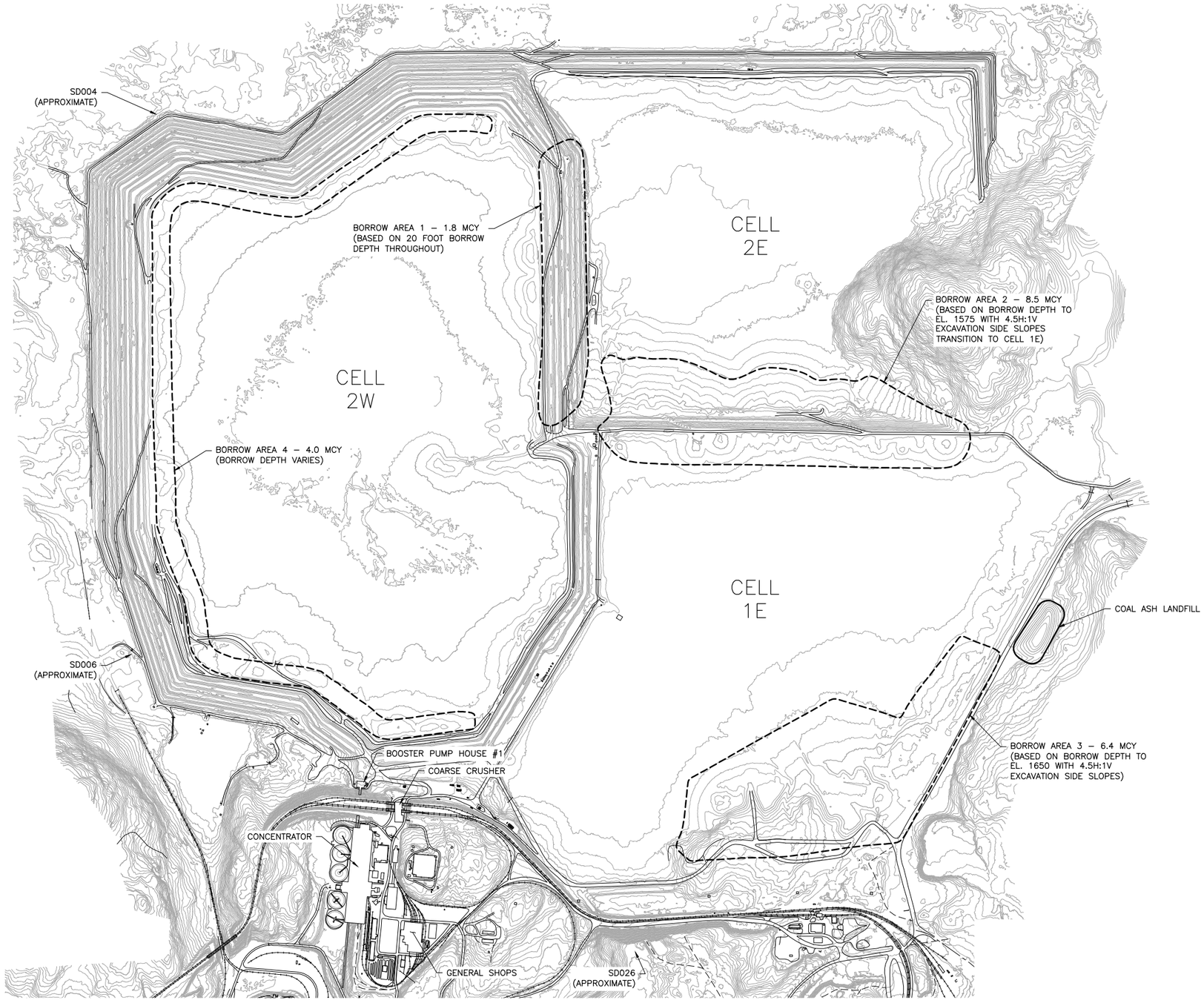
POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. SW-031 REV

INCHES 1 2



NOTES:

1. CONTOURS DO NOT REFLECT BORROW REMOVAL.
2. BORROW LTVSMC COARSE TAILINGS IN THE NUMERICAL SEQUENCE SHOWN.
3. COAL ASH LANDFILL TO BE RELOCATED TO HYDROMET RESIDUE FACILITY OR ALTERNATE PERMITTED FACILITY PRIOR TO TAILINGS DEPOSITION IN CELL 1E.

1 PLAN: EXISTING CONDITIONS

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	10/14/11	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	12/07/12	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
3	04/12/13	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 3 – ATTACHMENT A
4	11/25/14	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 4 – ATTACHMENT A
5	03/03/15	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 5 – ATTACHMENT A
6	5/20/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	6	5/20/15
FOR CONSTRUCTION	–	–

NOT APPROVED FOR CONSTRUCTION

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/20/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

FLOTATION TAILINGS BASIN EXISTING CONDITIONS

POLYMET MINING

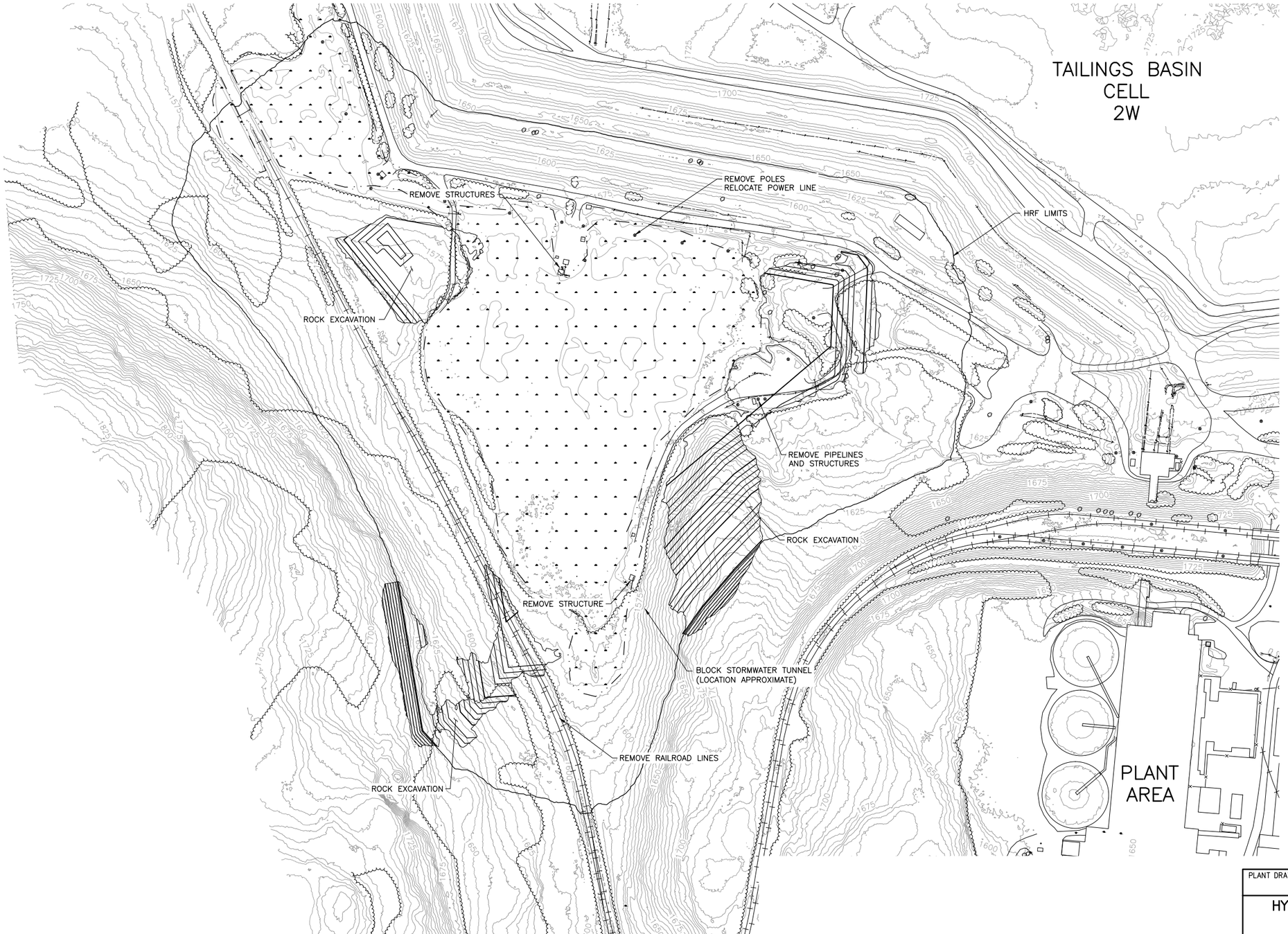
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. FTB-003
REV

INCHES 1 2



NOTES:

1. APPROXIMATE SOIL AND ROCK REMOVAL VOLUME = 329,000 CY

2. DISPOSE OF DEMOLITION DEBRIS IN LTVSMC EXISTING INDUSTRIAL LANDFILL. APPROXIMATE DISTANCE TO LANDFILL IS 3 MILES.

1 PLAN: EMERGENCY BASIN REMOVALS

0 200 400
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY EMERGENCY BASIN EXCAVATIONS AND REMOVALS

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. HRF-005 REV

INCHES 1 2

DRAINAGE COLLECTION SUMP AND LEAKAGE DETECTION SUMPS AND SIDEWALL RISERS (SEE DWG. HRF-013)

N.=733986.39
E.=2858333.05

N.=733704.15
E.=2858572.88

N.=733672.13
E.=2858581.53

N.=733742.23
E.=2858045.72

N.=733518.63
E.=2858622.98
EL.=1563.45

N.=733437.04
E.=2858526.97
EL.=1563.45

N.=733455.76
E.=2858326.90

DISCHARGE POINT (TYP.), SEE 1/018

DRAINAGE COLLECTION SYSTEM, SEE 5/016

EL 1600.0

N.=733355.01
E.=2860395.68

N.=733382.57
E.=2860412.65

PIPELINES. SEE SHEET HRF-017

N.=733333.94
E.=2860448.37

N.=733324.67
E.=2860417.96

N.=733444.20
E.=2859126.37
EL.=1567.10

N.=733139.95
E.=2858747.38
EL.=1567.10

N.=733273.57
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EL.=1576.32

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EL.=1578.92

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EL.=1578.41

1.0%

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E.=2859595.13

EL 1600.0

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E.=2859337.94

N.=731703.57
E.=2858996.90

N.=731832.34
E.=2859269.30
EL.=1580.48

TAILINGS BASIN CELL 2W

PLANT AREA

NOTES:

1. UPPER LINER SURFACE SHOWN.
2. DRAINAGE COLLECTION GEOCOMPOSITE SHOWN (SHADED AREA).
3. PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.

1 PLAN: LIFT 1 LAYOUT

0 200 400
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY
LIFT 1 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. HRF-008
REV

INCHES 1 2

TAILINGS BASIN CELL 2W

PROPOSED PIEZOMETER AND INCLINOMETER LOCATION

N.=733963.95
E.=2858569.76

N.=733931.93
E.=2858578.40

EL 1650.0

DISCHARGE POINT (TYP.), SEE 1/018

N.=733617.05
E.=2860557.08

N.=733589.48
E.=2860540.10

RELOCATE PIPES FROM LOWER DAM

PIPELINES SEE DWG. HRF-017

N.=733444.76
E.=2857958.77

N.=733441.33
E.=2858001.06

N.=733412.78
E.=2860707.10

N.=733403.52
E.=2860676.69

N.=732921.15
E.=2858430.92

N.=732903.79
E.=2858406.38

SEE DWG. HR-008 FOR CELL BOTTOM GRADES

N.=732708.69
E.=2860647.54

N.=732687.65
E.=2860676.68

N.=732674.78
E.=2860557.98

PROPOSED POND OVERFLOW PIPE

N.=732700.97
E.=2858531.15

N.=732713.59
E.=2858558.61

N.=732647.38
E.=2860570.34

BOOSTER PUMP HOUSE

N.=732481.00
E.=2858601.57

N.=732488.37
E.=2858630.71

N.=732538.03
E.=2860299.14

N.=732512.55
E.=2860315.13

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N.=732187.14
E.=2859940.84

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E.=2859821.05

N.=732065.83
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E.=2859669.14

N.=731844.11
E.=2859643.19

N.=731588.10
E.=2858787.68

N.=731574.42
E.=2858759.53

EL 1650.0

N.=731565.86
E.=2859540.83

N.=731577.30
E.=2859513.03

N.=731469.22
E.=2858896.60

N.=731438.10
E.=2858884.43

N.=731490.74
E.=2859515.33

PROPOSED PIEZOMETER AND INCLINOMETER LOCATION

N.=731519.01
E.=2859493.24

PLANT AREA

NOTES:

1. LIFT 3 CONSTRUCTION YEAR TO BE BASED ON HRF CAPACITY CONSUMPTION RATE.
2. UPPER LINER SURFACE SHOWN.
3. PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.

1 PLAN: LIFT 3 LAYOUT

0 200 400
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME THOMAS J. RADUE
SIGNATURE Thomas J. Radue
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY
LIFT 3 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. HRF-010 REV

Attachment 10.

Lundgren motors truck

Toprak, Filiz

From: Jim Scott <jr.scott@frontiernet.net>
Sent: Friday, June 17, 2016 2:55 PM
To: Toprak, Filiz
Subject: Fw: F-250 lease
Attachments: vehicle lease 2016 Ford.doc

Follow Up Flag: Follow up
Flag Status: Completed

Filiz

Purchase quite for pick ups – replace $35,000 placeholder

No quote for plow but internet search for adjustable V (V – invertedV – slant right.left – straight) is about $5000

Jim

From: Steve DeVaney
Sent: Tuesday, June 14, 2016 12:41 PM
To: Jim Scott
Subject: Fw: F-250 lease

FYI

From: Bruce Lundgren <blundgren@mchsi.com>
Sent: Tuesday, June 14, 2016 9:56 AM
To: Steve DeVaney
Subject: Re: F-250 lease

Steven,

The total for that truck would be $37,520.69. This includes all applicable taxes, license, and fees. Please let me know what else I can do for you.

Respectfully,

Bruce Lundgren
Lundgren Ford

From: Steve DeVaney
Sent: Tuesday, June 14, 2016 8:58 AM
To: Bruce Lundgren
Subject: Re: F-250 lease

Bruce,

PolyMet would like to know the full purchase price for the truck that you proposed the lease.

Thanks,
Steve DeVaney
PolyMet Mining, Inc.

From: Bruce Lundgren <blundgren@mchsi.com>
Sent: Tuesday, April 05, 2016 9:37:16 AM
To: Steve DeVaney
Subject: F-250 lease

Steven,

Please review the attached lease quote. I did not want to bother you with a credit application at this time so these numbers are approximate. If you need to be more specific please let me know. As always, if there is anything more I can do for you don't hesitate to call on me. Thanks for your interest.

Respectfully,

Bruce Lundgren

Attachment 11.

Demo

Asbestos Abatement Cost Proposal - Bid Form

Scope of Work Description	Reference Information	Asbestos Removal & Disposal Costs
Legacy Area 1 - used by project		
Area 1 Shop and Truck Storage (Bldg. 220)	ACT Report Zone H	$82,500
Area 1 Cold Storage (Bldg. 221)	No ACT report	$5,000
Area 1 Reporting Building (Bldg. 231)	No ACT report	$5,000
Area 1 Boiler House (Bldg. 226)	ACT Report Zone H	$2,500
Area 1 Fire Pump House & Water Tank (Bldg. 228)	ACT Report Zone H	$2,500
Legacy Area 2 - used by project		
Area 2 Service Shop (Bldg. 201)	ACT Report Zone I	$95,000
Area 2 Truck Storage (Bldg. 202)	ACT Report Zone I	$3,000
Area 2 Cold Storage (204)	ACT Report Zone I	$3,000
Area 2 Shop Locomotive Service Shop (Bldg. 203)	ACT Report Zone I	$52,500
Legacy Tailings Basin Buildings - used by project		
Foreman's Office (Bldg. 718)	No ACT report	$6,500
Reporting Building (Bldg. 719)	No ACT report	$6,500
Lube House (Bldg. 720)	No ACT report	$2,500
Reporting Building (Bldg. 724)	No ACT report	$2,500
Lube Oil Building (Bldg. 725)	No ACT report	$2,500
Legacy Plant Area - used by project		
Rebuild Shop (Bldg 602)	ACT Report Zone A	$85,000
General Shop (Bldg. 601)	ACT Report Zone A	$481,000
Carpenter Shop (Bldg. 603)	ACT Report Zone A	$2,500
Warehouse 49 (Bldg. 920)	ACT Report Zone A	$49,000
Warehouse 45 (Bldg. 921, Electrical)	ACT Report Zone A	$13,500
Lube House (Bldg. 926)	ACT Report Lubricant Storage Building	$52,000
Rubber Shop (Bldg. 605)	ACT Report Rubber Storage Building	$24,000
Water Treatment Plant & Storage Tanks	ACT Report Water Treatment Plant	$45,000
Colby Pump House	No ACT report	$2,500
Administration Building	ACT Report Administration Building	$850,000
Main Gate	No ACT report	$5,000
Sewage Treatment Plant	No ACT report	$5,000
Return Water Barge	No ACT report	$5,000

Total ACM Abatement Cost: **$1,891,000**

Asbestos Abatement Cost Proposal - Bid Form

Scope of Work Description	Reference Information	Asbestos Removal & Disposal Costs
Legacy Area 1 - used by project		
Area 1 Shop and Truck Storage (Bldg. 220)	ACT Report Zone H	$82,500
Area 1 Cold Storage (Bldg. 221)	No ACT report	$5,000
Area 1 Reporting Building (Bldg. 231)	No ACT report	$5,000
Area 1 Boiler House (Bldg. 226)	ACT Report Zone H	$2,500
Area 1 Fire Pump House & Water Tank (Bldg. 228)	ACT Report Zone H	$2,500
Legacy Area 2 - used by project		
Area 2 Service Shop (Bldg. 201)	ACT Report Zone I	$93,050
Area 2 Truck Storage (Bldg. 202)	ACT Report Zone I	$3,000
Area 2 Cold Storage (204)	ACT Report Zone I	$3,000
Area 2 Shop Locomotive Service Shop (Bldg. 203)	ACT Report Zone I	$52,150
Area 2 Shop Locomotive Fueling	ACT Report Zone I	$2,500
Legacy Tailings Basin Buildings - used by project		
Foreman's Office (Bldg. 718)	No ACT report	$6,500
Reporting Building (Bldg. 719)	No ACT report	$6,500
Lube House (Bldg. 720)	No ACT report	$2,500
Reporting Building (Bldg. 724)	No ACT report	$2,500
Lube Oil Building (Bldg. 725)	No ACT report	$2,500
Legacy Plant Area - used by project		
Rebuild Shop (Bldg 602)	ACT Report Zone A	$85,000
General Shop (Bldg. 601)	ACT Report Zone A	$480,800
Carpenter Shop (Bldg. 603)	ACT Report Zone A	$2,500
Warehouse 49 (Bldg. 920)	ACT Report Zone A	$49,000
Warehouse 45 (Bldg. 921, Electrical)	ACT Report Zone A	$13,500
Lube House (Bldg. 926)	ACT Report Lubricant Storage Building	$52,000
Rubber Shop (Bldg. 605)	ACT Report Rubber Storage Building	$24,000
Water Treatment Plant & Storage Tanks	ACT Report Water Treatment Plant	$45,000
Colby Pump House	No ACT report	$2,500
Administration Building	ACT Report Administration Building	$850,000
Main Gate	No ACT report	$5,000
Sewage Treatment Plant	No ACT report	$5,000
Return Water Barge	No ACT report	$5,000

Total ACM Abatement Cost: **$1,891,000**

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates							Mavo	Arrowhead Consulting & Testing
Scope of Work Description	Demo Specification Section Number	Reference Information / Drawings	Miscellaneous	Universal Waste Collection	Galbestos Removal	Demolition	Total Demo	Site Restoration	Assets Recovery	Asbestos Lead Paint Mold	Pre - Demo Building Inspection
Pre-Demolition Services			$54,400								
Legacy - demoed as part of construction											
Additive Building & Heating Plant							$1,593,300			Included in Lakehead's total demo	
Bentonite silos	8.1.14						inc in above			n/a	
Area 2 Water Tower (price separate from Heating & Additives buildings	8.1.29					$30,000	$30,000	$2,500	$1,125	n/a	
Legacy Tailings Basin Buildings - Demoed as part of construction											
Foreman's Office (Bldg. 718)	8.1.28	No ACT report				$9,350		$400		$6,500	$1,100
Reporting Building (Bldg. 719)	8.1.28	No ACT report				$9,900		$400		$6,500	$1,100
Lube House (Bldg. 720)	8.1.28	No ACT report				$2,500		$400		$2,500	$850
Reporting Building (Bldg. 724)	8.1.28	No ACT report				$3,300		$400		$2,500	$900
Lube Oil Building (Bldg. 725)	8.1.28	No ACT report				$2,500		$400		$2,500	$850
Legacy Area 1 - used by project											
Area 1 Shop and Truck Storage (Bldg. 220)	8.1.6	ACT Report Zone H		$2,900.00	$106,900	$103,332	$213,132	$74,669	$37,000	$82,500	
Area 1 Cold Storage (Bldg. 221)	8.1.6	ACT Report Zone H		$400.00	$48,970	$10,860	$60,230	$13,400	$2,800	$5,000	
Area 1 Reporting Building (Bldg. 231)	8.1.6	No ACT report				$9,900				$5,000	$850
Area 1 Boiler House (Bldg. 226)	8.1.6	ACT Report Zone H		$200.00	$13,500	$9,875	$23,575	$3,000	$200	$2,500	
Area 1 Fire Pump House & Water Tank (Bldg. 228)	8.1.6	TE-8-142 and TE-8-144, ACT Report Zone H		$410.00		$11,250	$11,660			$2,500	
Area 1 Locomotive Fueling	8.1.6	ACT Report Zone H		$500.00	$22,500	$10,100	$33,100	$6,250	$1,000	n/a	
Legacy Area 2 - used by project											
Area 2 Service Shop (Bldg. 201)	8.1.7	ACT Report Zone I		$2,200.00	$160,900	$38,990	$202,090	$37,334	$10,940	$93,050	
Area 2 Truck Storage (Bldg. 202)	8.1.7	ACT Report Zone I		$2,000.00	$63,190	$9,175	$74,365	$13,988	$3,075	$3,000	
Area 2 Cold Storage (204)	8.1.7	ACT Report Zone I		$697.00	$42,560	$13,080	$56,337	$14,100	$1,700	$3,000	
Area 2 Shop Locomotive Service Shop (Bldg. 203)	8.1.7	ACT Report Zone I		$3,400.00	$20,500	$12,300	$36,200	$11,113	$1,625	$52,150	
Area 2 Locomotive Fueling	8.1.7	ACT Report Zone I		$2,000.00	$20,900	$11,800	$34,700	$6,250	$975	$2,500	
Hose House (Bldg. 209) Not to be used in project	8.1.7	No ACT report			$3,000	$9,150				$2,500	$850
Sample House (Bldg. 208) Not to be used in project	8.1.7	No ACT report			$25,400	$20,300				$5,000	$950
Reporting Building (Bldg. 425) Not to be used in project	8.1.7	No ACT report			$3,300	$9,200				$3,500	$850
Legacy Plant Area - used by project											
Rebuild Shop (Bldg 602)	8.1.9	ACT Report Zone A		$3,000.00	$70,200	$125,600	$198,800	$27,560	$13,940	$85,000	
General Shop (Bldg. 601) Includes Acetylene Building (Bldg.604)	8.1.8	ACT Report Zone A		$15,000.00	$199,190	$353,600	$567,790	$182,300	$113,796	$480,800	
Carpenter Shop (Bldg. 603)	8.1.21	ACT Report Zone A		$2,000.00	$10,200	$13,250	$25,450	$3,300	$100	$2,500	
Coarse Crusher	8.1.1			$10,000.00	$313,345	$1,551,800	$1,875,145	$593,890	$199,325	$1,070,618	
Drive House 1 conv and housings	8.1.2	Drive Houses 1 & 2 and conveyors are all considered	$133,200	$7,500.00	$165,569	$141,540	$314,609	$46,900	$41,050	incl. in above	
Drive House 2 inc conv and housings	8.1.3	to be one structure for demo purposes.	inc in above		inc in above	inc in above	inc in above	inc in above	inc in above	incl. in Fines Crusher	
Fine Crusher	8.1.4			$45,000.00	$302,430	$1,373,460	$1,720,890	$203,400	$205,250	$439,686	
Warehouse 49 (Bldg. 920)	8.1.16	ACT Report Zone A		$6,500.00	$27,586	$82,800	$116,886	$15,947	$5,350	$49,000	
Warehouse 45 (Bldg. 921, Electrical)	8.1.15	ACT Report Zone A		$2,500.00	$35,159	$72,700	$110,359	$15,947	$3,590	$13,500	
Lube House (Bldg. 926)	8.1.10	ACT Report Lubricant Storage Building		$578.00	$17,000	$20,550	$38,128	$7,385	$1,600	$52,000	
Rubber Shop (Bldg. 605)	8.1.26	ACT Report Rubber Storage Building		$1,000.00	$30,464	$36,550	$68,014	$11,269	$5,150	$24,000	
Concentrator Building and Thickeners	8.1.5 AND 8.1.25			$100,000.00	$1,248,260	$5,895,850	$7,244,110	$1,145,998	$2,141,430	$1,535,236	
A-Lab	8.1.11			$500.00	$9,400	$14,560	$24,460	$2,940	$2,450	included in Concentrator	
Hinsdale Bridge	8.1.24			$0.00	$16,700	$616,300	$633,000	$15,200	$148,500	n/a	
Water Reservoir	8.1.12			$5,000.00		$98,100	$103,100	$914,400	$7,750	n/a	
Plant Site Water Tower	8.1.12	TG-7-005, Similar to Area 2 water tower				$30,000	$30,000	$2,500	$1,125	n/a	
Water Treatment Plant & Storage Tanks	8.1.27	TG-6-021		$1,000.00	$20,000	$72,600	$93,600	$2,250		$45,000	
Colby Pump House	8.1.13				$41,000	$8,260	$49,260	$1,500		$2,500	$1,000
Administration Building	8.1.17			$3,900.00		$157,935	$161,835	$18,200		$850,000	
Main Gate	8.1.18			$100.00		$11,400	$11,500	$875		$5,000	$900
Booster Pump House #1	8.1.19			$300.00		$23,500	$23,800	$9,200		included in Concentrator	
Sewage Treatment Plant	8.1.20	No ACT report		$0.00		$62,700	$62,700	$19,520		$5,000	$900
Portable Pump Houses	8.1.22	No ACM materials - See Dwg. TB-7-095		$0.00		$9,890	$9,890	$3,400		n/a	
Return Water Barge	8.1.23	No ACT report		$0.00		$44,900	$44,900			$5,000	$1,300
General Infrastructure (railroads, tunnels, roadways, etc)						$4,988,921	$4,988,921	$1,504,000	$237,500		
Railroads	8.2.5	Figure 7 and Krech & Ojard Dwg. C1		$0.00		$380,000	$380,000				
Tunnels (Service & Electrical)	8.2.2	TJ-63		$0.00		$1,856,000	$1,856,000			$2,127,767	
Galleries	8.2.2	Was estimated as a portion of the concentrator								included in Concentrator	
Sanitary Systems and Wells	8.2.1					$17,500	included in associated areas				
Pipelines				$0.00		$2,190,000	$2,190,000	$591,000			
Colby Lake water supply	8.2.2					$900,000		$98,000			
Inter pit pipeline	8.2.2					$562,000					

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates							Mavo	Arrowhead Consulting & Testing
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Total Demo**	**Site Restoration**	**Assets Recovery**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**
Natural Gas line	8.2.2					$150,000					
Tailings management above ground	8.2.2					$378,000					
Tailings management underground						$200,000					
Power Lines	8.2.3	Figures 5 & 5.1		$0.00		$97,810.00	$97,810				
Roads and Parking Lots	8.2.6	Figure 9		$0.00		$465,000	$465,000	$195,000			
New - Phase 1 - Plant Site											
Flotation Plant and Reagent Building	9.1.1			$75,000		$621,800	$696,800	$147,600	$242,500		
Concentrate Storage and Loadout Facility	9.1.2			$12,000		$273,760	$285,760	$48,100	$37,500		
Plant Site Sewage Treatment Plant	9.1.3	See Barr SOW 23 & Dwg. TL-2		$1,000.00		$118,000	$118,000	$30,000			
Railroads	9.3.3	See Barr SOW 19		$0.00		$185,000		$111,000			
Pipelines	9.3.1	SOW 12 and 14		$0.00		$1,555,000		$375,000			
Power Lines	9.3.2	SK-11-255		$0.00							
Roads and Parking Lots	9.3.4			$0.00							
Plant Site Wastewater Treatment Plant (WWTP) Ponds not included	9.5.2	See Barr SOW 20		$0.00		$245,000					
New - Phase 1 - Mine Site											
Maintenance Service and Fueling Facility	9.2.1			$1,100		$19,210	$20,310	$7,300	$1,200		
Rail Transfer Hopper	9.2.2	See Barr SOW 15		$1,100.00		$40,000	$41,100	$45,000	$1,200		
Rail Transfer Hopper Control Bldg	9.2.2	See Barr SOW 15		$100.00		$18,600	$18,700				
Rail Transfer Hopper Platform	9.2.2	See Barr SOW 15				$60,000	$60,000				
Central Pumping Station	9.2.3	See Barr SOW 7		$500.00		$14,000	$14,500	$1,200			
Railroads	9.2.4	See Barr SOW's 16, 17, 18		$0.00		$45,000	$45,000	$33,750			
Pipelines	9.3.1	See Barr SOW'S 05, 06, and 08		$0.00		$580,133	$580,133	$217,000			
Power Lines	9.3.2	See Barr SOW 13		$0.00		$83,900	$83,900		$7,175		
Roads and Parking Lots	9.3.4	See Barr SOW 1		$0.00		$392,000	$392,000	$132,000			
Mine Site Wastewater Treatment Facility (WWTF)	9.5.1	See Barr SOW 06		$0		$498,000	$498,000	$14,000			
New - Phase 2							$0				
Reagent Building	9.4.1	Bldg. Dims: 270' x 85' x 75' tall		$15,000.00		$820,000	$835,000	$4,100	$22,500		
Oxygen Plant	9.4.1	310' x 310' x 75' tall		$65,000.00		$4,238,600	$4,303,600	$16,600	$72,500		
Limestone Preparation	9.4.1	125' x 70' x 60' tall		$7,500.00		$345,000	$352,500	$1,750	$12,500		
Hydrometallurgical Plant	9.4.1	525' x 144' x 90' tall		$49,000.00		$4,365,000	$4,414,000	$13,500	$62,500		
Hydrometallurgical Reagents	9.4.1	144' x 90' x 90' tall		$15,000.00		$815,000	$830,000	$2,200	$17,500		
Railroads	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00							
Pipelines	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$1,450,000					
Power Lines	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00							
Roads and Parking Lots	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$156,000		$59,225			

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
a.	**Coarse Crusher**									
1	Below the ground level elevation of 1710', remove all existing HTHW pipelines with damaged or deteriorated insulation and all insulation fragments.					1478		124,817		
2	Below the ground level elevation of 1710', remove all equipment lubrication lines with damaged or deteriorated insulation and all insulation fragments.					1469		124,067		
3	Below the ground level elevation of 1710', remove any loose or fallen paint chips.					80		6,756		
4	Above the ground elevation of 1710', remove all lubrication lines with damaged or deteriorated insulation and all insulation fragments. Remove the insulation on the lubrication holding tanks.					730		61,649		
5	In the electrical control room, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					170		14,357		
6	In the electrical control room basement, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					250		21,113		
7	Clean the Coarse Crusher building of all extraneous debris and taconite fines.	2564						204,248		
8	Kill and clean mold from all Coarse Crusher building surfaces.	80						6,373		
9	Install protective railings around floor openings on apron feeder floor. Reestablish the north conveyor gallery exit by replacing all structurally compromised stair treads.	200						15,932		
	Sub-totals	2844	0	0	0	4177	0	579,301	320	0
b.	**Conveyor 1A\1B tunnel & Drive house 1** (556 ft.)									
1	Remove approximately **1200'** of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 1A and 1 B tunnel.					418		33,300		
2	Abate any loose or fallen paint chips.					80		6,756		
3	Clean tunnel and Drive House walkways and stairs of extraneous debris and taconite fines.	1285						102,204		
4	Kill and clean mold from all tunnel and Drive House No. 1 building surfaces.	120						9,559		
5	In Drive House #1, remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation between 1A and 1B tunnel and S -3 tunnel. Patch remaining partially deteriorated HTHW pipeline insulation.					76		6,418		
	Subtotal	1405	0	0	0	574	0	160,237	0	0
	Totals	**4247**	**0**	**0**	**0**	**4751**	**0**	**$739,538**	**320**	**0**

Supervision & Field Administration	Man-hours est.	950	Est. Cost	$92,530.00
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$132,900.00
Estimated Material Costs (Itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (Itemize)			Est. Cost	$100,650.00
			Total Estimated Cost	$1,070,618

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
c.	**Fine Crusher**									
1	Remove **all** existing HTHW pipelines with damaged or deteriorated insulation from the 4A/4B conveyor tunnel up to elevation 1794' on the north side of column 5. This insulation has tested positive for asbestos or probable ACM					496		41,887		
2	Remove all equipment lubrication lines damaged or deteriorated insulation and all insulation fragments from the 4A/4B conveyor tunnel up to the lube tanks at elevation 1817'-9" on the north side of column row 5. This insulation has tested positive for asbestos or probable ACM					901		76,089		
3	Remove any loose or fallen paint chips below the ground level elevation 1710'. The paint chips have tested positive for lead based material.					80		6,756		
4	Clean the Fine Crusher building of all extraneous debris and taconite fines.	987						78,624		
5	Kill and clean mold from Fine Crusher building surfaces.	80						6,373		
6										
	Sub-totals	1067	0	0	0	1477	0	209,730	0	0
d.	**Conveyors 4A\4B tunnel & Drive House No. 2** (120 ft. long)									
1	Remove approximately 275' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 4A and 4B tunnel. The insulation has tested positive for asbestos or probable ACM.					139		11,739		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					80		6,756		
3	Clean tunnel and Drive house walkways and stairs of extraneous debris and taconite fines.	607						48,354		
4	Kill and clean mold from all conveyor and Drive House No. 2 surfaces	80						6,373		
5	Remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in Drive House No. 2. The insulation has tested positive for asbestos or probable ACM.					88		7,432		
	Sub-totals	687	0	0	0	307	0	80,653	0	0
	Totals	**1754**	**0**	**0**	**0**	**1784**	**0**	**$290,382**	**0**	**0**

Supervision & Field Administration	Man-hours est.	441	Est. Cost	42,953
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (itemize)			Est. Cost	$5,000.00
Estimated Material Costs (itemize)			Est. Cost	$41,000.00
Estimated Misc. Costs (itemize)			Est. Cost	$60,350.00
			Total Estimated Cost	$439,686

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume [Cu. Yards]
		Labor	Operator	IW	Painters	Asbestos	Electrician		
d	**Service Tunnels**								
d-i.	**Service Tunnel S-1 (20X10X440)**								
1	Remove approximately 915' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					218		19,761	
2	Abate any loose or fallen paint chips.					48		3,726	
3	Clean tunnel walkways of extraneous debris and taconite fines.					468		41,251	
4	Kill and clean mold from all tunnel surfaces.					30		2,534	
	Sub-total	0	0	0	0	770	0	67,727	93
d-ii	**Service Tunnel S-2 (20X10X530)**								
1	Remove approximately 1,309' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					311		28,193	
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					53		4,476	
3	Clean tunnel walkways of extraneous debris and taconite fines.					525		44,338	
4	Kill and clean mold from all tunnel surfaces.					27		2,288	
	Sub-total	0	0	0	0	916	0	79,808	63
d-iii	**Service Tunnel S-3 (9X9X67)**								
1	Remove approximately 165' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					56		4,898	
2	Abate any loose or fallen paint chips.					6		507	
3	Clean tunnel walkways of extraneous debris and taconite fines.					34		1,582	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	81	0	6,825	7
d-iv	**Service Tunnel S-4 (10X10X372)**								
1	Remove approximately 800' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					188		16,721	
2	Abate any loose or fallen paint chips.					37		3,175	
3	Clean tunnel walkways of extraneous debris and taconite fines.					89		7,516	
4	Kill and clean mold from all tunnel surfaces.					22		1,808	
	Sub-total	0	0	0	0	336	0	29,220	26
d-v.	**Service Tunnel S-5 (7X8X31)**								
1	Remove approximately 65' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					41		3,462	
2	Abate any loose or fallen paint chips.					8		676	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		507	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	59	0	4,983	5
d-vi.	**Service Tunnel S-6 (8X8X31)**								
1	Remove approximately 70' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					49		4,138	
2	Abate any loose or fallen paint chips.					6		507	
3	Clean tunnel walkways of extraneous debris and taconite fines.					3		253	
4	Kill and clean mold from all tunnel surfaces.					2		169	
	Sub-total	0	0	0	0	60	0	5,067	5
d-vii.	**Service Tunnel S-7 (7X60X59)**								
1	Remove approximately 1300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					458		38,959	
2	Abate any loose or fallen paint chips.					65		5,488	
3	Clean tunnel walkways of extraneous debris and taconite fines.					165		13,934	
4	Kill and clean mold from all tunnel surfaces.					36		3,040	
	Sub-total	0	0	0	0	724	0	61,421	53
d-viii.	**Service Tunnel S-8 (7X8X30)**								
1	Remove approximately 300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					48		4,054	
2	Abate any loose or fallen paint chips.					6		507	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		507	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	64	0	5,406	5
d-ix.	**Service Tunnel S-9 (6-6X7-8X350)**								
1	Remove approximately 750' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					226		19,086	
2	Abate any loose or fallen paint chips.					42		3,547	
3	Clean tunnel walkways of extraneous debris and taconite fines.					50		4,223	
4	Kill and clean mold from all tunnel surfaces.					18		1,520	
	Sub-total	0	0	0	0	336	0	28,375	30
d-x.	**Service Tunnel S-10 (8X55X65)**								
1	Remove approximately 550' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					52		4,391	
2	Abate any loose or fallen paint chips.					10		845	
3	Clean tunnel walkways of extraneous debris and taconite fines.					9		760	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	75	0	6,334	6
d-xi.	**Service Tunnel S-11 (8X8X54)**								
1	Remove approximately 185' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					48		4,054	
2	Abate any loose or fallen paint chips.					16		1,351	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		507	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	74	0	6,249	6
	Totals	**0**	**0**	**0**	**0**	**3143**	**0**	**299,122**	**293**

Supervision & Field Administration	Man-hours est.	552	Est. Cost	$53,862
Craft support (Carpenters, teamster, hbsc operator, hbsc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (itemize)			Est. Cost	$44,585.00
Estimated Material Costs (itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (itemize)			Est. Cost	$76,360.00
			Total Estimated Cost	$179,819

SOW I.D.	Description	Est. Man-hours: Labor	Operator	FA	Painters	Asbestos	Electrician	Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
e.	**Electrical Tunnels**									
e-i.	**Electric Tunnel E-1N thru E-4N and E-1S thru E-4S** (7'X8'X260')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					2108		178,105		
2	Remove all existing deteriorated electric cables.					782		66,048		
3	Remove extraneous debris and taconite dust in the tunnel.					302		25,504		
4	Kill and clean mold from all tunnel surfaces.					147		12,414		
5	Remove all taconite fines and reestablish the emergency egress hatches					224		18,917		
	Sub-total	0	0	0	0	3569	0	301,988	777	0
e-ii.	**Electric Tunnel E-7** (7'X8'X203')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					424		35,807		
2	Remove all existing deteriorated electric cables.					147		12,414		
3	Remove extraneous debris and taconite dust in the tunnel.					24		2,027		
4	Kill and clean mold from all tunnel surfaces.					12		1,013		
	Sub-total	0	0	0	0	607	0	51,261	115	0
e-iii.	**Electric Tunnel E-8** (8 to 14 X 9-6 to 11 X 2758')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					3125		263,906		
2	Remove all existing deteriorated electric cables.					1235		104,296		
3	Remove extraneous debris and taconite dust in the tunnel.					425		35,895		
4	Kill and clean mold from all tunnel surfaces.					211		17,819		
	Sub-total	0	0	0	0	4560	0	421,917	1008	0
e-iv.	**Electric Tunnel E-9** (5-6X6-8X246)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					186		15,705		
2	Remove all existing deteriorated electric cables.					39		3,294		
3	Remove extraneous debris and taconite dust in the tunnel.					28		2,365		
4	Kill and clean mold from all tunnel surfaces.					15		1,267		
	Sub-total	0	0	0	0	145	0	22,631	89	0
e-v.	**Electric Tunnel E-10** (4-6X5-8X250')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					151		12,757		
2	Remove all existing deteriorated electric cables.					39		3,209		
3	Remove extraneous debris and taconite dust in the tunnel.					28		2,365		
4	Kill and clean mold from all tunnel surfaces.					14		1,182		
	Sub-total	0	0	0	0	231	0	19,509	93	0
e-vi.	**Electric Tunnels E-11** (5-6X6-8X95), **E-12** (5X6-9X15 to 7-6X2-6X22), **E-13** (same as 12), **E-14** (7-6X2-6X22), **E-15** (same as 14), **West Service Tunnel, and East Service Tunnel** (both service tunnels 6X10X180)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					374		31,584		
2	Remove all existing deteriorated electric cables.					102		8,614		
3	Remove extraneous debris and taconite dust in the tunnel.					74		6,249		
4	Kill and clean mold from all tunnel surfaces.					32		2,702		
	Sub-total	0	0	0	0	582	0	49,150	111	0
e-vii.	**Electric Tunnel E-16** (7X9-6X205)									
1	Remove extraneous debris and taconite dust in the tunnel.					80		6,756		
	Sub-total	0	0	0	0	80	0	6,756	0	0
	Concentrator									
6	In the North and South electrical control room basements, remove all existing ceiling tiles.					331		27,953		
7	In the North and South electrical control room basements, remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					1433		121,017		
8	In the North and South electrical control room basements, remove all existing deteriorated electric cables.					2143		180,976		
	Sub-total	0	0	0	0	3907	0	329,946	733	0
	Totals	**0**	**0**	**0**	**0**	**14212**	**0**	**1,180,858**	**2680**	**0**

Supervision & Field Administration	Man-hours est.	888	Est. Cost	89,491
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	210,109
Estimated Material Costs (Itemize)	**REPAIR BUDGET**		Est. Cost	35,000
Estimated Misc. Costs (Itemize)			Est. Cost	139,943
			Total Estimated Cost	1,648,738

MW LD.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper lbs.
		Labor	Operator	HH	Painters	Asbestos	Electrician			
a	**Concentrator** (1400 ft long building)									
1	Remove approximately 3,000' of existing HTHW pipelines along "F" and "G" column lines with damaged or deteriorated insulation and all fragments of insulation in 4A and 4B tunnel.					622		89,438		
2	Remove all insulated equipment fabrication lines and all insulation fragments.					1236		195,954		
3	Remove any loose or fallen paint chips.					220		16,890		
4	Kill and clean mold from all Concentrator building surfaces.					150		12,668		
5	Install protective railings around floor openings on separator deck and north side rod mill deck.					220		16,890		
9	Remove all floor tiles from the offices, locker rooms, washrooms, and central control room					981		76,089		
10	Remove all ceiling tiles from the offices, locker rooms, washrooms, and central control room.					1147		96,866		
11	In the North and South Air and Cable Ducts, remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap					841		71,027		
12	In the North and South Air and Cable Ducts, remove all existing deteriorated electric cables.					584		49,339		
	Sub-totals	0	0	0	0	6111	0	556,074	0	0
d-xE	**Service Gallery G-1, G-2, and Service Tunnel S-12** (20X10X470)									
1	Remove approximately 3300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					858		72,458		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					98		8,276		
3	Clean tunnel walkways of extraneous debris and taconite fines.					168		14,188		
4	Kill and clean mold from gallery and tunnel surfaces					30		2,534		
	Subtotal	0	0	0	0	1154	0	97,455	0	0
d-xH	**Service Gallery G-3 North Pipeway** (20X10X700)									
1	Remove approximately 1300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					1236		339,447		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					80		6,756		
3	Clean tunnel walkways of extraneous debris and taconite fines.					260		21,957		
4	Kill and clean mold from gallery and tunnel surfaces					30		2,534		
	Subtotal	0	0	0	0	1606	0	180,694	0	0
d-xJ	**Service Gallery G-4 South Pipe way, G-5 Gallery, and Service Tunnel S-13** (20X10X2200)									
1	Remove approximately 4500' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					2980		346,985		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					353		29,980		
3	Clean tunnel walkways of extraneous debris and taconite fines.					576		48,664		
4	Kill and clean mold from gallery and tunnel surfaces					103		8,445		
	Subtotal	0	0	0	0	4161	0	433,973	0	0
	Totals	0	0	0	0	12862	0	$1,085,196	0	0

Supervision & Field Administration	Man-hours est.	804	Est. Cost	78,818
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$302,280.00
Estimated Material Costs (Itemize)			Est. Cost	$35,080.00
Estimated Misc. Costs (Itemize)			Est. Cost	$251,470.00
			Total Estimated Cost	$1,535,236

Coarse Crusher

Misc Cost Breakdown

Air Samples		$1,000
Haul & Dispose of ACM		$48,430
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$7,400
MDH Fees		$5,870
Admin Exp (phones, office, facilities,etc.)		$5,200
HAZ/Reg Waste Collection		$20,000
Stair/Railing Repair		$10,000
SUBCONTRACT TOTAL	========>	$100,650

Fine Crusher

Misc Cost Breakdown

Air Samples		$600
Haul & Dispose of ACM		$18,360
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$3,615
MDH Fees		$2,445
Admin Exp (phones, office, facilities,etc.)		$3,455
Scaffold		$21,000
Reg/Haz Waste Collection/Disposal		$8,125
SUBCONTRACT TOTAL	========>	$60,350

Service Tunnels

Misc Cost Breakdown

Air Samples		$1,600
Haul & Dispose of ACM, Fines, Salvage		$60,610
Dispose of Lead Based Paint Scrapings		$390
Insurance (1%)		$2,790
MDH Fees		$3,780
Admin Exp (phones, office, facilities,etc.)		$2,190
Access Construction (BUDGET)		$5,000
SUBCONTRACT TOTAL	========>	$76,360

Electrical Tunnels

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose (acm, salvage)		$57,120
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$16,800
MDH Fees		$17,300
Haz/Reg Waste collection/disposal		$25,000
Admin Exp (phones, office, facilities,etc.)		$16,473
SUBCONTRACT TOTAL	========>	$136,943

CONCENTRATOR

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose of ACM		$25,840
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$14,820
MDH Fees		$15,560
Admin Exp (phones, office, facilities,etc.)		$5,000
Reg/Haz Waste Collection/Disposal		$45,000
Scaffold		$143,000
SUBCONTRACT TOTAL	========>	$253,470

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
a.	**Coarse Crusher**									
1	Below the ground level elevation of 1710', remove **all** existing HTHW pipelines with damaged or deteriorated insulation and all insulation fragments.					1478		124817		
2	Below the ground level elevation of 1710', remove all equipment lubrication lines with damaged or deteriorated insulation and all insulation fragments.					1469		124057		
3	Below the ground level elevation of 1710', remove any loose or fallen paint chips.					80		6756		
4	Above the ground elevation of 1710', remove all lubrication lines with damaged or deteriorated insulation and all insulation fragments. Remove the insulation on the lubrication holding tanks.					730		61649		
5	In the electrical control room, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					170		14357		
6	In the electrical control room basement, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					250		21113		
7	Clean the Coarse Crusher building of all extraneous debris and taconite fines.	2564						204248		
8	Kill and clean mold from all Coarse Crusher building surfaces.	80						6379		
9	Install protective railings around floor openings on apron feeder floor. Reestablish the north conveyor gallery exit by replacing all structurally compromised stair treads.	200						15932		
	Sub-totals	2844	0	0	0	4127	0	579301	320	0
b.	**Conveyor 1A\1B tunnel & Drive house 1** (556 ft.)									
1	Remove approximately **1200'** of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 1A and 1 B tunnel.					418		35300		
2	Abate any loose or fallen paint chips.					80		6756		
3	Clean tunnel and Drive House walkways and stairs of extraneous debris and taconite fines.	1283						102204		
4	Kill and clean mold from all tunnel and Drive House No. 1 building surfaces.	120						9559		
5	In Drive House #1, remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation between 1A and 1B tunnel and S -3 tunnel. Patch remaining partially deteriorated HTHW pipeline insulation.					76		6418		
	Subtotal	1403	0	0	0	574	0	160237	0	0
	Totals	**4247**	**0**	**0**	**0**	**4751**	**0**	**$739,538**	**320**	**0**

Supervision & Field Administration	Man-hours est.	950	Est. Cost	$92,530.00
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$132,900.00
Estimated Material Costs (Itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (Itemize)			Est. Cost	$77,220.00
			Total Estimated Cost	$1,047,188

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$3,400.00	3400
800402	Fuel	5	@	$1,200.00	6000
800403	Generators	5	@	$3,000.00	15000
800405	Lift Rental	5	@	$7,500.00	37500
800406	Skidsteer	5	@	$3,200.00	16000
800409	Vac Loader	2	@	$10,000.00	20000
800410	Boring Equip	70	@	$500.00	35000
	SUBTOTAL				132900

MATERIALS ITEMIZATION

Stairs/Railings	======>	5000
		========
		5000

Misc Cost Breakdown

Air Samples		$1,400
Haul & Dispose of ACM		$45,000
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$7,400
MDH Fees		$5,270
Admin Exp (phones, office, facilities,etc.)		$6,200
HAZ/Reg Waste Collection		$20,000
Stair/Railing Repair		$10,000
SUBCONTRACT TOTAL	====>	$97,220

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper lbs.
		Labor	Operator	AV	Painters	Asbestos	Electricians			
c.	Fine Crusher									
1	Remove all existing HDPW pipelines with damaged or deteriorated insulation from the 4A/4B conveyor tunnel up to elevation 1794' on the north side of column 5. This insulation has tested positive for asbestos or probable ACM					450		45,887		
2	Remove all equipment (lockout/tagout) with damaged or deteriorated insulation and all insulation fragments from the 4A/4B conveyor tunnel up to the vibe tanks at elevation 1817'-9" on the north side of column row 5. This insulation has tested positive for asbestos or probable ACM.					501		76,089		
3	Remove any loose or fallen paint chips below the ground level elevation 1770'. The paint chips have tested positive for lead-based material					50		6,756		
4	Clear the Fine Crusher building of all extraneous debris and loose bits	337						28,628		
5	Kit and clean mold from Fine Crusher building surfaces.	50						5,477		
6										
	Sub-totals	3193	0	0	0	3477	0	209,730	0	0
e.	Conveyors 4A/4B tunnel & Drive House No. 2 (120 ft. long)									
1	Remove approximately 275' of existing HDPW pipelines with damaged or deteriorated insulation and all fragments of insulation on 4A and 4B tunnel. The insulation has tested positive for asbestos or probable ACM					139		11,739		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					81		6,756		
3	Clean tunnel and Drive house walkways and stairs of extraneous debris and loose bits.	601						48,354		
4	Kit and clean mold from all conveyor and Drive House No. 2 surfaces	80						6,477		
5	Remove approximately 120' of existing HDPW pipelines with damaged or deteriorated insulation and all fragments of insulation in Drive House No. 2. The insulation has tested positive for asbestos or probable ACM.					58		7,432		
	Sub-totals	681	0	0	0	303	0	80,053	0	0
	Totals	3754	0	0	0	3780	0	$289,782	0	0

Supervision & Field Administration	Man-hours est.	441	Est. Cost	41,955
Craft Support (Carpenters, Scaffold, Misc. Operator, Misc Labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Rental)			Est. Cost	$5,000.00
Estimated Material Costs (Rental)			Est. Cost	$41,000.00
Estimated Misc. Costs (Rental)			Est. Cost	$51,640.00
			Total Estimated Cost	$429,376

EQUIPMENT (TSM)ZATION

500401	Small Tool Repair	1	ff	$1,200.00	1200
500402	Fuel	2	rr	$1,200.00	2400
500403	Generators	2	ff	$3,000.00	6000
500404	Lift Rental	2	ff	$7,500.00	15000
500405	Skidsteer	2	ff	$3,200.00	6400
500406	Vol Loader	1	ff	$[illegible]	10000
	SUBTOTAL				[illegible]
					41000

MATERIALS ITEMIZATION

Railing/Tread Steel	5000
	5000

Misc Cost Breakdown

Air Samples	$600
Haul & Dispose of ACM	$9,450
Dispose of Lead Based Paint Scrapings	$2,750
Insurance (1%)	$1,615
MDH Fees	$2,445
Admin Exp (phones, office, facilities,etc.)	$3,405
Scaffold	$31,000
Reg/Haz Waste Collection/Disposal	$8,125
SUBCONTRACT TOTAL >>>>>>>	$61,440

S/N	Description	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Service Tunnels								
4.1	Service Tunnel S-1 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.2	Service Tunnel S-2 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.3	Service Tunnel S-3 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.4	Service Tunnel S-4 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.5	Service Tunnel S-5 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.6	Service Tunnel S-6 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.7	Service Tunnel S-7 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.8	Service Tunnel S-8 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.9	Service Tunnel S-9 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.10	Service Tunnel S-10 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.11	Service Tunnel S-11 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
		Total [illegible]	[illegible]

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$685.00	685
800402	Power Washer	3	@	$3,200.00	9600
800403	Generators	3	@	$3,000.00	9000
800405	Fuel	3	@	$1,200.00	3600
800408	Skidsteer	3	@	$3,200.00	9600
800409	Vac Loader	1	@	$12,000.00	12000
800410	Hoisting Equip	0	@	$100.00	0
	SUBTOTAL				[illegible]
					44685

MATERIALS ITEMIZATION

Budget	======>	5000

		5000

Misc Cost Breakdown

Air Samples	$2,000
Haul & Dispose of ACM, Fines, Salvage	$31,200
Dispose of Lead Based Paint Scrapings	$390
Insurance (1%)	$2,790
MDH Fees	$3,780
Admin Exp (phones, office, facilities,etc.)	$2,190
Access Construction (BUDGET)	$6,000
SUBCONTRACT TOTAL ==========>	$46,390

SOW No.	Description	[illegible]						Est. Labor Cost	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
A	Electrical Tunnels									
A.1	Electric Tunnel E-14 thru E-[illegible] and E-15 thru E-45 ([illegible])									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					147		[illegible]		
5	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	137	[illegible]
A.2	Electric Tunnel E-7 ([illegible])									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					147		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A.3	Electric Tunnel E-8 ([illegible])									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A.4	Electric Tunnel E-9 ([illegible])									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A.5	Electric Tunnel E-10 ([illegible])									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A.6	Electric Tunnels E-11 ([illegible]), E-12 ([illegible]), E-13 ([illegible]), E-14 ([illegible]), E-16 ([illegible]), West Service Tunnel, and East Service Tunnel ([illegible])									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A.7	Electric Tunnel E-18 ([illegible])									
1	[illegible]					[illegible]		[illegible]		
	Subtotal	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0
	Concentrator									
[illegible]	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
b	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	0	[illegible]	0	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0

[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	
[illegible]				[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	[illegible]
[illegible]				[illegible]	[illegible]
				[illegible]	[illegible]

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$3,693.00	8200
800402	Fuel	5	@	$1,200.00	6000
800403	Generators	5	@	$3,000.00	15000
800405	Lift Rental	5	@	$1,500.00	7500
800406	Skidsteer (2)	12	@	$3,200.00	38400
800409	Vac Loader	1	@	$10,000.00	10000
800410	Scaffold	1	@	$125,000.00	125000
	SUBTOTAL				210100

MATERIALS ITEMIZATION

Stair/Railings	=======>	15000
		==========
		15000

Misc Cost Breakdown

Air Samples	$2,500
Haul & Dispose (asm, salvage)	$29,400
Dispose of Lead Based Paint Scrapings	$2,750
Insurance (1%)	$16,600
MDH Fees	$17,300
Haz/Reg Waste collection/disposal	$25,000
Admin Exp (phones, office, facilities,etc.)	$16,473
SUBCONTRACT TOTAL ==========>	$109,223

SOW #	Description	Est. Man Hours: Labor	Operator	[illegible]	Foreman	[illegible]	[illegible]	Est. Labor Cost	Est. [illegible] Volume (Cu. Yards)	Est. [illegible] Cost
8	[illegible]									
1	[illegible]					850		56,459		
2	[illegible]					1346		[illegible]		
3	[illegible]					280		[illegible]		
4	[illegible]					150		21,645		
5	[illegible]					200		16,450		
9	[illegible]					925		76,262		
10	[illegible]					2147		[illegible]		
11	[illegible]					442		[illegible]		
14	[illegible]					544		44,419		
	Sub Total	0	0	0	0	6175	0	516,014	0	0
[illegible]	Service Gallery G-1, G-2, and Service Tunnel [illegible]									
1	[illegible]					[illegible]		72,408		
2	[illegible]					[illegible]		4,275		
3	[illegible]					252		14,194		
4	[illegible]					50		[illegible]		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	0	0
[illegible]	Service Gallery G-3 North Pipeway [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					80		6,355		
3	[illegible]					[illegible]		21,857		
4	[illegible]					33		1,571		
	Subtotal	0	0	0	0	[illegible]	0	[illegible]	0	0
[illegible]	Service Gallery G-4 South Pipeway, G-5 Gallery, and Service Tunnel S-11 [illegible]									
1	[illegible]					[illegible]		144,406		
2	[illegible]					405		33,340		
3	[illegible]					616		46,513		
4	[illegible]					105		[illegible]		
	Subtotal	0	0	0	0	1257	0	[illegible]	0	0

	Total	0	0	0	0	11443	0	[illegible]	0	0

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	
[illegible]			[illegible]	[illegible]
[illegible]			[illegible]	[illegible]
[illegible]			[illegible]	[illegible]
			[illegible]	[illegible]

EQUIPMENT ITEMIZATION

Small Tool Repair	1	@	$8,500.00	8500
Fuel	4	@	$1,500.00	6000
Generators	4	@	$3,340.00	13360
Forklift	4	@	$2,200.00	8800
Skidsteer	8	@	$3,200.00	25600
Vac Loader	2	@	$10,000.00	20000
Scissor lift	4	@	$1,500.00	6000
Hoisting Equip	40	@	$350.00	14000
SUBTOTAL				102260

MATERIALS ITEMIZATION

Repair Steel	======>	15000
		==========
		15000

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose of ACM		$13,360
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$14,820
MDH Fees		$19,560
Admin Exp (phones, office, facilities,etc.)		$5,000
Reg/Haz Waste Collection/Disposal		$45,000
Scaffold		$143,000
SUBCONTRACT TOTAL	[illegible]	$240,930

PolyMet is evaluating the proposal, to assist in our effort we have a few follow up questions.

1) Please provide an estimated duration to complete the work in each project area.

Coarse Crusher – 95 days
Fine Crusher – 44 days
Concentrator – 80 days
Service Tunnels – 55 days
Electric Tunnels – 90 days

2) Please describe your proposed methods and techniques for lead abatement.

Areas of delaminated/deteriorated paint will be misted then either vacuumed or scraped and collected for disposal. TCLP will be performed for disposal protocols.

3) Please describe your proposed methods and techniques for general cleanup in each project area.

General debris will be removed to a location directed by Polymet staff. Fines will be vacuumed via vec loader or HEPA vacuums. Main walk ways will be mopped (concrete floors only). All debris will be collected and discarded as directed by Polymet staff.

4) Please describe your proposed methods and techniques for removal of the ACM fire protective wrap, Transite conduit, and electrical cable.

The electrical tunnel will be placed under a containment consisting of critical barriers, negative air and attached personnel and equipment decontamination units. Upon the removal, all electrical cabling will be removed from the transite conduit and removed to an area directed by Polymet. Transite conduit will then be removed, packaged and disposed.

Owner's response to Mavo's Clarifications & Assumptions

Mavo item 1). It is assumed that all overhead cranes are operational and can be used as a work platform for the cleaning/power washing portion of the project.

Owner's response – The schedule to reinstate the overhead cranes has not been determined, thus it should not be assumed they will be operational during the project.

Scaffold pricing and additional lift pricing has been added to the budget.

Mavo item 2). Owner to provide power and potable water. Mavo Systems will provide water filtration to power washing equipment. It is assumed that there will be a minimum water pressure of 20 PSI at the nozzle.

Owner's response – The contractor is responsible for supply of potable water.

Section D, item I of the work scope states: The Contractor shall supply **drinking and wash water**, field offices and lunchrooms, sanitary facilities, and wash water collection and filtering. The owner shall supply temporary electrical power at select locations.

Section 1 item ee of the general conditions also state: The Contractor will furnish their employees an adequate supply of portable water, containers, disposable cups, and trash receptacles for used cups.

Potable water will be contractor responsibility.

Mavo item 8). Electrical tunnel E8 is assumed to be 1,956 lineal feet not the 2,756 listed in the scope work.

Owner's response – The length of E-8 tunnel has been check and verified at 2,756 feet.

Confirmed

Mavo item 10). Included in the scope of work is the handling all the waste streams by disposal at the on-site landfill which the exception of the ACM wrapped lube oil piping. Excluded is the disposal of the miscellaneous hazardous waste such as bulbs, ballasts, paint, lead paint, chemicals, solvents, etc. – these items will be hauled to a central location and owner to take care of from there.

Owner's response – The Contractor is responsible for removal, transport, and disposal of hazardous materials.

Section D, item i of the work scope states: The Contractor is responsible for removal, transport, and disposal of hazardous materials. Contractor must secure the appropriately knowledgeable, certified, and/or licensed personnel to perform all hazardous waste activities. The Contractor is responsible to obtain permits and submit all reports required by state and federal agencies.

Pricing has been added to the budget to collect/dispose of Reg/Haz waste encountered

Proposal Specific Questions

1) The Mavo equipment itemization and estimate does not include lunch or office trailers, de-con stations, onsite vehicles, dumpsters, forklifts, or trucks. Will you be using these? If so what is the estimated cost?

   All costs have been addressed

2) The Mavo material itemization list includes consumables, which could be stated as a single entry = Man-hours * consumable rate, which is already covered as a portion of your labor hours. An example of anticipated material items is welding rod, cutting gases, lumber, rod stock and flat iron for hand rail, and grating for stairs. Did you include any of these items? Included

3) Do you have any resumes available for your Superintendent, Foremen and Project Manager? See attached

MAVO SYSTEMS

John Kraskey
Project Manager

Mavo Systems, Inc.
Duluth, MN

Qualifications
27 Years Abatement Experience

Summary of Work Experience

06/88 to 05/94	Rem-Con, Inc.	Worker/ Site Supervisor
05/94 to 10/2004	Envirobate, Inc	Supervisor/Project Manager
10/2004 to present	Mavo Systems, Inc.	Project/Regional Manager

Education and Industry Training / Certification

1988 - 1992	Construction Laborers – Lino Lakes, MN Asbestos Abatement Workers Certification
1992 - 2015	Construction Laborers – Lino Lakes, MN Asbestos Abatement Site Supervisor Certification
1996	Air Sampling Certification – MacNeil Environmental
1997 - 2015	Lead Abatement Contractor /Site Supervisor Certification

MAVO SYSTEMS

Melverd Nelson
Superintendent

Mavo Systems, Inc.
White Bear Lake, MN

Qualifications
19 Years Abatement Experience

Summary of Work Experience

07/96 To Present Mavo Systems, Inc. Worker/ Site Supervisor

Education and Industry Training / Certification

1996 Construction Laborers – Lino Lakes, MN Asbestos Abatement Workers Certification

1997 Construction Laborers – Lino Lakes, MN Asbestos Abatement Site Supervisor Certification

1998 Asbestos Abatement Contractor /Site Supervisor Refresher Course Lake States – White Bear Lake Two Day Air Sampling

1999 Construction Laborers – Lino Lakes, MN
Asbestos Abatement Contractor/ Supervisor Refresher Course

2000 Construction Laborers – Lino Lakes, MN
Asbestos Abatement Contractor/ Supervisor Refresher Course Firefighter I & II Training, Confined Space, Ladder Safety, Hazmat, Building Construction, Sprinkler Systems, Fire Safety

2001 Construction Laborers – Lino Lakes, MNAsbestos Abatement Contractor/ Supervisor Refresher Course Anoka Hennepin Technical College EMT-B Training, First Aid, CPR, EMT-B Certified

2002 Construction Laborers – Lino Lakes, MN Asbestos Abatement Contractor/ Supervisor Refresher Course Lead Abatement Contractor/ Supervisor Certification

2003-2015 Construction Laborers – Lino Lakes, MN Asbestos Abatement Contractor/ Supervisor Refresher Course/ Lead Abatement Contractor/ Supervisor Refresher Course

MAVO SYSTEMS

Gust Wells
Superintendent

Mavo Systems, Inc.
White Bear Lake, MN

Qualifications
8 Years Abatement Experience

Summary of Work Experience

06/2007 to Present	Mavo Systems, Inc.	Worker/Foreman/ Site Supervisor

Education and Industry Training / Certification

2008 - 2015	Construction Laborers – Lino Lakes, MN Asbestos Abatement Supervisor Certification
2007	Construction Laborers – Lino Lakes, MN Air Sampling Certification
2010 - 2015	Construction Laborers - Lead Abatement Contractor /Site Supervisor Certification
2011 - 2016	Construction Laborers – Lead Renovator (RRP) Course
2013 - 2016	MN Emergency Medical Services Regulatory Board – First Responder
2010 - 2016	Construction Laborers – Lino Lakes, MN Hazwoper (Haz Waste) Course

MAVO SYSTEMS

Environmental and Specialty Contracting Services

BUDGET PROPOSAL

DATE: ***June 7, 2016***

PROPOSAL SUBMITTED TO:	**PolyMet**	DESCRIPTION OF WORK:	**Legacy ACM Abatement**
ADDRESS:		SITE LOCATION:	**PolyMet**
CITY, STATE, ZIP:	**Hoyt Lakes, MN**	ADDRESS:	
ATTENTION:	**Mike Glissman**	CITY, STATE, ZIP:	**Hoyt Lakes, MN**
PHONE:	**218.471.2150**		

Mavo Systems, Inc. proposes the following scope of work:

This budgetary proposal is for abatement of ACM materials from remaining structures as part of a closure procedure for the PolyMet NorthMet venture. The pricing attached represents removal of acm materials from buildings and structures that will be necessary to facilitate demolition by others. No other removals are included in this pricing.

Pricing includes all costs associated with asbestos removal for each location identified except 3rd party monitoring typically retained by owner.

All pricing represents removal procedures compliant with all federal, state and local regulations governing asbestos abatement.

Legacy Area 1 - used by project	**Scope of Work**
Area 1 Shop and Truck Storage (Bldg. 220)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Area 1 Cold Storage (Bldg. 221)	- windows
Area 1 Reporting Building (Bldg. 231)	- windows
Area 1 Boiler House (Bldg. 226)	- windows
Area 1 Fire Pump House & Water Tank (Bldg. 228)	- windows
Legacy Area 2 - used by project	
Area 2 Service Shop (Bldg. 201)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Area 2 Truck Storage (Bldg. 202)	- windows
Area 2 Cold Storage (204)	- windows
Area 2 Shop Locomotive Service Shop (Bldg. 203)	- flooring, mastics, tsi, valves, gaskets, windows
Legacy Tailings Basin Buildings - used by project	
Foreman's Office (Bldg. 718)	- flooring, mastics, tsi, windows
Reporting Building (Bldg. 719)	- flooring, mastics, tsi, windows
Lube House (Bldg. 720)	- windows
Reporting Building (Bldg. 724)	- windows
Lube Oil Building (Bldg. 725)	- windows
Legacy Plant Area - used by project	
Rebuild Shop (Bldg 602)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
General Shop (Bldg. 601)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Carpenter Shop (Bldg. 603)	- windows
Warehouse 49 (Bldg. 920)	- flooring, mastics, tsi, valves, gaskets, windows
Warehouse 45 (Bldg. 921, Electrical)	- tsi, windows
Lube House (Bldg. 926)	- flooring, mastics, tsi, valves, gaskets, windows
Rubber Shop (Bldg. 605)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Water Treatment Plant & Storage Tanks	- flooring, mastics, tsi, valves, gaskets, windows
Colby Pump House	- valves, gaskets, windows
Administration Building	- flooring, mastics, tsi, plaster, windows
Main Gate	- flooring, mastics, windows
Sewage Treatment Plant	- valves, gaskets, windows
Return Water Barge	- valves, gaskets, windows

***anticipate a 2% increase to all pricing for each year until performance.*

Submitted: John Kraskey

Attachment 12.

Monitoring

Large Table 15 Monitoring Plan – Internal Streams – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Flotation Tailings Basin (FTB) Pond	PS	P	Cell 1E Cell 2E Cell 1/2E	Large Figure 7	Water Level	Daily	Annual Monitoring Report	Monitoring of pond water levels
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of in-pond water quality trends
FTB Seepage	S	P	WS126	Large Figure 7	Flow rate	Continuous	Annual Monitoring Report	Monitoring of flow from the FTB South Seepage Management System recycled to the FTB Ponds and pumped to the WWTP
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of trends in water quality of recovered surface seeps
	S	P	FTB Containment System	Large Figure 7	Flow rate	Continuous	Annual Monitoring Report	Monitoring of flow from the FTB Containment System recycled to the FTB Ponds and pumped to the WWTP
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of trends in water quality of FTB Containment System
Hydrometallurgical Residue Facility	PS	P	HRF Pond	Large Figure 7	Water Level	Daily	Annual Monitoring Report	Monitoring of pond water levels
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of in-pond water quality trends
	PS	P	HRF Leachate	Large Figure 7	Flow rate	Continuous	Annual Monitoring Report	Monitoring the quantity of leachate collected by the drainage layer.
					Water Quality (TBD)	Monthly or Quarterly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of leachate water quality.
Continued Existing Waste Streams	SW	P	WS009	Large Figure 7	Flow Rate	Quarterly during non-frozen conditions (Apr, Jul, Oct)	Annual Monitoring Report	Monitoring the quantity of water that enters the Tailings Basin from the east. Monitoring will cease once the East Dam is constructed in this area, which will cut off this flow.
					Water Quality (TBD)	Quarterly during non-frozen conditions (Apr, Jul, Oct)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of water entering the Tailings Basin from the east. Monitoring will cease once the East Dam is constructed in this area, which will cut off this flow.

Large Table 16 Monitoring Plan – Stormwater – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Stormwater	SW	P	TBD	Large Figure 8	Flow rate	Monthly during non-frozen conditions (approximately April to October)	Annual Monitoring Report	Monitor volume of stormwater outflows from the Plant Site
					Water Quality (TBD)	Monthly during non-frozen conditions (approximately April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitor quality of stormwater outflows from the Plant Site

Large Table 17 Monitoring Plan – Surface Discharges – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
WWTP Effluent	TW	P	TBD	Large Figure 9	Flow rate	Continuous	Annual Monitoring Report	Monitoring effluent quantity
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Monthly	Monitoring effluent characteristics to document water quality prior to discharge
	SW	P	TBD (Unnamed Creek, near SD006)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Unnamed Creek
	SW	P	TBD (Trimble Creek)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Trimble Creek
	SW	P	TBD (Mud Lake Creek)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Mud Lake Creek
	SW	P	SD026 (Second Creek)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Second Creek

Large Table 18 Monitoring Plan – Surface Water – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Embarrass River and Tributaries	SW	E	PM-12 (existing NPDES station SW004) PM-12.2 PM-13 (existing NPDES station SW005) MLC-2 PM-19 PM-11 (existing NPDES station SW003)	Large Figure 10	Flow rate	Monthly during non-frozen conditions (April to October)	Annual Monitoring Report	Monitoring streamflow in the Embarrass River.
					Water Quality (TBD)	Monthly during non-frozen conditions (April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring water quality in the Embarrass River and tributaries.
Second Creek	SW	P	PM-7	Large Figure 10	Flow rate	Monthly during non-frozen conditions (April to October)	Annual Monitoring Report	Monitoring streamflow in Second Creek downstream of the FTB South Seepage Management System and downstream of the WWTP discharge
					Water Quality (TBD)	Monthly during non-frozen conditions (April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of Second Creek downstream of the FTB South Seepage Management System and downstream of the WWTP discharge
Colby Lake Intake	SW	P	TBD (Colby Lake)	See Large Figure 102 of Reference (8)	Flow rate	Continuous	Water Quantity Monitoring Report • Annual • Monthly	Monitoring of the Colby Lake intake (existing location)
	SW	P	TBD (Unnamed Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation of Unnamed Creek.
	SW	P	TBD (Trimble Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation of Trimble Creek.
	SW	P	TBD (Mud Lake Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation in Mud Lake Creek.
	SW	P	TBD (Second Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation in Second Creek.

Large Table 19 Monitoring Plan – Groundwater – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Groundwater	GW	E	GW001 GW002 GW003(1) GW004(1) GW005 GW006 GW007 GW008 GW009 GW010 GW011 GW012 GW013 GW014 GW015 GW016	Large Figure 11	Groundwater Elevations	Quarterly during non-frozen conditions (April, July October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring groundwater levels
					Water Quality (TBD)	Quarterly during non-frozen conditions (April, July, October)	Water Quality Monitoring Report • Annual • Quarterly	Monitor groundwater quality trends through time

(1) Monitoring wells GW003 and GW004 are currently dry and have been dry for a number of years. These wells will be checked during each monitoring event. If they are found to contain water, groundwater elevations will be measured and the feasibility of obtaining groundwater quality samples will be evaluated.

Large Table 20 Monitoring Plan – Wetland Hydrology – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Wetlands – Baseline Monitoring								
Baseline Wetlands for the Plant Site	GW	E	Well TB1 through TB14 and TB1M through TB7M Ref TB1, Ref TB8, and Ref TB8M	Large Figure 8 in Reference (13)	Elevation – relative to ground surface	In progress Began in 2010 Ranging from monthly to continuous during non-freezing months	Varies	Provide sufficient hydrology information to allow identification of potential indirect hydrologic impacts to wetlands. There are currently 24 wetland hydrology monitoring wells at the Plant Site; see Section 4.3 of the Wetland Management Plan (Reference (13))
Wetlands – Operations Monitoring								
Plant Site Wetlands	GW	E P	TBD in permitting TBD in permitting	Large Figure 8 in Reference (13)	Elevation – relative to ground surface	TBD in permitting	TBD in permitting	This program will provide the necessary information to determine whether indirect hydrologic impacts have occurred and to assess required mitigation measures. Additional information is available in Section 4.4 of the Wetland Management Plan (Reference (13)) Final number of wells is TBD in permitting

Appendix 15.4 Mine Year 1 Projected Financial Assurance Estimate

NorthMet Financial Assurance Estimate
Basis of Cost for Mine Year 1

Report Prepared for

PolyMet Mining Inc.

Report Prepared by

SRK Consulting (U.S.), Inc.
177900.020
October 2016

NorthMet Financial Assurance Estimate Basis of Cost for Mine Year 1

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (U.S.), Inc. (SRK) by PolyMet Mining Corp (PolyMet). These opinions are provided in response to a specific request from PolyMet to do so, and are subject to the contractual terms between SRK and PolyMet. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report.

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List of Abbreviations

ACM	asbestos-containing materials
AOC	Areas of Potential Concern
AST	aboveground storage tank
Cliffs Erie	Cliffs Erie, LLC
FTB	Flotation Tailings Basin
HRF	Hydrometallurgical Residue Facility
kV	kilovolt
LTVSMC	LTV Steel Mining Company
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
OSLA	Overburden Storage and Laydown Area
OSP	Ore Surge Pile
PCB	polychlorinated biphenyl
PGE	platinum-group elements
PolyMet	Poly Met Mining Inc.
Project	NorthMet Project
PTM	Permit to Mine
RTH	Rail Transfer Hopper
TBD	To Be Determined
TWP	Treated Water Pipeline
WWTF	Mine Site Waste Water Treatment Facility
WWTP	Plant Site Waste Water Treatment Plant

1 Introduction and Scope of Report

This report is prepared in support of the financial assurance estimate for Mine Year 1 for the NorthMet Project (Project) Mine and Plant Sites and legacy components acquired by Poly Met Mining Inc. (PolyMet) from Cliffs Erie, LLC (Cliffs Erie).

1.1 Information Available

This report and the CRE are based on closure assumptions and actions described in the documents provided in Table 1-1. The CRE has been prepared with the Standardized Reclamation Cost Estimator (SRCE).

Table 1-1 Management Plans and Other Documents Referenced in Preparation of the CRE

Document	File Name/Version
Reclamation Plan	Reclamation_Plan_v6_FEB2015.pdf
Mine Plan	Mine_Plan_v4_DEC2014.pdf
Rock and Overburden Management Plan	Rock_and_Overburden_Management_Plan_v7_JAN2015.pdf
Flotation Tailings Management Plan	Flotation_Tailings_Management_Plan_v5_MAR2015.pdf
Residue Management Plan	Residue_Management_Plan_v4_DEC2014.pdf
Water Management Plan – Mine	Water_Management_Plan_-_Mine_v4_MAR2015.pdf
Water Management Plan – Plant	Water_Management_Plan_-_Plant_v4_MAR2015.pdf
Adaptive Water Management Plan	Adaptive_Water_Management_Plan_v9_APR2015.pdf
Ames SOW Quotes	CRE Bid Form for Ames MAY 16 2016 v2 – Ames JS.xlsx
Seed, fertilizer, and mulch quote	DandT Seeding Contingency Reclamation Estimate on Letterhead.doc
Pace Analytical Services, Inc. 2016 Price List	2016 Pace Fee Schedule - PolyMet.pdf
Proposal for NorthMet Dam Safety Inspection	Dam Safety Inspection Estimate for CRE 04_01_2015.pdf
Verification of Express Employment maintenance personnel rates	Express Employment temp services.pdf
Barr Engineering Fee Schedule – 2016	Fee Schedule_Barr 2016_US.pdf

Verification of NorthTek Security Services rates	NorthTEK Security Services.docx
Cost Estimates on Several Items	NTS Cost Estimate Signed Final.pdf
Snow Plowing Costs for 2013-2014 and 2014-2015	CRE SNOWPLOWING 2013-2016.xlsx
NorthMet Project Feature Changes Over Time	NorthMet Project Feature Changes Over Time v1.7 SEPT2016.pdf
Summary of Non-Mechanical Treatment Plans for PolyMet	MNT Summary_Combined_05182016.pdf
Pond Dimensions	"Ponds_ml_20150723.xlsx" "Water_Management_Plan_-_Mine_v4_MAR2015.pdf" Large Figure 4
Haul Distances	Haul Distances_rev_20160616.pdf
Asbestos Abatement Cost Proposal - Bid Form	ACM Abatement Bid Form rev 2.pdf
Asbestos Abatement Cost Proposal - Bid Form	DOC021915-02192015135429.pdf

1.2 Structure of Report

This report discusses the project description, closure assumptions and actions, and the closure cost estimate accompanying the closure assumptions and actions. The project description (Section 2) gives an overview of the life-of-mine (LOM) project components as well as a description of the project components at the time and phase for which the CRE has been prepared (Section 2.4).

1.3 Scope of Report

This report describes the closure liabilities present at the end of Mine Year 1 in the event of a default during Mine Year 1. The scope is drawn from the LOM closure plan as well as details provided at the end of Mine Year 1 by PolyMet and adjusted for the end of Mine Year 1 configuration. Exceptions and assumptions deviating from the LOM closure plan assumptions are outlined where applicable.

2 Project Description

2.1 Mine Site

The Project would use open pit mining methods, similar to those used at nearby taconite mines. Key Project features at the Mine Site would include:

- Supporting infrastructure (such as roads, electrical supply, rail connections, fueling and maintenance facilities);
- An Overburden Storage and Laydown Area (OSLA) to provide space to sort and store overburden used for construction and reclamation;
- Mine pit;
- Ore handling facilities, including an Ore Surge Pile (OSP) and a Rail Transfer Hopper (RTH);
- Waste rock stockpiles with engineered systems to manage potential water resource impacts (such as liners, covers and a groundwater containment system);
- A Waste Water Treatment Facility (WWTF) and water collection systems (ponds, pumps, pipes) to collect and treat water from the mine pit, the stockpiles, the ore handling facilities and the haul roads;
- A Central Pumping Station (CPS) and Treated Water Pipeline (TWP) to transport water from the Mine Site to the Plant Site; and
- Stormwater management systems.

2.2 Plant Site

The Project would upgrade existing facilities and construct new facilities. Key Project features of the Plant Site would include:

- Supporting infrastructure (such as roads, electrical supply, rail connections, Area 1 Shop, and Area 2 Shop);
- A Beneficiation Plant which would use existing buildings for crushing and concentration operations and new buildings for flotation and concentrate dewatering, storage, and shipping
- A Hydrometallurgical Plant and associated limestone and reagent handling and oxygen generation facilities;
- A Hydrometallurgical Residue Facility (HRF);
- The existing former LTVSMC tailings basin (Tailings Basin), with a new Flotation Tailings Basin (FTB) constructed atop;
- A FTB Cover System, a FTB South Surface Seepage Management System, and a FTB Containment System to manage seepage from the FTB; and
- A Waste Water Treatment Plant (WWTP).

With ore delivery of 32,000 tons per day (annual average) and assuming 90% availability of processing equipment, annual production would total about 94,000 tons of copper concentrate and 123,000 tons of nickel concentrate without the Hydrometallurgical Plant operational and about 113,000 tons of copper concentrate, 18,000 tons of mixed nickel-cobalt (Ni/Co) hydroxide and 500 tons of Gold and Platinum-Group Elements (Au/PGE) precipitate with the Hydrometallurgical Plant operational. All tons given in this document are short tons unless otherwise specified.

2.3 Structure Removal and Legacy Remediation

Table 2-1 lists all structures on Project including existing legacy LTVSMC buildings and new buildings planned for the Project. Table 2-2 lists all Areas of Potential Concern resulting from legacy LTVSMC operations on the Project area based on an Environmental Site Assessment conducted as part of the LTVSMC closure.

Table 2-1 Demolition Schedule for Buildings in Mine and Plant Sites According to the Reclamation Plan (PolyMet, 2015a)

Demolition / Reclamation Year[1]	Building[2]	Site[2]	Status	Present in Mine Year 1?
Year 1[3]	Additive Building & Heating Plant	Plant Site	Legacy	Yes
Year 1	Sewage Treatment Plant	Plant Site	Legacy	Yes
Year 1	Area 1 Shops	Plant Site	Legacy	Yes
Year 1	Area 2 Shops	Plant Site	Legacy	Yes
Year 1	Booster Pump House #1	Plant Site	Legacy	Yes
Year 2	Coarse Crusher	Plant Site	Legacy	Yes
Year 2	Drive House #1	Plant Site	Legacy	Yes
Year 2	Drive House #2	Plant Site	Legacy	Yes
Year 2	Fine Crusher	Plant Site	Legacy	Yes
Year 2	Rail Transfer Hopper	Mine Site	New	Yes
Year 2	Mine Site Fueling and Maintenance Facility	Mine Site	New	Yes
Year 3	Concentrator (includes new SAG mill)	Plant Site	Legacy	Yes
Year 3	General Shops	Plant Site	Legacy	Yes
Year 3	Rebuild Shop	Plant Site	Legacy	Yes
Year 3	Rubber Shop	Plant Site	Legacy	Yes
Year 3	Lube House	Plant Site	Legacy	Yes
Year 3	A-Lab	Plant Site	Legacy	Yes
Year 3	Water Tower	Plant Site	Legacy	Yes

Demolition / Reclamation Year[1]	Building[2]	Site[2]	Status	Present in Mine Year 1?
Year 3	Warehouse Electrical	Plant Site	Legacy	Yes
Year 3	Warehouse #2	Plant Site	Legacy	Yes
Year 3	Warehouse 49	Plant Site	Legacy	Yes
Year 3	Miscellaneous Buildings (not listed separately)	Plant Site	Legacy	Yes
Year 3	Administration Building	Plant Site	Legacy	Yes
Year 3	Flotation Building	Plant Site	New	Yes
Year 3	Reagent Building	Plant Site	New	Yes
Year 3	Oxygen Plant	Plant Site	New	No
Year 3	Concentrate Loadout	Plant Site	New	Yes
Year 3	Concentrate Storage	Plant Site	New	Yes
Year 3	Concentrate Dewatering	Plant Site	New	Yes
Year 3	Hydrometallurgical Plant	Plant Site	New	No
Year 3	Hydrometallurgical Reagents	Plant Site	New	No
Year 3	Limestone Preparation	Plant Site	New	No
Year 3	Colby Lake Pumphouse	Colby Lake	Legacy	Yes
To Be Determined (TBD)[4]	Mine Site Waste Water Treatment Facility (WWTF)	Mine Site	New	Yes
TBD[4]	Plant Site Waste Water Treatment Plant (WWTP)	Plant Site	New	Yes

(1) Demolition / Reclamation Year is the year in which reclamation begins. Assuming Mine Year 20 is the last year of mining, Reclamation Year 1 corresponds to Mine Year 21.
(2) See Reclamation Plan Large Figure 2 for buildings at the Plant Site and Colby Lake. See Mine Plan Large Figure 4 for buildings at the Mine Site.
(3) Portions of this building may be demolished prior to Demolition / Reclamation Year 1
(4) Buildings required through long-term closure; see Section 3.3 for the WWTF and Section 4.3 for the WWTP.

Table 2-2 Areas of Potential Concern (AOC) for Remediation

AOC	Description	Activity	Contaminants of Potential Concern[2]	Status
1[1]	Area 1 Shops and Reporting (reuse planned)	Fueling equipment, rebuild and repair, steam cleaning, electrical shop	DRO, GRO, VOC, RCRA SVOC	Investigation at closure
6	Oily Waste Disposal Area	Oily waste from oil/water separator of	DRO, GRO, VOC, PAH,	Investigation pending

AOC	Description	Activity	Contaminants of Potential Concern[2]	Status
		the LTVSMC Plant Site Sewage Treatment Plant disposal	RCRA	
7	Bull Gear Disposal	One-time disposal of heavy lubricant	PAH, Pb	Investigation pending
9	RR Panel Yard	Railroad siding area, fabrication of rail panels, disposal of railroad ties, locomotive fueling	DRO, VOC, RCRA, PAH	Scrap and trash were disposed. Some items remain to be removed. Sampling and analysis plan was carried out and site report and further action plan is being generated.
10	Airport	Equipment salvage and tear-down area, materials storage	DRO, GRO, VOC, RCRA	Scrap sold and trash disposed. Some cleanup remains, and investigation pending.
11	Stoker Coal Ash Disposal	Coal ash industrial waste disposal	B, Sr	Investigation pending
13	2001 Storage Area	Equipment salvage, materials storage, transformer storage	DRO, GRO. VOC, PAH, PCB, RCRA Metals	Investigation pending
14	Large Equipment Paint Area	Sandblasting and painting	RCRA, VOC	Buildings sold. Scrap and trash to be removed. Investigation pending.
35	Dunka WTP Sludge	Stockpiling area for WTP sludge	RCRA Metals	Investigation pending
38[1]	Area 2 Shops (reuse planned)	Fueling equipment, rebuild and repair, paint shop, carpenter shop	DRO, GRO, VOC, RCRA SVOC	Site investigation complete - no solvents detected; will be handled as LUST-CAP approved[3]
40	Heavy Duty Garage	Equipment maintenance	DRO, GRO, VOC, PAH	Building removed. Investigation at closure

AOC	Description	Activity	Contaminants of Potential Concern[2]	Status
42	Bunker C Tank Farm	Large Aboveground Storage Tank (AST) storage of #4 to #6 fuel oil	DRO	Some excavation and removal of surface stains complete. Pump house demolished. Day tanks removed and will be scrapped. Petroleum impacted soils removed. Further work necessary to remove tanks and some fuel lines.
43[1]	Administration Building (reuse planned)	Heating oil tank	DRO, BTEX	Demolition and investigation at closure
44[1]	Main Gate Vehicle Fueling Area (reuse planned)	Two 6,000 gallon AST	GRO/DRO/VOC	Demolition and investigation at closure
46[1]	Plant Site Proper and General Shops (reuse planned)	Crushing, concentrating, pelletizing and general maintenance facilities	DRO, GRO, VOC, PAH, PCB, RCRA	Investigation at closure
48[1]	Transformers (reuse planned)	Transformers associated with pumps located within the Tailings Basin	DRO, PCB	Investigation pending
50[1]	Emergency Basin (reuse planned)	Drain outfall for stormwater and process waste water for the Plant Site	DRO, VOC, PAH, RCRA	Sampling and analysis plan was completed. Final report pending, recommending No Further Action to MPCA.
51	Salvage and Scrap Areas	Storage and salvaging various equipment. These are small areas scattered on the southwest side of the Tailings Basin.	DRO, PAH, PCB, RCRA Metals	Investigation pending
52	Cell 2W Salvage Area	Storage of materials and equipment	DRO, PAH, Pb	Investigation pending
59[1]	Colby Lake Pumping Station (reuse planned)	Heating oil AST transformer	DRO, BTEX	Investigation at closure

AOC	Description	Activity	Contaminants of Potential Concern(2)	Status

(1) Areas to be used by the Project
(2) Abbreviations include: B = boron; BTEX = benzene, toluene, ethylbenzene and xylenes; DRO = Diesel Range Organics; GRO = Gasoline Range Organics; PAH = Polycyclic aromatic hydrocarbans; Pb = lead, PCB = Polychlorinated biphenyls; RCRA = Resource Conservation and Recovery Act; RCRA SVOC = RCRA Semi-Volatile Organic Compounds; Sr = strontium; VOC = Volatile Organic Compounds
(3) LUST-CAP = leaking underground storage tank corrective action plan

2.4 Configuration at the end of Mine Year 1

2.4.1 Mine Site

At the end of Mine Year 1, the East pit excavation will have begun and the Category 1, Category 2/3, and Category 4 stockpiles as well as the OSP, RTH, OSLA will have been constructed and materials placed in them. The supporting infrastructure will be in place. The WWTF will also have been constructed.

2.4.2 Plant Site

At the end of Mine Year 1, the Beneficiation Plant will be constructed, with the construction of the Hydrometallurgical Plant scheduled a few years later. The first lift will be constructed on the FTB and tailings deposition will have started. The WWTP will also be in place. The purpose of the WWTP is to treat water to augment flows in streams west, north, and south of the Tailings Basin and for discharge to the environment when the Project has excess water that cannot be stored in the FTB. The WWTP would include a reverse osmosis unit or similar membrane separation technologies.

3 Closure Assumptions and Actions

3.1 Mine Site Facilities

Key LOM reclamation cost parameters are summarized in Table 3-1.

3.1.1 Mine Pits

Basis:

1. *Reclamation Plan, Section 3.1*
2. *Reclamation Plan, Section 7.1*
3. *Mine Plan, Section 6*

According to Minnesota Rules Part 6132.2300 Subpart 2 A,

- the toe of the surface overburden portion shall be set back at least 20 feet from the crest of the rock portion of the pit wall;
- lift heights shall be no higher than 60 feet and shall take into consideration public safety, current and post-mining land use, and soil types and erosion characteristics;
- lift slopes shall be no steeper than 2.5H:1V; and
- runoff shall be temporarily stored on benches or diverted by drainage control structures.

The LOM includes three pits: the East Pit, the West Pit, and the Central Pit. According to the Mine Plan, reclamation actions planned at the end of mine life include the following:

- Removal of dewatering system;
- Pit wall sloping and revegetation;
- Installation of a pit perimeter barrier;
- Management of access to the pit lake;
- Construction of an outlet control structure between the East Pit and the West Pit;
- Water management, including flooding of the West Pit and treatment of the East Pit water to remove constituent load from backfilled waste rock; and
- Reclamation of borrow area(s).

There will also be long-term closure activities (see Section 3.7):

- Reclamation monitoring and maintenance; and
- Long-term water management, including managing the water level in the West Pit below an overflow elevation and long-term treatment of West Pit water prior to discharge to a small watercourse that flows to the Partridge River.

Table 3-1 Key Reclamation Features that Vary by Closure Year (Barr, 2016a)

	Units that Vary by Closure Year																					
Year of Closure	0 - Stage 1	0 - Stage 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Category 2/3 Stockpile Liner (acres)	63	63	63	63	119	119	119	181	181	181	181	181	181	181	181	181	150	120	90	60	30	0
Category 2/3 Stockpile Piping (LF)	8,000	8,000	8,000	8,000	10,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0	0
Category 2/3 Stockpile Sump/Pond (acres)	6.7	6.7	6.7	6.7	9.2	9.2	9.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	9.2	9.2	6.7	6.7	6.7	0.0
Category 2/3 Stockpile Pumps	2	2	2	2	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Category 2/3 Stockpile Overliner and Underdrain Piping (LF)	45,300	45,300	45,300	45,300	76,500	76,500	76,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	94,800	71,100	47,400	23,700	0
Category 2/3 Stockpile Relocation (tons)	0	0	5,238,766	9,671,631	13,968,736	17,624,295	20,039,335	24,388,312	26,954,315	31,286,526	35,946,676	40,017,183	44,021,108	44,021,108	38,281,584	32,542,061	26,802,537	21,063,014	15,323,491	9,583,967	3,844,444	0
Category 4 Stockpile Liner (acres)	29	29	29	29	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Piping (LF)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Sump/Pond (acres)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Overliner and Underdrain Piping (LF)	21,590	21,590	21,590	21,590	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Relocation (tons)	0	0	1,489,201	2,251,698	3,379,412	4,206,959	4,648,816	5,314,412	5,863,428	5,974,068	6,107,575	6,184,408	6,206,813	0	0	0	0	0	0	0	0	0
OSP Liner (acres)	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
OSP Piping (LF)	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
OSP Sump/Pond (acres)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
OSP Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OSP Overliner and Underdrain Piping (LF)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
OSP Relocation (tons)	0	0	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Footprint to Reclaim (acres)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Cover (acres)	0	0	205	205	369	369	458	526	526	526	526	526	526	526	526	460	394	328	262	196	130	64
Category 1 Stockpile Containment System Completion (LF)	0	0	2,800	2,800	2,800	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Containment System Breach & Reclaim (acres)	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Exposed/Unblasted Rock to Reclaim (Acres)	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Wall Unreclaimed (Acres)	0	0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
West Pit Exposed/Unblasted Rock to Reclaim (Acres)	0	0	0	0	0	4	40	0	0	0	0	52	65	0	0	0	0	0	0	0	0	0
West Pit Wall Unreclaimed (Acres)	0	0	0	8.7	8.7	8.7	8.9	8.9	8.9	11.0	11.0	16.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Central Pit Wall Unreclaimed (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Fence - 4 strand barb wire (LF)	0	0	1,100	1,400	1,400	1,400	1,400	1,400	1,400	1,700	1,700	1,600	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	1,400
Fence - non climbable (LF)	0	0	11,000	19,900	19,900	21,200	20,700	20,700	20,700	22,100	22,100	30,100	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	33,700
Pit Access Gates	0	0	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Mine Drainage Pond (acres)	19.4	19.4	19.4	19.4	21.6	21.6	21.6	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Mine Drainage Pond Liner (acres)	12.4	12.4	12.4	12.4	14.6	14.6	14.6	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Mine Drainage Pond Pumps	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Mine Drainage Pond Pipe (LF)	9,000	9,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Mine Drainage Pond Underdrains	4,500	4,500	4,500	5,200	6,000	6,000	6,000	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
Stormwater Pond (acres)	17.4	17.4	17.4	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
Stormwater Ditch (LF)	5,200	5,200	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	8,300	8,300
Unreclaimed Haul Road (LF)	22,000	22,000	22,000	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	31,500	31,500	31,500	29,500	27,500	27,500	27,500	27,500	21,500	21,500
FTB Beach to Reclaim (acres)	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTB Beach to Amend with Bentonite (acres)	0	0	95	95	93	92	91	89	87	203	207	211	212	212	212	212	216	219	222	225	420	428
FTB Pond Bottom to Amend with Bentonite (acres)	0	0	421	424	427	430	432	434	443	1068	1093	1118	1124	1130	1136	1142	1136	1129	1122	1116	905	905
FTB Borrow Area to Reclaim (acres)	31.6	31.6	44.7	16.9	16.5	16.5	15.9	15.9	12.0	12.0	12.0	12.0	18.0	22.4	22.4	22.4	26.8	26.8	26.8	26.8	21.5	19.5
HRF Disturbed Acres to Reclaim (acres)	5	5	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HRF cover (acres)	0	0	0	0	49	49	49	49	49	49	49	49	49	54	60	65	71	76	82	87	93	98
HRF drainage (years)	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9

Mine Year 1:

The mine plan for Mine Year 1 includes one pit: the East Pit. According to the mine plan, at the end of Mine Year 1, excavation in the East Pit will have started (Figure 3-1) and no excavation will have started in the West Pit or the Central Pit. The East Pit lake level will be at 1,592 ft-MSL, allowing for sub-aqueous storage of material in the Category 2/3 and Category 4 Stockpiles and the OSP.

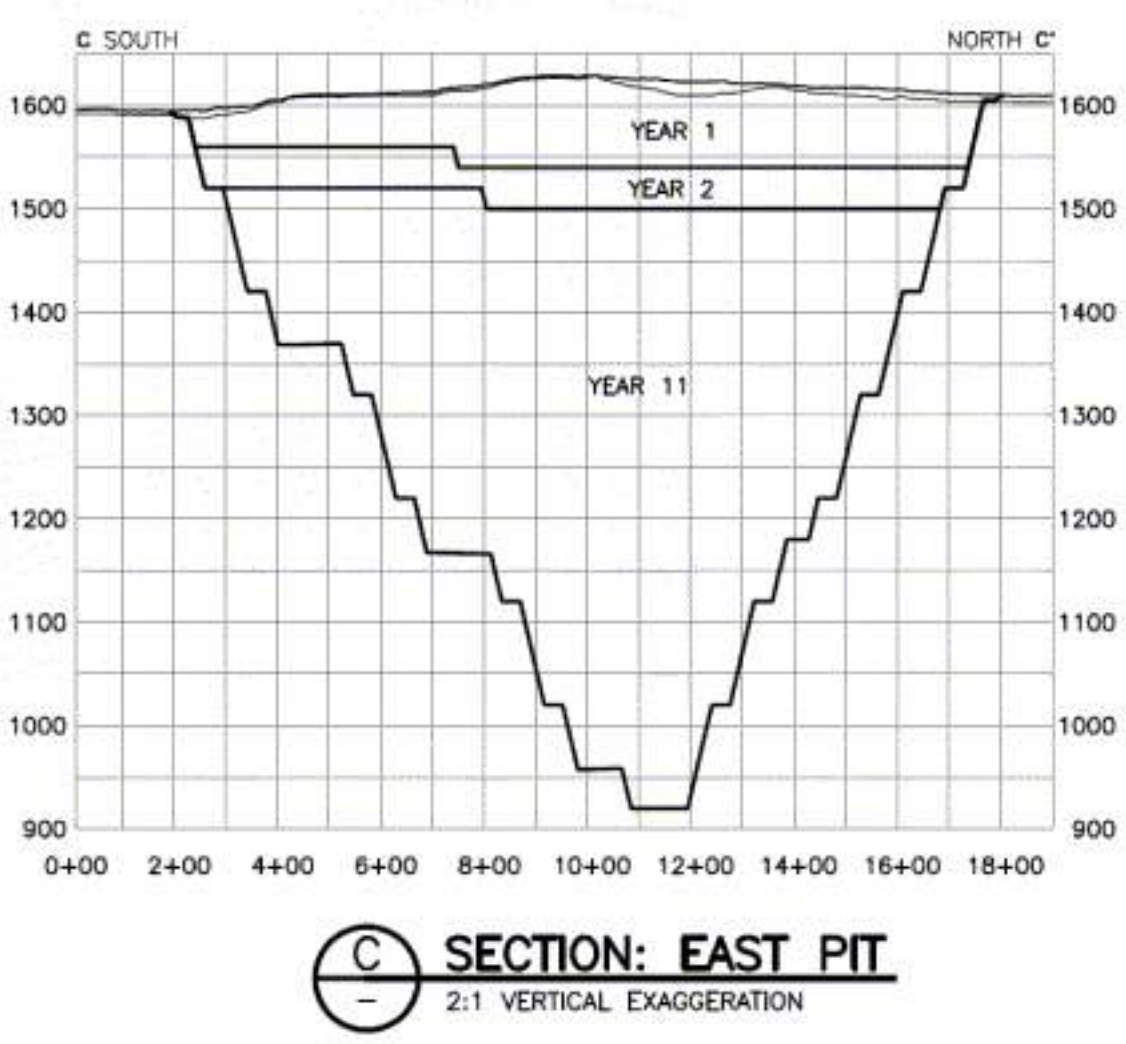

Figure 3-1: East Pit

Source: Mine_Plan_v4_DEC2014.pdf (Polymet, 2015x)

3.1.2 Stockpiles

Stockpiles can be categorized into permanent and temporary stockpiles:

- Permanent stockpile
  - Category 1 stockpile

- Temporary stockpiles
    - Category 2/3 stockpile
    - Category 4 stockpile
    - OSP

The design and operation of Category 1 stockpile will allow for progressive reclamation with an engineered cover. Per Minnesota Rules Part 6132.2400 Subpart 3 C (2) (c), lift slopes are to be no steeper than 2.5H:1V. The engineered cover requires placement of geomembrane and therefore the cover design is for 3.75H:1V.

Because of their characteristics, the material in the Category 2/3 and Category 4 stockpiles would require relocation and sub-aqueous storage at the end of mine life. This assumption holds for a contingency (default) scenario. Furthermore, whereas the OSP would have been empty at the end of mine life under normal operating circumstances, in a default scenario there may be ore in the OSP. The material in the Category 2/3 and Category 4 stockpiles and the OSP will be hauled for backfilling in a pit for sub-aqueous storage.

3.1.2.1 Category 1 stockpile reclamation

Basis:

1. *Rock and Overburden Management Plan, Section 7.1.1 and Section 7.4.1.2*
2. *Rock and Overburden Management Plan, Appendix B*
3. *Adaptive Water Management Plan, Section 3*

During operations, a groundwater containment system will be installed to capture drainage and surface runoff from the stockpile for treatment at the WWTF. This will be supplemented with an engineered cover system to reduce percolation into the stockpile. Details pertaining to the cover system are provided in the Rock and Overburden Management Plan, Appendix B. The engineered geomembrane cover system to be used for reclamation of the Category 1 Waste Rock Stockpile will meet the applicable requirements of Minnesota Rules, part 6132.2200, subpart 2, items B and C. Attachment B of the Rock and Overburden Management Plan presents the preliminary design drawing set for the cover system. Detailed permit-level design will be completed for the Permit to Mine Application. The Category 1 Waste Rock Stockpile cover will consist of, from top to bottom: 18 inches of rooting zone soil consisting of on-site overburden mixed with peat soils as needed to provide organic matter, 12 inches of granular drainage material with drain pipes to facilitate lateral drainage of infiltrating precipitation and snowmelt off the stockpile cover, a geomembrane barrier layer of 40-mil (40/1000 of an inch) thickness and 6 inches of bedding layer soil below the geomembrane. Included will be additional soil below the 6-inch soil bedding layer, placed as needed to fill surface voids in the waste rock, thereby providing a uniform foundation layer for the 6-inch soil bedding layer.

Of the cover layers, the 6-inch geomembrane bedding layer and 1-ft granular cover layer would be sourced locally within the facility as processed Category 1 stockpile material. The 1.5-ft rooting zone would consist of unsaturated overburden from the location of the Overburden Storage and Laydown Area located about 1 mile from the Category 1 Stockpile ramp.

Mine Year 1:

At the end of Mine Year 1, there would be no partial cover and the entire configuration in Mine Year 1 would require cover.

3.1.2.2 Category 2/3 stockpile relocation

Basis:

1. *Rock and Overburden Management Plan 7.1.2*
2. *Rock and Overburden Management Plan 7.4.1.2*

Mine Year 1:

In the event of a default in Year 1, the material in the Category 2/3 Waste Rock Stockpile will be hauled to the East Pit for final subaqueous storage.

If practicable, wetlands will be formed on part of the footprint of this stockpile.

3.1.2.3 Category 4 stockpile relocation

Basis:

1. *Rock and Overburden Management Plan 7.1.2*
2. *Rock and Overburden Management Plan 7.4.1.2*

Mine Year 1:

In case of a default in Mine Year 1, the material in the Category 4 Waste Rock Stockpile will be hauled to the East Pit for final subaqueous storage.

3.1.2.4 Ore Surge Stockpile (OSP) relocation

Basis:

1. *Rock and Overburden Management Plan 7.2.2*
2. *Rock and Overburden Management Plan 7.4.1.2*

Mine Year 1:

In case of a default in Mine Year 1, the material in the OSP will be hauled to the East Pit for final subaqueous storage.

If practicable, wetlands may form on part of the footprint of this stockpile although they were not previously present. Because this is not certain, for the purposes of this estimate conventional reclamation of the footprint by revegetation is assumed.

3.1.2.5 Overburden Storage and Laydown Area (OSLA)

Basis:

1. *Rock and Overburden Management Plan 7.2.3*

The majority of the material stored at the OSLA should be reused for reclamation of the Mine Site. At closure, the OSLA (approximately 45 acres) and any remaining overburden stockpiles will be reclaimed. Approximately 11 acres of wetlands will be impacted in the development of the OSLA. Where possible, wetlands will be created in these areas at closure. For portions of the footprint that cannot be converted into a wetland, the surface will be scarified or a soil cover placed, followed by seeding.

3.1.3 Mine Site Water Management Systems

3.1.3.1 Central Pumping Station (CPS)

Basis:

1. *Water Management Plan – Mine, Section 7.2.5*

The CPS and associated TWP will be removed.

Mine Year 1:

The liability for removal of the CPS and TWP pipelines will be present in the event of a default at the end of Mine Year 1.

3.1.3.2 Ponds

Basis:

1. *Water Management Plan – Mine, Section 7.1*
2. *Water Management Plan – Mine, Section 7.2.3*
3. *Water Management Plan – Mine, Section 7.2.4*

Reclamation will include removal of all piping, pump systems, and liner systems associated with the stockpile sumps and ponds. Once these systems have been removed, the sump and pond footprints will be reclaimed into a mixture of upland and wetland areas, depending on the ultimate elevation of the remaining materials.

At closure, the stormwater sedimentation ponds, the process water ponds, and the remaining stockpile sumps and overflow ponds will be reclaimed by developing wetlands or by filling, covering with topsoil, and revegetating the area. Outlet control structures from Ponds A and B will remain in-place to prevent Partridge River floodwater from entering the Mine Site. Outlet control structures from Ponds C (East) and D will remain in-place to direct water under Dunka Road and the railroad to the Partridge River along natural drainage paths. The overflow weir in Pond C (West) will be modified to create a more natural transition to the remaining stormwater ditch. The process water sumps and ponds may require cleanout and removal of the geomembrane liner in closure. Material removed from the ponds will be disposed of in the pits or an approved landfill. For the purposes of this estimate, the action assumed is that the material would be disposed of in the pits.

During reclamation, all process water pipes and pumps will be removed and recycled or abandoned in place except those used for the removing the flushing load from or flooding of the West Pit or recycling of the East or West Pit water, in years when applicable.

Mine Year 1:

In the event of a default at the end of Mine Year 1, material removed from the ponds would be disposed of in the East Pit.

3.1.4 Mine Site Water Treatment

3.1.4.1 Closure – Mine Water Treatment - Remove East Pit Flushing Load

Basis:

1. *Water Management Plan – Mine, Section 7.3.2*

2. *Water Management Plan – Mine, Section 7.4.1.2*

The subaqueous storage of Category 2/3 and Category 4 waste rock stockpiles and the OSP will require treatment of water at the WWTF to remove constituent load from the backfilled materials.

3.1.4.2 Long-Term – Mine Site Water Treatment - West Pit Overflow

Basis:

- *Water Management Plan – Mine, Section 7.3.2*
- *Barr, 2016b*

According to the LOM plan, the relocation of the Saturated Overburden and waste rock in the Category 2/3 and Category 4 waste rock stockpiles in the East Pit will result in a flushing of oxidation products into the East Pit water. As the East and West Pits flood with water, oxidation products that have accumulated on the pit wall rock will be flushed into the pits as the water level rises. The flushed oxidation products will be removed from the West and East Pits by pumping the pit water to the WWTF for treatment and returning the treated water to the pits. For long-term closure, water treatment is expected to continue until the West Pit water quality reaches an acceptable level. The WWTF will be maintained operable until MDNR releases PolyMet from doing so under the Permit to Mine.

Although the ultimate goal is to transition from the mechanical treatment provided by the WWTF to a non-mechanical treatment system, the estimate assumes that the WWTF will continue to operate during long-term closure. The transition from mechanical to non-mechanical treatment will occur only after the site-specific design for a non-mechanical system has been proven and approved by the appropriate regulatory agencies. The estimate includes cost to develop the site-specific design.

Mine Year 1:

Given the West Pit will not be operational by the end of Mine Year 1, in the event of a default, treated water from the East Pit would be returned to the East Pit.

3.1.4.3 Long-Term – Mine Site Waste Water Treatment Facility (WWTF)

Basis:

1. *Reclamation Plan, Section 8*
2. *Adaptive Water Management Plan, Section 2.2*
3. *Water Management Plan – Mine, Section 4.1.1*
4. *Water Management Plan – Mine, Section 7.3.2*
5. *Barr, 2016b*

In the early months of Mine Site development (Construction Year 1), the first phase of the WWTF will be built, specifically the East EQ Basin and the Construction Water Treatment Building. These facilities will treat construction water generated during Mine Site development activities. During Mine Year 1, these facilities will treat both construction water and process water, while construction of the West EQ Basin, Construction Water Basin, and the first half of the mechanical treatment are taking place. Mechanical treatment includes chemical precipitation and membrane filtration treatment. The WWTF will be fully

operational in Mine Year 1 and able to treat Mine Site water. After Mine Year 1, construction water will be routed to the Construction Water Basin, treated by chemical addition from the Construction Water Treatment Building, and subsequently discharged to the CPS pond.

The mine site WWTF will be converted from a mechanical system to a non-mechanical system at closure once it can be demonstrated that non-mechanical water treatment technologies will effectively treat water to the required water quality standards. The WWTF will be demolished at the end of the long-term closure period.

Mine Year 1:

In the event of a default at the end of Year 1, the WWTF will be available to treat water at the mine site.

3.1.4.4 Long-Term Closure –Category 1 Waste Rock Stockpile Containment System

Basis:

1. *Rock and Overburden Management Plan, Section 2.1.2.2*

To allow for planned growth of the stockpile, the Category 1 Waste Rock Stockpile Containment System would not be fully completed until Mine Year 4.

Mine Year 1:

In the event of default in Mine Year 1, this system would require completion by connecting the northern and southern portions on the western end of the stockpile.

3.2 Plant Site Facilities

3.2.1 Flotation Tailings Basin (FTB)

Basis:

1. *Flotation Tailings Management Plan, Section 7.6.2*
2. *Adaptive Water Management Plan, Section 5.*

The FTB will require the following measures:

- Interior portions will be graded to provide a gently sloping surface that effectively routes stormwater runoff to the interior of the FTB, accommodates future differential settlement of the underlying Flotation Tailings, and maximizes ponding of water in the reclaimed FTB Pond.
- The pond bottom will be amended with bentonite. The bentonite-amended pond bottom will reduce the percolation from the FTB Pond, thereby maintaining a permanent pond that will provide an oxygen barrier above the Flotation Tailings to reduce oxidation and resultant production of chemical constituents. It will also reduce the amount of water collected by the FTB seepage capture systems.
    - The FTB Pond Bottom Cover System will be implemented during reclamation and will be required to function until constituents have been depleted from the portion of the FTB that is subject to oxidation, and/or the

release rates of constituents from the FTB have decreased to the point where water resource objectives can be achieved without the cover system.

- Exposed beach areas will be amended with bentonite to limit oxygen infiltration into the Flotation Tailings. Granulated bentonite (approximately 3% by dry weight) will be added to an 18-inch thick layer of Flotation Tailings, overlain by an additional 30-inch layer of Flotation Tailings. The upper layer of tailings will be removed and equipment will be utilized to facilitate bentonite application and thorough mixing. The bentonite will be placed and tilled via agricultural equipment. The removed tailings will then be replaced and vegetated in accordance with requirements of the Reclamation Seeding Plan.
- Upland areas will be mulched and planted with permanent vegetation. Vegetation types will be selected to limit root penetration to within the top 24-inches of the Flotation Tailings in order to minimize the potential for root penetration into the underlying bentonite-amended Flotation Tailings layer planned for 30-inches below the Flotation Tailings surface. Fertilizer may be used but care will be taken to minimize carry-over into pond areas, which would encourage algae growth.
- Along the pond perimeter where wave action and freeze-thaw cycles occur, the bentonite layer will require protection from wave erosion and some confinement to resist freeze-thaw impacts. This protective layer will require periodic inspection early in the life of the reclaimed pond to confirm that the selected erosion control and freeze-thaw protection method (typically well graded rip rap) is effective and to repair and upgrade riprap in any areas showing signs of erosion and/or freeze-thaw impacts. Long-term FTB reclamation maintenance tasks therefore include the following:
    - Annual inspection of vegetation on the exterior dam faces and interior beaches, with erosion repaired and vegetation reseeded in accordance with requirements of the Reclamation Seeding Plan as needed until released from these activities by the MDNR;
    - Snow removal from the dam crest to allow access during winter months;
    - Reconstruction of eroded dam crest, slope or toe;
    - Mulching for fugitive dust control in accordance with requirements in the Fugitive Emissions Control Plan; and
    - Repair and/or replacement of damaged instrumentation and monitoring devices.
- During reclamation and long-term closure, the WWTP will remain operable to prevent FTB overflow by pumping any excess FTB pond water to the WWTP until it is demonstrated that water in the FTP Pond is stormwater and that it complies with applicable standards (i.e., pond water could be allowed to overflow) or MDNR releases PolyMet from mechanical water treatment requirements under the Permit to Mine (i.e., non-mechanical treatment can successfully treat excess FTB pond water).
- During reclamation, the FTB Closure Overflow will be constructed. It is expected that this structure will be modified to serve as a stormwater overflow or non-

mechanical treatment system discharge. Because there is a net positive water balance in the region, it is anticipated that in long-term closure there will be occasional overflow (stormwater or non-mechanical treatment discharge) via the Closure Overflow outlet to the adjacent wetlands if operation of the WWTP is discontinued.

Mine Year 1:

During Mine Year 1, approximately 11 million tons of Flotation Tailings will have been deposited in the FTB, a portion of Lift 1 will have been constructed, and the dam crest will be at elevation 1590 (+ 5) feet. The Transfer Pump Raft and Tailings Disposal Diffuser Raft will be operational. The FTB area requiring bentonite amendment will consist of approximately two-thirds to three-quarters of the exposed beaches, with the remainder consisting of pond area. Exterior slope areas will have previously been reclaimed as part of dam construction.

3.2.1.1 FTB Pond Bottom Cover

Basis:

1. *Adaptive Water Management Plan, Section 5.2.2*

- **Broadcasting bentonite:** granular or pelletized bentonite will be systematically fed through a barge mounted broadcast spreader system to uniformly distribute the bentonite across the area of the pond. The bentonite will subsequently settle to the pond bottom where it will hydrate, swell, and due to its inherently low hydraulic conductivity, reduce percolation from the pond bottom.

Mine Year 1:

By the end of Mine Year 1, there will be a liability to cover the FTB pond bottom with broadcast bentonite amendment.

3.2.2 Closure and Long Term - Plant Site Waste Water Treatment Plant (WWTP)

Basis:

1. *Adaptive Water Management Plan, Section 4*
2. *Water Management Plan – Plant, Section 7*

At the start of reclamation, the volume of water treated by the WWTP will increase relative to operations. Influent sources during reclamation include water collected by the FTB seepage capture systems, excess FTB pond water, and HRF pond water and drainage. The purpose of treatment during the reclamation phase will be to meet the appropriate discharge limits for water discharged to replace stream flow collected by the containment system and to accelerate flooding of the West Pit. Treatment will be designed to achieve constituent concentrations within the flooded West Pit that will not result in exceedance of appropriate groundwater and surface water standards at appropriate compliance points downstream of the West Pit during long-term closure.

During long-term closure, the WWTP will continue to treat water collected by the FTB seepage capture systems as well as excess water from the FTB Pond as needed to prevent overflow (until pond water meets the requirements for stormwater). The primary

purpose of treatment for the WWTP will be to meet the appropriate water quality discharge limits.

Although the ultimate goal is to transition from the mechanical treatment provided by the WWTP to a non-mechanical treatment system, the estimate assumes that the WWTP will continue to operate during long-term closure. The transition from mechanical to non-mechanical treatment will occur only after the site-specific design for a non-mechanical system has been proven and approved by the appropriate regulatory agencies. The estimate includes cost to develop the site-specific design.

The WWTP will be demolished at the end of the long-term closure period.

Mine Year 1:

In a Year 1 default scenario, the FTB seepage capture systems and WWTP would continue to operate through reclamation and long-term closure periods.

At this time, no excavation in the West Pit is expected in Year 1. Therefore, for Year 1 and until such time that the West Pit will be stripped to accommodate such discharges, there will be no water pumped to the Mine Site to accelerate pit flooding. The assumed action will be to use the WWTP effluent to replace headwater stream flow collected by the containment system.

The FTB Pond will contain approximately 950 million gallons of water at elevation 1580 feet. Water treatment by the WWTP is expected to continue until other non-mechanical methods can be proven and implemented to treat seepage from the Tailings Basin.

Water treatment will continue in the long-term closure period, during which the water level in the FTB will be maintained to prevent overflows, and water from the FTB seepage capture systems will continue to be collected and pumped to the WWTP for treatment to meet the appropriate water discharge limits.

3.2.3 Processing Facilities

The Process Plant would consist of a Beneficiation Plant and a Hydrometallurgical Plant. The purpose of the beneficiation process would be to produce a copper concentrate for shipment to customers and different grades of nickel concentrate that could be shipped to customers, used as a feedstock to the hydrometallurgical process, or divided for both uses. PolyMet expects that the Beneficiation Plant would be operational two to four years before the Hydrometallurgical Plant and during that period, all concentrates would be shipped to customers. Once the Hydrometallurgical Plant becomes operational, some or all of the nickel concentrates would be feedstock to the hydrometallurgical process. The decision to ship or process concentrates would be based on equipment maintenance schedules, customer requirements and overall Project economics.

The Beneficiation Plant processes would include ore crushing, grinding, flotation, dewatering, storage and shipping. Crushing and grinding would occur in the existing structures. Ore would be fed from the secondary crusher in the Coarse Crusher Building, into a semi-autogenous grinding (SAG) mill and ball mill in the Concentrator Building. Flotation would occur in a new Flotation Building located on disturbed ground immediately to the west of the Concentrator Building. Dewatering, storage, and shipping would occur in

a new Concentrate Dewatering/Storage Building located on disturbed ground near the Heating/Additive Plant, which would be demolished.

3.2.3.1 Beneficiation Plant

Basis:

1. *Reclamation Plan, Section 2.1*
2. *Reclamation Plan, Section 4.4*
3. *Reclamation Plan, Section 7.1.2*

All buildings and structures will be removed. Foundations above existing grade will be razed, and foundations and slabs at or below grade will be left in place. These will all be covered with a minimum of two feet of surface overburden and revegetated. Provisions may be made for continued subsequent use of mine facilities that will have future economic benefits to the surrounding area including buildings, pipelines, transmission lines, roads, and railroad lines.

Mine Year 1:

For the purposes of this cost estimate, for Year 1, it is assumed that all existing buildings and newly constructed Phase 1 structures in the mine site and plant site will be demolished. The Hydrometallurgical Plant and associated limestone and reagent handling and oxygen generation facilities are part of Phase 2 will not have been constructed in Year 1.

3.3 Wetlands

Basis:

1. *Reclamation Plan, Section 6.6*
2. *Wetland Management Plan, Section 4*
3. *Wetland Management Plan, Section 5*
4. *Barr, 2016a*

Wetland restoration for this project will be carried out off-site as well as on-site. Only off-site restoration will provide credits for wetland impacts. This bond cost estimate includes restoration of wetlands on-site. Restoration of wetlands on-site will be limited to the HRF. The Hydrometallurgical Residue Facility (HRF) changes as the exterior dams are raised and the tops move inward. The acres to be covered change over the project life to reflect dam raises. The HRF is planned to be constructed in Mine Year 3.

Mine Year 1:

Although liabilities related to the reclamation of the HRF will not be present until Mine Year 3, liabilities related to wetland restoration will be present in Mine Year 1 per Barr (2016a).

3.4 Other Demolition

3.4.1 Tunnels

Basis:

1. *Project Description Report, Section 4.4.1*

2. Reclamation Plan, Section 2.1.1

According to the LOM plan, the existing LTVSMC utility tunnels would be sealed and reclaimed in place.

Mine Year 1:

In the event of a default at the end of Mine Year 1, this liability will exist and has been included in the cost estimate.

3.4.2 Areas of Potential Concern (AOC's)

Basis:

1. Reclamation Plan, Section 5

AOC's accepted by PolyMet and not previously addressed, in receipt of a No Further Action letter, or addressed during construction will be addressed in the event of a default in Mine Year 1.

3.4.3 Culverts (Mine Site and Plant Site)

Basis:

1. Reclamation Plan, Section 3

2. Reclamation Plan, Section 4

Where roads and railroads will be abandoned, culverts will be removed to prevent potential flow obstruction due to clogged or dammed culverts and to minimize impediments to access and movement in the stream by aquatic life. Any culverts requiring removal will be replaced with channels; culvert locations will be graded and vegetated to provide a stable stream bank approximating a natural channel and floodplain configuration.

3.4.4 Pipelines (Mine Site and Plant Site)

Basis:

1. Reclamation Plan, Section 2.1.5

2. Water Management Plan – Mine, Section 7.2.4

Pipelines that will not remain as regional infrastructure will be removed, recycled or disposed, or abandoned in place. A few former existing LTVSMC Tailings Basin water management lines may be closed at the start of operations. Several of the remaining pipelines will be needed through reclamation and in long-term closure. Major pipeline systems planned for removal or to be abandoned in place during reclamation include:

- Water reclaim line from the FTB to the Processing Plant;
- Flotation Tailings Pipeline;
- Hydrometallurgical Residue Pipelines;
- Inter-pit pipeline from the Plant Reservoir to the Area 1 Shop and Area 2 Shop;
- Mine Site water management – OSP sump to WWTF pipelines and process water;
- Ponds to WWTF pipelines;

- Water supply pipeline from Colby Lake Pumphouse to the Plant Reservoir; and
- Natural gas line from the Town Border Station to the former Pellet Plant location.

Major pipeline systems that will be required to remain until long-term closure begins include:

- Treated Water Pipeline (TWP) from Mine Site WWTF to the FTB; and
- Mine Site water management – WWTF to East Pit pipelines.

Major pipeline systems that will be required to remain through long-term closure include:

- Tailings water management – tailings seepage collection pipelines from the FTB seepage capture systems, Plant Site WWTP discharge pipes to the discharge points;
- Mine Site water management – West Pit dewatering pipelines and Category 1 Waste Rock Stockpile Groundwater Containment System sumps to WWTF pipelines.

Above-ground pipelines and other facilities (e.g., pump booster station, associated controls) will be disassembled or demolished and the material recycled or disposed along the timeline described above. Underground pipelines will be abandoned in place.

The lengths of pipes in place will vary in the various mine operations years (Barr, 2016a) for the following:

- Category 2/3 Stockpile Piping;
- Category 4 Stockpile Piping;
- Category 2/3 Stockpile Collection Piping;
- Category 4 Stockpile Collection Piping; and
- Process Water Pond Pipe.

Mine Year 1:

The cost estimate will reflect the liability of removing pipes present in Mine Year 1.

3.4.5 Powerlines and substations and/or transformers

Basis:

1. Reclamation Plan, Section 2.1.5

Power lines (poles, pole hardware, and conductors) and substations that will not remain as regional infrastructure will be removed and recycled. Foundations and anchors will be removed or demolished to at least ground elevation and covered with at least two feet of soil and revegetated to achieve final reclamation. Power lines to be removed during reclamation include:

- 13.8 kilovolt (kV) distribution system from the FTB to the Coarse Crusher;
- 13.8 kV Lines from the Main Substation to Area 1 Shop and Area 2 Shop; and
- 7.20 kV distribution lines at the Mine Site.

Power lines that will remain until long-term closure begins include:

- 13.8 kV Line from the Main Substation to Colby Lake Pumphouse.

Power lines that will remain through long-term closure include:

- 13.8 kV Lines from the Minnesota Power Substation at the Mine Site to Mine Site facilities;
- 4.16 kV distribution lines at the FTB; and
- 4.16 kV distribution lines at the Mine Site.

Mine Year 1:

For the purposes of this estimate, Mine Year 1 is assumed to have all powerlines in place.

3.4.6 Railroad Track and Rail Transfer Hopper

Basis:

1. Reclamation Plan, Section 4.5

For the Mine Spur connecting the existing Cliffs Erie Mainline track to the existing track in Area 3 to meet Plant Site material movement needs, the track and ties controlled by PolyMet will be removed and recycled or disposed and the railroad bed will be reclaimed or evaluated for an approved subsequent reuse. Reclamation of railroads not controlled by PolyMet is the responsibility of the owner of record. Any areas where locomotives may have remained stationary for extended periods will be inspected for potential petroleum product release, and if necessary, remediation measures will be initiated.

A survey will be conducted along the railroad corridor between the RTH and the Plant Site to inspect for potential ore spillage along the track. If spillage is found of a quantity that could cause water quality degradation, clean up measures will be initiated. The specific details of this survey during operations, as well as in reclamation and long-term closure, will be outlined as part of the Transportation and Utility Corridor monitoring plan.

Mine Year 1:

In Mine Year 1, the Mine Spur will be removed in full.

3.4.7 Tanks

Basis:

1. Reclamation Plan, Section 2.1.6

Large aboveground storage tanks that are provided by suppliers will be removed by them. The rest will be cleaned and painted surfaces tested for lead prior to demolition. Tanks with insulation and associated wall and/or roof covers will be evaluated for potential asbestos-containing material (ACM). Insulation and coverings will be removed and disposed appropriately. Tank cleaning will remove remaining materials and sludge. The tanks will be cleaned and removed materials and cleaning residues will be sent to an appropriate recycling or waste disposal facility. Tanks will be disassembled for disposal or recycling, as appropriate. Where lead paint abatement is required, the disposal/recycling plan will be modified to accommodate the lead content. Below-grade foundations will be left in place

and covered with a minimum of two feet of soil and vegetated. Smaller aboveground storage tanks will be cleaned and removed without disassembly.

Mine Year 1:

In Mine Year 1, all legacy and new Plant Site and Mine Site tanks will be removed.

3.5 Other Disturbance

3.5.1 Roads (Plant Site and Mine Site)

Basis:

1. *Reclamation Plan, Section 3.4*
2. *Reclamation Plan, Section 4.4*

Mine roads that are deemed not necessary for access by the MDNR Commissioner will be scarified and vegetated. Asphalt from paved surfaces will be removed and recycled. Reclamation of roads not controlled by PolyMet, such as the Dunka Road and the road from the North Gate, are not included in this plan or estimate; reclamation of these features is the responsibility of the owner of record for the roads.

Any roads, which include mine access roads (Minnesota Rules Part 6132.3200) that may develop into unofficial off-road vehicle trails, will require a variance to allow a 15-foot wide unpaved and unvegetated track down the centerline of the road once reclamation is completed.

The length of haul roads requiring reclamation will vary from year to year. Haul roads will have berms on both sides.

Mine Year 1:

In the event of a default in Mine Year 1, all roads would need reclamation at different times. Those required for access would be left in place until after the end of long-term water treatment and the rest would be closed. At the end of the long-term water treatment phase, these roads used for access will also be reclaimed for final closure.

3.5.2 Yards

Basis:

1. *Reclamation Plan, Section 4.4*

After demolition of Plant Site buildings and parking areas, two feet of overburden material suitable for vegetation will be placed upon the facility's former footprint.

Mine Year 1:

In the event of a default in Mine Year 1, all miscellaneous surface disturbances would be reclaimed.

3.6 Waste Disposal

3.6.1 Demolition Waste Disposal

Basis:

1. *Reclamation Plan, Section 2.2*
2. *NorthMet Project Closure and Demolition Specification (Structures and Equipment Only)*

Per PolyMet (2016), demolition waste from structure removal will be disposed of in an off-site landfill. Concrete from demolition will be placed in building basements where possible including coarse crusher basement, fine crusher basement and concentrator basement and the Plant Reservoir.

Mine Year 1:

Mine Year 1 is assumed to be the same as the LOM scenario.

3.6.2 Special Material Disposal

Basis:

1. *Reclamation Plan, Section 2.3*
2. *NorthMet Project Closure and Demolition Specification (Structures and Equipment Only)*

Special materials on-site at the time of closure may include ACM, nuclear sources, partially used paint, chemical and petroleum products, fluorescent and sodium halide bulbs, certain batteries, electronic waste, lighting ballasts, small capacitors, and oil- or chemical-stained concrete. All of these materials will be safely collected, removed, and properly recycled or disposed of according to relevant regulations.

Surveys for Asbestos-Containing Materials (ACMs) have been completed. ACMs (i.e., pipe and electrical insulation) in utility tunnels will be sealed prior to the tunnels being sealed.

During initial closure of the Cliffs Erie facility, all PCB transformers (including sixteen large ones) and capacitors were removed and properly disposed.

During closure of the Cliffs Erie facility, all nuclear sources were inventoried and disposed.

Partially used paint, chemical and petroleum products will be collected and properly disposed.

Fluorescent and sodium halide bulbs will be removed from fixtures collected and properly disposed.

Mine Year 1:

For Mine Year 1, waste disposal will be carried out only for legacy sites and Phase 1 mine and plant sites. Nuclear sources from the processing plant will be disposed of appropriately. Other residual chemicals and products will be removed by their manufacturers. Other wastes will be disposed of according to relevant regulations.

3.6.3 Product Disposal

Basis:

1. Reclamation Plan, Section 2.4

In the event of a default, it is expected that all products (copper concentrate, nickel concentrate, mixed hydroxide product, PGE [platinum-group elements] precipitate) may be shipped to customers, placed in the HRF or disposed in an appropriate off-site landfill.

Mine Year 1:

For the purposes of this exercise, the cost estimate assumes that all product will be shipped off-site in the event of default at Mine Year 1. This estimate does not take credit for product value. Furthermore, the HRF will not have been constructed in Mine Year 1 to enable disposal of the product on-site.

3.6.4 Reagent Disposal

Basis:

1. Reclamation Plan, Section 2.4

The reagent suppliers, which will be under contract to PolyMet, will remove any reagents remaining at closure. In many cases, the suppliers of chemicals and equipment will be responsible for furnishing tanks and will therefore be required to remove and dispose of those tanks during reclamation.

Mine Year 1:

At the end of Mine Year 1, any reagents on site will be disposed of.

3.7 Closure and Post-Closure Management, Maintenance, and Monitoring

3.7.1 Carrying Costs

General and administration costs during the closure and post-closure periods that will support closure and/or post-closure activities will consist of the following:

- Vehicles; and
- Snow plowing.

3.7.2 Human Resources

Human resources during the closure and post-closure periods in support of closure and/or post-closure activities will consist of the following:

- Closure –
    - Site Manager
    - Project Engineer
    - Accountant/Purchaser
    - Water Treatment

- Utility

- Post-closure
  - Site Manager
  - Water Treatment
  - Utility

3.7.3 Road Maintenance

Roads will be maintained for continued activities during the closure and post-closure periods.

3.7.4 Water Treatment – Mine Site WWTF Maintenance – Closure and Post-Closure

Basis:

1. Water Management Plan – Mine, Section 7.3.2

The WWTF will require periodic maintenance. An annual cost for maintenance/replacement other than membrane replacement which is included in operating cost has been developed based on equipment life (Barr, 2016b).

3.7.5 Water Treatment – Plant Site WWTP Maintenance – Closure and Post-Closure

The Plant Site WWTP will require annual maintenance costs during the closure period and the post-closure period. An annual cost for maintenance/replacement other than membrane replacement which is included in operating cost has been developed based on equipment life (Barr, 2016b).

3.7.6 Cover Maintenance

3.7.6.1 General

Cover maintenance will consist of revegetation and erosion maintenance. An assumption of percentage rework on revegetation and growth media placement is provided site-wide. Facility-specific maintenance requirements are discussed in the following subheadings.

3.7.6.2 Flotation Tailings Basin Cover Maintenance

Basis:

1. Flotation Tailings Management Plan, Section 7.5

Cover maintenance actions with respect to the FTB will consist of the following:

- FTB containment system - pipe/pump/blockage repairs to FTB containment system;
- FTB south seepage management system - pipe/pump/blockage repairs to south seepage management system;
- FTB beach cover repairs - erosion repairs to FTB beach cover; and
- FTB pond bottom repairs - repairs to FTB pond bottom cover.

Mine Year 1:

The liabilities for maintenance of the cover of the FTB will be present at the end of Mine Year 1.

3.7.6.3 Category 1 Stockpile

Basis:

1. Adaptive Water Management Plan, Section 3.3.2

The stockpile cover system will require annual maintenance to remain effective. Annual maintenance will consist of repair of erosion that threatens to expose the geomembrane, removal of deep-rooted woody plant species (as permits require), repair of impacts from burrowing animals, and any other conditions that, if left unresolved, could impair performance of the cover. Periodic inspections (typically each spring and fall and after rainfall events approaching or exceeding the design event) will be conducted to identify any areas requiring repair.

Mine Year 1:

A portion of the Category 1 stockpile will have been constructed by the end of Mine Year 1. Cover maintenance will concern the cover placed on this configuration of the facility.

3.7.6.4 Coal Ash Landfill

Basis:

1. Reclamation Plan, Section 6.1.1

The following govern the requirement for cover maintenance on the coal ash landfill:

- Coal ash from LTVSMC's Taconite Harbor facility was disposed at the Hoyt Lakes' Coal Ash Landfill located southeast of the Tailing Basin.
- As part of a Compliance Agreement with the MPCA, LTVSMC agreed to close the Coal Ash Landfill. A Closure Plan and Post-Closure Plan were subsequently submitted to the MPCA during May 2000.
- That plan indicated that LTVSMC would stop accepting coal ash at the disposal area by approximately August 1, 2000. The Closure Plan was prepared in accordance with Minnesota Rules, part 7035.2815, subpart 5, items D and E, subpart 6 and subpart 16 and specified that closure activities be completed by September 2000.
- The Post-Closure Plan indicates that the postclosure care period will continue for 30 years from the final closure certification which certifies that the Coal Ash Landfill has been closed in accordance with approved plans and specifications as required by Minnesota Rules, part 7035.2610. Final closure was approximately 2000.
- Therefore there are a number of years where monitoring will continue until 2030 during which inspections of the final cover system and surface water control system will be performed three times a year (spring, summer and fall), and maintenance will be performed as necessary.
- A report describing the inspection(s), conditions observed, corrective actions, maintenance activities, and monitoring activities is required to be submitted to MPCA annually.

- Per PolyMet's LOM plan, the Coal Ash Landfill will be inundated by the FTB in approximately Mine Year 7, therefore the contents of the landfill will be relocated to the HRF prior to that time, or disposed of off-site in accordance with all federal and state regulations.

Mine Year 1:

By the end of Mine Year 1, the Coal Ash Landfill will still be present without the possibility of inundation by the FTB or the relocation to the HRF. Therefore, it will be monitored for cover integrity until 2030.

3.7.7 Other

3.7.7.1 Industrial Landfill SW-619

Basis:

1. Reclamation Plan, Section 6.1.2

In December 2006, PolyMet purchased Cliffs Erie's Industrial Landfill, which operates under MPCA Solid Waste Management Permit 619 (SW-619).

A groundwater monitoring system and a methane ventilation system were already present at the closed LTVSMC industrial waste landfill and are used to monitor conditions at Industrial Landfill SW- 619. Groundwater and methane monitoring is performed annually during October each year.

The post-closure care period will continue for 30 years from the final closure certification, which certifies that the disposal area has been closed in accordance with approved plans and specifications as required by Minnesota Rules, part 7035.2610. Current plans are to close this landfill in 2018.

Mine Year 1:

At the end of Mine Year 1, the facility will need 4 years to close, after which there will be post-closure care period monitoring for 30 years.

3.7.7.2 Land Treatment Facility SW-625

Basis:

1. Reclamation Plan, Section 6.1.3

On September 29, 2005, the MPCA issued in accordance with Minnesota Statute Chapters 115, 115A and 116 and Minnesota Rules, chapters 7000, 7001, 7035, and 7037, a permit to Cliffs Erie to construct and operate Land Treatment Facility SW-625. The facility consists of a 90-acre land treatment site located in Cell 2W of the FTB. The permit authorized a solid waste composting area (MC001).

The Facility shall not be considered closed until the Agency issues a closure certification to Cliffs Erie. Cliffs Erie may request closure of the Facility by the Agency after the following can be demonstrated:

1. All soil monitoring results (including any subsurface samples) are less than 10 ppm Total Petroleum Hydrocarbons;

2. All status reports, annual reports, and any other reports pertaining to the Facility were submitted to the Agency; and
3. Any other information specifically requested by the Commissioner has been provided.

PolyMet is not liable for closure of this facility.

3.7.8 Water Quality Monitoring

Basis:

1. Reclamation Plan, Section 7.1.2

Mine Site and Plant Site water treatment are expected to continue until discharges meet water quality standards.

This cost estimate assumes that water quality monitoring will be included for the following:

- East Pit lake water quality monitoring;
- West Pit lake water quality monitoring;
- Water quality monitoring around Category 1 stockpile;
- FTB pond water quality;
- Monitoring point downstream of FTB pond;
- HRF;
- Plant Site WWTP; and
- Mine Site WWTP.

Samplers will be the water treatment crew.

Mine Year 1:

A breakdown of the water quality monitoring points relevant to Mine Year 1 is provided in Appendix A (highlighted items will be present in the mine year).

3.7.9 Dam Safety Monitoring

Dam safety monitoring will consist of the following:

- Provide Engineering Services for providing Dam Safety Monitoring for the FTB and the HRF during the Closure Period.
- Provide Engineering Services for providing Dam Safety Monitoring for the FTB and the HRF at a reduced level during Post Closure.

Mine Year 1:

In Mine Year 1, dam safety monitoring liabilities for the FTB will be present. Those for the HRF will not, until the HRF is constructed.

4 Closure Cost Estimate

Version 1.4.1 Build 16 of the Standardized Reclamation Cost Estimator (SRCE) was used to prepare a portion of the CRE. The SRCE is spreadsheet software that was developed as part of a cooperative effort between the Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation (NDEP), the U.S. Department of Interior, Bureau of Land Management (BLM) and the Nevada Mining Association (NvMA) to facilitate accuracy, completeness and consistency in the calculation of costs for Mine Site reclamation. SRCE uses first principles methods to estimate quantities (lengths, areas, and volumes), productivities, and work hours required for various closure tasks based on input from the user. The model is available in the public domain and hosted on the web site: http://www.nvbond.com.

The SRCE model was selected for the estimation of closure costs for the following reasons:

- SRCE provides a standardized and systematic methodology for mine closure cost estimates. The routines provided in the model cover different operation units and aspects of mining projects.
- SRCE bases its estimates on accepted first principles. Facility dimensions are defined by the user. Equipment and personnel productivities for given tasks are established through widely accepted published statistics. In this regard equipment productivities are taken from Caterpillar Performance Handbook (2004). Personnel as well as other relevant productivities are established through the use of Means Heavy Construction Cost Data (2006). For specific tasks such as well plugging, which are not directly available in any publication, realistic values derived from field experiences in mine closure studies are utilized in the model.
- SRCE is flexible in cost estimation, allowing utilization of local unit costs.

Details on how the costing was compiled is provided in detail in Section 4.

Data required for SRCE consists of project data and cost data. Project data are (areas, lengths, volumes, ungraded and final reclamation slopes, etc.), haul distances and slopes, cover thicknesses, flow rates, etc., for the SRCE to estimate total (three-dimensional) areas, dozing distances, truck fleets, fleet productivities, volumes of materials, etc. For this project, project data pertains to the stockpiles, flotation tailings basin, pits, roads, miscellaneous disturbances, water treatment flowrates, etc. Cost data include labor, equipment, materials, and various project-specific costs.

Where the user of standardized approaches in SRCE were not applicable for the CRE, site-specific estimates were prepared or third-party contractor estimates were solicited. These have been incorporated into SRCE through the use of User sheets provided. References and supporting technical and cost data are appended.

4.1 Regulatory Considerations in Cost Estimating

`Minnesota Rules Part 6132.1200 Subpart 2 B (2) requires that no salvage value may be taken as credit to the closure cost estimate. Per Subpart 4 B (3), the cost estimate will be adjusted annually.

4.2 Methodology

4.2.1 Project Data

Project data has been input into the SRCE spreadsheet under the following tabs:

- Waste Rock Dumps;
- Roads;
- Quarries and Borrow Pits;
- Haul Material;
- Other Demolition and Equipment Removal;
- Sediment and Drainage Control;
- Process Ponds;
- Yards;
- Waste Disposal;
- Miscellaneous Costs;
- Monitoring;
- Construction Management;
- Human Resources; and
- Other User.

4.2.2 Cost Data

The SRCE utilizes cost data which is input into a separate file ("Cost Data File") where the user can define up to 15 different cost bases. Once loaded into the SRCE the cost bases can be selected by the user to quickly switch between cost bases. The data input in the Cost Data File include the following and the sources of the data used in this estimate are itemized further on:

- Labor rates:
  - Equipment operators:
    - Bulldozers;
    - Motor graders;
    - Scrapers;
    - Wheeled loaders; and
    - Other equipment (backhoes, cranes, pumps, light vehicles, etc.).
  - Truck drivers:
    - Articulated trucks; and
    - Large haul trucks.

    - Laborers:
        - General Laborer;
        - Skilled Laborer;
        - Driller's Helper;
        - Rodmen (reinforcing concrete);
        - Cement finisher; and
        - Carpenter.
    - Project management:
        - Project Manager;
        - Foreman;
        - Field Geologist/Engineer;
        - Field Tech/Sampler; and
        - Range Scientist, etc.
- Equipment rates:
    - Monthly equipment rates;
    - Hourly preventative maintenance costs;
    - Ground-engaging tool consumption; and
    - Tire costs.
- Material costs:
    - Revegetation materials:
        - Seed mixes;
        - Mulch;
        - Amendments.
    - Well abandonment materials;
    - Monitoring costs; and
    - Fuel and power.
- Miscellaneous unit costs – labor, equipment, and/or material costs for:
    - Revegetation labor and equipment;
    - Building and wall demolition;
    - Waste disposal;
    - Underground opening closure;
    - Miscellaneous linear projects;
    - Erosion, evaporation, and sedimentation control; and

- Production or dewatering well pump removal.

- Indirect Costs (apply to all bases):
  - Engineering (% of grand total);
  - Contingency (% of grand total);
  - Insurance (% of labor total);
  - Bond (% of grand total);
  - Contractor profit (% of grand total); and
  - Contract administration (% of grand total).

4.2.2.1 Labor

Labor rates have been obtained from DOLI (2015) (Appendix B) for prevailing wages for state funded construction projects and InfoMine rates where applicable. DOLI rates are for commercial type in St. Louis County per costs revised on April 20, 2015 and effective date May 1, 2015. Typical laborer costs utilized include, but are not necessarily limited to, operators of special equipment (articulated trucks), truck drivers, drill rig operators, overhead cranes, and laborers (common and skilled). The labor rates used include the basic and fringe rates for hourly totals with no additional add-ons.

4.2.2.2 Equipment

Equipment hourly rental rates were obtained from a local supplier (Jim Tieberg e-mail March 18, 2015). They do not include preventative maintenance and consumables; therefore, these have been taken from a July 2014 Cashman Equipment preventative maintenance costs from Elko, NV, as published by the Nevada Division of Environmental Protect, Bureau of Mining Regulation and Reclamation.

4.2.2.3 Materials

1. Seed mix, mulch, and fertilizer unit costs.
2. Base fuel costs are assumed at $2.70/gallon (Dan Hennen, e-mail 5/12/2015). $0.285/gal excise tax is added per MDR (2015).
3. 40 mil geomembrane costs have been obtained from PolyMet.
4. Water analysis costs have been obtained from PolyMet per a 2013 quote.
5. Power costs are $0.078 per Minnesota Power (Appendix C).

Costs for seed mixes for slope areas and flat areas were provided by D & T Landscaping, Inc. A sales tax rate of 6.875% was applied. SRK then split the Mix 1 cost equally into labor, equipment, and materials rates (Table 4-1). With the assumption that the labor and equipment burdens would be similar, material costs for Mix 2 and Mix 3 were obtained by keeping the labor and equipment rates constant and subtracting them from the cost for that seed mix. The same document also provides mulch costs.

Table 4-1: Seeding Costs

		Cost ($/acre)	Labor ($/acre)	Equipment ($/acre)	Materials ($/acre)
Mix 1	Tailings basin flats seed and fertilizer	417	139	139	**139**

Mix 2	Tailings basin slopes seed and fertilizer	577	139	139	**299**
Mix 3	Overburden seed and fertilizer	315	139	139	**37**

4.2.2.4 Indirect Costs

A contingency of 5% has been applied to the direct costs.

4.3 Mine Site Facilities

4.3.1 Mine Pits

SRCE sheet(s):

1. *Quarries and Borrow Pits*
2. *Other Demo & Equipment Removal*
3. *Misc. Costs\Fence Installation*

For reclamation of the pit(s), see the sheet “Quarries and Borrow Pits.”

For removal of the dewatering system, see “Other Demo & Equipment Removal” for in-pit pumps and “Misc. Costs” for in-pit piping and powerline and substation removal.

Pit walls will be set back from 2H:1V to 2.5H:1V. The setback will be at least 20 feet from the crest of the pit wall. The overburden portions of the pit walls will be sloped and graded at no greater than 2.5H: 1V. The sloped areas will be vegetated to conform to Minnesota Rules Part 6132.2700. There will be a fence around the perimeter of the pit.

4.3.2 Stockpiles

4.3.2.1 Category 1 Stockpile

SRCE sheet(s):

1. *Waste Rock Dumps; User 8*
2. *Haul Material; User 8*
3. *Other User*
4. *User 11*

At closure, the slopes will be regraded to 3.75H:1V and the stockpile covered with a cover system. Rip-rap will be installed at a length equal to the longest of the mid-bench lengths of the lifts and a width of 6 ft.

The Mine Year 1 configuration of the Category 1 stockpile has been utilized for deriving inputs for reclamation of this facility.

The mid-bench lengths and heights of the stockpile lifts are utilized to estimate grading costs. (Appendix D)

The mid-bench lengths, heights of the lifts, and final regraded area inputs estimate the three-dimensional area of the stockpile. This gives the total surface area over which a cover

can be placed. The cover system installed on the Category 1 Stockpile will consist of the following:

1. 6” additional soil for uniform foundation layer
2. 6” vertical percolation layer
3. Geomembrane barrier layer
4. 12” lateral drainage layer
5. 18” vertical percolation layer

Of these, items represented as “cover” and “growth media,” respectively, are under “Waste Rock Dumps.” Items represented as soil for uniform foundation layer and vertical percolation layer are in the “Haul Material” sheet. The haul distances are show in Appendix E.

These items were also provided in the Ames quotes in “User 11.” Therefore, to avoid a double dip, the quote items have been crossed out and taken out, leaving non-earthwork Item 3 is provided in the “Other User” sheet and the area is linked to the total surface area of the Category 1 Stockpile to estimate the quantity of geomembrane required with the cover material.

The extension of the containment system required for long-term Mine Site water treatment in the Mine Year 1 configuration is also provided in “Other User.”

4.3.2.2 Category 2/3 Stockpile

SRCE sheet(s):

1. *Haul Material*
2. *Misc. Costs*
3. *Other Demo & Equipment Removal*

The Category 2/3 Stockpile will be relocated to the pit excavation. The quantities are as provided in the “Rock and Overburden Management Plan.” The liner underneath the facility is assumed excavated and hauled with the rest of the rock material.

Collection piping associated with the stockpile will be removed. (See “Misc. Costs.”)

Pumps will be removed. (See “Other User.”) Costs are provided by PolyMet.

4.3.2.3 Category 4 Stockpile

SRCE sheet(s):

1. *Haul Material*
2. *Misc. Costs*

The Category 4 Stockpile will be relocated to the pit excavation. The quantities are as provided in the “Rock and Overburden Management Plan.” The liner underneath the facility is assumed excavated and hauled with the rest of the rock material.

The footprint of the stockpile will be covered with growth medium or ripped and revegetated.

Collection piping associated with the stockpile will be removed. (See “Misc. Costs.”)

4.3.2.4 Ore Surge Stockpile

SRCE sheet(s):

1. *Haul Material*
2. *Misc. Costs*

The Ore Surge Stockpile will be relocated to the pit excavation. The quantities are as provided in the “Rock and Overburden Management Plan.” The liner underneath the facility is assumed excavated and hauled with the rest of the rock material.

The footprint of the stockpile will be covered with growth medium or ripped and revegetated.).

Collection piping associated with the stockpile will be removed. (See “Misc. Costs.”)

4.3.3 Mine Site Water Management Systems

4.3.3.1 Stormwater and Process Water Pond Reclamation

SRCE sheet(s):

1. *Process Ponds*
2. *User 3*

The stockpile sumps and ponds will be reclaimed by backfilling, covering with topsoil, and revegetating. (See “Process Ponds.”)

The stormwater sedimentation ponds, the process water ponds, and the remaining stockpile sumps and overflow ponds will be reclaimed by developing wetlands or by filling, covering with topsoil, and revegetating the area.

For the purposes of the Mine Year 1 bond cost estimate, all ponds are assumed backfilled. Pond dimensions have been obtained from Large Figure 4 of Dimensions from the "Water_Management_Plan_-_Mine." The pond depths have been approximated from Table 4-1 of the same.

4.3.3.2 Central Pumping Station

SRCE sheet(s):

1. *Other Demo & Equipment Removal*
2. *User 11*

The cost for demolition of the CPS is included in the Lakehead quote.

4.3.4 Mine Site Water Treatment

Water treatment is addressed in Section 4.5.

4.4 Plant Site Facilities

4.4.1 Flotation Tailings Basin

SRCE sheet(s):

1. *Tailings*
2. *Other User; User 11*

Ames Construction has included a scope of work for bentonite amendment and reclamation of the FTB.

4.4.2 Plant Site Water Treatment

Water treatment is addressed in Section 4.5.

4.4.3 Processing Facilities

SRCE sheet(s):

1. *Other Demo & Equipment Removal*
2. *User 2*

The cost of demolition of the processing plant is included in Lakehead's quote provided in User 2. In Mine Year 1, Phase 2 will not have been built. Therefore, costs pertaining to facilities in Phase 2 have been excluded from the cost estimate.

4.5 Solution/Water Management

4.5.1 Water Treatment - Remove East Pit Flushing Load

SRCE sheet(s):

1. *Other User; User 7*
2. *Human Resources*

As described in Section 3.1.4, the hauling of Category 2/3 and Category 4 waste rock stockpiles into the pits will require treatment of water at the WWTF as the oxidation products on the surface of the backfilled rock is flushed into the pit lake.

Mine Year 1:

For Mine Year 1, the flow rate and treatment costs for the duration of the closure period were provided by Barr Engineering (2016b). The labor crews are provided under Human Resources.

4.5.2 Water Treatment - Flood West Pit with WWTP Effluent

SRCE sheet(s):

1. *Other User; User 7*
2. *Human Resources*

Any WWTP effluent that is excess of that required to replace water from headwater streams that was collected by the FTB containment system, will be used to accelerate flooding of West Pit.

Mine Year 1:

For Mine Year 1, the flow rate and treatment costs for the duration of the closure period were provided by Barr Engineering (2016b). The labor crews are provided under Human

Resources. Also because the West Pit will not have been excavated, no WWTP effluent will be pumped to the Mine Site.

4.5.3 Water Treatment Costs

SRCE sheet(s):

1. *Other User*
2. *User 7*
3. *Human Resources*

Water treatment costs for the following have been obtained through Barr (2016a):

- Operational expenditures;
- Annual equipment replacement costs; and
- Capital costs for modifications for long-term operations.

Barr (2016a) provides detailed documentation of methods of estimation and sources of

4.5.4 Water Treatment - Plant Site Long Term - Excess FTB Containment System, South Seepage Management System and FTB Pond Water

SRCE sheet(s):

1. *Other User; User 7*
2. *Human Resources*

Because the area enclosed by the FTB containment system will have a net positive water balance, excess water will have to be treated and discharged.

Mine Year 1:

For Mine Year 1, the flow rate and treatment costs for the duration of the closure period were provided by Barr Engineering (2016). The labor crews are provided under Human Resources.

4.6 Other Demolition

4.6.1 Areas of Concern, Legacy Remediation

SRCE sheet(s):

1. *Other User*
2. *User 4*

PolyMet has provided cost estimates for Areas of Concern for which liability has been accepted as part of purchase of the site from Cliffs Erie. Costs are provided per a quote from a local contractor.

4.6.2 Tunnels

SRCE sheet(s):

1. *Other Demo & Equip Removal*

2. User 2

Costs for tunnel removal have been provided by Lakehead Construction.

4.6.3 Pipelines

SRCE sheet(s):

1. Other Demo & Equip Removal

2. User 2

The cost of removal of all surface pipes, including those described in other headings in this section, are included in the "Other Demo & Equip Removal" through User 2 and the Lakehead demolition cost estimate.

4.6.4 Powerlines and Substations and/or Transformers

SRCE sheet(s):

1. Other Demo & Equip Removal

2. User 2

Costs for removal of powerlines are included in the Lakehead demolition cost estimate.

4.6.5 Railroad Track and Rail Transfer Hopper

SRCE sheet(s):

1. Other Demo & Equip Removal

2. User 2

The Lakehead demolition cost estimate includes costs for removing railroads across the sites.

4.6.6 Tanks

SRCE sheet(s):

1. Other Demo & Equip Removal

2. User 2

The cost of demolition of tanks is included in the quote provided for demolition of the legacy and new Mine Site and Plant Site demolition cost estimate by Lakehead.

4.6.7 Roads (Plant and Mine Site)

SRCE sheet(s):

1. Other Demo & Equip Removal

2. User 2

Roads in the Legacy Plant Area, New - Phase 1 - Plant Site, and New - Phase 1 - Mine Site are included in the Lakehead demo quote.

4.7 Waste Disposal

4.7.1 Demolition Waste Disposal

SRCE sheet(s):

1. *Other Demo & Equip Removal*
2. *User 2*

The Lakehead demolition cost estimate has been prepared per PolyMet (2016), and demolition waste from structure removal will be disposed of in an off-site landfill. Concrete from demolition will be placed in building basements where possible including coarse crusher basement, fine crusher basement and concentrator basement and the Plant Reservoir. Costs are included in the User 2 and Appendix F.

4.7.2 Special Material Disposal

SRCE sheet(s):

1. *Other Demo & Equipment Removal*
2. *User 2*

Costs for handling of special wastes is included in the Lakehead demolition cost estimate and this closure cost estimate includes legacy and Phase 1 plant site and mine site costs.

4.7.3 Product Disposal

There are no costs associated with disposal of mineral products.

4.7.4 Reagent Disposal

There are no costs associated with reagent disposal.

4.8 Closure Management, Maintenance, and Monitoring

SRCE sheet(s):

1. *Other User*
2. *Human Resources; User 6*
3. *Constr. Mgmt*
4. *Monitoring*

4.8.1 Vehicles

SRCE sheet(s):

1. *Other User*

General and administration costs during the closure and post-closure periods (4 years and 46 years, respectively) include the following:

- Vehicle costs; and
- Snow plowing.

A quote for F-250's was obtained and a vehicle life of seven years was assumed for annual replacement costs per vehicle.

Snow plowing costs were obtained from PolyMet (Appendix G) and an average was assumed for annual snow plowing costs for the closure and post-closure periods.

4.8.2 Maintenance and Repairs

SRCE sheet(s):

1. *Other User*
2. *Construction Management*
3. *Monitoring*
4. *Human Resources*

Maintenance and repairs costs consist of the following:

- Legacy Maintenance:
    - Landfill SW-619 Monitoring; and
    - Coal Ash Landfill Monitoring.
- FTB Containment & South Seepage Systems:
- FTB Cover Systems:
    - FTB Pond Maintenance - FTB Pond Bottom Cover Repairs
    - FTB Beach Maintenance - FTB Beach Cover and Erosion Repairs
- Category 1 Waste Rock Stockpile Cover Maintenance:
    - Stockpile Cover Maintenance; and
    - Containment System Maintenance:

Road maintenance costs are estimated at 40 hours a month requiring a grader during the closure period and 8 hours a month on average during the post-closure period.

Per Appendix H, the water treatment crews will also be tasked with the following:

- Inspect and provide routine maintenance for Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only)
- Inspect and provide routine maintenance for FTB Beach and Pond Bottom Cover Systems (Mine Year 1 only)
- Inspect and provide routine maintenance for storm water systems (ditches, culverts)
- Inspect and provide routine maintenance for reclamation vegetation (pit walls, stockpile/pond footprints, structure footprints, roads, railroads)
- Inspect and repair pit perimeter barrier fence and gates (Stage 2 and Mine Year 1 only)

4.8.3 Human Resources

SRCE sheet(s):

1. *Human Resources*

Human resources will consist of the following and also cover the crews for water treatment:

- State agency involvement;
- External management;
- utility crew for water treatment plant operation, water sample collection and routine inspection and maintenance

These are reflected under “Human Resources” and the crews scheduled out for 50 years total.

Costs for these items for both the closure and post-closure periods have been provided by Barr Engineering (Appendix I)..

There is also full-time supervision included under the “Constr. Mgmt” during the closure period.

4.8.4 Revegetation Maintenance

SRCE sheet(s):

1. *Monitoring*

An additional 5% revegetation has been added in the “Monitoring” sheet to the overall revegetation costs over the areas revegetated (stockpiles, pit(s), roads, ponds, general disturbance, ponds, etc.) to account for any rework. Erosion maintenance has not been included here given the technically-specific aspects of erosion maintenance on engineered covers is included under other headings.

4.8.5 Water Quality Monitoring

SRCE sheet(s):

1. *Monitoring*
2. *User 13*

Water quality monitoring costs are applied to those items described in Section 3.7.8. The cost estimate includes the laboratory analysis costs and supply costs only given sampling would be carried out by the solution management crew. Monitoring will be performed in the locations provided in User 13. s Lab analysis costs are provided in Appendix A.

5 Results

With 1.1% inflation rate and 8% discount rate, the grand total net present value for the NorthMet financial assurance estimate is $197,390,336.

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Mining Consultant

Reviewed by

Jeffrey V. Parshley

Corporate Consultant

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PolyMet, 2016. NorthMet Project Closure and Demolition Specification (Structures and Equipment Only) [Demo Spec Rev 6.docx] June 30, 2016, Revision 6.

PolyMet, 2015a. NorthMet Project Reclamation Plan. Version 6. Issue Date: February 10, 2015.

PolyMet, 2015b. NorthMet Project Rock and Overburden Management Plan, Version 7. Issue Date: January 20, 2015.

Appendices

Appendix A: Monitoring Points

Pace Analytical Services, Inc.
2016 Price List

Water		
Analyte	**Method Number**	**Unit Price**
Organics		
Gas Chromatography / Mass Spectrometry (GC/MS)		
VOCs (medium level)	8260B	$81.25
VOCs - Low Level	8260B	$87.50
1,4 Dioxane	8260B SIM	$118.75
VOCs 524.2 (drinking water)	524.2	$137.50
VOCs 624 (waste water)	624	$162.50
SVOC	8270C, D	$206.25
Acid Extractibles - Phenols	8270C,D	$156.25
Base Neutral (BN) Extractibles	8270C, D	$156.25
SVOC 625 (waste water)	625	$243.75
PAHs	8270C,D	$125.00
PAHs (low level)	8270C,D SIM	$87.50
cPAH	8270C,D SIM	$206.25
MN Dept of Ag List 1	8270D	$206.25
MN Dept of Ag List 2	8270D	$225.00
Pentachlorophenol (PCP)	8270C,D SIM	$218.75
Gas Chromatography (GC)		
DBCP, EDB	8011	$62.50
PCBs	8082/8082A	$75.00
Pesticides, Organochlorine	8081A, B	$137.50
Pesticides, Organochlorine and PCBs	8081A,B + 8082A	$225.00
Petroleum Hydrocarbons		
Total Purgeable Petroleum Hydrocarbons		
BTEX	8260B	$31.25
BTEX/MTBE	8260B	$33.75
BTEX/WI GRO	8260/WI GRO	$43.75
BTEX/TPH as Gas	8260/8015	$43.75
BTEX/MTBE/WI GRO	8260/WI GRO	$43.75
BTEX/MTBE/Naphthalene	8260B	$45.00
BTEX/MTBE/Naphthalene/1,2 DCA	8260B	$50.00
BTEX/MTBE/Trimethylbenzenes (PVOC)	8260B	$50.00
Gasoline Range Organics (GRO)	AK 101	$56.25
Gasoline Range Organics (GRO)	WI GRO	$28.75
NWTPH-Gx	NWTPH-Gx	$56.25
TPH as Gas	OA-1	$68.75
TPH as Gasoline (C6-C10)	8015B,C	$31.25
VPH	MA VPH	$93.75
Petroleum Hydrocarbons		
Total Extractible Petroleum Hydrocarbons		
Diesel Range Organics (DRO)	AK 102	$68.75
Residual Range Organics (RRO)	AK 103	$68.75
Diesel Range Organics (DRO)/Residual Range Organics (RRO)	AK 102/AK 103	$93.75
Diesel Range Organics (DRO)	WI DRO	$37.50
WI DRO w/silica gel clean-up on final run	WI DRO	$56.25
Extended Range Organics C10-C32 **or** C10-C36	WI DRO	$81.25
Extended Range Organics C10-C36	WI DRO	$81.25
EPH screen	MA EPH	$68.75
EPH fractions after screen	MA EPH	$125.00
TPH as Diesel (C10-C28)	8015B,C	$37.50
TPH as Diesel (C10-C28) with silica gel clean-up	8015B,C	$56.25
Motor Oil Range (C24-C36)	8015B,C	$50.00
Motor Oil Range (C24-C36) with silica gel clean-up	8015B,C	$68.75
Oil and Grease	1664A	$62.50
HEM - SGT (TPH)	1664A	$81.25
NWTPH-Dx	NWTPH-Dx	$75.00
NWTPH-Dx with silica gel clean-up	NWTPH-Dx	$93.75
TPH as Diesel	OA-2	$75.00

Water		
Analyte	**Method Number**	**One-time client**
Wet Chemistry / Inorganic Analysis		
Acidity	SM2310B	$18.75
Alkalinity, Total (includes carbonate, bicarbonate, hydroxide) reported as CaCO3	SM2320B	$18.75
BOD, 5 day	Hach 10360/SM5210B	$37.50
Bromide	300.0	$25.00

BTUs	ASTM D240, D5865	$22.50
Carbon, Total Organic (double run)	SM5310C	$56.25
Carbon, Total Organic (quad run)	9060A	$131.25
Cation/Anion Balance (Na, Ca, Mg, K, Alkalinity, Sulfate, Chloride, N+N, Fluoride) Calculation only	Calculation only, see indiv. methods	$12.50
CBOD	Hach 10360/SM5210B	$37.50
Chloride	300.0	$25.00
Chloride	SM4500-Cl-E	$12.50
Chlorine, Residual	SM4500Cl-G	$12.50
Chlorophyll a	SM10200H	$37.50
Chromium, hexavalent	SM3500-Cr B	$43.75
Chromium, trivalent	Calculation only	$12.50
COD	SM5220D	$25.00
Color	SM2120	$12.50
Cyanide, Total	SM4500CN-E	$37.50
Dissolved Oxygen	Hach 10360	$62.50
Wet Chemistry / Inorganic Analysis		
E. coli bacteria	Quantitray	$62.50
Eh	ASTM D1498	$37.50
Fecal coliform bacteria	SM9222D	$25.00
Fluoride	300.0	$25.00
Fluoride	SM4500F-C	$16.25
Formaldehyde	NIOSH 3500	$56.25
Hardness (calc only) (requires Ca and Mg at additional charge)	SM2340B/200.7	$12.50
Heterotrophic Plate Count (HPC)	SM 9215 B	$22.50
Nitrogen, Ammonia	SM4500NH3/350.1	$18.75
Nitrogen, Ammonia (if distillation is required)	SM4500NH3/350.1	$37.50
Nitrogen, Nitrate	SM4500 NO3-H/353.2/300.0	$17.50
Nitrogen, Nitrite	SM4500-NO2-B/353.2/300.0	$17.50
Nitrogen, Nitrate+Nitrite	SM4500 NO3-H/353.2/300.0	$17.50
Nitrogen, Total Kjeldahl	351.2	$31.25
Total Inorganic Nitrogen	Calculation only	$12.50
Total Organic Nitrogen (calc. only, requires 351.2, 350.1)	Calculation only	$12.50
Total Persulfate Nitrogen	SM 4500 N-C	$62.50
pH (Corrosivity)	SM4500H+B	$6.25
Phosphorus, Ortho	SM4500P-E	$31.25
Phosphorus, Ortho	365.3/300.0	$31.25
Phosphorus, Ortho, Low Level	SM4500P-E	$37.50
Phosphorus, Total or Dissolved	SM4500P-E	$25.00
Phosphorus, Total or Dissolved	365.1	$25.00
Phosphorus, Total, Low Level	SM4500P-E	$37.50
Phosphorus, Total or Dissolved, Low Level	365.1	$37.50
Specific Conductance	SM2510B/120.1	$12.50
Sulfate	ASTM D516/300.0	$25.00
Sulfide	SM4500S2D	$37.50
Surfactants (MBAS)	SM5540C	$93.75
Total Coliform (membrane filtration)	SM 9222 B (quantitative)	$28.75
Total Coliform & E. Coli	SM 9223 B (presence/absence)	$22.50
Total Dissolved Solids	SM2540C	$12.50
Total Phenolics (recoverable)	420.4	$31.25
Total Settleable Solids	SM 2540F	$12.50
Total Suspended Solids	SM2540D/USGS I-3765	$12.50
Total Suspended Solids - low level	SM2540D/USGS I-3765	$18.75
Total Volatile Solids	160.4	$25.00
Turbidity	SM2130B/180.1	$12.50
Water		
Metals		
Hexavalent Chromium (Cr VI)	SM3500-Cr-B	$43.75
Mercury (Hg)	7470A/245.1	$43.75
Mercury - Low Level	1631 E	$112.50
Methyl Mercury	1630	$218.75
Selenium Hydride	SM 3114C	$93.75
Sodium Absorption Ratio (includes Ca, Mg, Na)	6010B,C/6020/6020A	$56.25
Individual Metals by ICP (Inductively Coupled Plasma) EPA 6010B, C		
Metal Analysis	6010B,C/200.7	$13.75
RCRA metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag)	6010B,C/200.7/7470A	$87.50
Individual Metals by ICP/MS (Inductively Coupled Plasma/Mass Spectrometry) EPA 6020/6020A		
Metal Analysis	6020/6020A/200.8	$20.00
Dioxin and PCB Congeners		
2,3,7,8 TCDD (drinking water)	1613B/8290/8290A	$250.00
17 Dioxin Compounds	1613B/8290/8290A	$743.75
PCB Congeners - Food List (7 Congeners)	1668	$531.25
PCB Congeners - WHO List (12 Congeners)	1668	$600.00
PCB Congeners - 209 Congeners	1668	$981.25
Dissolved Gases		

Methane only	RSK 175	$72.50
Ethane, Ethene, Methane, Propane	RSK 175	$100.00
Other Charges		
Charges can include any/all of the items noted to the right - to be charged when applicable. Prices may vary		Cost of sample supplies Disposal of unused sample supplies Time for packing/shipping of sample supplies Shipping/courier charges Unused sample supplies
Additional compounds (added to method after analysis)		$75/hour + analysis
Composite of samples		$10/container
Copy of chromatogram (if not requested at time of sample submittal)		$15/analysis/sample
Data validation/technical review of data		$100/hour
Deionization (DI) water - laboratory grade		$25/Gallon
Deionization (DI) water - ultra pure		Cost + Shipping + 15%
Delivery of sample containers (<1 workday notice)		$100 + Shipping
Delivery of sample containers (<3 workday notice)		$50 + Shipping
Disposal of unanalyzed material		materials + handling
Electronic Data Deliverable (EDD)		request quote
Extract and hold or hold of sample		50% of cost of analysis
Hard copy of Final Report		$10
Minimum laboratory order (one-time client)		$250
Reporting in multiple formats		$35
Return shipping - if requesting other than standard carrier		Cost
Sample filtration		$10/container
Sample preparation fee		$75/hour
Summa canisters not returned in 2 weeks		$50/can per week
Unannounced short hold or samples received <50% of hold time		Applicable rush surcharge
Hourly Time & Material Rates		
Technician		$60/hour
Project Manager		$70/hour
Analyst		$75/hour
Supervisor		$105/hour
Lab Manager / Assistant General Manager		$125/hour
Senior General Manager		$150/hour
Officer		$200/hour
Turnaround Times and Rush Surcharges		
Standard (10 Working Business Days)	Not Applicable	No Surcharge
6-9 Business Days	Not Applicable	1.25x
5 Business Days	Not Applicable	1.5x
3-4 Business Days	Not Applicable	2x
2 Business Days	Not Applicable	2.5x
1 Business Day	Not Applicable	3x
Less than 1 Business Day	Not Applicable	Quote
Standard TAT is 10 Business days. All requested turnaround times less than 5 business days MUST be pre-arranged to insure on-time delivery. Day of sample receipt is day zero. Report due close of business on agreed upon day.		
Deliverables / Data Packages		
Level 1 Sample Data Reporting Only		No Surcharge
Level 2 Complete Quality Control (QC) Data Blanks, Spikes, duplicates (including matrix spike duplicates), laboratory control samples, relative percent difference (RPD), percent recovery		No Surcharge
Level 3 Items listed in Level 2 plus QC limits, QA batch cross reference table. Allow an additional two weeks for data package.		15% Surcharge ($50 minimum per Work Order)
Level 4 Items listed in Levels 2 and 3 including sample raw data and chromatograms. Allow an additional two weeks for data package.		20% Surcharge ($50 minimum per Work Order)

Pricing Notes

All prices include:

a) Containers, preservatives, coolers, labels, chain-of-custody forms, *except* terracore kits and encore sample containers

b) Standard Electronic Deliverables via email

c) Access to Data via PacePort

Items included represent services provided by Pace Analytical. Numerous additional services and certifications are available throughout our nationwide network of labs. The prices shown are for routine projects with standard turnaround times. Specific projects may be bid individually. These prices should be used as guidelines, as exact pricing will depend on project size and expected turnaround time. Please consult Pace Analytical for assistance.

· Pace Analytical will dispose of all non-hazardous samples. Pace Analytical reserves the right to return to the client any highly hazardous, acutely toxic, or radioactive samples and sample containers.

· The Client is responsible for informing Pace of any necessary certifications, reporting limits and/or methods at the time of initial project set-up.

· Pace Analytical reserves the right to subcontract any method listed with prior consent of the Client.

· Methods listed are EPA Methods unless otherwise noted.

Large Table 8 Monitoring Plan – Internal Streams - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Pit Water (PW)	GW/ SW	P	WS-PW-WW WS-PW-WE WS-PW-C WS-PW-E	Large Figure 10	Flow Rate	Continuous	Monitoring Reports • Annual • May, August, November	Monitor pump rates to manage water in the pits to compare water balance to expected conditions and define future pumping requirements. Monitor at each pit sump Flow rates to be based on flow meters.
					Water Quality (Large Table 13, Internal Streams)	Monthly	Monitoring Reports • Annual • May, August, November	Monitor water quality of pit water in each pit sump
Stockpile Liner (SL) and Containment System (CS) Drainage	S	P	WS-SL-OSP WS-SL-4 WS-SL-231 WS-SL-232 WS-SL-233 WS-CS-1 WS-CS-2	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • May, August, November	Monitor drainage from stockpile liners to compare water balance to expected conditions and define future pumping requirements. Monitor at each stockpile sump Flow rates to be based on flow meters.
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of stockpile liner drainage in each stockpile sump
Stockpile Underdrain (SU) Drainage	GW	P	WS-SU-OSP WS-SU-4 WS-SU-231 WS-SU-232 WS-SU-233	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • May, August, November	Monitor drainage from the underdrains (beneath the liner) when flows are present. Monitor at each stockpile underdrain sump Flow rates to be based on flow meters.
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of stockpile underdrains (beneath the liner) in each stockpile underdrain sump when flows are present
Overburden Storage and Laydown Area Runoff	SW	P	WS-OSLA	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • May, August, November	Monitor drainage from OSLA to compare water balance to expected conditions. Monitor at OSLA pond Flow rates to be based on a flow meter.
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of OSLA drainage in OSLA pond when flows are present

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Haul Road (HR) Runoff	SW	P	WS-HRE WS-HRN WS-HRC WS-HRW	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • May, August, November	Monitor drainage from haul roads to compare water balance to expected conditions. Monitor at haul road ponds Flow rates to be based on flow meters.
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of haul road drainage in haul road ponds when flows are present
Rail Transfer Hopper (RTH) Area Runoff	SW	P	WS-RTH	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • May, August, November	Monitor drainage from RTH to compare water balance to expected conditions. Monitor at RTH pond Flow rates to be based on a flow meter.
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of RTH drainage in RTH pond when flows are present
Waste Water Treatment Facility (WWTF) Influents	PS	P	One station per influent stream • Construction water • East Pit and haul road (HRN) (with Central Pit) • Category 1 Waste Rock Stockpile Groundwater Containment System • Category 2/3 Waste Rock Stockpile and OSP • Category 4 Waste Rock Stockpile • RTH and haul roads (HRC, HRE) • West Pit and haul road (HRW)	TBD (at influent splitter structure)	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • Monthly	Operational monitoring of influent streams to evaluate if treatment is required.
					Water Quality (Large Table 13, WWTF List 1)	Daily Grab	Water Quality Monitoring Reports • Annual • Monthly	
Waste Water Treatment Facility (WWTF) Influents (continued)	Combined PS	P	Combined West EQ Influent (Chemical precipitation treatment train)	TBD (after EQ Basin inside WWTF Building)	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • Monthly	Monitor influent characteristics to modify and/or optimize treatment operations.
					Water Quality (Large Table 13, WWTF List 2)	Daily: 24-Hr Composite	Water Quality Monitoring Reports • Annual • Monthly	

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
			• Consists of flows from the Category 2/3 and 4 waste rock stockpiles and the OSP		Water Quality (Large Table 13, WWTF List 3)	Monthly		
	Combined PS	P	Combined East EQ Basin Influent (Membrane filtration treatment train) • Consists of flows from haul road, RTH, pit dewatering and Category 1 Waste Rock Stockpile Groundwater Containment System	TBD (after EQ Basin inside WWTF Building)	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • Monthly	Monitor influent characteristics to modify and/or optimize treatment operations.
					Water Quality (Large Table 13, WWTF List 2)	Daily: 24-Hr Composite	Water Quality Monitoring Reports • Annual • Monthly	
					Water Quality (Large Table 13, WWTF List 3)	Monthly		
Waste Water Treatment Facility (WWTF) Effluents	TW	P	Effluent • Consists of whole effluent	TBD	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • Monthly	Monitor effluent characteristics to document water quality prior to reuse in closure operations
					Water Quality (Large Table 13, WWTF List 2)	Daily: 24-Hr Composite	Water Quality Monitoring Reports • Annual • Monthly	
					Water Quality (Large Table 13, WWTF List 3)	Monthly		
Treated Water Pipeline (PP) Flows	TW	P	WS-PP-1 WS-PP-2	Large Figure 10	Flow Rate and Pressure	Continuous	Flow Rate Monitoring Reports • Annual • May, August, November	Monitoring both ends of the pipeline to detect leaks.
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	

Large Table 9 Monitoring Plan – Stormwater - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Stormwater (OS)	SW	P	SD-OS-A SD-OS-B SD-OS-C SD-OS-D	Large Figure 10	Flow Rate	Monthly	Monitoring Reports • Annual • May, August, November	Monitor stormwater outflows from the Mine Site at 5 pond outlet locations.
					Water Quality (Large Table 13, Stormwater)	Monthly	Monitoring Reports • Annual • May, August, November	Monitor water quality from stormwater outflows from the Mine Site at 5 pond outlet locations.

Large Table 10 Monitoring Plan – Groundwater - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Monitoring Wells – Surficial Aquifer	GW	E	24 existing wells: MW-05-02 MW-05-08 MW-05-09 MW-1 through MW-5 MW-6S/6D MW-7 MW-8S/8D MW-9 MW-10S/10D MW-11 through MW-18	Large Figure 11	Elevation	Quarterly	Annual Monitoring Report • Evaluate groundwater flow gradient and direction.	Surficial aquifer wells will be generally located downgradient of mine features such as pits and stockpiles. Groundwater is expected to flow toward the mine pit during mine dewatering operations. Groundwater flow direction is expected to revert to the natural flow direction after mine reclamation. Sampling frequency is preliminary and may be revised based on the outcome of ongoing discussions. When nested monitoring wells are installed, they are numbered with MW-# with an S or D following the ID number to indicate a shallow and deep monitoring well.
					Water Quality (Large Table 13, Groundwater)	Quarterly	Annual Monitoring Report • Summarize water quality data and evaluate trends.	
Monitoring Wells – Bedrock	GW	E	9 existing wells: OB-1 through OB-5 P-1 through P-4	Large Table 11	Elevation	Quarterly	Annual Monitoring Report • Summarize water quality data and evaluate trends. • Evaluate groundwater flow gradient and direction.	Number and location of bedrock wells have not yet been identified.
		P	TBD (proposed wells: MW-BR-x		Water Quality (Large Table 13, Groundwater)	Quarterly	Annual Monitoring Report • Summarize water quality data and evaluate trends.	

Large Table 11 Monitoring Plan – Wetland Hydrology - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Wetlands – Baseline Monitoring								
Baseline Wetlands for the Mine Site and Transportation and Utility Corridors	GW	E	Well 1 through Well 2 Well 4 and 4A Well 6 through Well 16 Well 21 through Well 48 Ref 1 through Ref 3 Ref 1M	Large Figure 7 and 8 in Reference (23)	Elevation – relative to ground surface	In progress Began in 2005 Ranging from monthly to continuous during non-freezing months	Varies	Provide sufficient hydrology information to allow identification of potential indirect hydrologic impacts to wetlands. There are currently 43 wetland hydrology monitoring wells in the Mine Site; see Section 4.2 of the Wetland Management Plan (Reference (23)) Wells 3, and 17-20 were removed during the baseline monitoring phase, and several additional wells were added.
Wetlands – Operations Monitoring								
Mine Site Wetlands	GW	E P	TBD in permitting TBD in permitting	Large Figure 7 and 8 in Reference (23)	Elevation – relative to ground surface	TBD in permitting	TBD in permitting	This program will provide the necessary information to determine whether indirect hydrologic impacts have occurred and to assess required mitigation measures. Additional information is available in Section 4.2 of the Wetland Management Plan (Reference (23)) Final number of stations is TBD in permitting

Large Table 12 Monitoring Plan – Surface Water - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Partridge River	SW	E	SW002 (PM-2) SW003 (PM-3) SW004 (PM-16) SW004a SW005 (PM-4)	Large Figure 12	Flow Rate	Monthly	Flow Rate Monitoring Reports • Annual • May, August, November	Monitoring of the Partridge River to define trends in water flow and identify potential impacts from the Project SW001 and SW006 have been omitted; SW001 is upstream of the Mine Site. This site was omitted from further monitoring because it was one of two surface water monitoring stations upstream of the Mine Site and potential Mine Site impacts; SW002 is also upstream (Large Figure 1). SW006 is downstream of the Mine Site, upstream of Colby Lake. This site was omitted from further monitoring due to its proximity to SW005, with no additional surface waters entering the Partridge River between the two monitoring stations (Large Figure 1).
					Water Quality (Large Table 13, Surface Water)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitoring of the Partridge River to define trends on water quality and identify potential impacts from the Project
Partridge River Tributaries	SW	E	WP-1 LN-1 WL-1 PM-5	Large Figure 12	Flow Rate	Monthly	Flow Rate Monitoring Reports • Annual • May, August, November	Monitoring of the Partridge River tributaries to define trends in water flow and identify potential impacts from the Project
					Water Quality (Large Table 13, Surface Water)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitoring of the Partridge River tributaries to define trends on water quality and identify potential impacts from the Project
Colby Lake	SW	P	LCy-2	Large Figure 12	Water Quality (Large Table 13, Surface Water)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitoring of Colby Lake to define trends in water quality
					Water Level	Monthly	TBD in permitting	TBD in permitting
Whitewater Reservoir	SW	P	Location TBD in permitting	Large Figure 12	Water Level	Monthly	TBD in permitting	TBD in permitting

Large Table 13 Monitoring Plan – Parameter Lists - NorthMet Mine Site

Internal Streams – Pit Water (Large Table 8) • Parameter List TBD in permitting
Internal Streams – Stockpile Drainage, Overburden Storage and Laydown Area Runoff, Haul Road Runoff, Rail Transfer Hopper Runoff (Large Table 8) • Parameter List TBD in permitting
Internal Streams – Waste Water Treatment Plant Influent (WWTF List 1) (Large Table 8) • Parameter List TBD in permitting
Internal Streams – Waste Water Treatment Plant Daily Influent and Effluent (WWTF List 2) (Large Table 8) • Parameter List TBD in permitting
Internal Streams – Waste Water Treatment Plant Monthly Influent and Effluent (WWTF List 3) (Large Table 8) • Parameter List TBD in permitting
Stormwater – (Large Table 9) • Parameter List TBD in permitting
Groundwater – Surficial Aquifer and Bedrock (Large Table 10) • Parameter List TBD in permitting
Surface Water – Partridge River, Partridge River Tributaries, and Colby Lake (Large Table 12) • Parameter List TBD in permitting

Large Table 15 Monitoring Plan – Internal Streams – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Flotation Tailings Basin (FTB) Pond	PS	P	Cell 1E Cell 2E Cell 1/2E	Large Figure 7	Water Level	Daily	Annual Monitoring Report	Monitoring of pond water levels
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of in-pond water quality trends
FTB Seepage	S	P	WS126	Large Figure 7	Flow rate	Continuous	Annual Monitoring Report	Monitoring of flow from the FTB South Seepage Management System recycled to the FTB Ponds and pumped to the WWTP
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of trends in water quality of recovered surface seeps
	S	P	FTB Containment System	Large Figure 7	Flow rate	Continuous	Annual Monitoring Report	Monitoring of flow from the FTB Containment System recycled to the FTB Ponds and pumped to the WWTP
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of trends in water quality of FTB Containment System
Hydrometallurgical Residue Facility	PS	P	HRF Pond	Large Figure 7	Water Level	Daily	Annual Monitoring Report	Monitoring of pond water levels
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of in-pond water quality trends
	PS	P	HRF Leachate	Large Figure 7	Flow rate	Continuous	Annual Monitoring Report	Monitoring the quantity of leachate collected by the drainage layer.
					Water Quality (TBD)	Monthly or Quarterly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of leachate water quality.
Continued Existing Waste Streams	SW	P	WS009	Large Figure 7	Flow Rate	Quarterly during non-frozen conditions (Apr, Jul, Oct)	Annual Monitoring Report	Monitoring the quantity of water that enters the Tailings Basin from the east. Monitoring will cease once the East Dam is constructed in this area, which will cut off this flow.
					Water Quality (TBD)	Quarterly during non-frozen conditions (Apr, Jul, Oct)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of water entering the Tailings Basin from the east. Monitoring will cease once the East Dam is constructed in this area, which will cut off this flow.

Large Table 16 Monitoring Plan – Stormwater – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Stormwater	SW	P	TBD	Large Figure 8	Flow rate	Monthly during non-frozen conditions (approximately April to October)	Annual Monitoring Report	Monitor volume of stormwater outflows from the Plant Site
					Water Quality (TBD)	Monthly during non-frozen conditions (approximately April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitor quality of stormwater outflows from the Plant Site

Large Table 17 Monitoring Plan – Surface Discharges – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
WWTP Effluent	TW	P	TBD	Large Figure 9	Flow rate	Continuous	Annual Monitoring Report	Monitoring effluent quantity
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Monthly	Monitoring effluent characteristics to document water quality prior to discharge
	SW	P	TBD (Unnamed Creek, near SD006)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Unnamed Creek
	SW	P	TBD (Trimble Creek)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Trimble Creek
	SW	P	TBD (Mud Lake Creek)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Mud Lake Creek
	SW	P	SD026 (Second Creek)	Large Figure 9	Total Flow	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Second Creek

Large Table 18 Monitoring Plan – Surface Water – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Embarrass River and Tributaries	SW	E	PM-12 (existing NPDES station SW004) PM-12.2 PM-13 (existing NPDES station SW005) MLC-2 PM-19 PM-11 (existing NPDES station SW003)	Large Figure 10	Flow rate	Monthly during non-frozen conditions (April to October)	Annual Monitoring Report	Monitoring streamflow in the Embarrass River.
					Water Quality (TBD)	Monthly during non-frozen conditions (April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring water quality in the Embarrass River and tributaries.
Second Creek	SW	P	PM-7	Large Figure 10	Flow rate	Monthly during non-frozen conditions (April to October)	Annual Monitoring Report	Monitoring streamflow in Second Creek downstream of the FTB South Seepage Management System and downstream of the WWTP discharge
					Water Quality (TBD)	Monthly during non-frozen conditions (April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of Second Creek downstream of the FTB South Seepage Management System and downstream of the WWTP discharge
Colby Lake Intake	SW	P	TBD (Colby Lake)	See Large Figure 102 of Reference (8)	Flow rate	Continuous	Water Quantity Monitoring Report • Annual • Monthly	Monitoring of the Colby Lake intake (existing location)
	SW	P	TBD (Unnamed Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation of Unnamed Creek.
	SW	P	TBD (Trimble Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation of Trimble Creek.
	SW	P	TBD (Mud Lake Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation in Mud Lake Creek.
	SW	P	TBD (Second Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation in Second Creek.

Large Table 19 Monitoring Plan – Groundwater – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Groundwater	GW	E	GW001 GW002 GW003(1) GW004(1) GW005 GW006 GW007 GW008 GW009 GW010 GW011 GW012 GW013 GW014 GW015 GW016	Large Figure 11	Groundwater Elevations	Quarterly during non-frozen conditions (April, July October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring groundwater levels
					Water Quality (TBD)	Quarterly during non-frozen conditions (April, July, October)	Water Quality Monitoring Report • Annual • Quarterly	Monitor groundwater quality trends through time

(1) Monitoring wells GW003 and GW004 are currently dry and have been dry for a number of years. These wells will be checked during each monitoring event. If they are found to contain water, groundwater elevations will be measured and the feasibility of obtaining groundwater quality samples will be evaluated.

Large Table 20 Monitoring Plan – Wetland Hydrology – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Wetlands – Baseline Monitoring								
Baseline Wetlands for the Plant Site	GW	E	Well TB1 through TB14 and TB1M through TB7M Ref TB1, Ref TB8, and Ref TB8M	Large Figure 8 in Reference (13)	Elevation – relative to ground surface	In progress Began in 2010 Ranging from monthly to continuous during non-freezing months	Varies	Provide sufficient hydrology information to allow identification of potential indirect hydrologic impacts to wetlands. There are currently 24 wetland hydrology monitoring wells at the Plant Site; see Section 4.3 of the Wetland Management Plan (Reference (13))
Wetlands – Operations Monitoring								
Plant Site Wetlands	GW	E P	TBD in permitting TBD in permitting	Large Figure 8 in Reference (13)	Elevation – relative to ground surface	TBD in permitting	TBD in permitting	This program will provide the necessary information to determine whether indirect hydrologic impacts have occurred and to assess required mitigation measures. Additional information is available in Section 4.4 of the Wetland Management Plan (Reference (13)) Final number of wells is TBD in permitting

Appendix B: DOLI Rates

MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY PREVAILING WAGES FOR STATE FUNDED CONSTRUCTION PROJECTS

THIS NOTICE MUST BE POSTED ON THE JOBSITE IN A CONSPICUOUS PLACE

Construction Type: Commercial

County Number: 69

County Name: ST. LOUIS

Effective: 2015-12-21 Revised: 2016-04-25

This project is covered by Minnesota prevailing wage statutes. Wage rates listed below are the minimum hourly rates to be paid on this project.

All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at a rate of one and one half (1 1/2) times the basic hourly rate.

Violations should be reported to:

Department of Labor and Industry
Prevailing Wage Section
443 Lafayette Road N
St Paul, MN 55155
(651) 284-5091
DLI.PrevWage@state.mn.us

* Indicates that adjacent county rates were used for the labor class listed.

County: ST. LOUIS (69)

LABOR CODE AND CLASS		EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
LABORERS (101 - 112) (SPECIAL CRAFTS 701 - 730)					
101	LABORER, COMMON (GENERAL LABOR WORK)	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
102	LABORER, SKILLED (ASSISTING SKILLED CRAFT JOURNEYMAN)	2015-12-21	23.54	16.42	39.96

		2016-05-01	24.34	16.87	41.21
103	LABORER, LANDSCAPING (GARDENER, SOD LAYER AND NURSERY OPERATOR)	2015-12-21	11.00	0.00	11.00
104*	FLAG PERSON	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
105*	WATCH PERSON	2015-12-21	21.19	16.42	37.61
		2016-05-01	21.99	16.87	38.86
106	BLASTER	2015-12-21	24.24	16.42	40.66
		2016-05-01	25.04	16.87	41.91
107	PIPELAYER (WATER, SEWER AND GAS)	2015-12-21	30.61	16.57	47.18
		2016-05-01	31.73	17.02	48.75
108	TUNNEL MINER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
109	UNDERGROUND AND OPEN DITCH LABORER (EIGHT FEET BELOW STARTING GRADE LEVEL)	2015-12-21	28.81	16.57	45.38
		2016-05-01	29.93	17.02	46.95
110	SURVEY FIELD TECHNICIAN (OPERATE TOTAL STATION, GPS RECEIVER, LEVEL, ROD OR RANGE POLES, STEEL TAPE MEASUREMENT; MARK AND DRIVE STAKES; HAND OR POWER DIGGING FOR AND IDENTIFICATION OF MARKERS OR MONUMENTS; PERFORM AND CHECK CALCULATIONS; REVIEW AND UNDERSTAND CONSTRUCTION PLANS AND LAND SURVEY MATERIALS). THIS CLASSIFICATION DOES NOT APPLY TO THE WORK PERFORMED ON A PREVAILING WAGE PROJECT BY A LAND SURVEYOR WHO IS LICENSED PURSUANT TO MINNESOTA STATUTES, SECTIONS 326.02 TO 326.15.	2015-12-21	23.54	16.42	39.96
		2016-05-01	24.34	16.87	41.21
111		2015-12-21	23.54	16.42	39.96

	TRAFFIC CONTROL PERSON (TEMPORARY SIGNAGE)				
		2016-05-01	24.34	16.87	41.21
SPECIAL EQUIPMENT (201 - 204)					
201	ARTICULATED HAULER	2015-12-21	35.48	17.15	52.63
202	BOOM TRUCK	2015-12-21	35.48	17.15	52.63
203*	LANDSCAPING EQUIPMENT, INCLUDES HYDRO SEEDER OR MULCHER, SOD ROLLER, FARM TRACTOR WITH ATTACHMENT SPECIFICALLY SEEDING, SODDING, OR PLANT, AND TWO-FRAMED FORKLIFT (EXCLUDING FRONT, POSIT-TRACK, AND SKID STEER LOADERS), NO EARTHWORK OR GRADING FOR ELEVATIONS	2015-12-21	33.97	17.15	51.12
204	OFF-ROAD TRUCK	2015-12-21	35.48	17.15	52.63
205	PAVEMENT MARKING OR MARKING REMOVAL EQUIPMENT (ONE OR TWO PERSON OPERATORS); SELF-PROPELLED TRUCK OR TRAILER MOUNTED UNITS.	2015-12-21	26.66	18.77	45.43
		2016-05-02	28.01	18.77	46.78
HIGHWAY/HEAVY POWER EQUIPMENT OPERATOR					
GROUP 2		2015-12-21	32.92	17.20	50.12
306	GRADER OR MOTOR PATROL				
308	TUGBOAT 100 H.P. AND OVER WHEN LICENSE REQUIRED (HIGHWAY AND HEAVY ONLY)				
GROUP 3		2015-12-21	33.23	17.90	51.13
		2016-05-01	33.84	18.90	52.74
309	ASPHALT BITUMINOUS STABILIZER PLANT				
310	CABLEWAY				
312	DERRICK (GUY OR STIFFLEG)(POWER)(SKIDS OR STATIONARY) (HIGHWAY AND HEAVY ONLY)				

314 DREDGE OR ENGINEERS, DREDGE (POWER) AND ENGINEER

316 LOCOMOTIVE CRANE OPERATOR

320 TANDEM SCRAPER

322 TUGBOAT 100 H.P AND OVER (HIGHWAY AND HEAVY ONLY)

GROUP 4	2015-12-21	32.93	17.90	50.83
	2016-05-01	33.54	18.90	52.44

323 AIR TRACK ROCK DRILL

324 AUTOMATIC ROAD MACHINE (CMI OR SIMILAR) (HIGHWAY AND HEAVY ONLY)

325 BACKFILLER OPERATOR

327 BITUMINOUS ROLLERS, RUBBER TIRED OR STEEL DRUMMED (EIGHT TONS AND OVER)

328 BITUMINOUS SPREADER AND FINISHING MACHINES (POWER), INCLUDING PAVERS, MACRO SURFACING AND MICRO SURFACING, OR SIMILAR TYPES (OPERATOR AND SCREED PERSON)

329 BROKK OR R.T.C. REMOTE CONTROL OR SIMILAR TYPE WITH ALL ATTACHMENTS

330 CAT CHALLENGER TRACTORS OR SIMILAR TYPES PULLING ROCK WAGONS, BULLDOZERS AND SCRAPERS

331 CHIP HARVESTER AND TREE CUTTER

332 CONCRETE DISTRIBUTOR AND SPREADER FINISHING MACHINE, LONGITUDINAL FLOAT, JOINT MACHINE, AND SPRAY MACHINE

334 CONCRETE MOBIL (HIGHWAY AND HEAVY ONLY)

335 CRUSHING PLANT (GRAVEL AND STONE) OR GRAVEL WASHING, CRUSHING AND SCREENING PLANT

336 CURB MACHINE

337 DIRECTIONAL BORING MACHINE

338 DOPE MACHINE (PIPELINE)

340 DUAL TRACTOR

341 ELEVATING GRADER

345 GPS REMOTE OPERATING OF EQUIPMENT

347 HYDRAULIC TREE PLANTER

348 LAUNCHER PERSON (TANKER PERSON OR PILOT LICENSE)

349 LOCOMOTIVE (HIGHWAY AND HEAVY ONLY)

350 MILLING, GRINDING, PLANNING, FINE GRADE, OR TRIMMER MACHINE

352 PAVEMENT BREAKER OR TAMPING MACHINE (POWER DRIVEN) MIGHTY MITE OR SIMILAR TYPE

354 PIPELINE WRAPPING, CLEANING OR BENDING MACHINE

356 POWER ACTUATED HORIZONTAL BORING MACHINE, OVER SIX INCHES

357 PUGMILL

359 RUBBER-TIRED FARM TRACTOR WITH BACKHOE INCLUDING ATTACHMENTS (HIGHWAY AND HEAVY ONLY)

360 SCRAPER

361 SELF-PROPELLED SOIL STABILIZER

362 SLIP FORM (POWER DRIVEN) (PAVING)

363 TIE TAMPER AND BALLAST MACHINE

365 TRACTOR, WHEEL TYPE, OVER 50 H.P. WITH PTO UNRELATED TO LANDSCAPING (HIGHWAY AND HEAVY ONLY)

367 TUB GRINDER, MORBARK, OR SIMILAR TYPE

GROUP 5 *	2015-12-21	18.77	8.18	26.95

370 BITUMINOUS ROLLER (UNDER EIGHT TONS)

371 CONCRETE SAW (MULTIPLE BLADE) (POWER OPERATED)

372 FORM TRENCH DIGGER (POWER)

375 HYDRAULIC LOG SPLITTER

376 LOADER (BARBER GREENE OR SIMILAR TYPE)

377 POST HOLE DRIVING MACHINE/POST HOLE AUGER

379 POWER ACTUATED JACK

381 SELF-PROPELLED CHIP SPREADER (FLAHERTY OR SIMILAR)

382 SHEEP FOOT COMPACTOR WITH BLADE . 200 H.P. AND OVER

383 SHOULDERING MACHINE (POWER) APSCO OR SIMILAR TYPE INCLUDING SELF-PROPELLED SAND AND CHIP SPREADER

384 STUMP CHIPPER AND TREE CHIPPER

385 TREE FARMER (MACHINE)

GROUP 6	2015-12-21	28.68	17.90	46.58
	2016-05-01	29.29	18.90	48.19

387 CAT, CHALLENGER, OR SIMILAR TYPE OF TRACTORS, WHEN PULLING DISK OR ROLLER

389 DREDGE DECK HAND

391 GRAVEL SCREENING PLANT (PORTABLE NOT CRUSHING OR WASHING)

393 LEVER PERSON

395 POWER SWEEPER

396 SHEEP FOOT ROLLER AND ROLLERS ON GRAVEL COMPACTION, INCLUDING VIBRATING ROLLERS

397 TRACTOR, WHEEL TYPE, OVER 50 H.P., UNRELATED TO LANDSCAPING

COMMERCIAL POWER EQUIPMENT OPERATOR

GROUP 1		2015-12-21	37.74	17.15	54.89
501	HELICOPTER PILOT (COMMERCIAL CONSTRUCTION ONLY)				
502	TOWER CRANE 250 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
503	TRUCK CRAWLER CRANE WITH 200 FEET OF BOOM AND OVER, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 2		2015-12-21	37.40	17.15	54.55
504	CONCRETE PUMP WITH 50 METERS/164 FEET OF BOOM AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
505	PILE DRIVING WHEN THREE DRUMS IN USE (COMMERCIAL CONSTRUCTION ONLY)				
506	TOWER CRANE 200 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
507	TRUCK OR CRAWLER CRANE WITH 150 FEET OF BOOM UP TO AND NOT INCLUDING 200 FEET, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 3		2015-12-21	35.99	17.15	53.14
508	ALL-TERRAIN VEHICLE CRANES (COMMERCIAL CONSTRUCTION ONLY)				
509	CONCRETE PUMP 32-49 METERS/102-164 FEET (COMMERCIAL CONSTRUCTION ONLY)				
510	DERRICK (GUY & STIFFLEG) (COMMERCIAL CONSTRUCTION ONLY)				
511	STATIONARY TOWER CRANE UP TO 200 FEET				
512	SELF-ERECTING TOWER CRANE 100 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)				
513	TRAVELING TOWER CRANE (COMMERCIAL CONSTRUCTION ONLY)				
514	TRUCK OR CRAWLER CRANE UP TO AND NOT INCLUDING 150 FEET OF BOOM, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 4		2015-12-21	35.65	17.15	52.80
515	CRAWLER BACKHOE INCLUDING ATTACHMENTS (COMMERCIAL CONSTRUCTION ONLY)				
516	FIREPERSON, CHIEF BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
517	HOIST ENGINEER (THREE DRUMS OR MORE) (COMMERCIAL CONSTRUCTION ONLY)				
518	LOCOMOTIVE (COMMERCIAL CONSTRUCTION ONLY)				
519	OVERHEAD CRANE (INSIDE BUILDING PERIMETER) (COMMERCIAL CONSTRUCTION ONLY)				
520	TRACTOR . BOOM TYPE (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 5		2015-12-21	35.48	17.15	52.63
521	AIR COMPRESSOR 450 CFM OR OVER (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)				

522 CONCRETE MIXER (COMMERCIAL CONSTRUCTION ONLY)

523 CONCRETE PUMP UP TO 31 METERS/101 FEET OF BOOM

524 DRILL RIGS, HEAVY ROTARY OR CHURN OR CABLE DRILL WHEN USED FOR CAISSON FOR ELEVATOR OR BUILDING CONSTRUCTION (COMMERCIAL CONSTRUCTION ONLY)

525 FORKLIFT (COMMERCIAL CONSTRUCTION ONLY)

526 FRONT END, SKID STEER 1 C YD AND OVER

527 HOIST ENGINEER (ONE OR TWO DRUMS) (COMMERCIAL CONSTRUCTION ONLY)

528 MECHANIC-WELDER (ON POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)

529 POWER PLANT (100 KW AND OVER OR MULTIPLES EQUAL TO 100KW AND OVER) (COMMERCIAL CONSTRUCTION ONLY)

530 PUMP OPERATOR AND/OR CONVEYOR (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)

531 SELF-ERECTING TOWER CRANE UNDER 100 FEET MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)

532 STRADDLE CARRIER (COMMERCIAL CONSTRUCTION ONLY)

533 TRACTOR OVER D2 (COMMERCIAL CONSTRUCTION ONLY)

534 WELL POINT PUMP (COMMERCIAL CONSTRUCTION ONLY)

GROUP 6	2015-12-21	33.97	17.15	51.12

535 CONCRETE BATCH PLANT (COMMERCIAL CONSTRUCTION ONLY)

536 FIREPERSON, FIRST CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)

537 FRONT END, SKID STEER UP TO 1 C YD

538 GUNITE MACHINE (COMMERCIAL CONSTRUCTION ONLY)

539 TRACTOR OPERATOR D2 OR SIMILAR SIZE (COMMERCIAL CONSTRUCTION ONLY)

540 TRENCHING MACHINE (SEWER, WATER, GAS) EXCLUDES WALK BEHIND TRENCHER

GROUP 7	2015-12-21	32.85	17.15	50.00

541 AIR COMPRESSOR 600 CFM OR OVER (COMMERCIAL CONSTRUCTION ONLY)

542 BRAKEPERSON (COMMERCIAL CONSTRUCTION ONLY)

543 CONCRETE PUMP/PUMPCRETE OR COMPLACO TYPE (COMMERCIAL CONSTRUCTION ONLY)

544 FIREPERSON, TEMPORARY HEAT SECOND CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)

545 OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS AND MILLING MACHINES, OR OTHER SIMILAR POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)

546 PICK UP SWEEPER (ONE CUBIC YARD HOPPER CAPACITY) (COMMERCIAL CONSTRUCTION ONLY)

547 PUMP AND/OR CONVEYOR (COMMERCIAL CONSTRUCTION ONLY)

GROUP 8 *		2015-12-21	30.84	17.15	47.99
548	ELEVATOR OPERATOR (COMMERCIAL CONSTRUCTION ONLY)				
549	GREASER (COMMERCIAL CONSTRUCTION ONLY)				
550	MECHANICAL SPACE HEATER (TEMPORARY HEAT NO BOILER LICENSE REQUIRED) (COMMERCIAL CONSTRUCTION ONLY)				

TRUCK DRIVERS

GROUP 1		2015-12-21	28.70	15.20	43.90
		2016-05-01	30.15	15.20	45.35
601	MECHANIC . WELDER				
602	TRACTOR TRAILER DRIVER				
603	TRUCK DRIVER (HAULING MACHINERY INCLUDING OPERATION OF HAND AND POWER OPERATED WINCHES)				
GROUP 2		2015-12-21	28.15	15.20	43.35
		2016-05-01	29.60	15.20	44.80
604	FOUR OR MORE AXLE UNIT, STRAIGHT BODY TRUCK				
GROUP 3		2015-12-21	28.15	15.20	43.35
		2016-05-01	29.60	15.20	44.80
605	BITUMINOUS DISTRIBUTOR DRIVER				
606	BITUMINOUS DISTRIBUTOR (ONE PERSON OPERATION)				
607	THREE AXLE UNITS				
GROUP 4 *		2015-12-21	27.80	15.20	43.00
		2016-05-01	29.25	15.20	44.45
608	BITUMINOUS DISTRIBUTOR SPRAY OPERATOR (REAR AND OILER)				
609	DUMP PERSON				
610	GREASER				
611	PILOT CAR DRIVER				
612	RUBBER-TIRED, SELF-PROPELLED PACKER UNDER 8 TONS				
613	TWO AXLE UNIT				
614	SLURRY OPERATOR				
615	TANK TRUCK HELPER (GAS, OIL, ROAD OIL, AND WATER)				
616	TRACTOR OPERATOR, UNDER 50 H.P.				

SPECIAL CRAFTS

701	HEATING AND FROST INSULATORS	2015-12-21	39.31	16.20	55.51
		2016-06-06	41.26	15.80	57.06
702	BOILERMAKERS	2015-12-21	34.15	26.37	60.52
		2016-01-01	35.55	26.52	62.07
703	BRICKLAYERS	2015-12-21	32.87	20.96	53.83
704	CARPENTERS	2015-12-21	29.55	16.08	45.63
		2016-05-01	30.85	16.08	46.93
705	CARPET LAYERS (LINOLEUM)	2015-12-21	32.74	13.25	45.99
706	CEMENT MASONS	2015-12-21	30.61	16.88	47.49
		2016-05-01	31.11	16.88	47.99
707	ELECTRICIANS	2015-12-21	33.90	24.13	58.03
		2016-05-29	35.01	24.62	59.63
708	ELEVATOR CONSTRUCTORS	2015-12-21	44.93	33.36	78.29
		2016-01-01	45.87	35.07	80.94
709	GLAZIERS	2015-12-21	27.37	19.02	46.39
		2016-05-02	28.72	19.02	47.74
710*	LATHERS	2015-12-21	29.55	16.08	45.63
		2016-04-30	30.85	16.08	46.93
712	IRONWORKERS	2015-12-21	31.04	23.45	54.49
714	MILLWRIGHT	2015-12-21	32.57	14.73	47.30
		2016-05-01	34.42	14.73	49.15

715	PAINTERS (INCLUDING HAND BRUSHED, HAND SPRAYED, AND THE TAPING OF PAVEMENT MARKINGS)	2015-12-21	26.66	18.77	45.43
		2016-05-02	28.01	18.77	46.78
716	PILEDRIVER (INCLUDING VIBRATORY DRIVER OR EXTRACTOR FOR PILING AND SHEETING OPERATIONS)	2015-12-21	34.11	17.08	51.19
		2016-05-01	35.65	17.08	52.73
717	PIPEFITTERS . STEAMFITTERS	2015-12-21	38.17	18.13	56.30
		2016-05-02	39.67	18.13	57.80
718	PLASTERERS	2015-12-21	31.24	17.63	48.87
		2016-05-01	31.74	17.63	49.37
719	PLUMBERS	2015-12-21	38.17	18.13	56.30
		2016-05-02	39.67	18.13	57.80
720	ROOFER	2015-12-21	29.65	17.14	46.79
721	SHEET METAL WORKERS	2015-12-21	29.56	26.32	55.88
722	SPRINKLER FITTERS	2015-12-21	33.83	17.37	51.20
		2016-01-01	33.83	17.77	51.60
723	TERRAZZO WORKERS	2015-12-21	30.77	19.74	50.51
724	TILE SETTERS	2015-12-21	24.09	21.94	46.03
725	TILE FINISHERS	2015-12-21	17.09	17.44	34.53
726	DRYWALL TAPER	2015-12-21	30.66	15.37	46.03
727	WIRING SYSTEM TECHNICIAN	2015-12-21	36.00	14.43	50.43
		2016-07-01	36.90	14.43	51.33

728	WIRING SYSTEMS INSTALLER	2015-12-21	25.21	12.02	37.23
		2016-07-01	25.84	12.02	37.86
729	ASBESTOS ABATEMENT WORKER	2015-12-21	28.50	16.88	45.38
		2016-01-01	29.30	17.33	46.63
730	SIGN ERECTOR	2015-12-21	26.44	12.93	39.37
		2016-05-01	27.59	12.93	40.52

Appendix C: Power Cost

To Our Commercial/Industrial Customers

On December 10, 2012, Minnesota Power received approval of the rates contained herein from the Minnesota Public Utilities Commission. These rates will be applied to usage on or after January 1, 2013.

For your information and convenient reference, this folder contains the following electric service rates and rules:

- **GENERAL SERVICE**
- **LARGE LIGHT & POWER SERVICE**
- **COMMERCIAL/INDUSTRIAL DUAL FUEL INTERRUPTIBLE ELECTRIC SERVICE**
- **COMMERCIAL/INDUSTRIAL CONTROLLED ACCESS ELECTRIC SERVICE**

Should you desire any further information regarding these rates and how they apply to

your business, please visit **www.mnpower.com** or call **1-800-228-4966**.

minnesota power

AN ALLETE COMPANY

Form 4961A Rev. 2/13
J-59645 TCI

GENERAL SERVICE

APPLICATION

To any customer's electric service requirements when the total electric requirements are supplied through one meter. Service shall be delivered at one point from existing facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery. Service hereunder is limited to customers with total power requirements of less than 10,000 kW and is subject to Company's Electric Service Regulations and any applicable Riders.

Applicable to multiple metered service only in conjunction with the respective Rider for such service.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at one standard low voltage of 120/240 to 4160 volts; except that within the Low Voltage Network Area, service shall be three phase, four wire, 60 hertz, 277/480 volts.

RATE (Monthly)

Customers Without A Demand Meter

Service Charge	$10.50
Energy Charge for all kWh (¢/kWh)	7.836¢

Customers With A Demand Meter

Service Charge	$10.50
Demand Charge for all kW	$5.86
Energy Charge for all kWh (¢/kWh)	5.288¢

There shall be added to the monthly bill, as computed above, an Affordability Surcharge determined in accordance with the Pilot Rider for Customer Affordability of Residential Electricity (CARE).

Plus any applicable adjustments.

MINIMUM CHARGE (Monthly)

The appropriate service charge plus any applicable adjustments; however, in no event will the Minimum Charge (Monthly) for three phase service be less than $25.00.

HIGH VOLTAGE SERVICE

Where customer contracts for service delivered and metered at (or compensated to) the available primary voltage of 13,000 volts or higher, the monthly bill, before Adjustments, will be subject to a discount of $1.75 per kW of Billing Demand. In addition, where customer contracts for service delivered and metered at (or compensated to) the available transmission voltage of 115,000 volts or higher, the monthly bill, before Adjustments, will be further subject to a discount of 0.284¢ per kWh of Energy.

High Voltage Service shall not be available from the Low Voltage Network Area as designated by the Company.

DETERMINATION OF THE BILLING DEMAND

When customer's use exceeds 2500 kWh for three consecutive months or where the connected load indicates

customer's demand may be greater than 10 kW, the customer may be placed on a demand rate.

The Billing Demand will then be the kW measured during the 15-minute period of the customer's greatest use during the month, as adjusted for power factor, but not less than the minimum demand specified in the customer's contract.

Demand will be adjusted by multiplying by 85% and dividing by the average monthly power factor in percent when the average monthly power factor is less than 85% lagging. However, in no event shall the average monthly power factor used for calculation in this paragraph be less than 45%.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

LARGE LIGHT AND POWER SERVICE

APPLICATION

To the entire electrical service requirements on the customer's premises delivered at one point from existing facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery.

Service hereunder is limited to customers with total power requirements of less than 50,000 kW and is subject to the Company's Electric Service Regulations and any applicable Riders. Customers with total power requirements in excess of 10,000 kW shall be served under this rate only where the customer and the Company have executed an electric service agreement having an initial minimum term of ten (10) years with a minimum cancellation provision of four (4) years.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at one standard low voltage of 120/240 to 4160 volts; except that within the Low Voltage Network Area service shall be three phase, four wire, 60 hertz, 277/480 volts.

RATE (Monthly)

Demand Charge		
For the first 100 kW or less of Billing Demand	$1,100.00	
All additional kW of Billing Demand ($/kW)		$9.30
Energy Charge		
All kWh (¢/kWh)		3.722¢

There shall be added to the monthly bill, as computed above, an Affordability Surcharge determined in accordance with the Pilot Rider for Customer Affordability of Residential Electricity (CARE).

Plus any applicable adjustments.

HIGH VOLTAGE SERVICE

When service is delivered and metered at (or compensated to) the available primary voltage of 13,000 volts or higher, the Demand Charge will be subject to a discount of $1.75 per kW of Billing Demand. In addition, where service is delivered and metered at (or compensated to) the available transmission voltage of 115,000 volts or higher, the Energy Charge will also be subject to a discount of 0.284¢ per kWh of Energy.

High voltage service shall not be available from the Low Voltage Network Area as designated by the Company.

DETERMINATION OF THE BILLING DEMAND

Billing Demand is the kW measured during the 15-minute period of customer's greatest use during the month, as adjusted for power factor, except that the Billing Demand will not be less than the amount by which the greatest adjustment demand during the preceding eleven months exceeds 100 kW, but no more than 75% of such adjusted demand. However, the Billing Demand shall not be less than the minimum demand specified in the customer's contract.

Demand will be adjusted by multiplying by 85% and dividing by the average monthly power factor in percent when the average monthly power factor is less than 85% lagging. However, in no event shall the average monthly power factor used for calculation in this paragraph be less than 45%.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

COMMERCIAL/INDUSTRIAL DUAL FUEL INTERRUPTIBLE SERVICE

APPLICATION

To the interruptible electric service requirements of Commercial/Industrial Customers where an alternative source of energy is available to satisfy these requirements during period of interruption. Service shall be delivered at one point from facilities of adequate type and capacity and metered at (or compensated to) the voltage of delivery. Service is subject to the Company's Electric Service Regulations and any applicable Riders.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at low voltage (voltage level lower than that available from the Company's 13,000 volt system) or high voltage (voltage level equal to or greater than that available from the Company's 13,000 volt system).

RATE (Monthly)

Service Charge

Low Voltage Service $10.50	
High Voltage Service	$10.50

Energy Charge

Low Voltage Service (¢/kWh)	5.178¢
High Voltage Service (¢/kWh)	4.791¢

Plus any applicable adjustments.

The High Voltage Service Rate is applicable where service is delivered and metered at (or compensated to) the available high voltage level (13,000 volt system or higher).

MINIMUM CHARGE (Monthly)

The Minimum Charge shall be the Service Charge plus any applicable Adjustments.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

CONTRACT PERIOD

Not less than 1 year or such longer period as may be required under an Electric Service Agreement.

SERVICE CONDITIONS

1. The primary energy source for the Company-approved Dual Fuel installation must be electric. An approved Dual Fuel installation requires that the secondary or backup energy source be capable of continuous operation. Under no circumstances will firm electric service qualify as the secondary or backup energy source.
2. The interruptible load of the approved Dual Fuel installation shall be separately served and metered and shall at no time be connected to facilities serving customer's firm load.
3. The duration and frequency of interruptions shall be at the discretion of the Company. Interruption will normally occur at such times:
   a. when the Company is required to purchase or generate power at a cost higher than the customer's energy charge,
   b. when the Company expects to incur a system peak in excess of its Mid-Continent Area Power Pool (MAPP) accredited generating capability,
   c. when in the Company's opinion the reliability of the system is endangered, or
   d. when the Company performs necessary testing of interruptibility of the customer's load.

Interruptions shall normally occur for capacity related needs before interruptions for any certified interruptible loads for Large Power, Large Light and Power, and General Service (those loads that meet the requirements specified in the MAPP Procedure for the Certification of Interruptible Demand).

4. The Company shall not be liable for any loss or damage caused by or resulting from any interruption of service except in the case of gross negligence on the part of the Company.
5. The customer must be prepared to supply all of the interruptible load from an alternative energy source for up to 30% of the customer's Dual Fuel requirements during any annual period.
6. The customer will install, at its expense, a load-break switch, circuit breaker, or other means of allowing the Company to automatically interrupt the customer's Dual Fuel load by sending a command or signal. The Company reserves the right to inspect and approve the installation to ensure compliance and consistency with the Company's interruption system. If the Company's system cannot support automatic interruption, interruption shall be made in accordance with Service Condition 8. The customer must provide a continuous 120 volt AC power source at the Company's control point for operation of the Company's remote control equipment.
7. The rate contemplates that this service will utilize existing facilities with no additional major expenditures. The Customer shall pay the Company the installed cost of any additional facilities required which are not supported by this rate. Customers who have guaranteed annual revenue commitments to support line extension costs under a firm rate schedule that are not fully satisfied before switching to Dual Fuel service may be required to have their extension cost contributions recalculated.
8. Upon receiving a control signal from the Company, the customer must shed its interruptible load in ten (10) minutes or less, and for a duration as required by the Company, whenever the Company determines such interruption is necessary. Customers with existing provisions in their Electric Service Agreements for longer notice before interruption shall continue to have thirty (30) minutes to shed their interruptible loads through the term of their existing contracts or December 31, 1998, whichever is later.
9. Those customers who fail to interrupt their interruptible load after being notified to do so by the Company shall be responsible for all costs incurred by the Company due to such failure, including but not limited to penalties assessed the Company by the Mid-Continent Area Power Pool in the event the Company experiences a system capacity deficiency. Those costs shall be charged on a pro rata basis to all customers who did not interrupt as requested. Such customer shall also be billed as follows:
   a. The first failure to interrupt shall result in the customer being billed for the entire month on the standard applicable General Service or Large Light and Power Service Schedule (thereby not receiving an interruptible discount).
   b. If a second such failure to interrupt occurs, in addition to billing as specified in (a) above, the Company reserves

the right to discontinue the customer's service under the Dual Fuel Interruptible Electric Service Schedule.

COMMERCIAL/INDUSTRIAL CONTROLLED ACCESS ELECTRIC SERVICE

APPLICATION

To any electric service for commercial/industrial customers for controlled storage or loads which will be energized only for the time period between 11 p.m. and 7 a.m. daily. Service is subject to Company's Electric Service Regulations and any applicable Riders.

TYPE OF SERVICE

Single phase, three phase or single and three phase, 60 hertz, at low voltage (voltage level lower than that available from Company's 13,000 volt system) or high voltage (voltage level equal to or greater than that available from the Company's 13,000 volt system, supplied through one meter at one point of delivery.

RATE (Monthly)

Service Charge	
High Voltage Service	$10.50
Low Voltage Service	$10.50
Energy Charge	
High Voltage Service	4.032¢
Low Voltage Service	4.332¢

Plus any applicable adjustments.

The High Voltage Service Rate is applicable where service is delivered and metered at (or compensated to) the available high voltage level (13,000 volt system or higher).

MINIMUM CHARGE (Monthly)

The Minimum Charge shall be the Service charge plus any applicable Adjustments.

PAYMENT

Bills are due and payable 15 days following the date the bill is rendered or such later date as may be specified on the bill.

CONTRACT PERIOD

Not less than 30 days or such longer period as may be required under an Electric Service Agreement.

SERVICE CONDITIONS

1. The controlled load shall be separately served and metered and shall at no time be connected to facilities servicing the customer's other loads.
2. The total connected controlled load shall not exceed 200 kW.
3. Any controlled energy storage load to which this service schedule applies must have sufficient capacity to satisfy the customer's energy needs during the non-energized period.
4. The Company shall not be liable for any loss or damage caused by or resulting from any interruption of service except in the case of gross negligence on the part of the Company.
5. The customer's load shall be controlled by a switching device approved or supplied by the Company and paid for and installed by the customer. The customer must provide a continuous 120 volt AC power source at the Company's control point for operation of the Company's control equipment.
6. The rate contemplates that this service will utilize existing facilities with no additional major expenditures. The customer shall pay the Company the installed cost of any additional facilities required which are not supported by this rate.

ADJUSTMENTS APPLICABLE TO ALL ELECTRIC SERVICE RATES LISTED

1. There shall be added to or deducted from the monthly bill, as computed above, a fuel and purchased energy adjustment determined in accordance with the Rider for Fuel and Purchased Energy Adjustment.
2. There shall be added to the monthly bill, as computed above, an emissions-reduction adjustment determined in accordance with the Rider for Arrowhead Regional Emission Abatement (AREA).
3. There shall be added to the monthly bill, as computed above, a transmission investment adjustment determined in accordance with the Rider for Transmission Cost Recovery.
4. There shall be added to the monthly bill, as computed above, a renewable resources adjustment determined in accordance with the Rider for Renewable Resources.
5. There shall be added to the monthly bill a conservation program adjustment determined in accordance with the Rider for Conservation Program Adjustment. The combination of the fuel adjustment and the Conservation Program Adjustment shall be shown on the customer's bill as the Resource Adjustment.
6. There shall be added to the monthly bill the applicable proportionate part of any taxes and assessments imposed by any governmental authority which are assessed on the basis of meters or customers, or the price of or revenues from electric energy or service sold, or the volume of energy generated, transmitted or purchased for sale or sold.
7. Bills for service within the corporate limits of the cities of Aurora, Duluth, Hermantown, Little Falls, Long Prairie, Nashwauk, Park Rapids, Staples and other cities with approved franchise fee riders shall include an upward adjustment as specified in the applicable franchise fee rider for each city.
8. Minnesota Power will assess a Late Payment Charge of 1.50% or $1.00 per monthly billing period, whichever is greater, on that portion of a retail customer's account representing charges for utility service(s) past due, if the unpaid utility balance exceeds $10.00. Any portion of a utility bill under dispute will not be charged a Late Payment Charge while the dispute is being resolved. At the Company's discretion, any Late Payment Charge, or portion thereof, will be waived in accordance with the Minnesota Public Utilities Act.

Appendix D: Category 1 Stockpile Midbenches

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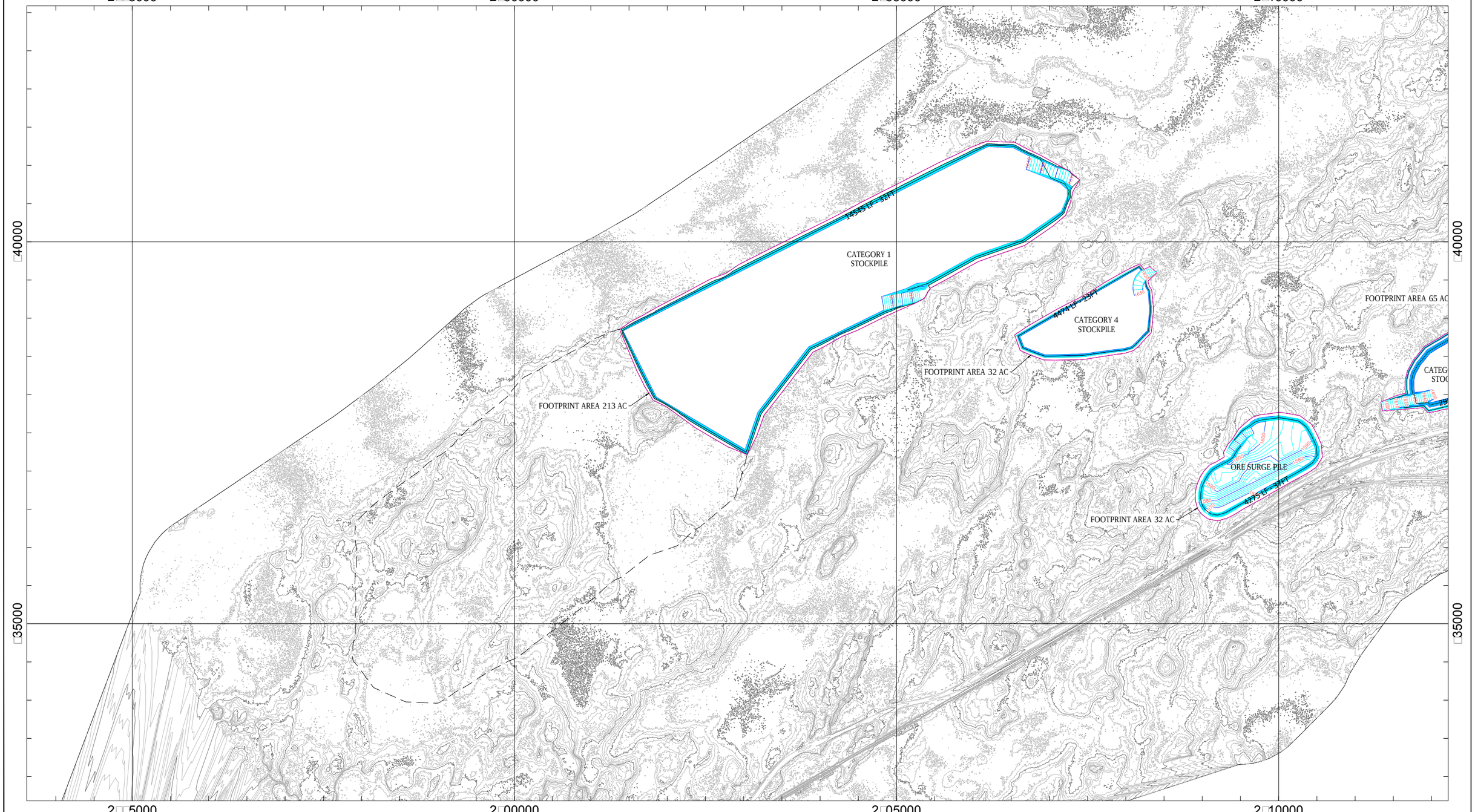

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srk consulting

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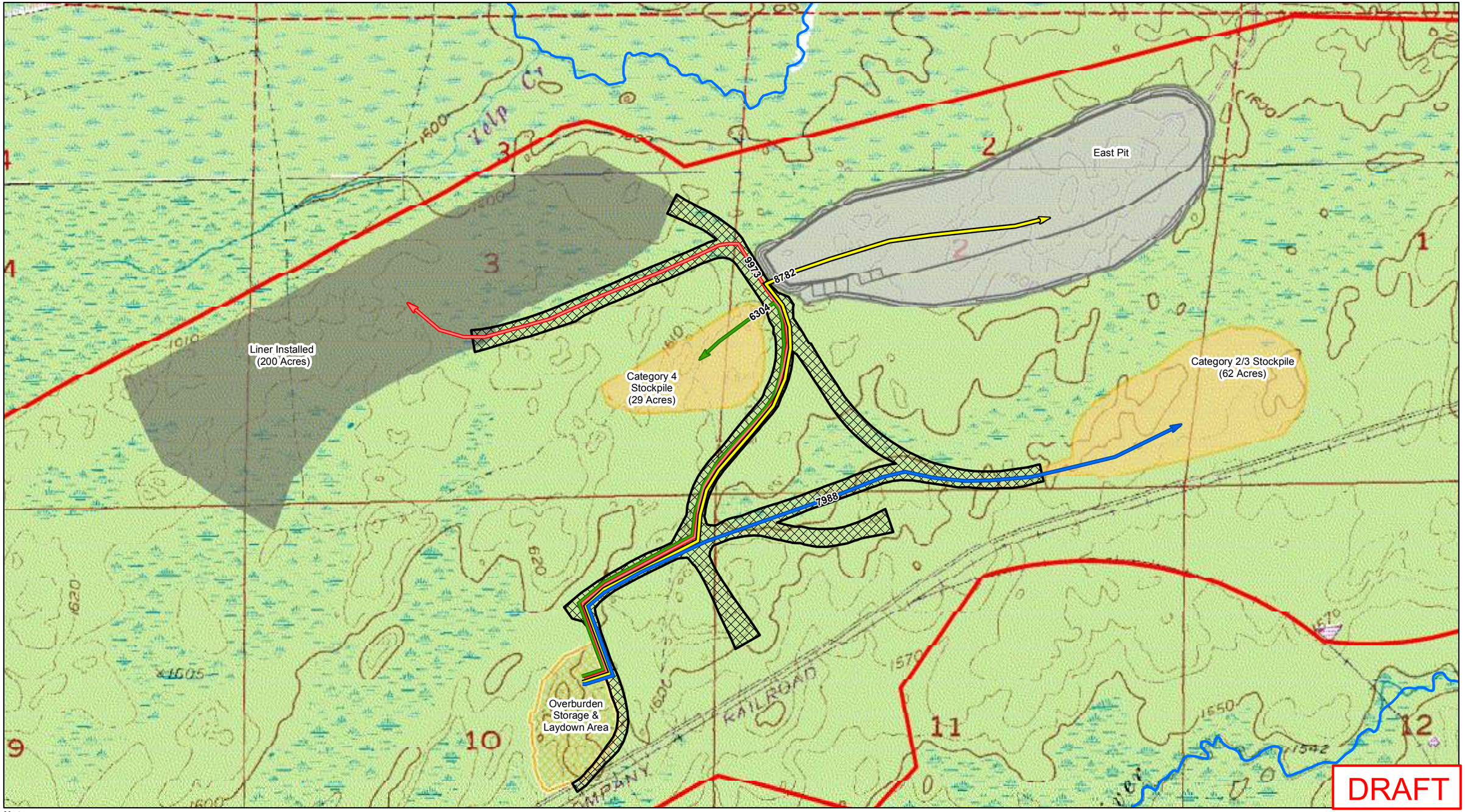
RECLAMATION COST ESTIMATE

DRAWING TITLE□
CATEGORY 1 STOCKPILE
MID□ENCH CALCULATIONS

DATE□ 6/30/2015
RE□ISION□ A
SRK PROJECT NO.□ 1□□□00.020
DRAWING NO.□ FIGURE 1

H□P□□□ □□1□□□00.020□P□□M□□R□□□□ □□□□C□□□E□□□ □□□040□Dr□□□□□T□□□□3□1□□□00.020□FIG1.d□□

Appendix E: Haul Distances



Notes

1. Basemap from Esri and its data suppliers.
2. Project features supplied by Barr Engineering.
3. Year 1 stockpiles, mine pits and haul roads from map packages received from Barr in April 2014.

Legend

- Overburden to Category 2/3
- Overburden to Category 4
- Overburden to East Pit
- Overburden to Liner
- Partridge River
- Haul Roads
- Active Stockpiles
- Reclaimed Areas
- Installed Liner
- Mine Development
- Proposed Project Area Boundary

PolyMet Mining

Foth

N

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION
PREPARED BY: GMK		DATE: JUN. '16	
REVIEWED BY:		DATE:	
APPROVED BY:		DATE:	

POLYMET MINING

Revised FIGURE 2-1 (Haul Distances)

MINE SITE PERMIT YEAR 01 CONTINGENCY PLAN
PERMIT TO MINE APPLICATION
HOYT LAKES, MINNESOTA

Scale: 0 245 490 980 Feet

Date: JUNE 2016

Drafted by: GMK

Project No: 177900.020

Path: H:\Polymet\177900.020_PolyMet_Reclamation Cost Estimate\040_Drafting\Task_3\Working\GMK\Haul Distances_rev_20160616.mxd Date: 6/16/2016

Appendix F: Demolition Costs

Asbestos Abatement Cost Proposal - Bid Form

Scope of Work Description	Reference Information	Asbestos Removal & Disposal Costs
Legacy Area 1 - used by project		
Area 1 Shop and Truck Storage (Bldg. 220)	ACT Report Zone H	$82,500
Area 1 Cold Storage (Bldg. 221)	No ACT report	$5,000
Area 1 Reporting Building (Bldg. 231)	No ACT report	$5,000
Area 1 Boiler House (Bldg. 226)	ACT Report Zone H	$2,500
Area 1 Fire Pump House & Water Tank (Bldg. 228)	ACT Report Zone H	$2,500
Legacy Area 2 - used by project		
Area 2 Service Shop (Bldg. 201)	ACT Report Zone I	$95,000
Area 2 Truck Storage (Bldg. 202)	ACT Report Zone I	$3,000
Area 2 Cold Storage (204)	ACT Report Zone I	$3,000
Area 2 Shop Locomotive Service Shop (Bldg. 203)	ACT Report Zone I	$52,500
Legacy Tailings Basin Buildings - used by project		
Foreman's Office (Bldg. 718)	No ACT report	$6,500
Reporting Building (Bldg. 719)	No ACT report	$6,500
Lube House (Bldg. 720)	No ACT report	$2,500
Reporting Building (Bldg. 724)	No ACT report	$2,500
Lube Oil Building (Bldg. 725)	No ACT report	$2,500
Legacy Plant Area - used by project		
Rebuild Shop (Bldg 602)	ACT Report Zone A	$85,000
General Shop (Bldg. 601)	ACT Report Zone A	$481,000
Carpenter Shop (Bldg. 603)	ACT Report Zone A	$2,500
Warehouse 49 (Bldg. 920)	ACT Report Zone A	$49,000
Warehouse 45 (Bldg. 921, Electrical)	ACT Report Zone A	$13,500
Lube House (Bldg. 926)	ACT Report Lubricant Storage Building	$52,000
Rubber Shop (Bldg. 605)	ACT Report Rubber Storage Building	$24,000
Water Treatment Plant & Storage Tanks	ACT Report Water Treatment Plant	$45,000
Colby Pump House	No ACT report	$2,500
Administration Building	ACT Report Administration Building	$850,000
Main Gate	No ACT report	$5,000
Sewage Treatment Plant	No ACT report	$5,000
Return Water Barge	No ACT report	$5,000

Total ACM Abatement Cost: **$1,891,000**

Asbestos Abatement Cost Proposal - Bid Form

Scope of Work Description	Reference Information	Asbestos Removal & Disposal Costs
Legacy Area 1 - used by project		
Area 1 Shop and Truck Storage (Bldg. 220)	ACT Report Zone H	$82,500
Area 1 Cold Storage (Bldg. 221)	No ACT report	$5,000
Area 1 Reporting Building (Bldg. 231)	No ACT report	$5,000
Area 1 Boiler House (Bldg. 226)	ACT Report Zone H	$2,500
Area 1 Fire Pump House & Water Tank (Bldg. 228)	ACT Report Zone H	$2,500
Legacy Area 2 - used by project		
Area 2 Service Shop (Bldg. 201)	ACT Report Zone I	$93,050
Area 2 Truck Storage (Bldg. 202)	ACT Report Zone I	$3,000
Area 2 Cold Storage (204)	ACT Report Zone I	$3,000
Area 2 Shop Locomotive Service Shop (Bldg. 203)	ACT Report Zone I	$52,150
Area 2 Shop Locomotive Fueling	ACT Report Zone I	$2,500
Legacy Tailings Basin Buildings - used by project		
Foreman's Office (Bldg. 718)	No ACT report	$6,500
Reporting Building (Bldg. 719)	No ACT report	$6,500
Lube House (Bldg. 720)	No ACT report	$2,500
Reporting Building (Bldg. 724)	No ACT report	$2,500
Lube Oil Building (Bldg. 725)	No ACT report	$2,500
Legacy Plant Area - used by project		
Rebuild Shop (Bldg 602)	ACT Report Zone A	$85,000
General Shop (Bldg. 601)	ACT Report Zone A	$480,800
Carpenter Shop (Bldg. 603)	ACT Report Zone A	$2,500
Warehouse 49 (Bldg. 920)	ACT Report Zone A	$49,000
Warehouse 45 (Bldg. 921, Electrical)	ACT Report Zone A	$13,500
Lube House (Bldg. 926)	ACT Report Lubricant Storage Building	$52,000
Rubber Shop (Bldg. 605)	ACT Report Rubber Storage Building	$24,000
Water Treatment Plant & Storage Tanks	ACT Report Water Treatment Plant	$45,000
Colby Pump House	No ACT report	$2,500
Administration Building	ACT Report Administration Building	$850,000
Main Gate	No ACT report	$5,000
Sewage Treatment Plant	No ACT report	$5,000
Return Water Barge	No ACT report	$5,000

Total ACM Abatement Cost: **$1,891,000**

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates							Mavo	Arrowhead Consulting & Testing
Scope of Work Description	Demo Specification Section Number	Reference Information / Drawings	Miscellaneous	Universal Waste Collection	Galbestos Removal	Demolition	Total Demo	Site Restoration	Assets Recovery	Asbestos Lead Paint Mold	Pre - Demo Building Inspection
Pre-Demolition Services			$54,400								
Legacy - demoed as part of construction											
Additive Building & Heating Plant							$1,593,300			Included in Lakehead's total demo	
Bentonite silos	8.1.14						inc in above			n/a	
Area 2 Water Tower (price separate from Heating & Additives buildings	8.1.29					$30,000	$30,000	$2,500	$1,125	n/a	
Legacy Tailings Basin Buildings - Demoed as part of construction											
Foreman's Office (Bldg. 718)	8.1.28	No ACT report				$9,350		$400		$6,500	$1,100
Reporting Building (Bldg. 719)	8.1.28	No ACT report				$9,900		$400		$6,500	$1,100
Lube House (Bldg. 720)	8.1.28	No ACT report				$2,500		$400		$2,500	$850
Reporting Building (Bldg. 724)	8.1.28	No ACT report				$3,300		$400		$2,500	$900
Lube Oil Building (Bldg. 725)	8.1.28	No ACT report				$2,500		$400		$2,500	$850
Legacy Area 1 - used by project											
Area 1 Shop and Truck Storage (Bldg. 220)	8.1.6	ACT Report Zone H		$2,900.00	$106,900	$103,332	$213,132	$74,669	$37,000	$82,500	
Area 1 Cold Storage (Bldg. 221)	8.1.6	ACT Report Zone H		$400.00	$48,970	$10,860	$60,230	$13,400	$2,800	$5,000	
Area 1 Reporting Building (Bldg. 231)	8.1.6	No ACT report				$9,900				$5,000	$850
Area 1 Boiler House (Bldg. 226)	8.1.6	ACT Report Zone H		$200.00	$13,500	$9,875	$23,575	$3,000	$200	$2,500	
Area 1 Fire Pump House & Water Tank (Bldg. 228)	8.1.6	TE-8-142 and TE-8-144, ACT Report Zone H		$410.00		$11,250	$11,660			$2,500	
Area 1 Locomotive Fueling	8.1.6	ACT Report Zone H		$500.00	$22,500	$10,100	$33,100	$6,250	$1,000	n/a	
Legacy Area 2 - used by project											
Area 2 Service Shop (Bldg. 201)	8.1.7	ACT Report Zone I		$2,200.00	$160,900	$38,990	$202,090	$37,334	$10,940	$93,050	
Area 2 Truck Storage (Bldg. 202)	8.1.7	ACT Report Zone I		$2,000.00	$63,190	$9,175	$74,365	$13,988	$3,075	$3,000	
Area 2 Cold Storage (204)	8.1.7	ACT Report Zone I		$697.00	$42,560	$13,080	$56,337	$14,100	$1,700	$3,000	
Area 2 Shop Locomotive Service Shop (Bldg. 203)	8.1.7	ACT Report Zone I		$3,400.00	$20,500	$12,300	$36,200	$11,113	$1,625	$52,150	
Area 2 Locomotive Fueling	8.1.7	ACT Report Zone I		$2,000.00	$20,900	$11,800	$34,700	$6,250	$975	$2,500	
Hose House (Bldg. 209) Not to be used in project	8.1.7	No ACT report			$3,000	$9,150				$2,500	$850
Sample House (Bldg. 208) Not to be used in project	8.1.7	No ACT report			$25,400	$20,300				$5,000	$950
Reporting Building (Bldg. 425) Not to be used in project	8.1.7	No ACT report			$3,300	$9,200				$3,500	$850
Legacy Plant Area - used by project											
Rebuild Shop (Bldg 602)	8.1.9	ACT Report Zone A		$3,000.00	$70,200	$125,600	$198,800	$27,560	$13,940	$85,000	
General Shop (Bldg. 601) Includes Acetylene Building (Bldg.604)	8.1.8	ACT Report Zone A		$15,000.00	$199,190	$353,600	$567,790	$182,300	$113,796	$480,800	
Carpenter Shop (Bldg. 603)	8.1.21	ACT Report Zone A		$2,000.00	$10,200	$13,250	$25,450	$3,300	$100	$2,500	
Coarse Crusher	8.1.1			$10,000.00	$313,345	$1,551,800	$1,875,145	$593,890	$199,325	$1,070,618	
Drive House 1 conv and housings	8.1.2	Drive Houses 1 & 2 and conveyors are all considered	$133,200	$7,500.00	$165,569	$141,540	$314,609	$46,900	$41,050	incl. in above	
Drive House 2 inc conv and housings	8.1.3	to be one structure for demo purposes.	inc in above		inc in above	inc in above	inc in above	inc in above	inc in above	incl. in Fines Crusher	
Fine Crusher	8.1.4			$45,000.00	$302,430	$1,373,460	$1,720,890	$203,400	$205,250	$439,686	
Warehouse 49 (Bldg. 920)	8.1.16	ACT Report Zone A		$6,500.00	$27,586	$82,800	$116,886	$15,947	$5,350	$49,000	
Warehouse 45 (Bldg. 921, Electrical)	8.1.15	ACT Report Zone A		$2,500.00	$35,159	$72,700	$110,359	$15,947	$3,590	$13,500	
Lube House (Bldg. 926)	8.1.10	ACT Report Lubricant Storage Building		$578.00	$17,000	$20,550	$38,128	$7,385	$1,600	$52,000	
Rubber Shop (Bldg. 605)	8.1.26	ACT Report Rubber Storage Building		$1,000.00	$30,464	$36,550	$68,014	$11,269	$5,150	$24,000	
Concentrator Building and Thickeners	8.1.5 AND 8.1.25			$100,000.00	$1,248,260	$5,895,850	$7,244,110	$1,145,998	$2,141,430	$1,535,236	
A-Lab	8.1.11			$500.00	$9,400	$14,560	$24,460	$2,940	$2,450	included in Concentrator	
Hinsdale Bridge	8.1.24			$0.00	$16,700	$616,300	$633,000	$15,200	$148,500	n/a	
Water Reservoir	8.1.12			$5,000.00		$98,100	$103,100	$914,400	$7,750	n/a	
Plant Site Water Tower	8.1.12	TG-7-005, Similar to Area 2 water tower				$30,000	$30,000	$2,500	$1,125	n/a	
Water Treatment Plant & Storage Tanks	8.1.27	TG-6-021		$1,000.00	$20,000	$72,600	$93,600	$2,250		$45,000	
Colby Pump House	8.1.13				$41,000	$8,260	$49,260	$1,500		$2,500	$1,000
Administration Building	8.1.17			$3,900.00		$157,935	$161,835	$18,200		$850,000	
Main Gate	8.1.18			$100.00		$11,400	$11,500	$875		$5,000	$900
Booster Pump House #1	8.1.19			$300.00		$23,500	$23,800	$9,200		included in Concentrator	
Sewage Treatment Plant	8.1.20	No ACT report		$0.00		$62,700	$62,700	$19,520		$5,000	$900
Portable Pump Houses	8.1.22	No ACM materials - See Dwg. TB-7-095		$0.00		$9,890	$9,890	$3,400		n/a	
Return Water Barge	8.1.23	No ACT report		$0.00		$44,900	$44,900			$5,000	$1,300
General Infrastructure (railroads, tunnels, roadways, etc)						$4,988,921	$4,988,921	$1,504,000	$237,500		
Railroads	8.2.5	Figure 7 and Krech & Ojard Dwg. C1		$0.00		$380,000	$380,000				
Tunnels (Service & Electrical)	8.2.2	TJ-63		$0.00		$1,856,000	$1,856,000			$2,127,767	
Galleries	8.2.2	Was estimated as a portion of the concentrator								included in Concentrator	
Sanitary Systems and Wells	8.2.1					$17,500	included in associated areas				
Pipelines				$0.00		$2,190,000	$2,190,000	$591,000			
Colby Lake water supply	8.2.2					$900,000		$98,000			
Inter pit pipeline	8.2.2					$562,000					

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates							Mavo	Arrowhead Consulting & Testing
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Total Demo**	**Site Restoration**	**Assets Recovery**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**
Natural Gas line	8.2.2					$150,000					
Tailings management above ground	8.2.2					$378,000					
Tailings management underground						$200,000					
Power Lines	8.2.3	Figures 5 & 5.1		$0.00		$97,810.00	$97,810				
Roads and Parking Lots	8.2.6	Figure 9		$0.00		$465,000	$465,000	$195,000			
New - Phase 1 - Plant Site											
Flotation Plant and Reagent Building	9.1.1			$75,000		$621,800	$696,800	$147,600	$242,500		
Concentrate Storage and Loadout Facility	9.1.2			$12,000		$273,760	$285,760	$48,100	$37,500		
Plant Site Sewage Treatment Plant	9.1.3	See Barr SOW 23 & Dwg. TL-2		$1,000.00		$118,000	$118,000	$30,000			
Railroads	9.3.3	See Barr SOW 19		$0.00		$185,000		$111,000			
Pipelines	9.3.1	SOW 12 and 14		$0.00		$1,555,000		$375,000			
Power Lines	9.3.2	SK-11-255		$0.00							
Roads and Parking Lots	9.3.4			$0.00							
Plant Site Wastewater Treatment Plant (WWTP) Ponds not included	9.5.2	See Barr SOW 20		$0.00		$245,000					
New - Phase 1 - Mine Site											
Maintenance Service and Fueling Facility	9.2.1			$1,100		$19,210	$20,310	$7,300	$1,200		
Rail Transfer Hopper	9.2.2	See Barr SOW 15		$1,100.00		$40,000	$41,100	$45,000	$1,200		
Rail Transfer Hopper Control Bldg	9.2.2	See Barr SOW 15		$100.00		$18,600	$18,700				
Rail Transfer Hopper Platform	9.2.2	See Barr SOW 15				$60,000	$60,000				
Central Pumping Station	9.2.3	See Barr SOW 7		$500.00		$14,000	$14,500	$1,200			
Railroads	9.2.4	See Barr SOW's 16, 17, 18		$0.00		$45,000	$45,000	$33,750			
Pipelines	9.3.1	See Barr SOW'S 05, 06, and 08		$0.00		$580,133	$580,133	$217,000			
Power Lines	9.3.2	See Barr SOW 13		$0.00		$83,900	$83,900		$7,175		
Roads and Parking Lots	9.3.4	See Barr SOW 1		$0.00		$392,000	$392,000	$132,000			
Mine Site Wastewater Treatment Facility (WWTF)	9.5.1	See Barr SOW 06		$0		$498,000	$498,000	$14,000			
New - Phase 2							$0				
Reagent Building	9.4.1	Bldg. Dims: 270' x 85' x 75' tall		$15,000.00		$820,000	$835,000	$4,100	$22,500		
Oxygen Plant	9.4.1	310' x 310' x 75' tall		$65,000.00		$4,238,600	$4,303,600	$16,600	$72,500		
Limestone Preparation	9.4.1	125' x 70' x 60' tall		$7,500.00		$345,000	$352,500	$1,750	$12,500		
Hydrometallurgical Plant	9.4.1	525' x 144' x 90' tall		$49,000.00		$4,365,000	$4,414,000	$13,500	$62,500		
Hydrometallurgical Reagents	9.4.1	144' x 90' x 90' tall		$15,000.00		$815,000	$830,000	$2,200	$17,500		
Railroads	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00							
Pipelines	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$1,450,000					
Power Lines	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00							
Roads and Parking Lots	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$156,000		$59,225			

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
a.	**Coarse Crusher**									
1	Below the ground level elevation of 1710', remove all existing HTHW pipelines with damaged or deteriorated insulation and all insulation fragments.					1478		124,817		
2	Below the ground level elevation of 1710', remove all equipment lubrication lines with damaged or deteriorated insulation and all insulation fragments.					1469		124,067		
3	Below the ground level elevation of 1710', remove any loose or fallen paint chips.					80		6,756		
4	Above the ground elevation of 1710', remove all lubrication lines with damaged or deteriorated insulation and all insulation fragments. Remove the insulation on the lubrication holding tanks.					730		61,649		
5	In the electrical control room, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					170		14,357		
6	In the electrical control room basement, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					250		21,113		
7	Clean the Coarse Crusher building of all extraneous debris and taconite fines.	2564						204,248		
8	Kill and clean mold from all Coarse Crusher building surfaces.	80						6,373		
9	Install protective railings around floor openings on apron feeder floor. Reestablish the north conveyor gallery exit by replacing all structurally compromised stair treads.	200						15,932		
	Sub-totals	2844	0	0	0	4177	0	579,301	320	0
b.	**Conveyor 1A\1B tunnel & Drive house 1** (556 ft.)									
1	Remove approximately **1200'** of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 1A and 1 B tunnel.					418		33,300		
2	Abate any loose or fallen paint chips.					80		6,756		
3	Clean tunnel and Drive House walkways and stairs of extraneous debris and taconite fines.	1285						102,204		
4	Kill and clean mold from all tunnel and Drive House No. 1 building surfaces.	120						9,559		
5	In Drive House #1, remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation between 1A and 1B tunnel and S -3 tunnel. Patch remaining partially deteriorated HTHW pipeline insulation.					76		6,418		
	Subtotal	1405	0	0	0	574	0	160,237	0	0
	Totals	**4247**	**0**	**0**	**0**	**4751**	**0**	**$739,538**	**320**	**0**

Supervision & Field Administration	Man-hours est.	950	Est. Cost	$92,530.00
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$132,900.00
Estimated Material Costs (Itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (Itemize)			Est. Cost	$100,650.00
			Total Estimated Cost	$1,070,618

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
c.	**Fine Crusher**									
1	Remove **all** existing HTHW pipelines with damaged or deteriorated insulation from the 4A/4B conveyor tunnel up to elevation 1794' on the north side of column 5. This insulation has tested positive for asbestos or probable ACM					496		41,887		
2	Remove all equipment lubrication lines damaged or deteriorated insulation and all insulation fragments from the 4A/4B conveyor tunnel up to the lube tanks at elevation 1817'-9" on the north side of column row 5. This insulation has tested positive for asbestos or probable ACM					901		76,089		
3	Remove any loose or fallen paint chips below the ground level elevation 1710'. The paint chips have tested positive for lead based material.					80		6,756		
4	Clean the Fine Crusher building of all extraneous debris and taconite fines.	987						78,624		
5	Kill and clean mold from Fine Crusher building surfaces.	80						6,373		
6										
	Sub-totals	1067	0	0	0	1477	0	209,730	0	0
d.	**Conveyors 4A\4B tunnel & Drive House No. 2** (120 ft. long)									
1	Remove approximately 275' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 4A and 4B tunnel. The insulation has tested positive for asbestos or probable ACM.					139		11,739		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					80		6,756		
3	Clean tunnel and Drive house walkways and stairs of extraneous debris and taconite fines.	607						48,354		
4	Kill and clean mold from all conveyor and Drive House No. 2 surfaces	80						6,373		
5	Remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in Drive House No. 2. The insulation has tested positive for asbestos or probable ACM.					88		7,432		
	Sub-totals	687	0	0	0	307	0	80,653	0	0
	Totals	**1754**	**0**	**0**	**0**	**1784**	**0**	**$290,382**	**0**	**0**

Supervision & Field Administration	Man-hours est.	441	Est. Cost	42,953
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (itemize)			Est. Cost	$5,000.00
Estimated Material Costs (itemize)			Est. Cost	$41,000.00
Estimated Misc. Costs (itemize)			Est. Cost	$60,350.00
			Total Estimated Cost	$439,686

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume [Cu. Yards]
		Labor	Operator	IW	Painters	Asbestos	Electrician		
d	**Service Tunnels**								
d-i.	**Service Tunnel S-1 (20X10X440)**								
1	Remove approximately 915' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					218		19,761	
2	Abate any loose or fallen paint chips.					48		3,726	
3	Clean tunnel walkways of extraneous debris and taconite fines.					468		41,251	
4	Kill and clean mold from all tunnel surfaces.					30		2,534	
	Sub-total	0	0	0	0	770	0	67,727	93
d-ii	**Service Tunnel S-2 (20X10X530)**								
1	Remove approximately 1,309' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					311		28,193	
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					53		4,476	
3	Clean tunnel walkways of extraneous debris and taconite fines.					525		44,338	
4	Kill and clean mold from all tunnel surfaces.					27		2,288	
	Sub-total	0	0	0	0	916	0	79,808	63
d-iii	**Service Tunnel S-3 (9X9X67)**								
1	Remove approximately 165' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					56		4,898	
2	Abate any loose or fallen paint chips.					6		507	
3	Clean tunnel walkways of extraneous debris and taconite fines.					34		1,582	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	81	0	6,825	7
d-iv	**Service Tunnel S-4 (10X10X372)**								
1	Remove approximately 800' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					188		16,721	
2	Abate any loose or fallen paint chips.					37		3,175	
3	Clean tunnel walkways of extraneous debris and taconite fines.					89		7,516	
4	Kill and clean mold from all tunnel surfaces.					22		1,808	
	Sub-total	0	0	0	0	336	0	29,220	26
d-v.	**Service Tunnel S-5 (7X8X31)**								
1	Remove approximately 65' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					41		3,462	
2	Abate any loose or fallen paint chips.					8		676	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		507	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	59	0	4,983	5
d-vi.	**Service Tunnel S-6 (8X8X31)**								
1	Remove approximately 70' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					49		4,138	
2	Abate any loose or fallen paint chips.					6		507	
3	Clean tunnel walkways of extraneous debris and taconite fines.					3		253	
4	Kill and clean mold from all tunnel surfaces.					2		169	
	Sub-total	0	0	0	0	60	0	5,067	5
d-vii.	**Service Tunnel S-7 (7X60X59)**								
1	Remove approximately 1300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					458		38,959	
2	Abate any loose or fallen paint chips.					65		5,488	
3	Clean tunnel walkways of extraneous debris and taconite fines.					165		13,934	
4	Kill and clean mold from all tunnel surfaces.					36		3,040	
	Sub-total	0	0	0	0	724	0	61,421	53
d-viii.	**Service Tunnel S-8 (7X8X30)**								
1	Remove approximately 300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					48		4,054	
2	Abate any loose or fallen paint chips.					6		507	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		507	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	64	0	5,406	5
d-ix.	**Service Tunnel S-9 (6-6X7-8X350)**								
1	Remove approximately 750' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					226		19,086	
2	Abate any loose or fallen paint chips.					42		3,547	
3	Clean tunnel walkways of extraneous debris and taconite fines.					50		4,223	
4	Kill and clean mold from all tunnel surfaces.					18		1,520	
	Sub-total	0	0	0	0	336	0	28,375	30
d-x.	**Service Tunnel S-10 (8X55X65)**								
1	Remove approximately 550' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					52		4,391	
2	Abate any loose or fallen paint chips.					10		845	
3	Clean tunnel walkways of extraneous debris and taconite fines.					9		760	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	75	0	6,334	6
d-xi.	**Service Tunnel S-11 (8X8X54)**								
1	Remove approximately 185' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation.					48		4,054	
2	Abate any loose or fallen paint chips.					16		1,351	
3	Clean tunnel walkways of extraneous debris and taconite fines.					6		507	
4	Kill and clean mold from all tunnel surfaces.					4		338	
	Sub-total	0	0	0	0	74	0	6,249	6
	Totals	**0**	**0**	**0**	**0**	**3143**	**0**	**299,122**	**293**

Supervision & Field Administration	Man-hours est.	552	Est. Cost	$53,862
Craft support (Carpenters, teamster, hbsc operator, hbsc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (itemize)			Est. Cost	$44,585.00
Estimated Material Costs (itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (itemize)			Est. Cost	$76,360.00
			Total Estimated Cost	$179,819

SOW I.D.	Description	Est. Man-hours: Labor	Operator	FA	Painters	Asbestos	Electrician	Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
e.	**Electrical Tunnels**									
e-i.	**Electric Tunnel E-1N thru E-4N and E-1S thru E-4S** (7'X8'X260')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					2108		178,105		
2	Remove all existing deteriorated electric cables.					782		66,048		
3	Remove extraneous debris and taconite dust in the tunnel.					302		25,504		
4	Kill and clean mold from all tunnel surfaces.					147		12,414		
5	Remove all taconite fines and reestablish the emergency egress hatches					224		18,917		
	Sub-total	0	0	0	0	3569	0	301,988	777	0
e-ii.	**Electric Tunnel E-7** (7'X8'X203')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					424		35,807		
2	Remove all existing deteriorated electric cables.					147		12,414		
3	Remove extraneous debris and taconite dust in the tunnel.					24		2,027		
4	Kill and clean mold from all tunnel surfaces.					12		1,013		
	Sub-total	0	0	0	0	607	0	51,261	115	0
e-iii.	**Electric Tunnel E-8** (8 to 14 X 9-6 to 11 X 2758')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					3125		263,906		
2	Remove all existing deteriorated electric cables.					1235		104,296		
3	Remove extraneous debris and taconite dust in the tunnel.					425		35,895		
4	Kill and clean mold from all tunnel surfaces.					211		17,819		
	Sub-total	0	0	0	0	4560	0	421,917	1008	0
e-iv.	**Electric Tunnel E-9** (5-6X6-8X246)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					186		15,705		
2	Remove all existing deteriorated electric cables.					39		3,294		
3	Remove extraneous debris and taconite dust in the tunnel.					28		2,365		
4	Kill and clean mold from all tunnel surfaces.					15		1,267		
	Sub-total	0	0	0	0	145	0	22,631	89	0
e-v.	**Electric Tunnel E-10** (4-6X5-8X250')									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					151		12,757		
2	Remove all existing deteriorated electric cables.					39		3,209		
3	Remove extraneous debris and taconite dust in the tunnel.					28		2,365		
4	Kill and clean mold from all tunnel surfaces.					14		1,182		
	Sub-total	0	0	0	0	231	0	19,509	93	0
e-vi.	**Electric Tunnels E-11** (5-6X6-8X95), **E-12** (5X6-9X15 to 7-6X2-6X22), **E-13** (same as 12), **E-14** (7-6X2-6X22), **E-15** (same as 14), **West Service Tunnel, and East Service Tunnel** (both service tunnels 6X10X180)									
1	Remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					374		31,584		
2	Remove all existing deteriorated electric cables.					102		8,614		
3	Remove extraneous debris and taconite dust in the tunnel.					74		6,249		
4	Kill and clean mold from all tunnel surfaces.					32		2,702		
	Sub-total	0	0	0	0	582	0	49,150	111	0
e-vii.	**Electric Tunnel E-16** (7X9-6X205)									
1	Remove extraneous debris and taconite dust in the tunnel.					80		6,756		
	Sub-total	0	0	0	0	80	0	6,756	0	0
	Concentrator									
6	In the North and South electrical control room basements, remove all existing ceiling tiles.					331		27,953		
7	In the North and South electrical control room basements, remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap.					1433		121,017		
8	In the North and South electrical control room basements, remove all existing deteriorated electric cables.					2143		180,976		
	Sub-total	0	0	0	0	3907	0	329,946	733	0
	Totals	**0**	**0**	**0**	**0**	**14212**	**0**	**1,180,858**	**2680**	**0**

Supervision & Field Administration	Man-hours est.	888	Est. Cost	89,491
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	210,109
Estimated Material Costs (Itemize)	**REPAIR BUDGET**		Est. Cost	35,000
Estimated Misc. Costs (Itemize)			Est. Cost	139,943
			Total Estimated Cost	1,648,738

MW LD.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper lbs.
		Labor	Operator	HH	Painters	Asbestos	Electrician			
a	**Concentrator** (1400 ft long building)									
1	Remove approximately 3,000' of existing HTHW pipelines along "F" and "G" column lines with damaged or deteriorated insulation and all fragments of insulation in 4A and 4B tunnel.					622		89,438		
2	Remove all insulated equipment fabrication lines and all insulation fragments.					1236		195,954		
3	Remove any loose or fallen paint chips.					220		16,890		
4	Kill and clean mold from all Concentrator building surfaces.					150		12,668		
5	Install protective railings around floor openings on separator deck and north side rod mill deck.					220		16,890		
9	Remove all floor tiles from the offices, locker rooms, washrooms, and central control room					981		76,089		
10	Remove all ceiling tiles from the offices, locker rooms, washrooms, and central control room.					1147		96,866		
11	In the North and South Air and Cable Ducts, remove all existing electric cable fireproofing wrap and Transite conduit and all fragments of fireproofing wrap					841		71,027		
12	In the North and South Air and Cable Ducts, remove all existing deteriorated electric cables.					584		49,339		
	Sub-totals	0	0	0	0	6111	0	556,074	0	0
d-xE	**Service Gallery G-1, G-2, and Service Tunnel S-12** (20X10X470)									
1	Remove approximately 3300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					858		72,458		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					98		8,276		
3	Clean tunnel walkways of extraneous debris and taconite fines.					168		14,188		
4	Kill and clean mold from gallery and tunnel surfaces					30		2,534		
	Subtotal	0	0	0	0	1154	0	97,455	0	0
d-xH	**Service Gallery G-3 North Pipeway** (20X10X700)									
1	Remove approximately 1300' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					1236		339,447		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					80		6,756		
3	Clean tunnel walkways of extraneous debris and taconite fines.					260		21,957		
4	Kill and clean mold from gallery and tunnel surfaces					30		2,534		
	Subtotal	0	0	0	0	1606	0	180,694	0	0
d-xJ	**Service Gallery G-4 South Pipe way, G-5 Gallery, and Service Tunnel S-13** (20X10X2200)									
1	Remove approximately 4500' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation. This insulation has tested positive for asbestos or probable ACM					2980		346,985		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					353		29,980		
3	Clean tunnel walkways of extraneous debris and taconite fines.					576		48,664		
4	Kill and clean mold from gallery and tunnel surfaces					103		8,445		
	Subtotal	0	0	0	0	4161	0	433,973	0	0
	Totals	0	0	0	0	12862	0	$1,085,196	0	0

Supervision & Field Administration	Man-hours est.	804	Est. Cost	78,818
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$302,280.00
Estimated Material Costs (Itemize)			Est. Cost	$35,080.00
Estimated Misc. Costs (Itemize)			Est. Cost	$251,470.00
			Total Estimated Cost	$1,535,236

Coarse Crusher

Misc Cost Breakdown

Air Samples		$1,000
Haul & Dispose of ACM		$48,430
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$7,400
MDH Fees		$5,870
Admin Exp (phones, office, facilities,etc.)		$5,200
HAZ/Reg Waste Collection		$20,000
Stair/Railing Repair		$10,000
SUBCONTRACT TOTAL	========>	$100,650

Fine Crusher

Misc Cost Breakdown

Air Samples		$600
Haul & Dispose of ACM		$18,360
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$3,615
MDH Fees		$2,445
Admin Exp (phones, office, facilities,etc.)		$3,455
Scaffold		$21,000
Reg/Haz Waste Collection/Disposal		$8,125
SUBCONTRACT TOTAL	========>	$60,350

Service Tunnels

Misc Cost Breakdown

Air Samples		$1,600
Haul & Dispose of ACM, Fines, Salvage		$60,610
Dispose of Lead Based Paint Scrapings		$390
Insurance (1%)		$2,790
MDH Fees		$3,780
Admin Exp (phones, office, facilities,etc.)		$2,190
Access Construction (BUDGET)		$5,000
SUBCONTRACT TOTAL	========>	$76,360

Electrical Tunnels

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose (acm, salvage)		$57,120
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$16,800
MDH Fees		$17,300
Haz/Reg Waste collection/disposal		$25,000
Admin Exp (phones, office, facilities,etc.)		$16,473
SUBCONTRACT TOTAL	========>	$136,943

CONCENTRATOR

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose of ACM		$25,840
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$14,820
MDH Fees		$15,560
Admin Exp (phones, office, facilities,etc.)		$5,000
Reg/Haz Waste Collection/Disposal		$45,000
Scaffold		$143,000
SUBCONTRACT TOTAL	========>	$253,470

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper Lbs.
		Labor	Operator	IW	Painters	Asbestos	Electrician			
a.	**Coarse Crusher**									
1	Below the ground level elevation of 1710', remove **all** existing HTHW pipelines with damaged or deteriorated insulation and all insulation fragments.					1478		124817		
2	Below the ground level elevation of 1710', remove all equipment lubrication lines with damaged or deteriorated insulation and all insulation fragments.					1469		124057		
3	Below the ground level elevation of 1710', remove any loose or fallen paint chips.					80		6756		
4	Above the ground elevation of 1710', remove all lubrication lines with damaged or deteriorated insulation and all insulation fragments. Remove the insulation on the lubrication holding tanks.					730		61649		
5	In the electrical control room, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					170		14357		
6	In the electrical control room basement, remove all existing electric cable fireproofing wrap and all fragments of fireproofing wrap.					250		21113		
7	Clean the Coarse Crusher building of all extraneous debris and taconite fines.	2564						204248		
8	Kill and clean mold from all Coarse Crusher building surfaces.	80						6379		
9	Install protective railings around floor openings on apron feeder floor. Reestablish the north conveyor gallery exit by replacing all structurally compromised stair treads.	200						15932		
	Sub-totals	2844	0	0	0	4127	0	579301	320	0
b.	**Conveyor 1A\1B tunnel & Drive house 1** (556 ft.)									
1	Remove approximately **1200'** of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation in 1A and 1 B tunnel.					418		35300		
2	Abate any loose or fallen paint chips.					80		6756		
3	Clean tunnel and Drive House walkways and stairs of extraneous debris and taconite fines.	1283						102204		
4	Kill and clean mold from all tunnel and Drive House No. 1 building surfaces.	120						9559		
5	In Drive House #1, remove approximately 120' of existing HTHW pipelines with damaged or deteriorated insulation and all fragments of insulation between 1A and 1B tunnel and S -3 tunnel. Patch remaining partially deteriorated HTHW pipeline insulation.					76		6418		
	Subtotal	1403	0	0	0	574	0	160237	0	0
	Totals	**4247**	**0**	**0**	**0**	**4751**	**0**	**$739,538**	**320**	**0**

Supervision & Field Administration	Man-hours est.	950	Est. Cost	$92,530.00
Craft support (Carpenters, teamster, Misc operator, Misc labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Itemize)			Est. Cost	$132,900.00
Estimated Material Costs (Itemize)			Est. Cost	$5,000.00
Estimated Misc. Costs (Itemize)			Est. Cost	$77,220.00
			Total Estimated Cost	$1,047,188

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$3,400.00	3400
800402	Fuel	5	@	$1,200.00	6000
800403	Generators	5	@	$3,000.00	15000
800405	Lift Rental	5	@	$7,500.00	37500
800406	Skidsteer	5	@	$3,200.00	16000
800409	Vac Loader	2	@	$10,000.00	20000
800410	Boring Equip	70	@	$500.00	35000
	SUBTOTAL				132900

MATERIALS ITEMIZATION

Stairs/Railings	======>	5000
		========
		5000

Misc Cost Breakdown

Air Samples		$1,400
Haul & Dispose of ACM		$45,000
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$7,400
MDH Fees		$5,270
Admin Exp (phones, office, facilities,etc.)		$6,200
HAZ/Reg Waste Collection		$20,000
Stair/Railing Repair		$10,000
SUBCONTRACT TOTAL	====>	$97,220

SOW I.D.	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. recovered Copper lbs.
		Labor	Operator	AV	Painters	Asbestos	Electricians			
c.	Fine Crusher									
1	Remove all existing HDPW pipelines with damaged or deteriorated insulation from the 4A/4B conveyor tunnel up to elevation 1794' on the north side of column 5. This insulation has tested positive for asbestos or probable ACM					450		45,887		
2	Remove all equipment (lockout/tagout) with damaged or deteriorated insulation and all insulation fragments from the 4A/4B conveyor tunnel up to the vibe tanks at elevation 1817'-9" on the north side of column row 5. This insulation has tested positive for asbestos or probable ACM.					501		76,089		
3	Remove any loose or fallen paint chips below the ground level elevation 1770'. The paint chips have tested positive for lead-based material					50		6,756		
4	Clear the Fine Crusher building of all extraneous debris and loose bits	337						28,628		
5	Kit and clean mold from Fine Crusher building surfaces.	50						5,477		
6										
	Sub-totals	3193	0	0	0	3477	0	209,730	0	0
e.	Conveyors 4A/4B tunnel & Drive House No. 2 (120 ft. long)									
1	Remove approximately 275' of existing HDPW pipelines with damaged or deteriorated insulation and all fragments of insulation on 4A and 4B tunnel. The insulation has tested positive for asbestos or probable ACM					139		11,739		
2	Abate any loose or fallen paint chips. The paint chips have tested positive for lead based material.					81		6,756		
3	Clean tunnel and Drive house walkways and stairs of extraneous debris and loose bits.	601						48,354		
4	Kit and clean mold from all conveyor and Drive House No. 2 surfaces	80						6,477		
5	Remove approximately 120' of existing HDPW pipelines with damaged or deteriorated insulation and all fragments of insulation in Drive House No. 2. The insulation has tested positive for asbestos or probable ACM.					58		7,432		
	Sub-totals	681	0	0	0	303	0	80,053	0	0
	Totals	3754	0	0	0	3780	0	$289,782	0	0

Supervision & Field Administration	Man-hours est.	441	Est. Cost	41,955
Craft Support (Carpenters, Scaffold, Misc. Operator, Misc Labor)	Man-hours est.		Est. Cost	
Estimated Equipment Costs (Rental)			Est. Cost	$5,000.00
Estimated Material Costs (Rental)			Est. Cost	$41,000.00
Estimated Misc. Costs (Rental)			Est. Cost	$51,640.00
			Total Estimated Cost	$429,376

EQUIPMENT (TSM)ZATION

500401	Small Tool Repair	1	ff	$1,200.00	1200
500402	Fuel	2	rr	$1,200.00	2400
500403	Generators	2	ff	$3,000.00	6000
500404	Lift Rental	2	ff	$7,500.00	15000
500405	Skidsteer	2	ff	$3,200.00	6400
500406	Vol Loader	1	ff	$[illegible]	10000
	SUBTOTAL				[illegible]
					41000

MATERIALS ITEMIZATION

Railing/Tread Steel	5000
	5000

Misc Cost Breakdown

Air Samples	$600
Haul & Dispose of ACM	$9,450
Dispose of Lead Based Paint Scrapings	$2,750
Insurance (1%)	$1,615
MDH Fees	$2,445
Admin Exp (phones, office, facilities,etc.)	$3,405
Scaffold	$31,000
Reg/Haz Waste Collection/Disposal	$8,125
SUBCONTRACT TOTAL >>>>>>>	$61,440

S/N	Description	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Service Tunnels								
4.1	Service Tunnel S-1 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.2	Service Tunnel S-2 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.3	Service Tunnel S-3 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.4	Service Tunnel S-4 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.5	Service Tunnel S-5 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.6	Service Tunnel S-6 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.7	Service Tunnel S-7 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.8	Service Tunnel S-8 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.9	Service Tunnel S-9 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.10	Service Tunnel S-10 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.11	Service Tunnel S-11 [illegible]								
1	[illegible]					[illegible]		[illegible]	
2	[illegible]					[illegible]		[illegible]	
3	[illegible]					[illegible]		[illegible]	
4	[illegible]					[illegible]		[illegible]	
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Total [illegible]

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$685.00	685
800402	Power Washer	3	@	$3,200.00	9600
800403	Generators	3	@	$3,000.00	9000
800405	Fuel	3	@	$1,200.00	3600
800408	Skidsteer	3	@	$3,200.00	9600
800409	Vac Loader	1	@	$12,000.00	12000
800410	Hoisting Equip	0	@	$100.00	0
	SUBTOTAL				[illegible]
					44685

MATERIALS ITEMIZATION

Budget	======>	5000

		5000

Misc Cost Breakdown

Air Samples	$2,000
Haul & Dispose of ACM, Fines, Salvage	$31,200
Dispose of Lead Based Paint Scrapings	$390
Insurance (1%)	$2,790
MDH Fees	$3,780
Admin Exp (phones, office, facilities,etc.)	$2,190
Access Construction (BUDGET)	$6,000
SUBCONTRACT TOTAL ==========>	$46,390

SOW No.	Description	[illegible]						[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
4	**Electrical Tunnels**									
4.1	**Electric Tunnel E-14 thru E-54 and E-15 thru E-45 (7X8X260)**									
1	[illegible]					2,129		126,165		
2	[illegible]					385		64,040		
3	[illegible]					153		25,594		
4	[illegible]					147		11,454		
5	[illegible]					234		12,517		
	Sub-total	4	5	4	0	[illegible]	3	239,180	177	7
4.2	**Electric Tunnel E-7 (7X8X292)**									
1	[illegible]					434		26,927		
2	[illegible]					147		11,454		
3	[illegible]					35		4,137		
4	[illegible]					38		1,908		
	Sub-total	5	0	0	0	659	2	51,440	115	7
4.3	**Electric Tunnel E-8 [illegible]**									
1	[illegible]					1,125		265,206		
2	[illegible]					2,175		201,359		
3	[illegible]					425		35,481		
4	[illegible]					177		13,419		
	Sub-total	6	5	4	1	4,255	3	424,007	1,306	8
4.4	**Electric Tunnel E-9 [illegible]**									
1	[illegible]					157		11,165		
2	[illegible]					19		1,119		
3	[illegible]					18		2,105		
4	[illegible]					15		1,262		
	Sub-total	5	0	0	2	209	1	20,512	38	6
4.5	**Electric Tunnel E-10 [illegible]**									
1	[illegible]					155		10,252		
2	[illegible]					15		1,206		
3	[illegible]					28		2,149		
4	[illegible]					14		1,082		
	Sub-total	4	0	3	5	215	3	14,556	58	4
4.6	**Electric Tunnels E-11 [illegible], E-12 [illegible], E-13 [illegible], E-14 [illegible], E-16 [illegible], West Service Tunnel, and East Service Tunnel [illegible]**									
1	[illegible]					174		31,564		
2	[illegible]					200		8,644		
3	[illegible]					78		5,219		
4	[illegible]					13		2,203		
	Sub-total	0	3	3	5	510	0	48,252	115	5
4.7	**Electric Tunnel E-18 [illegible]**									
1	[illegible]					[illegible]		6,026		
	Sub-total	0	0	0	0	[illegible]	0	[illegible]	[illegible]	0
	Concentrator									
6	[illegible]					2,517		17,911		
7	[illegible]					3,453		172,411		
8	[illegible]					[illegible]		182,535		
	Sub-total	0	1	4	0	5,970	0	363,886	778	0
	Total	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,463	0

[illegible]	[illegible]	[illegible]	[illegible]	40,450
[illegible]	[illegible]		[illegible]	
[illegible]			[illegible]	215,450
[illegible]	[illegible]		[illegible]	15,000
[illegible]			[illegible]	375,125
			[illegible]	[illegible]

EQUIPMENT ITEMIZATION

800401	Small Tool Repair	1	@	$3,693.00	8200
800402	Fuel	5	@	$1,200.00	6000
800403	Generators	5	@	$3,000.00	15000
800405	Lift Rental	5	@	$1,500.00	7500
800406	Skidsteer (2)	12	@	$3,200.00	38400
800409	Vac Loader	1	@	$10,000.00	10000
800410	Scaffold	1	@	$125,000.00	125000
	SUBTOTAL				210100

MATERIALS ITEMIZATION

Stair/Railings	=======>	15000
		==========
		15000

Misc Cost Breakdown

Air Samples	$2,500
Haul & Dispose (asm, salvage)	$29,400
Dispose of Lead Based Paint Scrapings	$2,750
Insurance (1%)	$16,600
MDH Fees	$17,300
Haz/Reg Waste collection/disposal	$25,000
Admin Exp (phones, office, facilities,etc.)	$16,473
SUBCONTRACT TOTAL ==========>	$109,223

WBS #	Description	Est. Man-hours						Est. Labor Cost	Est. Asbestos Volume (Cu. Yards)	Est. Recovered Copper (lbs)
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
[illegible]	[illegible]					[illegible]		[illegible]		
	Sub-total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Service Gallery G-1, G-2, and Service Tunnel [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Service Gallery G-3 North Pipeway [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Service Gallery G-4 South Pipe way, G-5 Gallery, and Service Tunnel S-11 [illegible]									
1	[illegible]					[illegible]		[illegible]		
2	[illegible]					[illegible]		[illegible]		
3	[illegible]					[illegible]		[illegible]		
4	[illegible]					[illegible]		[illegible]		
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Total	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
		[illegible]	[illegible]

EQUIPMENT ITEMIZATION

Small Tool Repair	1	@	$8,500.00	8500
Fuel	4	@	$1,500.00	6000
Generators	4	@	$3,340.00	13360
Forklift	4	@	$2,200.00	8800
Skidsteer	8	@	$3,200.00	25600
Vac Loader	2	@	$10,000.00	20000
Scissor lift	4	@	$1,500.00	6000
Hoisting Equip	40	@	$350.00	14000
SUBTOTAL				102260

MATERIALS ITEMIZATION

Repair Steel	======>	15000
		==========
		15000

Misc Cost Breakdown

Air Samples		$1,500
Haul & Dispose of ACM		$13,360
Dispose of Lead Based Paint Scrapings		$2,750
Insurance (1%)		$14,820
MDH Fees		$19,560
Admin Exp (phones, office, facilities,etc.)		$5,000
Reg/Haz Waste Collection/Disposal		$45,000
Scaffold		$143,000
SUBCONTRACT TOTAL	[illegible]	$240,930

PolyMet is evaluating the proposal, to assist in our effort we have a few follow up questions.

1) Please provide an estimated duration to complete the work in each project area.

Coarse Crusher – 95 days
Fine Crusher – 44 days
Concentrator – 80 days
Service Tunnels – 55 days
Electric Tunnels – 90 days

2) Please describe your proposed methods and techniques for lead abatement.

Areas of delaminated/deteriorated paint will be misted then either vacuumed or scraped and collected for disposal. TCLP will be performed for disposal protocols.

3) Please describe your proposed methods and techniques for general cleanup in each project area.

General debris will be removed to a location directed by Polymet staff. Fines will be vacuumed via vec loader or HEPA vacuums. Main walk ways will be mopped (concrete floors only). All debris will be collected and discarded as directed by Polymet staff.

4) Please describe your proposed methods and techniques for removal of the ACM fire protective wrap, Transite conduit, and electrical cable.

The electrical tunnel will be placed under a containment consisting of critical barriers, negative air and attached personnel and equipment decontamination units. Upon the removal, all electrical cabling will be removed from the transite conduit and removed to an area directed by Polymet. Transite conduit will then be removed, packaged and disposed.

Owner's response to Mavo's Clarifications & Assumptions

Mavo item 1). It is assumed that all overhead cranes are operational and can be used as a work platform for the cleaning/power washing portion of the project.

Owner's response – The schedule to reinstate the overhead cranes has not been determined, thus it should not be assumed they will be operational during the project.

Scaffold pricing and additional lift pricing has been added to the budget.

Mavo item 2). Owner to provide power and potable water. Mavo Systems will provide water filtration to power washing equipment. It is assumed that there will be a minimum water pressure of 20 PSI at the nozzle.

Owner's response – The contractor is responsible for supply of potable water.

Section D, item I of the work scope states: The Contractor shall supply **drinking and wash water**, field offices and lunchrooms, sanitary facilities, and wash water collection and filtering. The owner shall supply temporary electrical power at select locations.

Section 1 item ee of the general conditions also state: The Contractor will furnish their employees an adequate supply of portable water, containers, disposable cups, and trash receptacles for used cups.

Potable water will be contractor responsibility.

Mavo item 8). Electrical tunnel E8 is assumed to be 1,956 lineal feet not the 2,756 listed in the scope work.

Owner's response – The length of E-8 tunnel has been check and verified at 2,756 feet.

Confirmed

Mavo item 10). Included in the scope of work is the handling all the waste streams by disposal at the on-site landfill which the exception of the ACM wrapped lube oil piping. Excluded is the disposal of the miscellaneous hazardous waste such as bulbs, ballasts, paint, lead paint, chemicals, solvents, etc. – these items will be hauled to a central location and owner to take care of from there.

Owner's response – The Contractor is responsible for removal, transport, and disposal of hazardous materials.

Section D, item i of the work scope states: The Contractor is responsible for removal, transport, and disposal of hazardous materials. Contractor must secure the appropriately knowledgeable, certified, and/or licensed personnel to perform all hazardous waste activities. The Contractor is responsible to obtain permits and submit all reports required by state and federal agencies.

Pricing has been added to the budget to collect/dispose of Reg/Haz waste encountered

Proposal Specific Questions

1) The Mavo equipment itemization and estimate does not include lunch or office trailers, de-con stations, onsite vehicles, dumpsters, forklifts, or trucks. Will you be using these? If so what is the estimated cost?

   All costs have been addressed

2) The Mavo material itemization list includes consumables, which could be stated as a single entry = Man-hours * consumable rate, which is already covered as a portion of your labor hours. An example of anticipated material items is welding rod, cutting gases, lumber, rod stock and flat iron for hand rail, and grating for stairs. Did you include any of these items? Included

3) Do you have any resumes available for your Superintendent, Foremen and Project Manager? See attached

MAVO SYSTEMS

John Kraskey
Project Manager

Mavo Systems, Inc.
Duluth, MN

Qualifications
27 Years Abatement Experience

Summary of Work Experience

06/88 to 05/94	Rem-Con, Inc.	Worker/ Site Supervisor
05/94 to 10/2004	Envirobate, Inc	Supervisor/Project Manager
10/2004 to present	Mavo Systems, Inc.	Project/Regional Manager

Education and Industry Training / Certification

1988 - 1992	Construction Laborers – Lino Lakes, MN Asbestos Abatement Workers Certification
1992 - 2015	Construction Laborers – Lino Lakes, MN Asbestos Abatement Site Supervisor Certification
1996	Air Sampling Certification – MacNeil Environmental
1997 - 2015	Lead Abatement Contractor /Site Supervisor Certification

MAVO SYSTEMS

Melverd Nelson
Superintendent

Mavo Systems, Inc.
White Bear Lake, MN

Qualifications
19 Years Abatement Experience

Summary of Work Experience

07/96 To Present Mavo Systems, Inc. Worker/ Site Supervisor

Education and Industry Training / Certification

1996 Construction Laborers – Lino Lakes, MN Asbestos Abatement Workers Certification

1997 Construction Laborers – Lino Lakes, MN Asbestos Abatement Site Supervisor Certification

1998 Asbestos Abatement Contractor /Site Supervisor Refresher Course Lake States – White Bear Lake Two Day Air Sampling

1999 Construction Laborers – Lino Lakes, MN
Asbestos Abatement Contractor/ Supervisor Refresher Course

2000 Construction Laborers – Lino Lakes, MN
Asbestos Abatement Contractor/ Supervisor Refresher Course Firefighter I & II Training, Confined Space, Ladder Safety, Hazmat, Building Construction, Sprinkler Systems, Fire Safety

2001 Construction Laborers – Lino Lakes, MNAsbestos Abatement Contractor/ Supervisor Refresher Course Anoka Hennepin Technical College EMT-B Training, First Aid, CPR, EMT-B Certified

2002 Construction Laborers – Lino Lakes, MN Asbestos Abatement Contractor/ Supervisor Refresher Course Lead Abatement Contractor/ Supervisor Certification

2003-2015 Construction Laborers – Lino Lakes, MN Asbestos Abatement Contractor/ Supervisor Refresher Course/ Lead Abatement Contractor/ Supervisor Refresher Course

MAVO SYSTEMS

Gust Wells
Superintendent

Mavo Systems, Inc.
White Bear Lake, MN

Qualifications
8 Years Abatement Experience

Summary of Work Experience

06/2007 to Present	Mavo Systems, Inc.	Worker/Foreman/ Site Supervisor

Education and Industry Training / Certification

2008 - 2015	Construction Laborers – Lino Lakes, MN Asbestos Abatement Supervisor Certification
2007	Construction Laborers – Lino Lakes, MN Air Sampling Certification
2010 - 2015	Construction Laborers - Lead Abatement Contractor /Site Supervisor Certification
2011 - 2016	Construction Laborers – Lead Renovator (RRP) Course
2013 - 2016	MN Emergency Medical Services Regulatory Board – First Responder
2010 - 2016	Construction Laborers – Lino Lakes, MN Hazwoper (Haz Waste) Course

MAVO SYSTEMS

Environmental and Specialty Contracting Services

BUDGET PROPOSAL

DATE: ***June 7, 2016***

PROPOSAL SUBMITTED TO:	**PolyMet**	DESCRIPTION OF WORK:	**Legacy ACM Abatement**
ADDRESS:		SITE LOCATION:	**PolyMet**
CITY, STATE, ZIP:	**Hoyt Lakes, MN**	ADDRESS:	
ATTENTION:	**Mike Glissman**	CITY, STATE, ZIP:	**Hoyt Lakes, MN**
PHONE:	**218.471.2150**		

Mavo Systems, Inc. proposes the following scope of work:

This budgetary proposal is for abatement of ACM materials from remaining structures as part of a closure procedure for the PolyMet NorthMet venture. The pricing attached represents removal of acm materials from buildings and structures that will be necessary to facilitate demolition by others. No other removals are included in this pricing.

Pricing includes all costs associated with asbestos removal for each location identified except 3rd party monitoring typically retained by owner.

All pricing represents removal procedures compliant with all federal, state and local regulations governing asbestos abatement.

Legacy Area 1 - used by project	**Scope of Work**
Area 1 Shop and Truck Storage (Bldg. 220)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Area 1 Cold Storage (Bldg. 221)	- windows
Area 1 Reporting Building (Bldg. 231)	- windows
Area 1 Boiler House (Bldg. 226)	- windows
Area 1 Fire Pump House & Water Tank (Bldg. 228)	- windows
Legacy Area 2 - used by project	
Area 2 Service Shop (Bldg. 201)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Area 2 Truck Storage (Bldg. 202)	- windows
Area 2 Cold Storage (204)	- windows
Area 2 Shop Locomotive Service Shop (Bldg. 203)	- flooring, mastics, tsi, valves, gaskets, windows
Legacy Tailings Basin Buildings - used by project	
Foreman's Office (Bldg. 718)	- flooring, mastics, tsi, windows
Reporting Building (Bldg. 719)	- flooring, mastics, tsi, windows
Lube House (Bldg. 720)	- windows
Reporting Building (Bldg. 724)	- windows
Lube Oil Building (Bldg. 725)	- windows
Legacy Plant Area - used by project	
Rebuild Shop (Bldg 602)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
General Shop (Bldg. 601)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Carpenter Shop (Bldg. 603)	- windows
Warehouse 49 (Bldg. 920)	- flooring, mastics, tsi, valves, gaskets, windows
Warehouse 45 (Bldg. 921, Electrical)	- tsi, windows
Lube House (Bldg. 926)	- flooring, mastics, tsi, valves, gaskets, windows
Rubber Shop (Bldg. 605)	- flooring, mastics, tsi, crane components, valves, gaskets, windows
Water Treatment Plant & Storage Tanks	- flooring, mastics, tsi, valves, gaskets, windows
Colby Pump House	- valves, gaskets, windows
Administration Building	- flooring, mastics, tsi, plaster, windows
Main Gate	- flooring, mastics, windows
Sewage Treatment Plant	- valves, gaskets, windows
Return Water Barge	- valves, gaskets, windows

***anticipate a 2% increase to all pricing for each year until performance.*

Submitted: John Kraskey

Appendix G: Truck Purchase and Historic Snowplowing Costs

Toprak, Filiz

From: Jim Scott <jr.scott@frontiernet.net>
Sent: Friday, June 17, 2016 2:55 PM
To: Toprak, Filiz
Subject: Fw: F-250 lease
Attachments: vehicle lease 2016 Ford.doc

Follow Up Flag: Follow up
Flag Status: Completed

Filiz

Purchase quite for pick ups – replace $35,000 placeholder

No quote for plow but internet search for adjustable V (V – invertedV – slant right.left – straight) is about $5000

Jim

From: Steve DeVaney
Sent: Tuesday, June 14, 2016 12:41 PM
To: Jim Scott
Subject: Fw: F-250 lease

FYI

From: Bruce Lundgren <blundgren@mchsi.com>
Sent: Tuesday, June 14, 2016 9:56 AM
To: Steve DeVaney
Subject: Re: F-250 lease

Steven,

The total for that truck would be $37,520.69. This includes all applicable taxes, license, and fees. Please let me know what else I can do for you.

Respectfully,

Bruce Lundgren
Lundgren Ford

From: Steve DeVaney
Sent: Tuesday, June 14, 2016 8:58 AM
To: Bruce Lundgren
Subject: Re: F-250 lease

Bruce,

PolyMet would like to know the full purchase price for the truck that you proposed the lease.

Thanks,
Steve DeVaney
PolyMet Mining, Inc.

From: Bruce Lundgren <blundgren@mchsi.com>
Sent: Tuesday, April 05, 2016 9:37:16 AM
To: Steve DeVaney
Subject: F-250 lease

Steven,

Please review the attached lease quote. I did not want to bother you with a credit application at this time so these numbers are approximate. If you need to be more specific please let me know. As always, if there is anything more I can do for you don't hesitate to call on me. Thanks for your interest.

Respectfully,

Bruce Lundgren

SNOW PLOWING 2013-2016

2015-2016 WINTER

DINCAU CONSTRUCTION

	DATE	AREA	HOURS*	COST
	13-Nov-15	ADMIN BLDG PARK LOT, SCALE, FUEL STA	2.0	$170.00
	2-Dec-15	ADMIN BLDG PARK LOT, SCALE, FUEL STA	2.0	$170.00
	16-Dec-15	SCALE AREA & SALT	3.5	$297.50
	17-Dec-15	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, 2WX PUMP, PLANT SITE & HAUL ROADS	12.5	$1,277.50
	27-Dec-15	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, 2WX PUMP, PLANT SITE & HAUL ROADS	15.0	$1,450.00
	8-Jan-16	ADMIN BLDG PARK LOT, SCALE, FUEL STA	3.5	$297.50
	12-Jan-16	ROAD TO MINE SITE BORE HOLE, ROADS TO TEST HOLES	7.5	$717.50
	15-Jan-16	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, 2WX PUMP, PLANT SITE & HAUL ROADS	17.0	$1,700.00
	25-Jan-16	DUNKA ROAD, TEST HOLE ROADS	8.0	$780.00
	26-Jan-16	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, 2WX PUMP, PLANT SITE & HAUL ROADS	14.0	$1,365.00
	27-Jan-16	TEST HOLE ROADS	4.5	$400.00
	28-Jan-16	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, 2WX PUMP, PLANT SITE, DUNKA ROAD & TEST HOLES	21.5	$2,065.00
	29-Jan-16	TEST HOLE ROADS	5.0	$445.00
	30-Jan-16	TEST HOLE ROADS	4.5	$400.00
	1-Feb-16	TEST HOLE ROADS	3.5	$310.00
	4-Feb-16	TAILINGS BASIN	3.0	$305.00
	8-Feb-16	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, DUNKA ROAD & TEST HOLES	27.0	$2,530.00
	9-Feb-16	ROADS, CLEAN UP ROADS & SCALE AREA	6.0	$545.00
	15-Feb-16	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, 2WX PUMP, PLANT SITE, DUNKA ROAD & TEST HOLES	18.0	$1,645.00
	16-Feb-16	ROADS	5.0	$465.00
	20-Feb-16	ROADS & DUNKA ROAD	6.5	$772.50
	24-Feb-16	ADMIN BLDG PARK LOT, SCALE, FUEL STA, ROADS, 2WX PUMP, PLANT SITE, DUNKA ROAD & TEST HOLES	23.5	$2,322.50
TOTAL	22 CALLOUTS		213.0	**$20,430.00**

2014-2015 WINTER

C&C Winger

	8-Dec-14	NO DESCRIPTIONS OF AREAS PLOWED - SEE MAP	3.5	$483.00
	11-Dec-14		3.0	$309.00
	12-Dec-14		3.0	$504.00
	16-Dec-14		8.0	$1,239.00
	22-Dec-14		0.5	$69.00
	3-Jan-15		12.75	$1,543.25
	5-Jan-15		3.5	$483.00
	8-Jan-15		3.5	$483.00
	15-Jan-15		4.0	$572.00
	16-Jan-15		3.0	$414.00
	18-Jan-15		2.5	$345.00
	19-Jan-15		7.5	$1,035.00
	26-Jan-15		12.75	$1,322.25
	27-Jan-15		6.0	$589.50
	2-Feb-15		2.75	$393.25
	11-Feb-15		14.25	$1,822.00
	16-Feb-15		4.0	$340.00
	20-Feb-15		10.1	$1,225.50
	21-Feb-15		3.0	$255.00
	24-Feb-15		1.0	$138.00
	25-Feb-15		4.0	$552.00
	3-Mar-15		11.1	$1,501.80
	8-Apr-15		1.0	$163.00
TOTAL	23 CALLOUTS		124.7	**$15,781.55**

2013-2014 WINTER

EARTH TECH INC.

	3-Dec-13	NO DESCRIPTIONS OF AREAS PLOWED - SEE MAP	5.0	$375.00
	4-Dec-13		5.5	$412.00
	5-Dec-13		11.5	$862.50
	6-Dec-13		4.5	$337.50
	8-Dec-13		6.0	$700.00
	9-Dec-13		3.5	$262.50
	16-Dec-13		6.0	$450.00
	18-Dec-13		6.5	$487.50
	23-Dec-13		4.0	$300.00
	26-Dec-13		7.5	$562.50
	28-Dec-13		1.0	$75.00
	4-Jan-14		7.0	$525.00
	5-Jan-14		2.5	$187.50
	6-Jan-14		6.0	$450.00
	8-Jan-14		4.0	$300.00
	14-Jan-14		2.5	$212.50
	16-Jan-14		1.0	$75.00
	19-Jan-14		6.0	$480.00
	20-Jan-14		11.0	$935.00
	21-Jan-14		9.0	$765.00
	22-Jan-14		15.5	$1,417.50
	26-Jan-14		14.5	$1,207.50
	29-Jan-14		9.0	$765.00
	30-Jan-14		11.0	$935.00
	2-Feb-14		10.0	$800.00
	13-Feb-14		1.5	$112.50
	15-Feb-14		3.5	$262.50
	17-Feb-14		18.5	$1,472.50
	18-Feb-14		14.0	$1,212.50
	19-Feb-14		19.0	$1,605.00
	21-Feb-14		25.5	$2,082.50
	22-Feb-14		28.5	$2,317.50

RADOTICH ENTERPRISES

	27-Feb-14	\		
	28-Feb-14	---------->	42.5	$4,675.00
	2-Mar-14	/		
	21-Mar-14	\		
	22-Mar-14	---------->	16.25	$1,787.50
	27-Mar-14	/		
	1-Apr-14	\		
	2-Apr-14	/	9.0	$990.00
TOTAL	40 CALLOUTS		348.3	**$30,397.00**

NOTE: HOURS* - MULTIPLE PIECES OF EQUIPMENT AT DIFFERENT RATES

Appendix H: Staff and Services Basis

NorthMet CRE – Staff and Services Basis

August 4, 2016

The CRE is being developed for Stage 1 and Stage 2 of construction and Mine Year 1. The Stage 1 CRE will cover legacy liabilities plus liabilities due to NorthMet construction up to the point where Duluth Complex rock is blasted at the Mine Site. The Stage 2 CRE will cover Stage 1 plus Mine Year 1 NorthMet operating liabilities at the Mine Site but not NorthMet operating liabilities at the Plant Site. The Mine Year 1 CRE will cover legacy, NorthMet construction and NorthMet Mine Year 1 operating liabilities.

Staff - Closure

During the Closure period the large one time activities of structure removal and cover system construction will be done and contracts established for longer term, ongoing Closure and Post Closure activities. The State Project Manager would hire Reclamation, Demolition, Accounting/Purchasing and Site Managers. These managers would be sourced from local firms with personnel familiar with the site (Lakehead, NTS or Barr or former PolyMet employees). Security provided by limited access via manned gate and patrol of active working areas. See Attachment A for Staff Schedule and Attachment B for annual cost development for Stage 1, Stage 2 and Mine Year 1.

1. State Project Manager (State price)
    a. Manage funds and overall process
    b. Hire Site Manager, Project Engineer and Accountant/Purchaser
2. Site Manager (cost from Barr price list)
    a. Manage initial reclamation and initiate and plan for post closure
    b. Manage water treatment/utility personnel
    c. Manage water quality monitoring and water treatment facilities
    d. Manage dam safety monitoring
    e. Provide required water quality, dam safety and permit to mine reporting
    f. Manage site services – security, snow plowing
3. Project Engineer (cost from Barr price list)
    a. Manage structure demolition and AOC remediation
    b. Manage construction of the Tailings Basin Non Mechanical Treatment System (Stage 1 and Stage 2 only)
    c. Manage construction of Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only), FTB Beach Cover System (Mine Year 1 only)
    d. Develop plans for FTB Pond Bottom Cover System (Mine Year 1 only) to be implemented later
    e. Provide required reclamation and closure reporting
4. Accountant /Purchaser (cost from Barr price list)
    a. Initiate contracts for reclamation and demolition work
    b. Initiate contractors for dam safety monitoring and site services
    c. Set up process for post closure activities
    d. Manage purchase/payment process
5. Security (cost from NorthTek Security)
    a. Man the Main Gate 24/7
    b. Patrol the site on day shift

6. Water Treatment/Utility (cost from Express Employment)
    a. Operate and provide routine maintenance for tailings basin non mechanical treatment system (Stage 1 and Stage 2 only)
    b. Operate and provide routine maintenance for Mine Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Stage 2 and Mine Year 1 only)
    c. Operate and provide routine maintenance for Plant Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Mine Year 1 only)
    d. Collect Mine Site water quality samples (Stage 2 and Mine Year 1 only)
    e. Collect Plant Site water quality samples
    f. Inspect and provide routine maintenance for Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only)
    g. Inspect and provide routine maintenance for FTB Beach and Pond Bottom Cover Systems (Mine Year 1 only)
    h. Inspect and provide routine maintenance for storm water systems (ditches, culverts)
    i. Inspect and provide routine maintenance for reclamation vegetation (pit walls, stockpile/pond footprints, structure footprints, roads, railroads)
    j. Inspect and repair pit perimeter barrier fence and gates (Stage 2 and Mine Year 1 only)

Staff – Post Closure

During the Post Closure period the one remaining one time construction activity (FTB Pond Bottom Cover System which was designed and planned during the Closure period) will be initiated and completed. Security provided by locked gates at FTB and Mine Site. See Attachment A for Staff Schedule and Attachment B for annual cost development for Stage 1, Stage 2 and Mine Year 1..

1. Site Manager (cost from NTS price list)
    a. Manage water treatment/utility personnel
    b. Manage water quality monitoring and water treatment facilities
    c. Manage dam safety monitoring
    d. Provide required water quality, dam safety and permit to mine reporting
    e. Manage site services – snow plowing
2. Water Treatment/Utility (cost from Express Employment)
    a. Operate and provide routine maintenance for tailings basin non mechanical treatment system (Stage 1 and Stage 2 only)
    b. Operate and provide routine maintenance for Mine Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Stage 2 and Mine Year 1 only)
    c. Operate and provide routine maintenance for Plant Site water treatment facilities including containment systems and pumps/pipes to move water to and from treatment plant (Mine Year 1 only)
    d. Collect Mine Site water quality samples (Stage 2 and Mine Year 1 only)

e. Collect Plant Site water quality samples
f. Inspect and provide routine maintenance for Category 1 Stockpile Cover System (Stage 2 and Mine Year 1 only)
g. Inspect and provide routine maintenance for FTB Beach and Pond Bottom Cover Systems (Mine Year 1 only)
h. Inspect and provide routine maintenance for storm water systems (ditches, culverts)
i. Inspect and provide routine maintenance for reclamation vegetation (pit walls, stockpile/pond footprints, structure footprints, roads, railroads)
j. Inspect and repair pit perimeter barrier fence and gates (Stage 2 and Mine Year 1 only)
k. Snow plowing

Vehicles

Staff will require vehicles to accomplish their activities. See Attachment C for Vehicle Schedule for Closure and Post Closure with annual cost development for Stage 1, Stage 2 and Mine Year 1.

Services – Closure and Post Closure

There are ongoing activities that will be performed by a combination of Utility Staff and specialized consultant. These activities have been ongoing at this site since 2001 and, in general, decrease over time as conditions stabilize, which include:

1. Water Monitoring (b and d below assumed to decrease over time to reflect transition from monthly surface water sampling to quarterly and quarterly groundwater sampling to annual – first 10 years is full monitoring, next 5 years at 50% full and then 25% of full on an ongoing basis)
    a. water quality (surface and well) samples collected by Water treatment/Utility Staff
    b. water quality analysis by local laboratory (cost from Pace Analytical)
    c. wetland water level data from loggers collected by Water Treatment/Utility Staff
    d. periodic water data review, QA/QC and required NPDES reporting by Site Manager
    e. annual NPDES report (cost from NTS)
2. Dam Safety Monitoring
    a. dam instrumentation data collection and exception report (cost from NTS)
    b. dam instrument annual report (cost from NTS)
    c. geotechnical inspection (cost from Barr)
    d. annual dam safety report (cost from Barr)
3. SW-619 Private Landfill Monitoring for 30 years from closure as required by Minnesota Solid Waste Landfill (assume closed in 2017)
    a. Inspection by Water treatment/Utility Staff
    b. Annual Water Quality and Gas Monitoring (from NTS)
    c. Annual Report (from NTS)
4. Coal Ash Disposal Site Monitoring for 30 years from closure as required by Minnesota Solid Waste Landfill (closed in 2000)
    a. Inspection by Water Treatment/Utility Staff
    b. Annual Report (from NTS)

5. Snowplowing (Closure Only – Utility via snow plow equipped 4WD pick up for Post Closure)
    a. Annual snow plowing to provide access to areas active during closure (based on current annual)

Reclamation Vegetation Establishment and Long Term Care

Initial reclamation seeding is done with a seed mix and fertilizer mix that will typically develop into a permanent self-sustaining vegetation cover. Because there will be some seeding failures and some erosion due to storm events before the permanent self-sustaining vegetation cover develops, an allowance of cost for all seeding is included.

Once a permanent self-sustaining vegetation cover is established Site Water treatment/Utility Staff will inspect, make minor repairs and arrange for erosion repairs using small earth moving equipment.

Open channel water conveyance systems (ditches, channels, etc.) will need to be kept clear and flowing. Site Water treatment/Utility Staff will inspect, clear minor blockages and arrange for removal of major blockages using small earth moving equipment.

Cover systems will need to be kept free of woody vegetation and borrowing animal/erosion damage will need to be repaired. Site Water treatment/Utility Staff will inspect, make minor repairs and arrange for major erosion repairs using small earth moving equipment as wells as arrange for herbicide spraying as needed.

Water Treatment Facility Repair/Replacement

The major wear component of the water treatment plants is the filter membranes. Because the annual cost of replacement membranes is a function of the degree of water treatment and the amount of water treated, replacement membrane cost is included in the water treatment unit cost ($/1000 gal). The Water Treatment/Utility Staff will change membranes and perform other routine maintenance.

Long term facility and equipment replacement cost has been developed by using EPA equipment life values and NorthMet Project capital equipment cost to calculate an annual cost (cost/life). The sum of all of the annual costs for the water treatment plants and pumps and pipe to move water to and from the treatment plants is the total annual cost for facility and equipment repair/replacement. This is fully explained in another document.

List of sources for costs (see Attachment B)

1. NTS Letter of 4/22/16 (site manager, water quality reporting, land fill monitoring and reporting, tailings basin instrumentation)
2. Barr Engineering 2016 Fee Schedule (demo/reclamation/accounting managers)
3. NorthTek Security Services letter of 4/5/16 (security staff)
4. Express Employment Professionals letter of 4/4/16 (utility staff)
5. Pace Analytical 2016 Price List (water quality sample analysis) – Attachment D
6. Barr Engineering letter of 4/1/16 (dam safety)
7. Snow Plowing Analysis spreadsheet (snow plowing)

Attachment A – Staff Schedules

Staff Schedule - Closure												
	FTE											
	Stage 1	Stage 2	Mine Year 1	shift	M	T	W	Th	F	S	S	Notes
State Project Manager	1	1	1	day	1	1	1	1	1			
Site Manager	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Project Engineer	0.5	0.75	1	day	1	1	1	1	1			Stage 1 1/2 time, Stage 2 3/4 time, MY 1 FT
Accountant/Purchaser	0.5	0.75	1	day	1	1	1	1	1			Stage 1 1/2 time, Stage 2 3/4 time, MY 1 FT
Security Chief	1	1	1	day	1	1	1	1	1	0	0	
Security Officer	1.4	1.4	1.4	day	1	1	1	1	1	1	1	
Security Officer	1.4	1.4	1.4	aft	1	1	1	1	1	1	1	
Security Officer	1.4	1.4	1.4	nite	1	1	1	1	1	1	1	
Security Officer Total	4.2	4.2	4.2									
Water Treatment	0	0.7	1.4	day	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	aft	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	nite	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Utility	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment/Utility Total	0.835	2.935	5.035									

Staff Schedule - Post Closure												
	FTE											
	Stage 1	Stage 2	Mine Year 1	shift	M	T	W	Th	F	S	S	Notes
Site Manager	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment	0	0.7	1.4	day	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	aft	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Water Treatment	0	0.7	1.4	nite	1	1	1	1	1	1	1	Stage 1 zero, Stage 2 1/2 time, MY 1 FT
Utility	0.835	0.835	0.835	day	1	1	1	1	1			half time Nov,Dec,Jan,Feb
Water Treatment/Utility Total	0.835	2.935	5.035									

Attachment B – Sources and Annual Cost Development

List of Sources for Staff and Services							
Staff	**Annual $ / FTE**	**Stage 1 Annual $**	**Stage 2 Annual $**	**Mine Year 1 Annual $**	**Source**	**Basis Document Reference**	**SRCE**
Closure							
State Project Manager	TBD	TBD	TBD	TBD		Staff - Closure 1	Human Resources
Site Manager	$224,640	$187,574	$187,574	$187,574	NTS 4/22/16 letter #1 Mid Level Professional	Staff - Closure 2	Human Resources
Project Engineer	$223,600	$111,800	$167,700	$223,600	Barr 1/1/16 price list Engineer/Scientist/Specialist II average	Staff - Closure 3	Human Resources
Accountant/Purchaser	$187,200	$93,600	$140,400	$187,200	Barr 1/1/16 price list Support Personnel I maximum	Staff - Closure 4	Human Resources
Security Chief	$56,160	$56,160	$56,160	$56,160	NorthTek Security Services 4/5/16 letter	Staff - Closure 5	Human Resources
Security Officer	$31,595	$132,700	$132,700	$132,700	NorthTek Security Services 4/5/16 letter	Staff - Closure 5	Human Resources
Water Treatment/Utility	$67,038	$55,977	$196,758	$337,538	Express Employment 4/4/16 letter Maintenance 1	Staff - Closure 6	Human Resources
Post Closure							Human Resources
Site Manager	$224,640	$187,574	$187,574	$187,574	NTS 4/22/16 letter #1 Mid Level Professional	Staff - Post Closure 1	Human Resources
Water Treatment/Utility	$67,038	$55,977	$196,758	$337,538	Express Employment 4/4/16 letter Maintenance 1	Staff - Post Closure 2	Human Resources
Services	**Unit $**	**Unit**					
Water Monitoring							
- sample analysis	$331	sample			Pace Analytical 2016 Price Sheet (see Attachment C Water Analysis)	Services 1b	Material Cost Water Analysis
- annual report	$3,492	year			NTS 4/22/16 letter #5 Water Quality Report Preparation	Services 1e	?
Dam Safety Monitoring							
- instrumentation data collection	$7,686	event			NTS 4/22/16 letter #7 Tailings Basin Instrumentation Inspection and Data Collection	Services 2a	Other User
- instrumentation report	$2,850	event			NTS 4/22/16 letter #8 Tailings Basin Instrumentation Report Preparation	Services 2b	Other User
- geotechnical inspection	$7,000	year			Barr 4/1/16 letter	Services 2c	Other User
- annual report	$10,500	year			Barr 4/1/16 letter	Services 2d	Other User
SW-619 Landfill Monitoring							
- water and gas monitoring	$10,150	year			NTS 4/22/16 letter #6 SW-619 Groundwater + Gas Vent Monitoring	Services 3b	Other User
- annual report	$5,280	year			NTS 4/22/16 letter #6 SW-619 Staff Reporting	Services 3c	Other User
Coal Ash Landfill Monitoring							
- annual report	$2,640	year			NTS 4/22/16 letter #6 SW-619 Staff Reporting (assume 50% no gas/water monitoring)	Services 4b	Other User
Snow Plowing							
- average annual	$22,203				Average of 2013 to 2015	Services 5ab	Other User

Attachment C – Vehicle Schedule

Vehicle Schedule - Closure									
	Stage 1	Stage 2	Mine Year 1	Cost	Service Life	Stage 1 Annual $	Stage 2 Annual $	Mine Year 1 Annual $	Notes
State Project Manager	0	0	0						
Site Manager	0.5	1	1	$35,000	7	$2,500	$5,000	$5,000	pick up - 4WD
Project Engineer	0.5	1	1	$35,000	7	$2,500	$5,000	$5,000	pick up - 4WD
Accountant/Purchaser	0	0	0						
Security	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Water Treatment	0	1	1	$35,000	7	$0	$5,000	$5,000	pick up - 4WD
Utility	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Total	3	5	5			$15,000	$25,000	$25,000	

Vehicle Schedule - Post Closure									
	Stage 1	Stage 2	Mine Year 1	Cost	Service Life	Stage 1 Annual $	Stage 2 Annual $	Mine Year 1 Annual $	Notes
Site Manager	1	1	1	$35,000	7	$5,000	$5,000	$5,000	pick up - 4WD
Water Treatment	0	1	1	$35,000	7	$0	$5,000	$5,000	pick up - 4WD
Utility	1	1	1	$40,000	7	$5,714	$5,714	$5,714	pick up - 4WD with snow plow
Total	2	3	3			$10,714	$15,714	$15,714	

Attachment D –Water Analysis

Water Analysis - From Pace Analytical 2016 Price List			
Analyte	**Price**	**Qty/sample**	**Sample Cost**
Alkalinity	$18.75	1	$18.75
Arsenic	$20.00	1	$20.00
Calcium	$20.00	1	$20.00
Copper	$20.00	1	$20.00
Cobalt	$20.00	1	$20.00
Iron	$20.00	1	$20.00
Hardness Calc	$12.50	1	$12.50
Magnesium	$20.00	1	$20.00
Mercury Low Level	$112.50	0.25	$28.13
Nickel	$20.00	1	$20.00
pH	$6.25	1	$6.25
Specific Conductance	$12.50	1	$12.50
Sulfate	$25.00	1	$25.00
Total Dissolved Solids	$12.50	1	$12.50
Total Suspended Solids	$12.50	1	$12.50
Zinc	$20.00	1	$20.00
SubTotal			$288.13
Level 3 QC*		15%	$43.22
Total			$331.34
* Data Reporting, Complete Quality Control plus QC Limits and Batch Cross reference			

Appendix I: Fees

April 22, 2016

PolyMet Mining, Inc.
Attn. Steve DeVaney
Via Email
sdevaney@polymetmining.com

Environmental Science & Engineering

RE: Cost Estimates on Several Items

Attached are the cost estimates that will be used in the Contingency Reclamation Estimate (CRE) as part of the application for the permit to mine with the State of Minnesota. Included are the following items:

1. Hourly labor rates by staff type
2. Hourly rate for surveying
3. Wetland data collection, data entry and quality assurance, per annum cost estimate
4. DMR data collection, data entry, quality assurance and report preparation, per annum cost estimate
5. Water quality report preparation, per annum cost estimate
6. SW-619 industrial landfill monitoring and maintenance, per annum cost estimate (closed state)
7. Tailings basin instrumentation inspection and data collection, per annum cost estimate (current activity)
8. Tailings basin instrumentation report preparation, per annum cost estimate (current activity)
9. Tailings basin instrumentation inspection and data collection, per annum cost estimate (operating activity)
10. Tailings basin instrumentation report preparation, per annum cost estimate (operating activity)
11. Reverse osmosis treatment plants operation, per annum cost estimate

The cost estimates for items 3-8 are based on our experience performing these duties in years past. We have a high degree of certainty in terms of level of effort and unit rates for these items. For items 9 and 10 we lack detail as to how operating conditions would affect the level of effort, therefore we roughly estimated double the level of effort of current, non-operating conditions. For Item 11 we based our cost estimate on our experience elsewhere, however with the absence of design criteria and operating requirements, we estimated what typical plants of this size may cost to operate.

Please note that all pricing is valid for the remainder of calendar year 2016. Pricing is subject to an increase not to exceed 2.5% each year thereafter, effective on Jan 1st, for a period of 10 years. If you should have any questions, please feel free to contact Mr. Bruce Trebnick at 218-742-1051 (office) or 218-780-2006 (cell).

Sincerely,

Richard H. Crum, P

NTS, President

PRICING REQUEST FOR SEVERAL ITEMS FOR THE CONTINGENCY RECLAMATION ESTIMATE (CRE)

AS PART OF THE APPLICATION FOR THE PERMIT TO MINE WITH THE STATE OF MINNESOTA

Prepared For

Steve DeVaney

PolyMet Mining, Inc.

Prepared By

Northeast Technical Services, Inc. (NTS)

526 Chestnut Street

Virginia, Minnesota 55792

218.741.4290

April 21, 2016

Environmental Science & Engineering

Table of Contents

1. Hourly labor rates by staff type

Staff Type	Hourly Rate
Entry Level Professional (I)	88
Middle Level Professional (II)	108
Senior Level Professional (III)	128
Principal Level Professional (IV)	148
WWTP Operator, Class B, C & D	58
WWTP Operator, Class A	128
Field Scientist	78
Project Support (Clerical)	58
Laborer/Intern	48

2. Hourly rate for surveying

$98/hour; includes Professional Engineer or EIT along with survey equipment. NTS is not permitted to survey property boundaries at this time.

3. Wetland data collection, data entry and quality assurance, per annum cost estimate

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	2220.00	/lump	1	2220
Misc. Consumable Items	504.00	/lump	1	504
Pickup Truck 4x4	0.70	/mile	2000	1,400
Staff, Data Collection (Avg Rate)	83.00	/hour	520	43,160
			Total:	$47,284

Per annum cost estimate *per monitoring point* (21 points): $2,252

4. **DMR data collection, data entry, quality assurance and report preparation, per annum cost estimate**

Facility #1) Hoyt Lakes Tailings Basin

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	7,276.00	/lump	1	7,276
Misc. Consumable Items	3,000.00	/lump	1	3,000
Pickup Truck 4x4	0.70	/mile	3400	2,380
Staff, Data Collection (Avg Rate)	83.00	/hour	560	46,480
Staff, Reporting (Avg Rate)	92.00	/hour	240	22,080
			Total:	$81,216

Facility #2) Hoyt Lakes Mining Area

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	4,957.00	/lump	1	4,957
Misc. Consumable Items	648.00	/lump	1	648
Pickup Truck 4x4	0.70	/mile	1600	1,120
Staff, Data Collection (Avg Rate)	83.00	/hour	260	21,580
Staff, Reporting (Avg Rate)	92.00	/hour	264	24,288
			Total:	$52,593

Per Annum Cost Estimate, Total for *Both Facilities*: $133,809

5. **Water quality report preparation, per annum cost estimate**

Item	Rate	Unit	Quantity	Subtotal
Staff, Reporting (Avg Rate)	97.00	/hour	36	3,492
			Total:	$3,492

6. **SW-619 industrial landfill monitoring and maintenance, per annum cost estimate (closed state)**

Item	Rate	Unit	Quantity	Subtotal
Landfill Inspection	400.00	/ea	3	1,200
Cover Mowing	5327.00	/lump	1	5,327
Groundwater Monitoring	850.00	/well	7	5,950
Gas Vent Monitoring	600.00	/vent	7	4,200
Staff, Reporting (Avg Rate)	88.00	/day	60	5,280
			Total:	$21,957

Actual cost for maintenance will vary year-to-year. Costs shown are 3 year average.

NTS recommends that if the landfill leachate plume is proven to be stable, the number of groundwater sampling events/locations be reduced after five years.

7. **Tailings basin instrumentation inspection and data collection, per annum cost estimate (current activity)**

Item	Rate	Unit	Quantity	Subtotal
Field Equipment	2360.00	/lump	1	2360
Misc. Consumable Items	76.00	/lump	1	76
Pickup Truck 4x4	0.70	/mile	400	280
Staff, Data Collection (Average Rate)	113.00	/hour	112	12,656
			Total:	$15,372

Per Annum Cost Estimate, *per event* (2 events): $7,686

8. **Tailings basin instrumentation report preparation, per annum cost estimate (current activity)**

Item	Rate	Unit	Quantity	Subtotal
Staff, Reporting (Average Rate)	114.00	/hour	50	5,700
			Total:	$5,700

Per Annum Cost Estimate, *per event* (2 events): $2,850

9. **Tailings basin instrumentation inspection and data collection, per annum cost estimate (operating activity)**

Assumed Double Effort of Current Activity (Item #7)

Per Annum Cost Estimate, *per event* (2 events): $15,372

10. **Tailings basin instrumentation report preparation, per annum cost estimate (operating activity)**

Assumed Double Effort of Current Activity (Item #8)

Per Annum Cost Estimate, *per event* (2 events): $5,700

11. **Reverse osmosis treatment plants operation, per annum cost estimate**

Operation of RO treatment systems is dependent upon numerous variables. Proposed cost estimates are subject to the following variables and qualifying statements:

- Typical hours of plant operation required, assuming not continuous.
- Typical level of capacity required, assuming not maximum.
- Typical influent water quality and expected variability.
- Treatment objectives.
- Operational Strategies and SCADA Capabilities: Automation, remote monitoring, remote control capabilities, etc
- Are we to include membrane filter replacement in the estimate?
- How will reject water be stored or otherwise handled?

The following per annum cost estimate is based on this set of assumptions:

- Plants are operational 24/7 at 50% of capacity.
- Two RO plants (500gpm and 2000gpm) are both in operation; the cost estimate below is for combined operation and maintenance.
- Operator required 1 site visit per day.
- Operator scheduled 8 hours per day, 7 days a week.
- Operators are paid flat rate $40 per 8 hours "on-call".
- Not charging travel time for routine operation.
- Class A operator oversight 8 hours per week on average.
- Initial water quality is moderately impaired and moderately variable.
- Membrane filter replacement is not included.
- Potential reject water handling costs are not included.
- See Appendix A for detailed assumed design parameters.

Wastewater Treatment:

Item	Rate	Unit	Quantity	Subtotal
Energy Costs*	112,000.00	/lump	1	112,000
Chemical Costs*	599,000.00	/lump	1	599,000
Maintenance Costs*	124,000.00	/lump	1	124,000
Pickup Truck 4x4	0.70	/mi	32,000	22,400
Operator "on-call" charge	40.00	/8 hours	730	29,200
Operator, Class B, C or D	58.00	/hour	3,800	220,400
Operator, Class A	128.00	/hour	416	53,248
			Total:	$1,160,248

*See Appendix B for detailed breakdown of costs.

Wastewater Pretreatment:

Item	Rate	Unit	Quantity	Subtotal
Coagulation/Flocculation/Settling	245,000.00	/lump	1	245,000
Ultrafiltration	105,000.00	/lump	1	105,000
			Total:	$350,000

Pretreatment may be optional depending on influent water quality and effluent objectives.

Treatment costs may increase/decrease dependent on pretreatment options.

Appendix A: Assumed design parameters for WWTP's

Design Parameters:		
Percent Recovery	75%	
Design Feed Flow (Max)	3.6	mgd
Design Permeate Flow (Max)	2.70	mgd
Design Concentrate Flow (Max)	0.90	mgd
Average Feed Flow	1.80	mgd
Average Permeate Flow	1.35	mgd
Average Concentrate Flow	0.45	mgd
No. of Skids	3	skids
Size of RO Skids	0.90	mgd
RO Flux Rate	10	gfd
RO Area per Element	400	ft/elements
Number of Pressure Vessels per Skid	7	PV/skid
Number of RO Elements per Skid	231.00	elements/skid
Number of Cartridge Filters	157.00	

Appendix B: Detailed operation & maintenance costs for WWTP's

Annual Energy Cost	$112,000.00	$/year
Annual Energy Rate	$0.08	/kwh
Annual Feed Energy Cost	$97,700.24	$/year
Feed Pressure	200	psi
Interstage Boost Pressure	0	psi
Pump Motor Efficiency	78%	
Energy Consumption	3,345.90	kwh/day
Annual Concentrate Pump Energy Cost	14,000.00	$/year
Head	150.00	
Pump Horsepower	25.00	hp
Hours in Operation	24.00	hours/day
Energy Consumption	447.60	kwh/day

Annual Chemical Costs	$599,000.00	$/year
Antiscalant	$102,738.38	$/year
Dose	5.00	mg/L
Unit Cost	$3.75	$/lb
CIP Chemicals	$395,416.67	$/year
Acid CIP Frequency	30.00	days
Acid CIP Cost (2011 Cost)	$6,500.00	$/CIP
Caustic CIP Frequency	45.00	days
Caustic CIP Cost (2011 Cost)	$6,500.00	$/CIP
Miscellaneous Chemical	$99,631.01	$/year
Percentage of Non-CIP Chemicals	20%	
Final pH adjustment	$616.43	$/year
NaOH	0.25	mg/L
Strength	50%	% Concentration
Cost	$0.30	$/lb

Annual Maintenance Cost	$124,000.00	$/year
Annual Cartridge Filter Replacement Cost	$4,775.42	$/year
Filters to be Replaced	78.50	filters
Filter Replacement Frequency	90.00	days
Filter Cost	$15.00	$/filter
Annual RO Element Replacement Cost	$103,950.00	$/year
RO Elements to be Replaced	346.50	elements
RO Element Replacement Frequency	2.00	years
RO Element Cost	$600.00	$/element
Annual Maintenance Cost	$15,000.00	$/year
RO Capital Cost	$3,000,000	$
Maintenance Cost Percentage	0.50%	of capital cost/year

Fee Schedule—2016

Rev. 01/01/16

Description	Rate* (U.S. dollars)
Principal	$145-295
Consultant/Advisor	$155-250
Engineer/Scientist/Specialist III	$125-150
Engineer/Scientist/Specialist II	$95-120
Engineer/Scientist/Specialist I	$65-90
Technician III	$125-150
Technician II	$95-120
Technician I	$50-90
Support Personnel II	$95-150
Support Personnel I	$50-90

Rates for litigation support services will include a 30% surcharge.

A ten percent (10%) markup will be added to subcontracts for professional support and construction services to cover overhead and insurance surcharge expenses.

Invoices are payable within 30 days of the date of the invoice. Any amount not paid within 30 days shall bear interest from the date 10 days after the date of the invoice at a rate equal to the lesser of 18 percent per annum or the highest rate allowed by applicable law.

Reimbursable expenses including, but not limited to, the actual and reasonable costs of transportation, meals, lodging, parking costs, postage, and shipping charges will be billed at actual cost. Materials and supplies charges, printing charges, and equipment rental charges will be billed in accordance with Barr's standard rate schedules. Mileage will be billed at the IRS-allowable rate.

Principal category includes consultants, advisors, engineers, scientists, and specialists who are officers of the company.

Consultant/Advisor category includes experienced personnel in a variety of fields. These professionals typically have advanced background in their areas of practice and include engineers, engineering specialists, scientists, related technical professionals, and professionals in complementary service areas such as communications and public affairs.

Engineer/Scientist/Specialist categories include registered professionals and professionals in training (e.g. engineers, geologists, and landscape architects), and graduates of engineering and science degree programs.

Technician category includes CADD operators, construction observers, cost estimators, data management technicians, designers, drafters, engineering technicians, interns, safety technicians, surveyors, and water, air, and waste samplers.

Support Personnel category includes information management, project accounting, report production, word processing, and other project support personnel.

*Rates do not include sales tax on services that may be required in some jurisdictions.

April 4th, 2016

To Whom It May Concern:

This letter serves as a verification of what Express Employment Professionals has been charging PolyMet for two building maintenance personnel and one janitor. All personnel started working for Express Employment Professionals on November 28th, 2011 and rates are as follows:

- Maintenance 1 - $32.23/hour
- Maintenance 2 - $30.77/hour
- Janitor - $14.51/hour

Our rates include the following:

- Weekly pay for the employees
- Workers' Compensation Insurance
- Social Security Tax
- Bonding of Employees
- General Liability Insurance coverage
- Advertising, recruiting, testing, interviewing and reference checks for new employee's
- Employee Coaching
- Weekly invoicing to client
- Benefits for employees
    - Vacation (typically 5 days/year for a full-time employee)
    - Holiday pay (recognized holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving, Christmas Day) based on eligibility
    - Health Insurance (Minimum Essential Coverage under the federal healthcare reform required by the ACA)
    - 401K Retirement savings plan
    - Direct deposit

Other Highlights of Using Express Employment:

- All employee benefits are paid out by Express, at no additional charge to the client company.
- We bill for services rendered on a pay-per-hour basis (ex: if a person works 15 hour/wk, you'll only be charged 15 hrs for that week).
- Locally owned & operated with offices in Hibbing, Grand Rapids, and Duluth.
- We assist with any employee issues that may arise.
- We deal with any unemployment issues that may arise.
- Personalized service and support by local employment specialists.

Please contact one of our offices if you have any future questions or request.

Sincerely,

Kala Linder

Kala Linder
Branch Manager
Kala.Linder@ExpressPros.com

Appendix J: D & T Landscaping, Inc.

D & T Landscaping, Inc.
PO Box 65
Solway, MN 56678
Office Phone & Fax 218-467-9242
Email: dntwinge@paulbunyan.net

Dave's Cell 218-556-4560
Deb's Cell 218-760-0894
Tom's Cell 218-760-3795

4/5/16

PolyMet Mining, Inc.
PO Box 475, 6500 Co Rd 666
Hoyt Lakes, MN 55750

Att: Steve DeVaney,

Below, please find some rough estimates for the Contingency Reclamation Estimate:

1. **Commercial Fertilizer and Seed for Tailings Basin Flats – Supply/Apply/ Incorporate Unit Pricing per acre @ 500 lb/acre $390.00/Acre**
2. **Commercial Fertilizer and Seed for Tailings Basin Slopes – Supply/Apply/Incorporate Unit Pricing per acre @ 200 lb/Acre $540.00/Acre**
3. **Commercial Fertilizer and Seed for Overburden – Supply/Apply/Incorporate Unit Pricing per Acre @ 200 lb/Acre $295.00/Acre**
4. **4.) Mulch – Supply and Incorporate. Unit Pricing per Acre @ 2 ton/acre of Hay or Straw Mulch $340.00/Acre**

Thank You,

Deb Winge

Appendix K: SRCE and Cost Data File

Enter Data Below in Green and Blue Spaces

STANDARDIZED RECLAMATION COST ESTIMATOR

Version 1.4.1
Build 016 (revised 01 Aug 2014)
NOT YET VALIDATED FOR REGULATORY USE IN NEVADA

COST DATA FILE INFORMATION

File Name:	PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Cost Data File:	PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Data Date:	February, 2016
Cost Data Basis:	User Data
Data Cost Units:	Imperial
Author/Source:	SRK Consulting, 2016

PROJECT INFORMATION

Property/Mine Name:	NorthMet
Property Code:	
Project Name:	PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate
Date of Submittal:	October, 2016
Average Altitude:	0 ft.
Units of Measure:	○ Metric (m, km, ha, etc.) ◉ Imperial (ft, mi, acres, etc.)
Select One:	○ Notice or Sm Exploration Plan ○ Lg Exploration Plan ◉ Mine Operation
Select One:	○ Private Land ◉ Public or Public/Private
Cost Estimate Type:	Surety
Cost Basis Category:	Polymet

MN prevailing wages, CAT equipment rates

Cost Basis Description:

☐ This project is in the State of Nevada

Closure Cost Estimate
Cost Summary
Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate
Project Date: October, 2016
Model Version: Version 1.4.1
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm

A. Earthwork/Recontouring	Labor (1)	Equipment (2)	Materials	Total
Exploration	$0	$0	$0	$0
Exploration Roads & Drill Pads	$0	$0	$0	$0
Roads	$0	$0	$0	$0
Well Abandonment	$17,839	$7,725	$147	$25,711
Pits	$0	$0	N/A	$0
Quarries & Borrow Areas	$8,608	$22,581	$0	$31,189
Underground Openings	$0	$0	$0	$0
Process Ponds	$143,390	$418,699	$0	$562,089
Heaps	$0	$0	$0	$0
Waste Rock Dumps	$1,092,899	$1,936,852	$0	$3,029,751
Landfills	$0	$0	$0	$0
Tailings	$5,261	$8,618	$0	$13,879
Foundation & Buildings Areas	$0	$0	$0	$0
Yards, Etc.	$27,559	$58,542	$0	$86,101
Drainage & Sediment Control	$0	$0	$0	$0
Generic Material Hauling	$3,511,358	$10,213,614	$0	$13,724,972
Other User Costs (from Other User sheet)	$0	$26,387,736	$0	$26,387,736
Other**				$0
Subtotal	**$4,806,914**	**$39,054,367**	**$147**	**$43,861,428**
Mob/Demob if included in Other User sheet	$0	$0	$0	$0
Mob/Demob				$0
Subtotal "A"	**$4,806,914**	**$39,054,367**	**$147**	**$43,861,428**

B. Revegetation/Stabilization	Labor (1)	Equipment (2)	Materials	Total
Exploration	$0	$0	$0	$0
Exploration Roads & Drill Pads	$0	$0	$0	$0
Roads	$0	$0	$0	$0
Well Abandonment				N/A
Pits	$0	$0	$0	$0
Quarries & Borrow Areas	$6,255	$6,255	$6,336	$18,846
Underground Openings				N/A
Process Ponds	$3,962	$3,962	$1,041	$8,965
Heaps	$0	$0	$0	$0
Waste Rock Dumps	$28,644	$28,644	$29,015	$86,303
Landfills	$0	$0	$0	$0
Tailings	$15,602	$15,602	$15,804	$47,008
Foundation & Buildings Areas	$0	$0	$0	$0
Yards, Etc.	$4,726	$4,726	$4,726	$14,178
Drainage & Sediment Control	$0	$0	$0	$0
Generic Material Hauling	$17,236	$17,236	$4,588	$39,060
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "B"	**$76,425**	**$76,425**	**$61,510**	**$214,360**

C. Detoxification/Water Treatment/Disposal of Wastes**	Labor (1)	Equipment (2)	Materials	Total
Process Ponds/Sludge				$0
Heaps				$0
Dumps (Waste & Landfill)				$0
Tailings				$0
Surplus Water Disposal				$0
Monitoring				$0
Miscellaneous				$0
Solid Waste - On Site	$0	$0	N/A	$0
Solid Waste - Off Site				$0
Hazardous Materials				$0
Hydrocarbon Contaminated Soils	$0	$0	$0	$0
Pumping (from Solution Mgmt sheet)	$0	$0	N/A	$0
Evaporation (from Solution Mgmt sheet)	$0	$0	$0	$0
Treatment (from Solution Mgmt sheet)	$0	$0	$0	$0
Decontamination (from Solution Mgmt sheet)	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$2,246,733	$428,632,295	$0	$430,879,028
Other**				$0
Subtotal "C"	**$2,246,733**	**$428,632,295**	**$0**	**$430,879,028**

D. Structure, Equipment and Facility Removal, and Misc.	Labor (1)	Equipment (2)	Materials	Total
Foundation & Buildings Areas	$0	$0	$0	$0
Other Demolition	$15,012,089	$30,085,002	$0	$45,097,091
Equipment Removal	$0	$0	$0	$0
Fence Removal	$0	$0		$0
Fence Installation	$33,638	$6,413	$6,292	$46,343
Culvert Removal	$0	$0	N/A	$0
Pipe Removal	$0	$0	N/A	$0
Powerline Removal	$0			$0
Transformer Removal	$0			$0
Rip-rap, rock lining, gabions	$0	$0	$0	$0
Other Misc. Costs	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$0	$0	$0	$0
Other**				$0
Subtotal "D"	**$15,045,727**	**$30,091,415**	**$6,292**	**$45,143,434**

E. Monitoring	Labor (1)	Equipment (2)	Materials	Total
Reclamation Monitoring and Maintenance	$6,683	$6,683	$6,683	$20,049
Ground and Surface Water Monitoring	$36,072	$21,400	$5,560,800	$5,618,272
Other User Costs (from Other User sheet)	$2,725,820	$0	$0	$2,725,820
Subtotal "E"	**$2,768,575**	**$28,083**	**$5,567,483**	**$8,364,141**

F. Construction Management & Support	Labor	Equipment (2)	Materials	Total
Construction Management	$0	$0	N/A	$0
Construction Support	$0	$0	$0	$0
Road Maintenance	$378,766	$576,956	$0	$955,722
Other User Costs (from Other User sheet)	$0	$1,000	$0	$1,000
Other**				$0
Subtotal "F"	**$378,766**	**$577,956**	**$0**	**$956,722**

G. Closure Planning, G&A, Human Resources			Include?	Total
Closure Planning				$0
General & Administration				$0
Human Resources				$18,544,781
Other User Costs (from Other User sheet)	$0	$1,733,355	$0	$1,733,355
Other**				$0
Subtotal "G"	**$0**	**$1,733,355**	**$0**	**$20,278,136**

Subtotal Operational & Maintenance Costs	Labor (1)	Equipment (2)	Materials (3)	Total
Subtotal A through G	**$25,323,140**	**$500,193,895**	**$5,635,432**	**$549,697,249**

** Other Operator supplied costs - additional documentation required.

Closure Cost Estimate
Cost Summary
Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate
Project Date: October, 2016
Model Version: Version 1.4.1
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm

Indirect Costs				Include?	Total
1. Engineering, Design and Construction (ED&C) Plan (7)					$0
2. Contingency (8)					$27,484,862
3. Insurance (9)	$0				
4. Performance Bond (10)					
5. Contractor Profit (11)					
6. Contract Administration (12)					$0
7. Government Indirect Cost (13)					
Subtotal Add-On Costs					**$27,484,862**
Total Indirect Costs as % of Direct Cost					5%
GRAND TOTAL					**$577,182,111**

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate	0%	0%		0%	0%
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	5%	5%	5%	5%	0%
3. Insurance (9)	0.0%	of labor costs			
4. Bond (10)	0.0%	of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)	0%	of the O&M costs			
	<=	<=	<=	>	
0	$0	$0		$0	
Variable Rate	0%	0%		0%	
0	0%	$0			

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

ect Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
of Submittal: October, 2016
Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
: Data: User Data
: Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
: Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016	
First Year of Operation	2018	
Operating Period		years
Closure Year 1:	2021	
Closure Period:	4	years
Post Closure Period	46	years

Inflation Rate (r) (%):	
Market Risk (MR)(%):	
Discount Rate (i)(%):	
Closure Period:	
Post Closure Period:	

Engineering, Design and Construction Plan (%)	0%
Contingency (%)	5.0%
Contractor OH and Profit (CP)(%):	0%
Contract Administration (%)	0%
Show how many years in schedule (10 to 100)	55

Set Years

	Term (t)(years):		0	1	2	3	4	5	6	7	8
	Schedule Variance	Total From Cost Summary	2016	2017	2018	2019	2020	2021	2022	2023	2024
A. Earthwork/Recontouring											
Exploration	$ -	$ -						$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -						$ -	$ -	$ -	$ -
Roads	$ -	$ -						$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 25,711						$ 4,886	$ -	$ -	$ -
Pits	$ -	$ -						$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 31,189						$ 31,189	$ -	$ -	$ -
Underground Openings	$ -	$ -						$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089						$ 562,089	$ -	$ -	$ -
Heaps	$ -	$ -						$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 3,029,751						$ 3,029,751	$ -	$ -	$ -
Landfills	$ -	$ -						$ -	$ -	$ -	$ -
Tailings	$ -	$ 13,879						$ 13,879	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -						$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 86,101						$ 86,101	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -						$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 13,724,972						$ 8,959,617	$ 3,427,900	$ 1,337,454	$ -
Other User Costs (from Other User sheet)	$ (1)	$ 26,387,736						$ 26,387,736	$ -	$ -	$ -
Other**	$ -	$ -									
								p			
Mob/Demob if included in Other User sheet	$ -	$ -		$ -	$ -	$ -	$ -				
Mob/Demob	$ -	$ -									
Subtotal "A"	$ (1)	$ 43,861,428	$ -	$ -	$ -	$ -	$ -	$ 39,075,248	$ 3,427,900	$ 1,337,454	$ -
B. Revegetation/Stabilization											
Exploration	$ -	$ -						$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -						$ -	$ -	$ -	$ -
Roads	$ -	$ -						$ -	$ -	$ -	$ -
Well Abandonment		N/A						$ -	$ -	$ -	$ -
Pits	$ -	$ -						$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 18,846						$ 18,846	$ -	$ -	$ -
Underground Openings		N/A						$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965						$ 8,965	$ -	$ -	$ -
Heaps	$ -	$ -						$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 86,303						$ 86,303	$ -	$ -	$ -
Landfills	$ -	$ -						$ -	$ -	$ -	$ -
Tailings	$ -	$ 47,008						$ 47,008	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -						$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 14,178						$ 14,178	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -						$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060						$ 39,060	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -						$ -	$ -	$ -	$ -
Other**	$ -	$ -						$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 214,360	$ -	$ -	$ -	$ -	$ -	$ 214,360	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**											
Process Ponds/Sludge	$ -	$ -									
Heaps	$ -	$ -						$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -						$ -	$ -	$ -	$ -
Tailings	$ -	$ -						$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -						$ -	$ -	$ -	$ -
Monitoring	$ -	$ -						$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -						$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -						$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -						$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -						$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -						$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -						$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -						$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -									
Decontamination (from Solution Mgmt sheet)	$ -	$ -						$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 430,879,028						$ 18,721,272	$ 34,953,954	$ 9,480,737	$ 9,480,737
Other**	$ -	$ -									
Subtotal "C"	$ -	$ 430,879,028	$ -	$ -	$ -	$ -	$ -	$ 18,721,272	$ 34,953,954	$ 9,480,737	$ 9,480,737
D. Structure, Equipment and Facility Removal, and Misc.											
Foundation & Buildings Areas	$ -	$ -									
Other Demolition	$ -	$ 45,097,091						$45,097,091	$0	$0	$0
Equipment Removal	$ -	$ -						$0	$0	$0	$0
Fence Removal	$ -	$ -						$0	$0	$0	$0
Fence Installation	$ -	$ 46,343						$46,343	$0	$0	$0
Culvert Removal	$ -	$ -						$0	$0	$0	$0
Pipe Removal	$ -	$ -						$0	$0	$0	$0
Powerline Removal	$ -	$ -						$0	$0	$0	$0
Transformer Removal	$ -	$ -						$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -						$0	$0	$0	$0
Other Misc. Costs	$ -	$ -						$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -						$0	$0	$0	$0
Other**	$ -	$ -									
Subtotal "D"	$ -	$ 45,143,434	$ -	$ -	$ -	$ -	$ -	$ 45,143,434	$ -	$ -	$ -
E. Monitoring											
Reclamation Monitoring and Maintenance	$ -	$ 20,049						$20,049	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ 5,618,272						$ 281,984	$ 279,844	$ 279,844	$ 279,844
Other User Costs (from Other User sheet)	$ -	$ 2,725,820						$80,712	$80,712	$80,712	$80,712
Subtotal "E"	$ -	$ 8,364,141	$ -	$ -	$ -	$ -	$ -	$ 382,745	$ 360,556	$ 360,556	$ 360,556
F. Construction Management & Support											
Construction Management	$ -	$ -						$0	$0	$0	$0
Construction Support	$ -	$ -						$0	$0	$0	$0
Road Maintenance	$ -	$ 955,722						$72,403	$72,403	$72,403	$72,403
Other User Costs (from Other User sheet)	$ -	$ 1,000						$1,000	$0	$0	$0
Other**	$ -	$ -									
Subtotal "F"	$ -	$ 956,722	$ -	$ -	$ -	$ -	$ -	$ 73,403	$ 72,403	$ 72,403	$ 72,403
G. Closure Planning, G&A, Human Resources											
Closure Planning	$ -	$ -						$0	$0	$0	$0
General & Administration	$ -	$ -						$0	$0	$0	$0
Human Resources	$ -	$ 18,544,781						$1,802,632	$1,802,632	$1,802,632	$1,802,632
Other User Costs (from Other User sheet)	$ -	$ 1,733,355						$211,928	$33,809	$33,809	$33,809
Other**	$ -	$ -									
Subtotal "G"	$ (1)	$ 20,278,136	$ -	$ -	$ -	$ -	$ -	$ 2,014,560	$ 1,836,441	$ 1,836,441	$ 1,836,441
Subtotal Operational & Maintenance Costs											
Subtotal A through G	$ (1)	$ 549,697,249	$ -	$ -	$ -	$ -	$ -	$ 105,625,022	$ 40,651,255	$ 13,087,592	$ 11,750,137
Indirect Costs											
1. Engineering, Design and Construction (ED&C) Plan (7)	$ -	$ -		$0	$0	$0	$0				
2. Contingency (8)		$ 27,484,862	$ -	$ -	$ -	$ -	$ -	$ 5,281,251	$ 2,032,563	$ 654,380	$ 587,507
3. Insurance (9)		N/A									
4. Performance Bond (10)		N/A									
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A									
Subtotal Add-On Costs	$ -	$ 27,484,862	$ -	$ -	$ -	$ -	$ -	$ 5,281,251	$ 2,032,563	$ 654,380	$ 587,507
Grand Total (Undiscounted)	$ (1)	$ 577,182,111	$ -	$ -	$ -	$ -	$ -	$ 110,906,273	$ 42,683,817	$ 13,741,971	$ 12,337,644
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ -	$ -	$ -	$ -	$ 110,906,273	$ 42,683,817	$ 13,741,971	$ 12,337,644
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ -	$ -	$ -	$ -	$ 110,906,273	$ 42,683,817	$ 13,741,971	$ 12,337,644
Net Present Value (PV)	$PV = Fv_{adj}/(1+i)^t$	$ 577,182,110	$ -	$ -	$ -	$ -	$ -	$ 110,906,273	$ 42,683,817	$ 13,741,971	$ 12,337,644

Grand Total (Undiscounted)		$ 577,182,110
Grand Total (Inflation Adjusted) (FV)		$ 577,182,110
Grand Total Market Risk Adjusted (Fv_{adj})		$ 577,182,110
Grand Total Net Present Value (NPV)		$ 577,182,110

ect Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
of Submittal: October, 2016
Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
: Data: User Data
: Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
: Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016		Inflation Rate (r) (%):
First Year of Operation	2018		Market Risk (MR)(%):
Operating Period		years	Discount Rate (i)(%):
Closure Year 1:	2021		
Closure Period:	4	years	Closure Period:
Post Closure Period	46	years	Post Closure Period: <<< Set years and click "Set Years" button

	Term (t)(years):		0	9	10	11	12	13	14	15	16	17
	Schedule Variance	Total From Cost Summary	2016	2025	2026	2027	2028	2029	2030	2031	2032	2033
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 25,711		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 31,189		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 3,029,751		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 13,879		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 86,101		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 13,724,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ (1)	$ 26,387,736		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ (1)	$ 43,861,428	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 18,846		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 86,303		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 47,008		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 14,178		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 214,360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 430,879,028		$ 8,904,664	$ 8,904,664	$ 8,904,664	$ 8,904,664	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 430,879,028	$ -	$ 8,904,664	$ 8,904,664	$ 8,904,664	$ 8,904,664	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 45,097,091		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ 46,343		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 45,143,434	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 20,049		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ 5,618,272		$ 279,844	$ 95,421	$ 93,281	$ 93,281	$ 93,281	$ 93,281	$ 95,421	$ 93,281	$ 93,281
Other User Costs (from Other User sheet)	$ -	$ 2,725,820		$62,642	$62,642	$62,642	$62,642	$62,642	$60,002	$60,002	$60,002	$60,002
Subtotal "E"	$ -	$ 8,364,141	$ -	$ 342,486	$ 158,063	$ 155,923	$ 155,923	$ 155,923	$ 153,283	$ 155,423	$ 153,283	$ 153,283
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 955,722		$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481
Other User Costs (from Other User sheet)	$ -	$ 1,000		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 956,722	$ -	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
General & Administration	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Human Resources	$ -	$ 18,544,781		$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397
Other User Costs (from Other User sheet)	$ -	$ 1,733,355		$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809
Other**	$ -	$ -										
Subtotal "G"	$ (1)	$ 20,278,136	$ -	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ (1)	$ 549,697,249	$ -	$ 9,541,837	$ 9,357,414	$ 9,355,274	$ 9,355,274	$ 8,132,126	$ 8,129,486	$ 8,131,626	$ 8,129,486	$ 8,129,486
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)	$ -	$ -										
2. Contingency (8)		$ 27,484,862	$ -	$ 477,092	$ 467,871	$ 467,764	$ 467,764	$ 406,606	$ 406,474	$ 406,581	$ 406,474	$ 406,474
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 27,484,862	$ -	$ 477,092	$ 467,871	$ 467,764	$ 467,764	$ 406,606	$ 406,474	$ 406,581	$ 406,474	$ 406,474
Grand Total (Undiscounted)	$ (1)	$ 577,182,111	$ -	$ 10,018,928	$ 9,825,285	$ 9,823,038	$ 9,823,038	$ 8,538,732	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 10,018,928	$ 9,825,285	$ 9,823,038	$ 9,823,038	$ 8,538,732	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ 10,018,928	$ 9,825,285	$ 9,823,038	$ 9,823,038	$ 8,538,732	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960
Net Present Value (PV)	$PV = Fv_{adj}/(1+i)^t$	$ 577,182,110	$ -	$ 10,018,928	$ 9,825,285	$ 9,823,038	$ 9,823,038	$ 8,538,732	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960

Grand Total (Undiscounted)		$ 577,182,110
Grand Total (Inflation Adjusted) (FV)		$ 577,182,110
Grand Total Market Risk Adjusted (Fv_{adj})		$ 577,182,110
Grand Total Net Present Value (NPV)		$ 577,182,110

ect Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
of Submittal: October, 2016
Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
: Data: User Data
: Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
: Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016		Inflation Rate (r) (%):
First Year of Operation	2018		Market Risk (MR)(%):
Operating Period		years	Discount Rate (i)(%):
Closure Year 1:	2021		
Closure Period:	4	years	Closure Period:
Post Closure Period	46	years	Post Closure Period:

	Term (t)(years):		0	18	19	20	21	22	23	24	25	26
	Schedule Variance	Total From Cost Summary	2016	2034	2035	2036	2037	2038	2039	2040	2041	2042
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 25,711		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 31,189		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 3,029,751		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 13,879		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 86,101		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 13,724,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ (1)	$ 26,387,736		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ (1)	$ 43,861,428	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 18,846		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 86,303		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 47,008		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 14,178		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 214,360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 430,879,028		$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 430,879,028	$ -	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 45,097,091		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ 46,343		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 45,143,434	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 20,049		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ 5,618,272		$ 93,281	$ 93,281	$ 95,421	$ 93,281	$ 93,281	$ 93,281	$ 93,281	$ 95,421	$ 93,281
Other User Costs (from Other User sheet)	$ -	$ 2,725,820		$60,002	$60,002	$60,002	$60,002	$60,002	$60,002	$60,002	$60,002	$60,002
Subtotal "E"	$ -	$ 8,364,141	$ -	$ 153,283	$ 153,283	$ 155,423	$ 153,283	$ 153,283	$ 153,283	$ 153,283	$ 155,423	$ 153,283
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 955,722		$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481
Other User Costs (from Other User sheet)	$ -	$ 1,000		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 956,722	$ -	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
General & Administration	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Human Resources	$ -	$ 18,544,781		$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397
Other User Costs (from Other User sheet)	$ -	$ 1,733,355		$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809
Other**	$ -	$ -										
Subtotal "G"	$ (1)	$ 20,278,136	$ -	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ (1)	$ 549,697,249	$ -	$ 8,129,486	$ 8,129,486	$ 8,131,626	$ 8,129,486	$ 8,129,486	$ 8,129,486	$ 8,129,486	$ 8,131,626	$ 8,129,486
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)	$ -	$ -										
2. Contingency (8)		$ 27,484,862	$ -	$ 406,474	$ 406,474	$ 406,581	$ 406,474	$ 406,474	$ 406,474	$ 406,474	$ 406,581	$ 406,474
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 27,484,862	$ -	$ 406,474	$ 406,474	$ 406,581	$ 406,474	$ 406,474	$ 406,474	$ 406,474	$ 406,581	$ 406,474
Grand Total (Undiscounted)	$ (1)	$ 577,182,111	$ -	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960
Net Present Value (PV)	$PV = Fv_{adj}/(1+i)^t$	$ 577,182,110	$ -	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960

Grand Total (Undiscounted)		$ 577,182,110
Grand Total (Inflation Adjusted) (FV)		$ 577,182,110
Grand Total Market Risk Adjusted (Fv_{adj})		$ 577,182,110
Grand Total Net Present Value (NPV)		$ 577,182,110

ect Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
of Submittal: October, 2016
Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
: Data: User Data
: Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
: Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016	
First Year of Operation	2018	
Operating Period		years
Closure Year 1:	2021	
Closure Period:	4	years
Post Closure Period	46	years

Inflation Rate (r) (%):	
Market Risk (MR)(%):	
Discount Rate (i)(%):	

Closure Period:	
Post Closure Period:	

	Term (t)(years):		0	27	28	29	30	31	32	33	34	35
	Schedule Variance	Total From Cost Summary	2016	2043	2044	2045	2046	2047	2048	2049	2050	2051
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 25,711		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 31,189		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 3,029,751		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 13,879		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 86,101		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 13,724,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ (1)	$ 26,387,736		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ (1)	$ 43,861,428	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 18,846		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 86,303		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 47,008		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 14,178		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 214,360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 430,879,028		$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 430,879,028	$ -	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 45,097,091		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ 46,343		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 45,143,434	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 20,049		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ 5,618,272		$ 93,281	$ 93,281	$ 93,281	$ 95,421	$ 93,281	$ 93,281	$ 93,281	$ 93,281	$ 95,421
Other User Costs (from Other User sheet)	$ -	$ 2,725,820		$60,002	$60,002	$60,002	$60,002	$44,572	$44,572	$44,572	$44,572	$44,572
Subtotal "E"	$ -	$ 8,364,141	$ -	$ 153,283	$ 153,283	$ 153,283	$ 155,423	$ 137,853	$ 137,853	$ 137,853	$ 137,853	$ 139,993
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 955,722		$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481
Other User Costs (from Other User sheet)	$ -	$ 1,000		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 956,722	$ -	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
General & Administration	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Human Resources	$ -	$ 18,544,781		$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397
Other User Costs (from Other User sheet)	$ -	$ 1,733,355		$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809
Other**	$ -	$ -										
Subtotal "G"	$ (1)	$ 20,278,136	$ -	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ (1)	$ 549,697,249	$ -	$ 8,129,486	$ 8,129,486	$ 8,129,486	$ 8,131,626	$ 8,114,056	$ 8,114,056	$ 8,114,056	$ 8,114,056	$ 8,116,196
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)	$ -	$ -										
2. Contingency (8)		$ 27,484,862	$ -	$ 406,474	$ 406,474	$ 406,474	$ 406,581	$ 405,703	$ 405,703	$ 405,703	$ 405,703	$ 405,810
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 27,484,862	$ -	$ 406,474	$ 406,474	$ 406,474	$ 406,581	$ 405,703	$ 405,703	$ 405,703	$ 405,703	$ 405,810
Grand Total (Undiscounted)	$ (1)	$ 577,182,111	$ -	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006
Net Present Value (PV)	$PV = Fv_{adj}/(1+i)^t$	$ 577,182,110	$ -	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006

Grand Total (Undiscounted)		$ 577,182,110
Grand Total (Inflation Adjusted) (FV)		$ 577,182,110
Grand Total Market Risk Adjusted (Fv_{adj})		$ 577,182,110
Grand Total Net Present Value (NPV)		$ 577,182,110

ect Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
of Submittal: October, 2016
Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
: Data: User Data
: Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
: Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016	
First Year of Operation	2018	
Operating Period		years
Closure Year 1:	2021	
Closure Period:	4	years
Post Closure Period	46	years

Inflation Rate (r) (%):	
Market Risk (MR)(%):	
Discount Rate (i)(%):	

Closure Period:	
Post Closure Period:	

	Term (t)(years):		0	36	37	38	39	40	41	42	43	44
	Schedule Variance	Total From Cost Summary	2016	2052	2053	2054	2055	2056	2057	2058	2059	2060
A. Earthwork/Recontouring												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 25,711		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 31,189		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 3,029,751		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 13,879		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 86,101		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 13,724,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ (1)	$ 26,387,736		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -										
Mob/Demob if included in Other User sheet	$ -	$ -										
Mob/Demob	$ -	$ -										
Subtotal "A"	$ (1)	$ 43,861,428	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization												
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 18,846		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 86,303		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 47,008		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 14,178		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 214,360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -										
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -										
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 430,879,028		$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
Other**	$ -	$ -										
Subtotal "C"	$ -	$ 430,879,028	$ -	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas	$ -	$ -										
Other Demolition	$ -	$ 45,097,091		$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ 46,343		$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "D"	$ -	$ 45,143,434	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ 20,049		$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ 5,618,272		$ 93,281	$ 93,281	$ 93,281	$ 93,281	$ 95,421	$ 93,281	$ 93,281	$ 93,281	$ 93,281
Other User Costs (from Other User sheet)	$ -	$ 2,725,820		$44,572	$44,572	$44,572	$44,572	$44,572	$44,572	$44,572	$44,572	$44,572
Subtotal "E"	$ -	$ 8,364,141	$ -	$ 137,853	$ 137,853	$ 137,853	$ 137,853	$ 139,993	$ 137,853	$ 137,853	$ 137,853	$ 137,853
F. Construction Management & Support												
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 955,722		$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481
Other User Costs (from Other User sheet)	$ -	$ 1,000		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -										
Subtotal "F"	$ -	$ 956,722	$ -	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
G. Closure Planning, G&A, Human Resources												
Closure Planning	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
General & Administration	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0
Human Resources	$ -	$ 18,544,781		$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397
Other User Costs (from Other User sheet)	$ -	$ 1,733,355		$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$33,809
Other**	$ -	$ -										
Subtotal "G"	$ (1)	$ 20,278,136	$ -	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206
Subtotal Operational & Maintenance Costs												
Subtotal A through G	$ (1)	$ 549,697,249	$ -	$ 8,114,056	$ 8,114,056	$ 8,114,056	$ 8,114,056	$ 8,116,196	$ 8,114,056	$ 8,114,056	$ 8,114,056	$ 8,114,056
Indirect Costs												
1. Engineering, Design and Construction (ED&C) Plan (7)	$ -	$ -										
2. Contingency (8)		$ 27,484,862	$ -	$ 405,703	$ 405,703	$ 405,703	$ 405,703	$ 405,810	$ 405,703	$ 405,703	$ 405,703	$ 405,703
3. Insurance (9)		N/A										
4. Performance Bond (10)		N/A										
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A										
Subtotal Add-On Costs	$ -	$ 27,484,862	$ -	$ 405,703	$ 405,703	$ 405,703	$ 405,703	$ 405,810	$ 405,703	$ 405,703	$ 405,703	$ 405,703
Grand Total (Undiscounted)	$ (1)	$ 577,182,111	$ -	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759
Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759
Net Present Value (PV)	$PV = Fv_{adj}/(1+i)^t$	$ 577,182,110	$ -	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759

Grand Total (Undiscounted)		$ 577,182,110
Grand Total (Inflation Adjusted) (FV)		$ 577,182,110
Grand Total Market Risk Adjusted (Fv_{adj})		$ 577,182,110
Grand Total Net Present Value (NPV)		$ 577,182,110

ect Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
of Submittal: October, 2016
Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
el Version: Version 1.4.1
: Data: User Data
: Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
: Estimate Type: Surety Cost Basis: Polymet

Clear Schedule

Cost Schedule and Financial Analysis

Budget Year:	2016		Inflation Rate (r) (%):
First Year of Operation	2018		Market Risk (MR)(%):
Operating Period		years	Discount Rate (i)(%):
Closure Year 1:	2021		
Closure Period:	4	years	Closure Period:
Post Closure Period	46	years	Post Closure Period:

	Term (t)(years):		0	45	46	47	48	49	50	51	52	53	54
	Schedule Variance	Total From Cost Summary	2016	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
A. Earthwork/Recontouring													
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ 25,711		$ -	$ -	$ -	$ -	$ -	$ 20,825	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 31,189		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 562,089		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 3,029,751		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 13,879		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 86,101		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 13,724,972		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ (1)	$ 26,387,736		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -											
Mob/Demob if included in Other User sheet	$ -	$ -											
Mob/Demob	$ -	$ -											
Subtotal "A"	$ (1)	$ 43,861,428	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,825	$ -	$ -	$ -	$ -
B. Revegetation/Stabilization													
Exploration	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pits	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ 18,846		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings		N/A		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Process Ponds	$ -	$ 8,965		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ 86,303		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ 47,008		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Yards, Etc.	$ -	$ 14,178		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ 39,060		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal "B"	$ -	$ 214,360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
C. Detoxification/Water Treatment/Disposal of Wastes**													
Process Ponds/Sludge	$ -	$ -											
Heaps	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Evaporation (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Treatment (from Solution Mgmt sheet)	$ -	$ -											
Decontamination (from Solution Mgmt sheet)	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ 430,879,028		$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
Other**	$ -	$ -											
Subtotal "C"	$ -	$ 430,879,028	$ -	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
D. Structure, Equipment and Facility Removal, and Misc.													
Foundation & Buildings Areas	$ -	$ -											
Other Demolition	$ -	$ 45,097,091		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Equipment Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fence Installation	$ -	$ 46,343		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Powerline Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transformer Removal	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Rip-rap, rock lining, gabions	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Misc. Costs	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other User Costs (from Other User sheet)	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -											
Subtotal "D"	$ -	$ 45,143,434	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
E. Monitoring													
Reclamation Monitoring and Maintenance	$ -	$ 20,049		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ 5,618,272		$ 95,421	$ 93,281	$ 93,281	$ 93,281	$ 93,281	$ 95,421	$ 93,281	$ 93,281	$ 93,281	$ 93,281
Other User Costs (from Other User sheet)	$ -	$ 2,725,820		$44,572	$44,572	$44,572	$44,572	$44,572	$44,572	$44,572	$44,572	$44,572	$44,572
Subtotal "E"	$ -	$ 8,364,141	$ -	$ 139,993	$ 137,853	$ 137,853	$ 137,853	$ 137,853	$ 139,993	$ 137,853	$ 137,853	$ 137,853	$ 137,853
F. Construction Management & Support													
Construction Management	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Support	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Road Maintenance	$ -	$ 955,722		$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481	$14,481
Other User Costs (from Other User sheet)	$ -	$ 1,000		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other**	$ -	$ -											
Subtotal "F"	$ -	$ 956,722	$ -	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
G. Closure Planning, G&A, Human Resources													
Closure Planning	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General & Administration	$ -	$ -		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Human Resources	$ -	$ 18,544,781		$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397	$246,397
Other User Costs (from Other User sheet)	$ -	$ 1,733,355		$33,809	$33,809	$33,809	$33,809	$33,809	$33,809	$0	$0	$0	$0
Other**	$ -	$ -											
Subtotal "G"	$ (1)	$ 20,278,136	$ -	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 280,206	$ 246,397	$ 246,397	$ 246,397	$ 246,397
Subtotal Operational & Maintenance Costs													
Subtotal A through G	$ (1)	$ 549,697,249	$ -	$ 8,116,196	$ 8,114,056	$ 8,114,056	$ 8,114,056	$ 8,114,056	$ 8,137,021	$ 8,080,247	$ 8,080,247	$ 8,080,247	$ 8,080,247
Indirect Costs													
1. Engineering, Design and Construction (ED&C) Plan (7)	$ -	$ -											
2. Contingency (8)		$ 27,484,862	$ -	$ 405,810	$ 405,703	$ 405,703	$ 405,703	$ 405,703	$ 406,851	$ 404,012	$ 404,012	$ 404,012	$ 404,012
3. Insurance (9)		N/A											
4. Performance Bond (10)		N/A											
5. Contractor Profit (11)		N/A	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
6. Contract Administration (12)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7. Government Indirect Cost (13)		N/A											
Subtotal Add-On Costs	$ -	$ 27,484,862	$ -	$ 405,810	$ 405,703	$ 405,703	$ 405,703	$ 405,703	$ 406,851	$ 404,012	$ 404,012	$ 404,012	$ 404,012
Grand Total (Undiscounted)	$ (1)	$ 577,182,111	$ -	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,543,872	$ 8,484,259	$ 8,484,259	$ 8,484,259	$ 8,484,259

Inflation Adjustment (Future Value = FV)	$FV = Se^{(rt)}$		$ -	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,543,872	$ 8,484,259	$ 8,484,259	$ 8,484,259	$ 8,484,259
Market Risk Adjustment	(MR x FV)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Future Value (Fv_{adj})	$Fv_{adj} = (FV + MR)$		$ -	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,543,872	$ 8,484,259	$ 8,484,259	$ 8,484,259	$ 8,484,259
Net Present Value (PV)	$PV = Fv_{adj}/(1+i)^t$	$ 577,182,110	$ -	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,543,872	$ 8,484,259	$ 8,484,259	$ 8,484,259	$ 8,484,259

Grand Total (Undiscounted)		$ 577,182,110
Grand Total (Inflation Adjusted) (FV)		$ 577,182,110
Grand Total Market Risk Adjusted (Fv_{adj})		$ 577,182,110
Grand Total Net Present Value (NPV)		$ 577,182,110

Closure Cost Estimate
Other User

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Other Cost Items Calculated Elsewhere

	Description (required)	ID Code	Facility Type	Quantity	Units	Total Capital Cost $	Material Unit Cost $	Labor Unit Cost $	Equipment/ Operating Unit Cost $	Cost Type (select)	Total Cost $	Comments
1	Areas of concern, legacy remediation (quote from NTS)		Other Facilities	1	LS			$2,246,733.17	$4,493,466.33	C. Water Management	$6,740,200	See User 4; assume 1/3 is labor, rest equipment.
2	SOW 3: Category 1 Cover System: Year 1		Waste Rock Dump	1	LS				$10,678,857.50	A. Earthwork	$10,678,858	User 11
3	SOW 11: Hydroment Residue Facility: Year 1		Waste Rock Dump	1	LS				$236,155.00	A. Earthwork	$236,155	User 11
4	SOW 14: Flotation Tailings Basin: Year 1		Waste Rock Dump	1	LS				$15,472,723.00	A. Earthwork	$15,472,723	User 11
5	SOW 21: Category 1 Groundwater Containment System: Year 1		Other Water	1	LS				$2,341,414.20	C. Water Management	$2,341,414	User 11
6	Closure - Pickup Trucks - Closure Year 1		Closure G & A	4	each				$5,360.10	G. Closure Planning, Ga	$21,440	purchase price $37,520.69 with 7-year life; annual cost=37520.69/7=5360.10
7	Closure - Pickup Trucks - Closure Year 2		Closure G & A	4	each				$5,360.10	G. Closure Planning, Ga	$21,440	purchase price $37,520.69 with 7-year life; annual cost=37520.69/7=5360.10
8	Closure - Pickup Trucks - Closure Year 3		Closure G & A	4	each				$5,360.10	G. Closure Planning, Ga	$21,440	purchase price $37,520.69 with 7-year life; annual cost=37520.69/7=5360.10
9	Closure - Pickup Trucks - Closure Year 4		Closure G & A	4	each				$5,360.10	G. Closure Planning, Ga	$21,440	purchase price $37,520.69 with 7-year life; annual cost=37520.69/7=5360.10
10	Closure - Snow Plowing - Closure Year 1		Closure G & A	1	each				$23,089.28	G. Closure Planning, Ga	$23,089	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs
11	Closure - Snow Plowing - Closure Year 2		Closure G & A	1	each				$23,089.28	G. Closure Planning, Ga	$23,089	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs
12	Closure - Snow Plowing - Closure Year 3		Closure G & A	1	each				$23,089.28	G. Closure Planning, Ga	$23,089	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs
13	Closure - Snow Plowing - Closure Year 4		Closure G & A	1	each				$23,089.28	G. Closure Planning, Ga	$23,089	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs
14	Closure - Landfill SW-619 Water and Gas Monitoring		Closure G & A	4	years			$10,150.00		E. Monitoring	$40,600	NTS Cost Estimate Signed Final.pdf
15	Closure - Landfill SW-619 Annual Report		Closure G & A	4	years			$5,280.00		E. Monitoring	$21,120	NTS Cost Estimate Signed Final.pdf
16	Closure - Coal Ash Landfill Monitoring		Closure G & A	4	years			$2,640.00		E. Monitoring	$10,560	Assume half of cost for SW-619 in NTS Cost Estimate Signed Final.pdf
17	Post-Closure - Pickup Trucks		Closure G & A	46	years				$10,720.20	G. Closure Planning, Ga	$493,129	2 vehicles; purchase price $37,520.69 with 7-year life; annual cost=37520.69/7=5360.10
18	Post-Closure - Snow Plowing		Closure G & A	46	years				$23,089.28	G. Closure Planning, Ga	$1,062,107	CRE SNOWPLOWING 2013-2016.xlsx; average of 2013-2014 and 2014-2015 costs
19	Post-Closure - Landfill SW-619 Water and Gas Monitoring		Closure G & A	26	years			$10,150.00		E. Monitoring	$263,900	NTS Cost Estimate Signed Final.pdf
20	Post-Closure - Landfill SW-619 Annual Report		Closure G & A	26	years			$5,280.00		E. Monitoring	$137,280	NTS Cost Estimate Signed Final.pdf
21	Post-Closure - Coal Ash Landfill Monitoring		Closure G & A	9	years			$2,640.00		E. Monitoring	$23,760	Assume half of cost for SW-619 in NTS Cost Estimate Signed Final.pdf
22	Dam safety monitoring - instrumentation data collection		Closure G & A	50	years			$15,372.00		E. Monitoring	$768,600	NTS Cost Estimate Signed Final.pdf
23	Dam safety monitoring - instrumentation report		Closure G & A	50	years			$5,700.00		E. Monitoring	$285,000	Dam Safety Inspection Estimate for CRE 04_01_2015.pdf
24	Dam safety monitoring - geotechnical inspection		Closure G & A	50	years			$10,000.00		E. Monitoring	$500,000	Dam Safety Inspection Estimate for CRE 04_01_2015.pdf
25	Dam safety monitoring - annual report		Closure G & A	50	years			$13,500.00		E. Monitoring	$675,000	Dam Safety Inspection Estimate for CRE 04_01_2015.pdf
26	Pit Access Gate		Closure G & A	1	LS				$1,000.00	F. Construction Mgmt	$1,000	
27	NorthMet Project – CRE O&M for water treatment during reclamation and long-term		H2O Treat Sys Constr - Pa	1	LS				$420,195,314.00	C. Water Management	$420,195,314	User 7
28	FTB containment system NMT development costs		H2O Treat Sys Constr - Pa	1	LS				$1,081,100.00	C. Water Management	$1,081,100	User 5
29	FTB Pond Overflow NMT development costs		H2O Treat Sys Constr - Pa	1	LS				$521,000.00	C. Water Management	$521,000	User 5
						$0	$0	$4,972,553	$456,754,385		$461,726,938	

Notes: Capital cost is lump sum (i.e. not multiplied by the quantity).
Material, Labor and Equipment/Operating costs are unit costs (i.e. multiplied by the quantity).

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	Totals
Salaries & Benefits	$18,544,781
Severance & Relocation	$0
TOTALS	$18,544,781

Human Resources - Salary & Benefits

	Job Description (required)	Avg. Annual Salary (incl. benefits) $	Type	Closure Year 1 #	Closure Year 2 #	Closure Year 3 #	Closure Year 4 #	Closure Year 5 #	Closure Year 6 #	Closure Year 7 #	Closure Year 8 #	Closure Year 9 #	Closure Year 10 #	Closure Year 11 #	Closure Year 12 #	Closure Year 13 #	Closure Year 14 #	Closure Year 15 #	Closure Year 16 #	Closure Year 17 #
1	Closure - Project manager (Principal av. @ Fee Sched	$503,360	Closure G & A	1	1	1	1													
2	Closure - Reclamation manager (Engr II av. @ Fee Sc	$245,960	Closure G & A	1	1	1	1													
3	Closure - Demo Manager (Engr II av. @ Fee Schedule	$245,960	Closure G & A	1	1	1	1													
4	Closure - Site Manager (Midlevel prof. @ NTS Cost Es	$266,240	Closure G & A	1	1	1	1													
5	Closure - Accountant (Support I max. @ Fee Schedul	$205,920	Closure G & A	1	1	1	1													
6	Closure - Plant WWTP Laborer(s) (Express Employm	$67,038	Closure G & A	3	3	3	3													
7	Closure - Mine WWTF Laborer(s) (Express Employme	$67,038	Closure G & A	2	2	2	2													
8	Post-Closure - Site Manager	$224,640	Closure G & A					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
9	Post-Closure - Plant WWTP Laborer(s) for FTB NMT	$67,038	Closure G & A					2	2	2	2	2	2	2	2	2	2	2	2	2
10	Post-Cl. - Mine WWTF labor - no treatment - Yrs 5-9	$67,038	Closure G & A																	
		SUBTOTAL		$ 1,802,632	$ 1,802,632	$ 1,802,632	$ 1,802,632	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397

Notes:

Human Resources - Severance & Outplacement Benefits

	Job Description	Severance & Outplacement Cost $		Closure Year 1 #	Closure Year 2 #	Closure Year 3 #	Closure Year 4 #	Closure Year 5 #	Closure Year 6 #	Closure Year 7 #	Closure Year 8 #	Closure Year 9 #	Closure Year 10 #	Closure Year 11 #	Closure Year 12 #	Closure Year 13 #	Closure Year 14 #	Closure Year 15 #	Closure Year 16 #	Closure Year 17 #
1	Closure - Project manager (Principal av. @ Fee Schedule_Barr 2016_US.pdf)						1.0													
2	Closure - Reclamation manager (Engr II av. @ Fee Schedule_Barr 2016_US.pdf)						1.0													
3	Closure - Demo Manager (Engr II av. @ Fee Schedule_Barr 2016_US.pdf)						1.0													
4	Closure - Site Manager (Midlevel prof. @ NTS Cost Estimate Signed Final.pdf)						1.0													
5	Closure - Accountant (Support I max. @ Fee Schedule_Barr 2016_US.pdf)						1.0													
6	Closure - Plant WWTP Laborer(s) (Express Employment Maint. I @ Express Employment temp servic						3.0													
7	Closure - Mine WWTF Laborer(s) (Express Employment Maint. I @ Express Employment temp servic						2.0													
8	Post-Closure - Site Manager																			
9	Post-Closure - Plant WWTP Laborer(s) for FTB NMT																			
10	Post-Cl. - Mine WWTF labor - no treatment - Yrs 5-9																			
			SUBTOTAL	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Notes:
1. Assumes Severance + Outplacement

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Es
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	Totals
Salaries & Benefits	$18,544,781
Severance & Relocation	$0
TOTALS	$18,544,781

Human Resources - Salary & Benefits

	Job Description (required)	Avg. Annual Salary (incl. benefits) $	Closure Year 18 #	Closure Year 19 #	Closure Year 20 #	Closure Year 21 #	Closure Year 22 #	Closure Year 23 #	Closure Year 24 #	Closure Year 25 #	Closure Year 26 #	Closure Year 27 #	Closure Year 28 #	Closure Year 29 #	Closure Year 30 #	Closure Year 31 #	Closure Year 32 #	Closure Year 33 #	Closure Year 34 #	Closure Year 35 #	Closure Year 36 #
1	Closure - Project manager (Principal av. @ Fee Sched	$503,360																			
2	Closure - Reclamation manager (Engr II av. @ Fee Sc	$245,960																			
3	Closure - Demo Manager (Engr II av. @ Fee Schedule	$245,960																			
4	Closure - Site Manager (Midlevel prof. @ NTS Cost Es	$266,240																			
5	Closure - Accountant (Support I max. @ Fee Schedul	$205,920																			
6	Closure - Plant WWTP Laborer(s) (Express Employm	$67,038																			
7	Closure - Mine WWTF Laborer(s) (Express Employme	$67,038																			
8	Post-Closure - Site Manager	$224,640	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
9	Post-Closure - Plant WWTP Laborer(s) for FTB NMT	$67,038	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	Post-Cl. - Mine WWTF labor - no treatment - Yrs 5-9	$67,038																			
	SUBTOTAL		$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397

Notes:

Human Resources - Severance & Outplacement Benefits

	Job Description	Severance & Outplacement Cost $	Closure Year 18 #	Closure Year 19 #	Closure Year 20 #	Closure Year 21 #	Closure Year 22 #	Closure Year 23 #	Closure Year 24 #	Closure Year 25 #	Closure Year 26 #	Closure Year 27 #	Closure Year 28 #	Closure Year 29 #	Closure Year 30 #	Closure Year 31 #	Closure Year 32 #	Closure Year 33 #	Closure Year 34 #	Closure Year 35 #	Closure Year 36 #
1	Closure - Project manager (Principal av. @ Fee Schedule_Barr 2016_US																				
2	Closure - Reclamation manager (Engr II av. @ Fee Schedule_Barr 2016_																				
3	Closure - Demo Manager (Engr II av. @ Fee Schedule_Barr 2016_US.pd																				
4	Closure - Site Manager (Midlevel prof. @ NTS Cost Estimate Signed Fin																				
5	Closure - Accountant (Support I max. @ Fee Schedule_Barr 2016_US.pd																				
6	Closure - Plant WWTP Laborer(s) (Express Employment Maint. I @ Expr																				
7	Closure - Mine WWTF Laborer(s) (Express Employment Maint. I @ Expr																				
8	Post-Closure - Site Manager																				
9	Post-Closure - Plant WWTP Laborer(s) for FTB NMT																				
10	Post-Cl. - Mine WWTF labor - no treatment - Yrs 5-9																				
			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Notes:
1. Assumes Severance + Outplacement

Closure Cost Estimate
Human Resources

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Es
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Human Resources	
	Totals
Salaries & Benefits	$18,544,781
Severance & Relocation	$0
TOTALS	$18,544,781

Human Resources - Salary & Benefits

	Job Description (required)	Avg. Annual Salary (incl. benefits) $	Closure Year 37 #	Closure Year 38 #	Closure Year 39 #	Closure Year 40 #	Closure Year 41 #	Closure Year 42 #	Closure Year 43 #	Closure Year 44 #	Closure Year 45 #	Closure Year 46 #	Closure Year 47 #	Closure Year 48 #	Closure Year 49 #	Closure Year 50 #
1	**Closure - Project manager (Principal av. @ Fee Sched**	**$503,360**														
2	**Closure - Reclamation manager (Engr II av. @ Fee Sc**	**$245,960**														
3	**Closure - Demo Manager (Engr II av. @ Fee Schedule**	**$245,960**														
4	**Closure - Site Manager (Midlevel prof. @ NTS Cost Es**	**$266,240**														
5	**Closure - Accountant (Support I max. @ Fee Schedul**	**$205,920**														
6	**Closure - Plant WWTP Laborer(s) (Express Employm**	**$67,038**														
7	**Closure - Mine WWTF Laborer(s) (Express Employme**	**$67,038**														
8	**Post-Closure - Site Manager**	**$224,640**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
9	**Post-Closure - Plant WWTP Laborer(s) for FTB NMT**	**$67,038**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
10	**Post-Cl. - Mine WWTF labor - no treatment - Yrs 5-9**	**$67,038**														
		SUBTOTAL	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397

Notes:

Human Resources - Severance & Outplacement Benefits

	Job Description	Severance & Outplacement Cost $	Closure Year 37 #	Closure Year 38 #	Closure Year 39 #	Closure Year 40 #	Closure Year 41 #	Closure Year 42 #	Closure Year 43 #	Closure Year 44 #	Closure Year 45 #	Closure Year 46 #	Closure Year 47 #	Closure Year 48 #	Closure Year 49 #	Closure Year 50 #
1	**Closure - Project manager (Principal av. @ Fee Schedule_Barr 2016_US**															
2	**Closure - Reclamation manager (Engr II av. @ Fee Schedule_Barr 2016_**															
3	**Closure - Demo Manager (Engr II av. @ Fee Schedule_Barr 2016_US.pd**															
4	**Closure - Site Manager (Midlevel prof. @ NTS Cost Estimate Signed Fin**															
5	**Closure - Accountant (Support I max. @ Fee Schedule_Barr 2016_US.pd**															
6	**Closure - Plant WWTP Laborer(s) (Express Employment Maint. I @ Expr**															
7	**Closure - Mine WWTF Laborer(s) (Express Employment Maint. I @ Expr**															
8	**Post-Closure - Site Manager**				0.5											0.5
9	**Post-Closure - Plant WWTP Laborer(s) for FTB NMT**				2.0											2.0
10	**Post-Cl. - Mine WWTF labor - no treatment - Yrs 5-9**															
			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Notes:
1. Assumes Severance + Outplacement

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Waste Rock Dumps - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$6,636	$17,406	N/A	$24,042
Cover Placement Cost	$430,715	$761,621	N/A	$1,192,336
Topsoil Placement Cost	$645,086	$1,140,687	N/A	$1,785,773
Ripping/Scarifying Cost	$10,462	$17,138	N/A	$27,600
Subtotal Earthworks	**$1,092,899**	**$1,936,852**	**$0**	**$3,029,751**
Revegetation Cost	$28,644	$28,644	$29,015	$86,303
TOTALS	**$1,121,543**	**$1,965,496**	**$29,015**	**$3,116,054**

Waste Rock Dumps - User Input

You must fill in ALL green cells in this section for each dump, lift or dump category

	Facility Description			Physical - MANDATORY									Cover				Growth Media			
	Description (required)	ID Code	Type	Underlying Ground Slope % Grade	Ungraded Slope _H:1V	Final Slope _H:1V	Final Top Slope % Grade	Lift (dump) Height ft	Mid-Bench Length ft	Average Flat Area Long Dimension (ripping distance) ft	Final (Regraded) Dump Footprint acres	Regrade Volume (1) (if calculated elsewhere) cy	Cover Thickness Slopes in	Cover Thickness Flat Areas in	Distance from Cover Borrow ft	Slope from Dump to Cover Borrow % grade	Slope Growth Media Thickness in	Flat Area Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Dump to Stockpile % grade
1	**Category 1 stockpile (Mine Year 1)**		**Waste Rock Dur**	**0.0**	**1.4**	**3.8**	**1.0**	**32**	**14,545**	**6,000**	**205.00**		**12.0**	**12.0**	**9,973**	**-5.0**	**18.0**	**18.0**	**9,973**	**-5.0**

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Waste rock dumps sheet allows for two layers (granular soil cover above geomembrane under "cover" and rooting zone above granular cover under "growth media"). Other layers are included in "Haul Material."

Waste Rock Dumps - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each dump, lift or dump category

		Grading				Cover		Growth Media		Revegetation									
	Description (required)	Dozing Material Condition (select)	Dump Material Type (select)	Grading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Slopes (select)	Seed Mix Flat Areas (select)	Mulch Slopes (select)	Mulch Flat Areas (select)	Fertilizer Slopes (select)	Fertilizer Flat Areas (select)	Slope Scarify/ Rip? (select)	Flat Area Scarify/ Rip? (select)	Scarify/ Ripping Fleet (select)
1	**Category 1 stockpile (Mine Year 1)**	**1**	**LS - broken**	**Med**	**Yes**	**Alluvium**	**Small Truck**	**Alluvium**	**Small Truck**	**Mix 1**	**Mix 1**	**Straw Mulch**	**Straw Mulch**			**Yes**	**Yes**	**Small Dozer**

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Waste Rock Dumps - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$6,636	$17,406	N/A	$24,042
Cover Placement Cost	$430,715	$761,621	N/A	$1,192,336
Topsoil Placement Cost	$645,086	$1,140,687	N/A	$1,785,773
Ripping/Scarifying Cost	$10,462	$17,138	N/A	$27,600
Subtotal Earthworks	**$1,092,899**	**$1,936,852**	**$0**	**$3,029,751**
Revegetation Cost	$28,644	$28,644	$29,015	$86,303
TOTALS	**$1,121,543**	**$1,965,496**	**$29,015**	**$3,116,054**

Waste Rock Dumps - Calculations

Regrading Volume Calculation

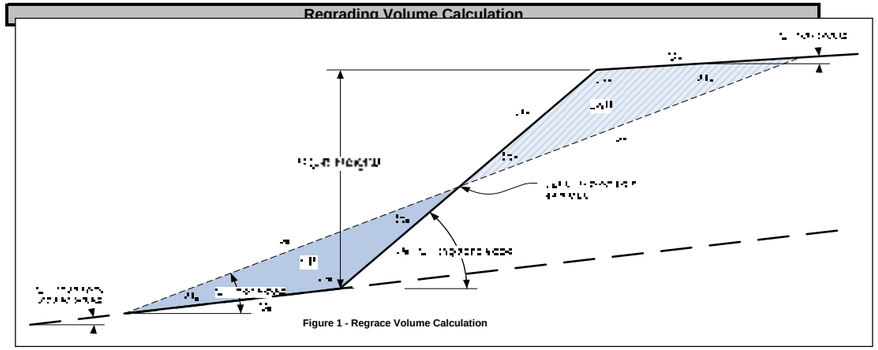


Figure 1 - Regrace Volume Calculation

Final Slope Area and Footprint Area Calculations

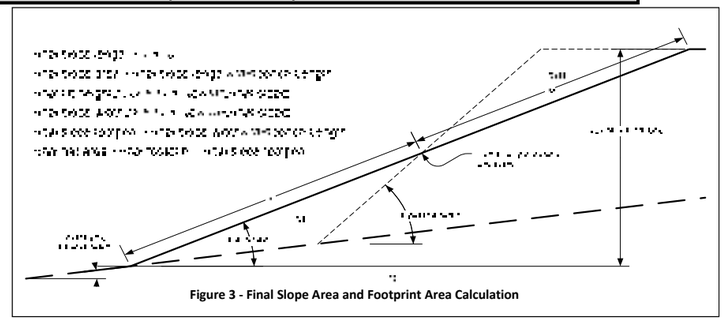


Figure 3 - Final Slope Area and Footprint Area Calculation

Regrading Push Distance Calculation

dozing distance: based on 2/3 final cut slope + 2/3 final fill slope (minimum = 50 ft)

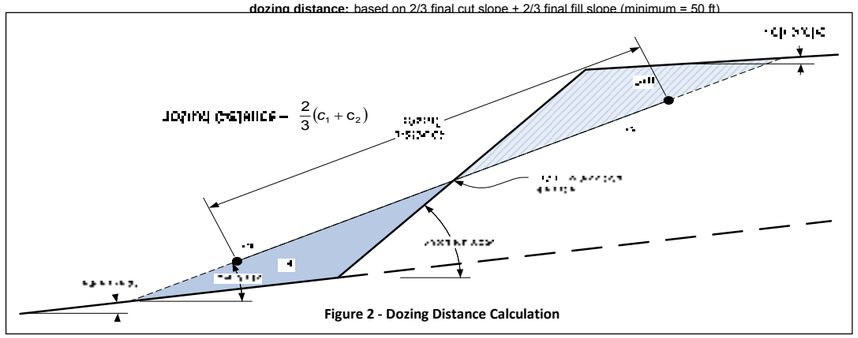


Figure 2 - Dozing Distance Calculation

Ripping/Scarifying Calculations

Minimum 1 hr ripping/scarifying time per dump

Slopes:
Number of passes = Final slope length ÷ Grader width
Travel distance = Number of passes x Mid-bench length
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)
Minimum 1 hr

Flat Areas:
Flat area width = Final flat area ÷ Average long dimensions
Number of passes = Flat area width ÷ Grader width
Travel distance = Number of passes x Average long dimensions
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)

Revegetation: Minimum 1 acre revegetation crew time per area

Closure Cost Estimate
Waste Rock Dumps

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Waste Rock Dumps - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$6,636	$17,406	N/A	$24,042
Cover Placement Cost	$430,715	$761,621	N/A	$1,192,336
Topsoil Placement Cost	$645,086	$1,140,687	N/A	$1,785,773
Ripping/Scarifying Cost	$10,462	$17,138	N/A	$27,600
Subtotal Earthworks	**$1,092,899**	**$1,936,852**	**$0**	**$3,029,751**
Revegetation Cost	$28,644	$28,644	$29,015	$86,303
TOTALS	**$1,121,543**	**$1,965,496**	**$29,015**	**$3,116,054**

Waste Rock Dumps - Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	**Category 1 stockpile (Mine Year 1)**	163,766	59	D8R	1,403	1.6	1.0	0.88	1.2	1,476	111	$6,636	$17,406	$24,042
		163,766									111	**$6,636**	**$17,406**	**$24,042**

Waste Rock Dumps - Cover and Growth Media Costs

		Cover (lower layer)								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Replacement Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Cover Labor Cost $	Cover Equipment Cost $	Total Cover Cost $	Growth Media Volume cy	Growth Media Replacement Fleet	Fleet Productivity BCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	**Category 1 stockpile (Mine Year 1)**	332,460	725/966G	508	9	655	$430,715	$761,621	$1,192,336	498,689	725/966G	508	9	981	$645,086	$1,140,687	$1,785,773
		332,460				655	**$430,715**	**$761,621**	**$1,192,336**	498,689				981	**$645,086**	**$1,140,687**	**$1,785,773**

Waste Rock Dumps - Scarifying/Revegetation Costs

	Description (required)	Slope Area acres	Flat Area acres	Total Surface Area acres	Final Slope Length ft	Flat Area Long Dimension ft	Ripping/ Scarifying Fleet	Slope Scarifying/ Ripping Hours hrs	Flat Area Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Costs $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Costs $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**Category 1 stockpile (Mine Year 1)**	42.07	164.00	206.07	126	6,000	D6R	36	139	$10,462	$17,138	$27,600	$28,644	$28,644	$29,015	$86,303
		42.07	164.00	206.07				36	139	**$10,462**	**$17,138**	**$27,600**	**$28,644**	**$28,644**	**$29,015**	**$86,303**

Notes: 1) Minimum total ripping hours = 1 (i.e. If total ripping hrs (slope + flat) < 1, then one hour of fleet time is assumed, regardless of acres shown in in scarifying table.)
2) Assumes 50min/hr equipment availability

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$5,261	$8,618	N/A	$13,879
Subtotal Earthworks	**$5,261**	**$8,618**	**$0**	**$13,879**
Revegetation Cost	$15,602	$15,602	$15,804	$47,008
TOTALS	**$20,863**	**$24,220**	**$15,804**	**$60,887**

Tailings - User Input — You must fill in ALL green cells and relevant blue cells in this section for each tailings impoundment

	Facility Description		Physical - MANDATORY								Cover				Growth Media			
	Description (required)	ID Code	Underlying Ground Slope % Grade	Ungraded Slope _H:1V	Final (Regraded) Embankment Slope _H:1V	Final Embankment Height ft	Final Tailings Surface Area acres	Mid-Embankment or Ripping Length ft	Embankment Regrade Volume (if calculated elsewhere) cy	Surface Regrade Volume (calculated elsewhere) cy	Embankment Cover Thickness in	Tailings Surface Cover Thickness in	Distance from Cover Borrow ft	Slope from Tailings to Borrow % grade	Embankment Growth Media Thickness in	Tailings Surface Growth Media Thickness in	Distance from Growth Material Stockpile ft	Slope from Tailings to Stockpile % grade
1	Flotation Tailings Basin - Beach Area Reveg - Mine Year 01		0.0	4.5	4.5	20	95.40	7,974										

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

The beach and pond will have bentonite amended covers. See "Other User" sheet for costs.

Tailings - User Input (cont.) — You must fill in ALL green cells and relevant blue cells in this section for each tailings impoundment

		Grading				Cover		Growth Media		Revegetation								
	Description (required)	Dozing Material Condition (select)	Embankment Material Type (select)	Grading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Embankment Slope (select)	Seed Mix Tailings Surface (select)	Mulch Embankment Slopes (select)	Mulch Tailings Surface (select)	Fertilizer Embankment Slopes (select)	Fertilizer Tailing Surface (select)	Embankment Slope Scarify/ Rip? (select)	Tailings Surface Scarify/ Rip? (select)	Scarifying/ Ripping Fleet (select)
1	Flotation Tailings Basin - Beach Area Reveg - Mine Year 01									Mix 1	Mix 1	Straw Mulch	Straw Mulch			Yes	Yes	Small Dozer

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$5,261	$8,618	N/A	$13,879
Subtotal Earthworks	**$5,261**	**$8,618**	**$0**	**$13,879**
Revegetation Cost	$15,602	$15,602	$15,804	$47,008
TOTALS	**$20,863**	**$24,220**	**$15,804**	**$60,887**

Tailings - Calculations

Surface Area Calculations

Top Surface Area provided by user

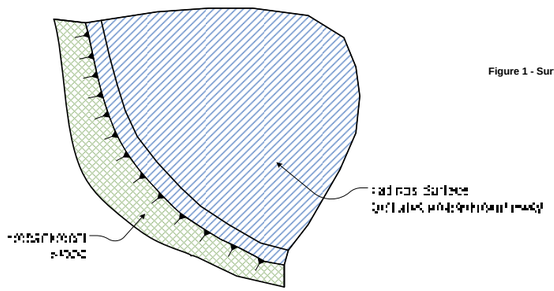


Figure 1 - Surface Areas

Final Slope Area and Footprint Area Calculations

$$\text{Slope length} = \frac{\text{Embankment height}}{\cos(\text{Overal l slope angle})}$$

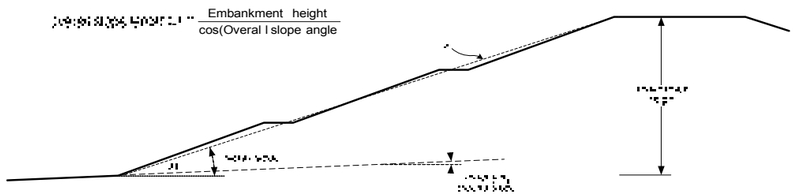


Figure 2 - Final Slope Area and Footprint Area Calculation

Grading Calculations

Grading assumed on impoundment surface only, not embankment
Average push distance assumed to be 2/3 of the 600 feet maximum from Catepillar Handbook or 400 feet
Material assumed to be loose stockile (1.2 productivity factor)
Dozing density correction based on dry sand = 2300/2400 = 0.96
Slope assumed to be 0 to 5% (1.0 productivity factor)

Ripping/Scarifying/Revegetation Calculation

Minimum 1 hr ripping/scarifying per area
Minimum 1 acre revegetation crew time per area

Regrading Volume Calculation

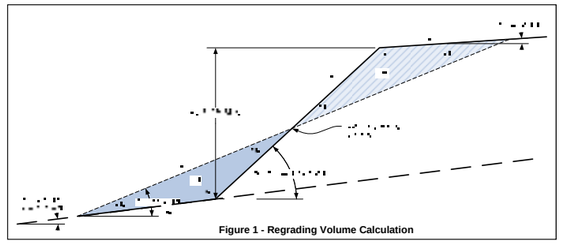


Figure 1 - Regrading Volume Calculation

Regrading Push Distance Calculation

$$\text{Push distance} = \frac{2}{3}(c_1 + c_2)$$

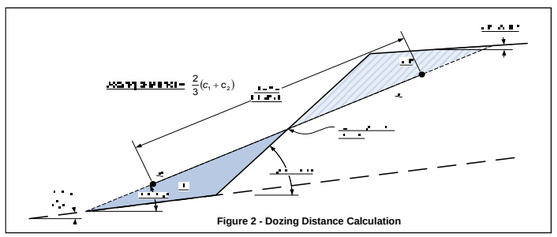


Figure 2 - Dozing Distance Calculation

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Tailings - Cost Summary

	Labor	Equipment	Materials	Totals
Embankment Regrading Cost	$0	$0	N/A	$0
Tailings Surface Grading Cost	$0	$0	N/A	$0
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$5,261	$8,618	N/A	$13,879
Subtotal Earthworks	**$5,261**	**$8,618**	**$0**	**$13,879**
Revegetation Cost	$15,602	$15,602	$15,804	$47,008
TOTALS	**$20,863**	**$24,220**	**$15,804**	**$60,887**

Tailings - Embankment Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material Condition	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	Flotation Tailings Basin - Beach Area Reveg - Mine Year 01	0		Select Fleet								$0	$0	$0
												$0	**$0**	**$0**

Tailings - Surface Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Density Correction	Dozing Material	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	Flotation Tailings Basin - Beach Area Reveg - Mine Year 01			Select Fleet								$0	$0	$0
												$0	**$0**	**$0**

Tailings - Cover and Growth Media Costs

		Cover Placement								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Placement Fleet	Cover Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Placement Cost $	Growth Media Volume cy	Growth Media Placement Fleet	Growth Media Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoil Placement Cost $
1	Flotation Tailings Basin - Beach Area Reveg - Mine Year 01						$0	$0	$0						$0	$0	$0
							$0	**$0**	**$0**						**$0**	**$0**	**$0**

Tailings - Scarifying/Revegetation Costs

	Description (required)	Embankment Slope Area acres	Tailings Surface Area acres	Total Surface Area acres	Final Slope Length ft	Ripping/ Scarifying Fleet	Slope Scarifying/ Ripping Hours hrs	Flat Area Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Cost $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Cost $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	Flotation Tailings Basin - Beach Area Reveg - Mine Year 01	16.84	95.40	112.24	92	D6R	14	74	$5,261	$8,618	$13,879	$15,602	$15,602	$15,804	$47,008
		16.84	95.40	112.24			14	74	**$5,261**	**$8,618**	**$13,879**	**$15,602**	**$15,602**	**$15,804**	**$47,008**

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$8,608	$22,581	N/A	$31,189
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$8,608**	**$22,581**	**$0**	**$31,189**
Revegetation Cost	$6,255	$6,255	$6,336	$18,846
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$6,255	**$6,255**	**$6,336**	**$18,846**
TOTALS	**$14,863**	**$28,836**	**$6,336**	**$50,035**

Quarries & Borrow Pits - User Input

You must fill in ALL green cells in this section for each dump, lift or dump category

	Facility Description			Physical - MANDATORY								Cover				Growth Media			
	Description (required)	ID Code	Type	Underlying Ground Slope % Grade	Ungraded Slope _H:1V	Final Slope _H:1V	Final Top Slope % Grade	Bench or Highwall Height ft	Mid-Bench Length ft	Average Flat Area Long Dimension (ripping distance) ft	Final (Regraded) Footprint acres	Regrade Volume (1) (if calculated elsewhere) cy	Cover Thickness Slopes in	Cover Thickness Flat Areas in	Distance from Cover Borrow ft	Slope from Dump to Cover Borrow % grade	Slope Growth Media Thickness in	Flat Area Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Dump to Stockpile % grade
1	**East pit**		**Quarry**	**0.0**	**2.0**	**2.5**	**1.0**	**60**	**12,100**	**1,000**	**10.00**									

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

A lake will form in the East pit

Quarries & Borrow Pits - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each dump, lift or dump category

	Facility Description	Grading				Cover		Growth Media		Revegetation								
	Description (required)	Dozing Material Condition (select)	Highwall Material Type (select)	Grading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Slopes (select)	Seed Mix Flat Areas (select)	Mulch Slopes (select)	Mulch Flat Areas (select)	Fertilizer Slopes (select)	Fertilizer Flat Areas (select)	Slope Scarify/ Rip? (select)	Flat Area Scarify/ Rip? (select)	Scarify/ Ripping Fleet (select)
1	**East pit**	**1**	**LS - broken**	**Med**				**Alluvium**	**Med Truck**	**Mix 1**	**Mix 1**	**Straw Mulch**	**Straw Mulch**					

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Quarries & Borrow Pits - User Input (cont.)

	Facility Description	Highwall Berms					Berm Construction		Excavate or Doze	Hauling (if selected method)				Revegetation		
	Description (required)	Berm (or Highwall) Length ft	Berm Height ft	Berm Base Width ft	Berm Sideslope Angle _H:1V	Volume (if calculated elsewhere) cy	Construction Method (select)	Berm Material Type (select)	Berm Construction Equipment Fleet (select)	Berm Hauling Fleet (select)	Distance to Borrow Source ft	Slope to Borrow Source % grade	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)
1	**East pit**															

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)
3. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$8,608	$22,581	N/A	$31,189
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$8,608**	**$22,581**	**$0**	**$31,189**
Revegetation Cost	$6,255	$6,255	$6,336	$18,846
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$6,255	**$6,255**	**$6,336**	**$18,846**
TOTALS	**$14,863**	**$28,836**	**$6,336**	**$50,035**

Quarries & Borrow Pits - Calculations

Regrading Volume Calculation

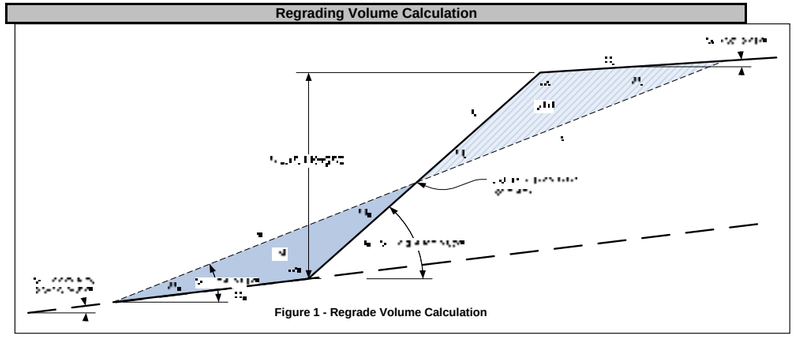


Figure 1 - Regrade Volume Calculation

Final Slope Area and Footprint Area Calculations

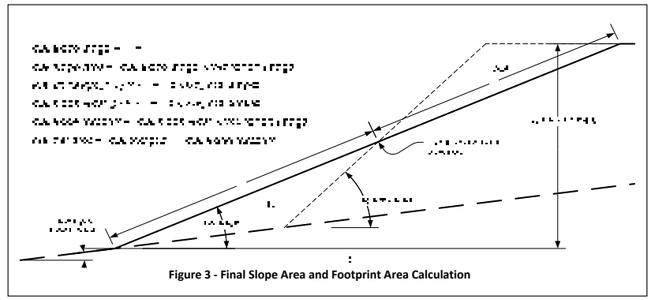


Figure 3 - Final Slope Area and Footprint Area Calculation

Regrading Push Distance Calculation

dozing distance: based on 2/3 final cut slope + 2/3 final fill slope (minimum = 50 ft)

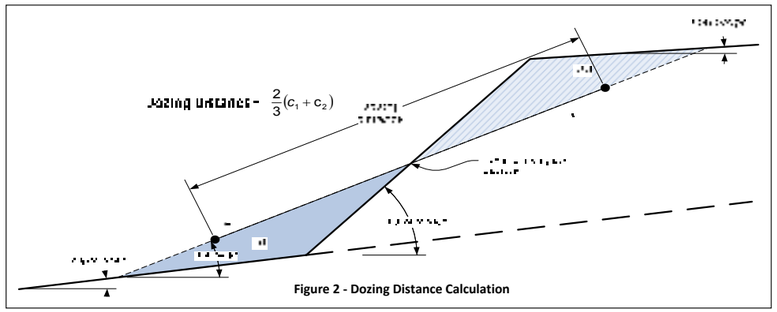
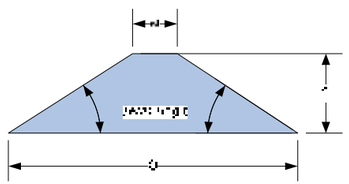


Figure 2 - Dozing Distance Calculation

Safety Berm Volume Calculation

Berm Sectional Area = $\frac{(a+b)}{2} \times h$

Berm Volume = Berm Length x Cross Sectional Area



Dozer productivity assumes push distance of:
100 feet

Dozer:
Length x (Berm Base Width + Dozer Push Distance) - accounts for disturbance created in borrow area

Excavator:
Length x (Berm Base Width + (2 x Excavator Track Width) - accounts for disturbance created in borrow area

Haul & Place:
Length x Berm Base Width - if necessary use Yards sheet to account for disturbance created in borrow area

Ripping/Scarifying Calculations

Minimum 1 hr ripping/scarifying time per dump

Slopes:
Number of passes = Final slope length ÷ Grader width
Travel distance = Number of passes x Mid-bench length
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)
Minimum 1 hr

Flat Areas:
Flat area width = Final flat area ÷ Average long dimensions
Number of passes = Flat area width ÷ Grader width
Travel distance = Number of passes x Average long dimensions
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)

Revegetation: Minimum 1 acre revegetation crew time per area

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Quarries and Borrow Areas - Cost Summary

	Labor	Equipment	Materials	Totals
Grading Costs	$8,608	$22,581	N/A	$31,189
Cover Placement Cost	$0	$0	N/A	$0
Topsoil Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost		$0	N/A	$0
Safety Berm Construction Cost	$0	$0	N/A	$0
Subtotal Earthwork	**$8,608**	**$22,581**	**$0**	**$31,189**
Revegetation Cost	$6,255	$6,255	$6,336	$18,846
Safety Berm Revegetation Cost	$0	$0	$0	$0
	$6,255	**$6,255**	**$6,336**	**$18,846**
TOTALS	**$14,863**	**$28,836**	**$6,336**	**$50,035**

Quarries & Borrow Pits - Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	**East pit**	101,281	99	D8R	802	1.6	1.0	0.88	1.0	703	144	$8,608	$22,581	$31,189
		101,281									144	**$8,608**	**$22,581**	**$31,189**

Quarries & Borrow Pits - Cover and Growth Media Costs

		Cover (lower layer)								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Replacement Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Cover Labor Cost $	Cover Equipment Cost $	Total Cover Cost $	Growth Media Volume cy	Growth Media Replacement Fleet	Fleet Productivity BCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	**East pit**						$0	$0	$0						$0	$0	$0
							$0	**$0**	**$0**						**$0**	**$0**	**$0**

Quarries & Borrow Pits - Scarifying/Revegetation Costs

	Description (required)	Slope Area acres	Flat Area acres	Total Surface Area acres	Final Slope Length ft	Flat Area Long Dimension ft	Ripping/ Scarifying Fleet	Slope Scarifying/ Ripping Hours hrs	Flat Area Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Costs $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Costs $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**East pit**	45.00		45.00	162					$0	$0	$0	$6,255	$6,255	$6,336	$18,846
		45.00		45.00							**$0**	**$0**	**$6,255**	**$6,255**	**$6,336**	**$18,846**

Notes: 1) Minimum total ripping hours = 1 (i.e. If total ripping hrs (slope + flat) < 1, then one hour of fleet time is assumed, regardless of acres shown in in scarifying table.)

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Generic Material Hauling - Cost Summary

	Labor	Equipment	Materials	Totals
Hauling/Crush/Screen/Compact	$3,204,029	$9,324,647	N/A	$12,528,676
Cover Placement Cost	$228,838	$664,508	N/A	$893,346
Topsoil Placement Cost	$78,491	$224,459	N/A	$302,950
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$3,511,358**	**$10,213,614**	**$0**	**$13,724,972**
Revegetation Cost	$17,236	$17,236	$4,588	$39,060
TOTALS	**$3,528,594**	**$10,230,850**	**$4,588**	**$13,764,032**

Generic Material Hauling - User Input

	Facility Description			Physical		Hauled Material			Crushing & Screening					Cover			Growth Media		
	Description (required)	ID Code	Type	Final Surface Area acres	Average Ripping Distance ft	Material Volume Required cy	Distance from Borrow Source (1) ft	Slope to Borrow Source % grade	Crush Material	Screen Material	Loss to Crushing/ Screening %	Distance to Placement Location (2) ft	Slope to Placement % grade	Cover Thickness in	Distance to Cover Borrow ft	Slope to Borrow % grade	Growth Media Thickness in	Distance to Growth Material Stockpile ft	Slope to Stockpile % grade
1	Category 1 stockpile (Mine Year 1) additional soil for uniform foundation la		Stockpile	206.07										6	5,000	-5.0			
2	Category 1 stockpile (Mine Year 1) geomembrane bedding layer		Stockpile	206.07										6	5,000	-5.0			
3	Category 2/3 stockpile relocation to West Pit		Stockpile	63.00	2,932	2,993,581	7,554	-0.1									6	7,988	-5.0
4	Category 4 stockpile relocation to West Pit		Stockpile	29.00	2,003	850,972	4,547	-0.4									6	6,304	-5.0
5	Ore Surge Stockpile to West Pit		Ore Stockpile	32.00	6,272	1,300,000	9,052	0.0									6	6,304	-5.0

Notes:
1. Input distance to crusher if material to be crushed
2. Input distance from crusher to placement if material to be crushed
3. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Generic Material Hauling - User Input (cont.)

		Hauling Material				Cover			Growth Media			Revegetation				
	Description (required)	Haul Material Type (select)	Material Hauling Fleet (select)	Each Fleet Size (from/to crusher) (user override)	Compact After Placement?	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch Type (select)	Fertilizer Type (select)	Scarify/ Rip? (select)	Scarifying/ Ripping Fleet (select)
1	Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer					Alluvium	Med Truck									
2	Category 1 stockpile (Mine Year 1) geomembrane bedding layer					Alluvium	Med Truck									
3	Category 2/3 stockpile relocation to West Pit	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
4	Category 4 stockpile relocation to West Pit	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				
5	Ore Surge Stockpile to West Pit	LS - broken	Med Truck						Alluvium	Med Truck		Mix 3				

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
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Model Version: Version 1.4.1
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Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Generic Material Hauling - Cost Summary

	Labor	Equipment	Materials	Totals
Hauling/Crush/Screen/Compact	$3,204,029	$9,324,647	N/A	$12,528,676
Cover Placement Cost	$228,838	$664,508	N/A	$893,346
Topsoil Placement Cost	$78,491	$224,459	N/A	$302,950
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$3,511,358**	**$10,213,614**	**$0**	**$13,724,972**
Revegetation Cost	$17,236	$17,236	$4,588	$39,060
TOTALS	**$3,528,594**	**$10,230,850**	**$4,588**	**$13,764,032**

Generic Material Hauling - Load, Haul, Place and Grade

		Material Haulage								Crush and/or Compact			
	Description (required)	Material Volume to Crusher cy	Final Material Volume cy	Material Haulage Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Hauling Labor Cost $	Hauling Equipment Cost $	Total Crush/ Screen Cost $	Compact Labor Cost $	Compact Equipment Cost $	Total Load/Haul/ Place Cost $
1	**Category 1 stockpile (Mine Year 1) additional soil for unifor**							$0	$0	$0	$0	$0	$0
2	**Category 1 stockpile (Mine Year 1) geomembrane bedding l**							$0	$0	$0	$0	$0	$0
3	**Category 2/3 stockpile relocation to West Pit**	2,993,581	2,993,581	740/988G	578	4	5,179	$1,857,604	$5,394,187	$0	$0	$0	$7,251,791
4	**Category 4 stockpile relocation to West Pit**	850,972	850,972	740/988G	543	3	1,567	$468,376	$1,380,746	$0	$0	$0	$1,849,122
5	**Ore Surge Stockpile to West Pit**	1,300,000	1,300,000	740/988G	531	4	2,448	$878,049	$2,549,714	$0	$0	$0	$3,427,763
		5,144,553	5,144,553				9,194	**$3,204,029**	**$9,324,647**	**$0**	**$0**	**$0**	**$12,528,676**

Notes: Final Material Volume includes allowance for additional material hauled to crushing/screening plant based on Loss to Crushing/Screening input above.

Generic Material Hauling - Cover and Growth Media Costs

		Cover Placement								Growth Media Placement							
	Description (required)	Cover Volume cy	Cover Placement Fleet	Cover Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Placement Cost $	Growth Media Volume cy	Growth Media Placement Fleet	Growth Media Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoil Placement Cost $
1	**Category 1 stockpile (Mine Year 1) additional soil for unifor**	166,230	740/988G	521	4	319	$114,419	$332,254	$446,673	0					$0	$0	$0
2	**Category 1 stockpile (Mine Year 1) geomembrane bedding l**	166,230	740/988G	521	4	319	$114,419	$332,254	$446,673	0					$0	$0	$0
3	**Category 2/3 stockpile relocation to West Pit**						$0	$0	$0	50,820	740/988G	578	6	88	$42,085	$119,889	$161,974
4	**Category 4 stockpile relocation to West Pit**						$0	$0	$0	23,393	740/988G	564	5	41	$17,157	$49,280	$66,437
5	**Ore Surge Stockpile to West Pit**						$0	$0	$0	25,813	740/988G	564	5	46	$19,249	$55,290	$74,539
		332,460				638	**$228,838**	**$664,508**	**$893,346**	100,026				175	**$78,491**	**$224,459**	**$302,950**

Generic Material Hauling - Scarifying/Revegetation Costs

	Description (required)	Total Surface Area acres	Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Cost $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Cost $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**Category 1 stockpile (Mine Year 1) additional soil for unifor**	206.07		$0	$0	$0	$0	$0	$0	$0
2	**Category 1 stockpile (Mine Year 1) geomembrane bedding l**	206.07		$0	$0	$0	$0	$0	$0	$0
3	**Category 2/3 stockpile relocation to West Pit**	63.00		$0	$0	$0	$8,757	$8,757	$2,331	$19,845
4	**Category 4 stockpile relocation to West Pit**	29.00		$0	$0	$0	$4,031	$4,031	$1,073	$9,135
5	**Ore Surge Stockpile to West Pit**	32.00		$0	$0	$0	$4,448	$4,448	$1,184	$10,080
		536.14		**$0**	**$0**	**$0**	**$17,236**	**$17,236**	**$4,588**	**$39,060**

Closure Cost Estimate
Other Demo & Equip Removal

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Other Demoltion and Equipment Removal - Cost Summary				
	Labor	Equipment	Materials	Totals
Other Demolition	$15,012,089	$30,085,002	$0	$45,097,091
Equipment Removal	$0	$0	$0	$0
TOTALS	**$15,012,089**	**$30,085,002**	**$0**	**$45,097,091**

Other Demolition

Facility Description									
	Description (required)	ID Code	Type	Quantity	Units	Labor Unit Cost $	Equipment Unit Cost $	Material Unit Cost $	Total Cost $
1	**Demo and Asbestos Abatement Cost Summary - User 2**		Site Facilities - Structures	**1**	**LS**	**$14,930,613.67**	**$29,861,227.33**		$44,791,841
2	**Above Ground Storage Tanks - User 2**		Site Facilities - Structures	**1**	**LS**	**$81,475.00**	**$162,950.00**		$244,425
3	**Remove & Dispose of Stockpile/Pond Liners - OSP**	**remove_3**	Site Facilities - Structures	**32**	**acres**		**$300.00**		$9,600
4	**Remove & Dispose of Collection pipe - OSP**	**remove_4**	Site Facilities - Structures	**3100**	**LF**		**$2.25**		$6,975
5	**Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile**	**remove_3**	Site Facilities - Structures	**63**	**acres**		**$300.00**		$18,900
6	**Remove & Dispose of Collection pipe - Category 2/3 Stockpile**	**remove_4**	Site Facilities - Structures	**4800**	**LF**		**$2.25**		$10,800
7	**Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile**	**remove_3**	Site Facilities - Structures	**29**	**acres**		**$300.00**		$8,700
8	**Remove & Dispose of Collection pipe - Category 4 Stockpile**	**remove_4**	Site Facilities - Structures	**2600**	**LF**		**$2.25**		$5,850
						$15,012,089	**$30,085,002**	**$0**	**$45,097,091**

Notes: **Quotes are broken down by labor and equipment at a ratio of 1:2.**

Equipment & Material Removal

Facility Description									
	Description (required)	ID Code	Type	Quantity	Units	Labor Unit Cost ($)	Equipment Unit Cost ($)	Material Unit Cost ($)	Total Cost ($)
						$0	**$0**	**$0**	

Notes:

Closure Cost Estimate
Process Ponds

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - User Input

You must fill in ALL green cells and relevant blue cells in this section for each pond

	Facility Description		Pond Dimensions (1)					Backfill - (If trucks are used) (1)				Growth Media		
	Description (required)	ID Code	Pond Length ft	Pond Width ft	Pond Depth ft	Pond Sideslope Angle _H:1V	Disturbed Area (if calculated elsewhere) acres	Percent Backfill (100% if blank)	Distance from Backfill Borrow ft	Slope from Facility to Borrow Area % grade	Pond Volume (if calculated elsewhere) cy	Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Facility to Stockpile % grade
1	**Mine Site WWTF Pond - 1**		**230**	**180**	**10.0**	**3.0**			**1,000**	**0%**				
2	**Mine Site WWTF Pond - 2**		**340**	**340**	**10.0**	**3.0**			**1,000**	**0%**				
3	**Mine Site WWTF Pond - 3**		**670**	**320**	**10.0**	**3.0**			**1,000**	**0%**				
4	**Mine Site CPS Pond**		**240**	**240**	**10.0**	**3.0**			**1,000**	**0%**				
5	**Mine Site PW-OSLA**		**450**	**200**	**8.5**	**3.0**			**1,000**	**0%**				
6	**Mine Site PW-HRE**		**380**	**170**	**9.3**	**3.0**			**1,000**	**0%**				
7	**Mine Site PW-RTH**		**320**	**80**	**1.3**	**3.0**			**1,000**	**0%**				
8	**Mine Site Temporary pond**		**340**	**140**	**10.0**	**3.0**			**1,000**	**0%**				
9	**Mine Site S4, PW-S4**		**560**	**320**	**6.0**	**3.0**			**1,000**	**0%**				
10	**Mine Site SOSP, PW-SOSP**		**380**	**310**	**5.7**	**3.0**			**1,000**	**0%**				
11	**Mine Site PW-HRC**		**340**	**130**	**9.5**	**3.0**			**1,000**	**0%**				
12	**Mine Site S23-1**		**830**	**110**	**10.6**	**3.0**			**1,000**	**0%**				
13	**Mine Site PW-S23-1**		**1180**	**110**	**10.7**	**3.0**			**1,000**	**0%**				

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Liner cutting is assumed at 500 ft/hr along perimeter.
Dimensions from "Ponds_ml_20150723.xlsx" and "Ponds_ml_20150723.dwg" per "Water_Management_Plan_-_Mine_v4_MAR2015.pdf" Large Figure 4
Pond depths approximated from design volume data in User 3 (except WWTF Pond 1 thru 3, CPS pond, and temporary pond).
Pond sludge removal and haul to East Pit included in "Waste Disposal" sheet.

Process Ponds - User Input (cont.)

		Liner	Backfill			Growth Media			Revegetation		
	Description (required)	Crew Cut & Fold Time (2) hrs	Backfill Material Type (select)	Backfill Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)
1	**Mine Site WWTF Pond - 1**	**1.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
2	**Mine Site WWTF Pond - 2**	**2.7**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
3	**Mine Site WWTF Pond - 3**	**4.0**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
4	**Mine Site CPS Pond**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
5	**Mine Site PW-OSLA**	**2.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
6	**Mine Site PW-HRE**	**2.2**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
7	**Mine Site PW-RTH**	**1.6**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
8	**Mine Site Temporary pond**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
9	**Mine Site S4, PW-S4**	**3.5**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
10	**Mine Site SOSP, PW-SOSP**	**2.8**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
11	**Mine Site PW-HRC**	**1.9**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
12	**Mine Site S23-1**	**3.8**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		
13	**Mine Site PW-S23-1**	**5.2**	**LS - broken**	**Med Truck**		**Alluvium**	**Med Truck**		**Mix 3**		

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table
(2) Pond liner removal crew (2Clab + excavator) = 2 General Laborers + 325C Excavator

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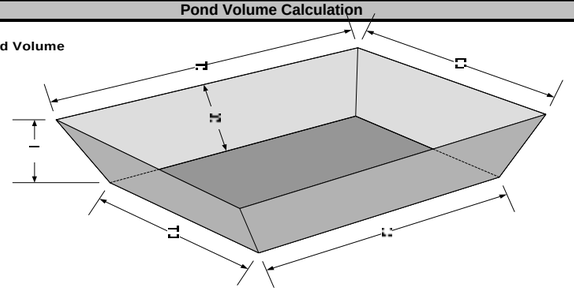
Cost Estimate Type: Surety Cost Basis: Polymet

Process Ponds - Cost Summary				
	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - Calculations

Pond Volume Calculation

Figure 1 - Pond Volume



Area and Volume of the Frustrum of a Pyramid

$$\text{Surface Area} = \left[ab + ac + (a+c)\sqrt{\left(\frac{a-c}{2}\right)^2 + h^2}\right] \times \frac{b}{2}$$

$$\text{Volume} = \frac{h\left[ab + ac + \sqrt{(ab)(ac)}\right]}{3}$$

Revegetation Calculations

Minimum 1 acre revegetation crew time per area

Process Ponds - Liner Cutting and Folding

	Description (required)	Crew Hours hrs	Total Labor Cost $	Total Equipment Cost $	Total Cover Cost $
1	**Mine Site WWTF Pond - 1**	2	$249	$131	$380
2	**Mine Site WWTF Pond - 2**	3	$413	$217	$630
3	**Mine Site WWTF Pond - 3**	4	$602	$315	$917
4	**Mine Site CPS Pond**	2	$292	$153	$445
5	**Mine Site PW-OSLA**	3	$395	$207	$602
6	**Mine Site PW-HRE**	2	$334	$175	$509
7	**Mine Site PW-RTH**	2	$243	$127	$370
8	**Mine Site Temporary pond**	2	$292	$153	$445
9	**Mine Site S4, PW-S4**	4	$535	$280	$815
10	**Mine Site SOSP, PW-SOSP**	3	$420	$220	$640
11	**Mine Site PW-HRC**	2	$286	$150	$436
12	**Mine Site S23-1**	4	$572	$300	$872
13	**Mine Site PW-S23-1**	5	$784	$411	$1,195
		36	**$5,417**	**$2,839**	**$8,256**

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Process Ponds - Cost Summary

	Labor	Equipment	Materials	Totals
Backfilling Costs	$137,973	$415,860	N/A	$553,833
Growth Media Placement Costs	$0	$0	N/A	$0
Liner Cutting & Folding Costs	$5,417	$2,839	N/A	$8,256
Subtotal Earthworks	**$143,390**	**$418,699**	**$0**	**$562,089**
Revegetation Costs	$3,962	$3,962	$1,041	$8,965
TOTALS	**$147,352**	**$422,661**	**$1,041**	**$571,054**

Process Ponds - Backfill and Growth Media Costs

		Pond Backfill								Growth Media							
	Description (required)	Backfill Volume cy	Backfill Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours hrs	Total Labor Cost $	Total Equipment Cost $	Total Backfill Cost $	Growth Media Volume cy	Growth Media Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	**Mine Site WWTF Pond - 1**	11,217	740/988G	546	2	21	$5,022	$15,135	$20,157						$0	$0	$0
2	**Mine Site WWTF Pond - 2**	35,704	740/988G	546	2	65	$15,543	$46,847	$62,390						$0	$0	$0
3	**Mine Site WWTF Pond - 3**	68,815	740/988G	546	2	126	$30,129	$90,812	$120,941						$0	$0	$0
4	**Mine Site CPS Pond**	16,444	740/988G	546	2	30	$7,174	$21,622	$28,796						$0	$0	$0
5	**Mine Site PW-OSLA**	23,393	740/988G	546	2	43	$10,282	$30,991	$41,273						$0	$0	$0
6	**Mine Site PW-HRE**	17,263	740/988G	546	2	32	$7,652	$23,063	$30,715						$0	$0	$0
7	**Mine Site PW-RTH**	1,129	740/988G	546	2	2	$478	$1,441	$1,919						$0	$0	$0
8	**Mine Site Temporary pond**	12,673	740/988G	546	2	23	$5,500	$16,577	$22,077						$0	$0	$0
9	**Mine Site S4, PW-S4**	36,139	740/988G	546	2	66	$15,782	$47,568	$63,350						$0	$0	$0
10	**Mine Site SOSP, PW-SOSP**	22,587	740/988G	546	2	41	$9,804	$29,550	$39,354						$0	$0	$0
11	**Mine Site PW-HRC**	11,132	740/988G	546	2	20	$4,782	$14,415	$19,197						$0	$0	$0
12	**Mine Site S23-1**	24,039	740/988G	546	2	44	$10,521	$31,712	$42,233						$0	$0	$0
13	**Mine Site PW-S23-1**	34,687	740/988G	546	2	64	$15,304	$46,127	$61,431						$0	$0	$0
		315,222				577	**$137,973**	**$415,860**	**$553,833**						**$0**	**$0**	**$0**

Process Ponds - Revegetation Costs

	Description (required)	Surface Area acres	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	**Mine Site WWTF Pond - 1**	1.00	$139	$139	$37	$315
2	**Mine Site WWTF Pond - 2**	2.70	$375	$375	$100	$850
3	**Mine Site WWTF Pond - 3**	4.90	$681	$681	$181	$1,543
4	**Mine Site CPS Pond**	1.30	$181	$181	$48	$410
5	**Mine Site PW-OSLA**	2.10	$292	$292	$78	$662
6	**Mine Site PW-HRE**	1.50	$209	$209	$56	$474
7	**Mine Site PW-RTH**	0.60	$139	$139	$22	$300
8	**Mine Site Temporary pond**	1.10	$153	$153	$41	$347
9	**Mine Site S4, PW-S4**	4.10	$570	$570	$152	$1,292
10	**Mine Site SOSP, PW-SOSP**	2.70	$375	$375	$100	$850
11	**Mine Site PW-HRC**	1.00	$139	$139	$37	$315
12	**Mine Site S23-1**	2.10	$292	$292	$78	$662
13	**Mine Site PW-S23-1**	3.00	$417	$417	$111	$945
		28.10	**$3,962**	**$3,962**	**$1,041**	**$8,965**

Closure Cost Estimate
Yards, Etc.

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$27,559	$58,542	N/A	$86,101
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$27,559**	**$58,542**		**$86,101**
Revegetation Cost	$4,726	$4,726	$4,726	$14,178
TOTALS	**$32,285**	**$63,268**	**$4,726**	**$100,279**

Yards, Etc. - User Input

You must fill in ALL green cells and relevant blue cells in this section for each building or facility

	Facility Description			Physical			Cover			Growth Media		
	Description (required)	ID Code	Type	Area acres	Average Flat Area Long Dimension (ripping distance) ft	Regrade Volume (calculated elsewhere) cy	Cover Thickness in	Distance from Cover Borrow Area ft	Slope from Facility to Borrow Area % grade	Growth Media Thickness in	Distance from Growth Media Stockpile ft	Slope from Facility to Stockpile % grade
1	**OSLA Overburden Storage and Laydown Area minus wetland area**		**Yard**	**34.00**	**1,220**	**54,853**						

Notes:
1. All Physical parameters must be input even if manual overrides for volume or area are used.
2. If Slope from facility to borrow source is >20, downhill travel time may be underestimated due to limitation of uphill travel time curves and downhill speed tables from CAT Handbook (see Productivty Sheet)

Assume average __ ft regrade over area: **1**

Yards, Etc. - User Input (cont.)

You must fill in ALL green cells and relevant blue cells in this section for each building or facility

		Grading			Cover			Growth Media			Revegetation				
	Description (required)	Dozing Material Condition (select)	Dozing Material Type (select)	Grading Equipment Fleet (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Maximum Fleet Size (user override)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Maximum Fleet Size (user override)	Seed Mix (select)	Mulch (select)	Fertilizer (select)	Scarify/ Rip? (select)	Ripping Fleet (select)
1	**OSLA Overburden Storage and Laydown Area minus wetla**	**1**	**Gravel**	**Small**							**Mix 1**				

Notes:
1. Material Types are used for density correction based on material densities in Caterpillar Performance Handbook material density table

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
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Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$27,559	$58,542	N/A	$86,101
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$27,559**	**$58,542**		**$86,101**
Revegetation Cost	$4,726	$4,726	$4,726	$14,178
TOTALS	**$32,285**	**$63,268**	**$4,726**	**$100,279**

Yards, Etc. - Calculations

Grading Calculations

Average push distance assumed to be 2/3 of the 600 feet maximum from Catepillar Handbook or 400 feet
Material assumed to be loose stockile (1.2 productivity factor)
Slope assumed to be 0 to 5% (1.0 productivity factor)

Cover Volume Calculation

Yard area x cover thickness

Ripping/Scarifying Calculations

Flat area width = Final flat area ÷ Average long dimensions
Number of passes = Flat area width ÷ Grader width
Travel distance = Number of passes x Average long dimensions
Total hours = (Travel distance ÷ Grader productivity) + (Number of passes x Grader maneuver time)
Minimum 1 hr ripping/scarifying per area

Revegetation

Minimum 1 acre revegetation crew time per area

Closure Cost Estimate
Yards, Etc.

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Yards, Etc. - Cost Summary

	Labor	Equipment	Materials	Totals
Regrading Cost	$27,559	$58,542	N/A	$86,101
Cover Placement Cost	$0	$0	N/A	$0
Growth Media Placement Cost	$0	$0	N/A	$0
Ripping/Scarifying Cost	$0	$0	N/A	$0
Subtotal Earthworks	**$27,559**	**$58,542**		**$86,101**
Revegetation Cost	$4,726	$4,726	$4,726	$14,178
TOTALS	**$32,285**	**$63,268**	**$4,726**	**$100,279**

Yards, Etc. - Regrading Costs

Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side)

	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost $	Total Equipment Cost $	Total Regrading Cost $
1	OSLA Overburden Storage and Laydown Area minus wetla	54,853	400	213	1.0	1.0	0.90	119	461	$27,559	$58,542	$86,101
		54,853							461	**$27,559**	**$58,542**	**$86,101**

Yards, Etc. - Cover and Growth Media Costs

		Cover								Growth Media							
	Description (required)	Cover Volume cy	Topsoil Repacement Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Cover Cost $	Growth Media Volume cy	Growth Media Fleet	Fleet Productivity LCY/hr	Number of Trucks/ Scrapers	Total Fleet Hours	Total Labor Cost $	Total Equipment Cost $	Total Topsoiling Cost $
1	OSLA Overburden Storage and Laydown Area minus wetla						$0	$0	$0						$0	$0	$0
							$0	**$0**	**$0**						**$0**	**$0**	**$0**

Yards, Etc. - Scarifying/Revegetation Costs

	Description (required)	Surface Area acres	Area Long Dimension ft	Scarifying/ Ripping Hours hrs	Scarifying/ Ripping Labor Costs $	Scarifying/ Ripping Equipment Cost $	Total Scarifying/ Ripping Costs $	Revegetation Labor Cost $	Revegetation Equipment Cost $	Revgetation Material Cost $	Total Revegetation Cost $
1	OSLA Overburden Storage and Laydown Area minus wetla	34.00	1,220		$0	$0	$0	$4,726	$4,726	$4,726	$14,178
		34.00			**$0**	**$0**	**$0**	**$4,726**	**$4,726**	**$4,726**	**$14,178**

Closure Cost Estimate
Well Abandonment

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$2,257	$2,629	$0	$4,886
Monitoring Wells	$15,582	$5,096	$147	$20,825
TOTALS	**$17,839**	**$7,725**	**$147**	**$25,711**

Production, Dewatering and Infiltration Well Closure

	Description (required)	ID Code	Number of Holes	Casing Diam in	Average Depth[1] ft bgs	Depth to First Water ft bgs	Original Static Water Level ft bgs	Top of Slotted Casing[2] ft bgs	Blank Casing Below Top of Screen[2] ft	Type of Pump (if any) (select)	Depth to Pump ft bgs	Hole Plug Method (select)	Casing Volume per ft cf	Perforation Length[3,4] ft	Grout Volume per Hole[4,5] cy	Cement Volume per Hole[6] cy	Inert Media Volume per Hole[7] cy	Pump Removal Labor Cost $	Pump Removal Equip Cost $	Perf Labor Cost $	Perf Equip Cost[8] $	Grout + Cement Labor Cost[9] $	Grout + Cement Equip Cost[9] $	Grout + Cement Material Cost $	Inert Media Labor Cost[10] $	Inert Media Equip Cost[9] $	Total Cost $
1	**Well closure**	**waterwell_close**	**5**	**10.0**	**100**	**50**	**30**	**30**	**5**	**Line Shaft**	**35**	**Cement Plu**	0.550	5		0.40	8.15	$1,024	$2,226	$0	$0	$0	$0	$0	$1,233	$403	$4,886
																		$1,024	**$2,226**	**$0**	**$0**	**$0**	**$0**	**$0**	**$1,233**	**$403**	**$4,886**

(1) For previously abandoned holes enter "0" for depth
(2) Wells abandoned per Nevada Administrative Code (NAC 534.420). Hole grouted and perforated from bottom to 50 feet (15.24m) above the top of the screen, or first water encountered or original static water level, depending on vertical hydraulic gradient and well construction parameters. Inert media (cuttings or alluvium) used from top of grout to top seal.
(3) Perforation length = amount of blank casing below first water (for confined aquifers) or predicted recovered water table (unconfined aquifers) + 50 feet (15.24m) of blank casing above water table
(4) Assumes 50' (15.24m) sanitary seal at top of hole. Therefore, perforation and grouting only required to bottom of sanitary seal.
(5) Assumes 100% loss to formation for grout (abandonite) for screened and perforated sections.
(6) Assumes 10' (3m) top seal of cement in casing only. See note 4.
(7) Inert material is cuttings or alluvium sourced locally.
(8) Includes perforation tool wear cost/ft of perforation (see Productivty Sheet).
(9) See Productivity Sheet for hourly production. Minimum 1 hr per hole + fixed hours per hole for move and setup. If no perforation required, use standard drill rig.
(10) See Productivity Sheet for hourly production. Minimum 1 hr per hole.

Notes:
Well parameters assumed.

Closure Cost Estimate
Well Abandonment

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
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Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$2,257	$2,629	$0	$4,886
Monitoring Wells	$15,582	$5,096	$147	$20,825
TOTALS	**$17,839**	**$7,725**	**$147**	**$25,711**

Monitoring Well Closure

	Description (required)	ID Code	Number of Holes	Casing Diam in	Average Depth ft bgs	Top of Screen[1] ft bgs	Hole Plug Method (select)	Casing Volume per ft ft3	Grout Volume/ Well[2,3] cy	Cement Volume per Hole[4] cy	Inert Backfill Volume per Hole[5] cy	Total Grouting Hours/ Hole hr	Total Inert Media Hours/ Hole hr	Grout + Cement Labor Cost[6] $	Grout + Cement Equip Cost[6] $	Grout + Cement Material Cost $	Inert Material Labor Cost[7] $	Inert Material Equip Cost[7] $	Total Cost $
1	Mine site - MW-05-02		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
2	Mine site - MW-05-08		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
3	Mine site - MW-05-09		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
4	Mine site - MW-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
5	Mine site - MW-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
6	Mine site - MW-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
7	Mine site - MW-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
8	Mine site - MW-5		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
9	Mine site - MW-6S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
10	Mine site - MW-6D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
11	Mine site - MW-7		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
12	Mine site - MW-8S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
13	Mine site - MW-8D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
14	Mine site - MW-9		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
15	Mine site - MW-10S		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
16	Mine site - MW-10D		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
17	Mine site - MW-11		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
18	Mine site - MW-12		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
19	Mine site - MW-13		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
20	Mine site - MW-14		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
21	Mine site - MW-15		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
22	Mine site - MW-16		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
23	Mine site - MW-17		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
24	Mine site - MW-18		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
25	Mine site - OB-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
26	Mine site - OB-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
27	Mine site - OB-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
28	Mine site - OB-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
29	Mine site - OB-5		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
30	Mine site - P-1		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
31	Mine site - P-2		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
32	Mine site - P-3		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
33	Mine site - P-4		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
34	Plant Site - GW-001		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
35	Plant Site - GW-002		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
36	Plant Site - GW-003		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
37	Plant Site - GW-004		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
38	Plant Site - GW-005		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
39	Plant Site - GW-006		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
40	Plant Site - GW-007		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
41	Plant Site - GW-008		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
42	Plant Site - GW-009		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
43	Plant Site - GW-010		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
44	Plant Site - GW-011		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
45	Plant Site - GW-012		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
46	Plant Site - GW-013		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
47	Plant Site - GW-014		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
48	Plant Site - GW-015		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
49	Plant Site - GW-016		1	4.0	150	50	Cement Pl	0.090		0.08			3.0	$0	$0	$3	$318	$104	$425
														$0	**$0**	**$147**	**$15,582**	**$5,096**	**$20,825**

Wells abandoned per NAC 534.420 with bentonite grout placed to 50 feet above the top of the screen (see note 1).
(1) Assumes top of screen is at or above the static water level (in unconfined aquifers) or the depth of first water encountered (in confined aquifers).
(2) Assumes 25% loss to formation for grouting
(3) Grouting only required to 50' (15.24m) above the top of screen because monitor wells are constructed with a seal in the annular space.
(4) Assumes top 10' (3m) plugged with cement.
(5) Assumes hole plugged with inert material (cuttings or alluvium) above grout up to cement surface plug.
(6) See Productivity Sheet for hourly production. Minimum 1 hr per hole + fixed hours per hole for move and setup (see Productivty Sheet).
(7) See Productivity Sheet for hourly production. Minimum 1 hr per hole.

Notes:
Well ID's from
Large Table 10 of Water Management Plan - Mine
Large Table 19 of Water Management Plan - Plant
Well parameters assumed

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment				
	Labor	Equipment	Materials	Totals
Production, Dewatering, Infiltration Wells	$2,257	$2,629	$0	$4,886
Monitoring Wells	$15,582	$5,096	$147	$20,825
TOTALS	**$17,839**	**$7,725**	**$147**	**$25,711**

Well Construction

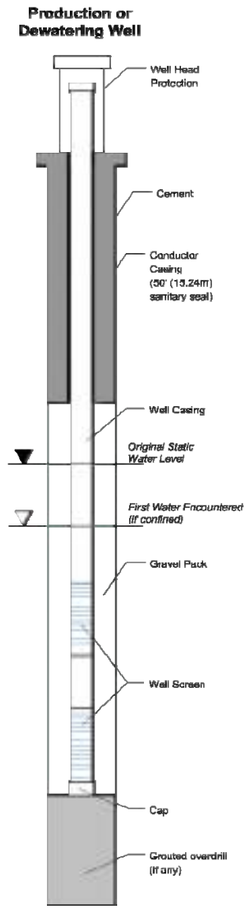

Figure 1 - Production Well

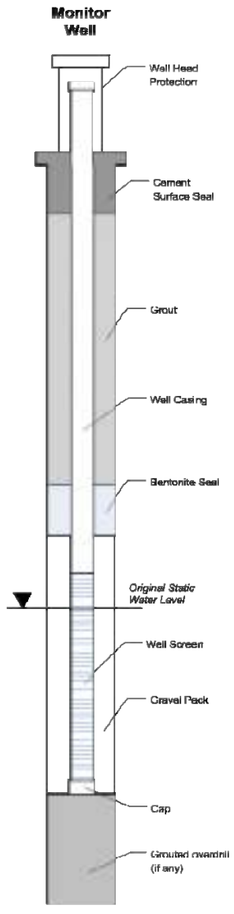

Figure 2 - Monitor Well

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Reclamation Monitoring & Maintenance - Cost Summary

	Labor	Equipment	Lab & Materials	Totals
Revegetation Maintenance	$6,683	$6,683	$6,683	$20,049
Erosion Maintenance	$0	$0	N/A	$0
Reclamation Monitoring	$0	$0	N/A	$0
Subtotal Reclamation Monitoring	**$6,683**	**$6,683**	**$6,683**	**$20,049**
Water Quality Monitoring	$36,072	$21,400	$5,560,800	$5,618,272
TOTAL MONITORING	**$42,755**	**$28,083**	**$5,567,483**	**$5,638,321**

Clear Sheet

Reclamation Maintenance

Description	Total Revegetation Surface Area (1,2) acres	% Area Requiring Reseeding	Seed Mix (select)	Area Requiring Reseeding acres	Seed $/acres	Labor $/acres	Equipment $/acres	Totals $
Revegetation Maintenance	962	**5%**	**Mix 1**	48.1	$139.00	$139.00	$139.00	
Labor								$6,683
Equipment								$6,683
Materials								$6,683
Cost/Acre								$417
							Subtotal	**$20,049**

Notes: 1) Surface area is NOT the same as footprint disturbance area typically used for permitting purposes.
2) If BRCE model, revegetation surface area determined by area included in PER, LOM or Surety estimate

	Total Volume Growth Media cy	% Volume Requiring Maintenance	Average Growth Media Placement Cost $/CY	Volume Requiring Replacement cy		Labor (assume: 25%) $/acres	Equipment (assume: 75%) $/acres	Total $
Erosion Maintenance	598,715		$3.49	0		$0.00	$0.00	$0

Notes:

Reclamation Monitoring

Description	Hrs/Day	Days/Year	Number of Years	Rate $/hr		
Field Work						
Field Geologist/Engineer				$75.15		$0
Range Scientist				$75.15		$0
Reporting						
Field Geologist/Engineer				$75.15		$0
Range Scientist				$75.15		$0
					Subtotal	**$0**
Travel						
	Hrs/Trip hr	**Trips/Year**	**Years**	**Truck Cost** $/hr		
Travel				$37.66		$0
					Subtotal	**$0**
					Total Reclamation Monitoring	**$0**

Notes: **Monitoring costs are included in the Human Resources sheet**

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety **Cost Basis: Polymet**

Reclamation Monitoring & Maintenance - Cost Summary

	Labor	Equipment	Lab & Materials	Totals
Revegetation Maintenance	$6,683	$6,683	$6,683	$20,049
Erosion Maintenance	$0	$0	N/A	$0
Reclamation Monitoring	$0	$0	N/A	$0
Subtotal Reclamation Monitoring	**$6,683**	**$6,683**	**$6,683**	**$20,049**
Water Quality Monitoring	$36,072	$21,400	$5,560,800	$5,618,272
TOTAL MONITORING	**$42,755**	**$28,083**	**$5,567,483**	**$5,638,321**

Clear Sheet

Closure Cost Estimate
Monitoring

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Reclamation Monitoring & Maintenance - Cost Summary

	Labor	Equipment	Lab & Materials	Totals
Revegetation Maintenance	$6,683	$6,683	$6,683	$20,049
Erosion Maintenance	$0	$0	N/A	$0
Reclamation Monitoring	$0	$0	N/A	$0
Subtotal Reclamation Monitoring	**$6,683**	**$6,683**	**$6,683**	**$20,049**
Water Quality Monitoring	$36,072	$21,400	$5,560,800	$5,618,272
TOTAL MONITORING	**$42,755**	**$28,083**	**$5,567,483**	**$5,638,321**

Clear Sheet

Water and Rock Sample Analysis

Description	Samples #	Events/Year	No. Years	First Sample Year closure year (1-100)	No. of Samplers	Days/Event	Hrs/Day	Analysis Cost $/sample	Supplies $/sample	Lab Cost $	Material Cost $	Equipment Cost $	Labor Cost $	Cost $	Comments
Water Analysis	**29**	**12**	**5**	**1**				$331.00	$0.00	$575,940	$0			$575,940	**See User 13 for details; Plant site monitoring; closure**
Water Analysis	**29**	**4**	**45**	**6**				$331.00	$0.00	$1,727,820	$0			$1,727,820	**See User 13 for details; Plant site monitoring; post-closure**
Water Analysis	**41**	**12**	**5**	**1**				$331.00	$0.00	$814,260	$0			$814,260	**See User 13 for details; Mine site monitoring; closure**
Water Analysis	**41**	**4**	**45**	**6**				$331.00	$0.00	$2,442,780	$0			$2,442,780	**See User 13 for details; Mine site monitoring; post-closure**
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
														$0	
										$5,560,800.00	$0.00	$0.00	$0.00		
													Subtotal Sampling Costs	**$5,560,800**	

Notes: Sampling labor cost = No. Samplers x Years x Events/year x Days/event x Hour/Day x Labor Rate
Sampling equipment costs include 1 pickup truck for every two samplers

Ground & Surface Water Monitoring

Pump Costs

Description	No. of units		Years		Cost $
Pump (purchased)	**1**	Replacement period (yrs):	**5**	2140	$21,400
				Subtotal Field Work	**$21,400**

Notes: Replacement period = frequency of pump replacement

Reporting

Description	Hrs/Event	Rate $/hr	Cost $
Field Geologist/Engineer	**2**	$75.15	$36,072
		Subtotal Reporting	**$36,072**

Notes: **Locations derived from:**
Water Management Plan - Plant - Large Table 15-20
Water Management Plan - Mine - Large Table 8-13
Sampling carried out by solution management crew
Frequencies for post-closure adjusted

Closure Cost Estimate
Constr. Mgmt

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Construction Management & Road Maintenance - Cost Summary				
	Labor	Equipment	Materials	Totals
Construction Management	$0	$0	N/A	$0
Construction Support		$0		$0
Road Maintenance	$378,766	$576,956	$0	$955,722
TOTAL CONSTRUCTION MANAGEMENT	**$378,766**	**$576,956**	**$0**	**$955,722**

Clear Sheet

Construction Management

Construction Management Staff

Description	Duration mo.	Hours/ Month hr.	Number of Supervisors	Supervisor Rate $/hr	Labor Cost $	Equipment Cost[1] $	Totals $
Active Reclamation					$0	$0	$0
Monitoring & Maintenance					$0	$0	$0
				Total Staff	**$0**	**$0**	**$0**

Construction Management Support

Description	Duration mo.	Number of Units		Rental Rate $/mo	Generator Cost $/mo	Equipment Cost[1] $	Totals $
Temporary Office Rental						$0	$0
Temporary Toilets						$0	$0
					Total Support	**$0**	**$0**

Notes: Office rental assumes only 1 generator required for every 4 trailers

Total Construction Management **$0**

Road Maintenance

Description	Fleet Size (select)	Number	Duration mo.	Hours/ Month hr.	Labor Cost $	Equipment Cost $	Totals $
Active Reclamation							
Water Truck	**Small**	**0**	**48**	**40**	$0	$0	$0
Grader	**Small**	**1**	**48**	**40**	$114,778	$174,835	$289,613
Monitoring & Maintenance							
Water Truck	**Small**	**0**	**552**	**8**	$0	$0	$0
Grader	**Small**	**1**	**552**	**8**	$263,988	$402,121	$666,109

Description	Gallons/ Day	Days/ Month	Duration mo.	Cost/ Gallon $			Totals $
Water Fees							
Water Fees							$0
				Total Project Maintenance	**$378,766**	**$576,956**	**$955,722**

Notes: 1) Supervisor equipment = pickup truck

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	**Direct Input**
User Input - Pull Down List	**Pull Down Selection**
Program Constant (can override)	**Alternate Input**
Program Calculated Value	**Locked Cell - Formula or Reference**

ZONE ADJUSTMENTS

Cost Basis/Project Region	**Polymet**	MN prevailing wages, CAT equipment rates	
Power Equipment Operators	**none**	$0.00	
Truck Drivers	**none**	$0.00	
Laborers	**none**	$0.00	

INDIRECT COSTS

Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Labor Group	Base Rate ($/hr)	Zone Adjustment ($/hr)	Hourly Wage ($/hr)	Fringe ($/hr)	Retirement/ Medicare ($/hr)	Unemployment Insurance ($/hr)	Workman's Compensation ($/hr)	Other Indirect Costs ($/hr)	Additional User Markups to Base Rate† ($/hr)	Additional User Markups to Base Rate† %	Additional User Markups to Base Rate† ($/hr)	Total ($/hr)
Equipment Operators ($/hr) (2)													
Bulldozers													
D6R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D6R w/ Winch	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D7R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D8R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D9R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D10R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
D11R	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Wheeled Dozers													
824G					$17.15							$0	
834G					$17.15							$0	
844					$17.15							$0	
854G					$17.15							$0	
Motor Graders													
120H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
14G/H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
16G/H	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
24M	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Track Excavators													
312C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
320C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
325C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
330C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
345B	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
365BL	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
385BL	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Scrapers													
631G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
637G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Wheeled Loaders													
924G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
928G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
950G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
966G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
972G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
980G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
988G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
990	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
992G	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
994D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
L2350	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Shovels													
PC2000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC3000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC4000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC5500	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
PC8000	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Hydraulic Hammers													
H-120 (fits 325)													
H-160 (fits 345)													
H-180 (fits 365/385)													
Demolition Shears													
S340 (fits 322/325/330)													
S365 (fits 330/345)													
S390 (fits 365/385)													
Demolition Grapples													
G315 (fits 322/325)													
G320 (fits 325/330)													
G330 (fits 345/365)													

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	Direct Input
User Input - Pull Down List	Pull Down Selection
Program Constant (can override)	Alternate Input
Program Calculated Value	Locked Cell - Formula or Reference

ZONE ADJUSTMENTS			
Cost Basis/Project Region	Polymet	MN prevailing wages, CAT equipment rates	
Power Equipment Operators	none	$0.00	
Truck Drivers	none	$0.00	
Laborers	none	$0.00	

INDIRECT COSTS	
Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

Other Equipment													
420D 4WD Backhoe	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
428D 4WD Backhoe	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CS533E Vibratory Roller	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CS633E Vibratory Roller	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CP533E Sheepsfoot Compactor	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
CP633E Sheepsfoot Compactor	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Light Truck - 1.5 Ton	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Supervisor's Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Flatbed Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Air Compressor + tools	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Welding Equipment	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Heavy Duty Drill Rig	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Pump (plugging) Drill Rig	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Concrete Pump					$17.15							$0	
Gas Engine Vibrator	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Generator 5KW					$17.15							$0	
HDEP Welder (pipe or liner)					$17.15							$0	
5 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
20 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
50 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
120 Ton Crane	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78

NOTES:

(1) Equipment Type:	Catepillar model or equivalent, LeTourneau
(2) Equipment Operator Source:	
(3) Zone Basis:	

Truck Drivers ($/hr) (4)													
725	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
730	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
735	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
740	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
769D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
773E	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
777D	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
785C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
793C	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
797B	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
613E (5,000 gal) Water Wagon	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
621E (8,000 gal) Water Wagon	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
777D Water Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
785C Water Truck	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78
Dump Truck (10-12 yd3)	69-201	$35.48	$0.00	$35.48	$17.15	$0.53	$2.71	$3.90	$0.00			$0	$59.78

NOTES:

(4) Truck Driver Source:	
(5) Zone Basis:	

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Color Code Key	
User Input - Direct Input	Direct Input
User Input - Pull Down List	Pull Down Selection
Program Constant (can override)	Alternate Input
Program Calculated Value	Locked Cell - Formula or Reference

ZONE ADJUSTMENTS		
Cost Basis/Project Region	Polymet	MN prevailing wages, CAT equipment rates
Power Equipment Operators	none	$0.00
Truck Drivers	none	$0.00
Laborers	none	$0.00

INDIRECT COSTS	
Unemployment (%)	1.49%
Retirement/SS/Medicare (%)	7.65%
Workman's Compensation (%)	11.00%
Other Indirects	
Total cost of benefits	
Total Other Indirects	**0.00%**

HOURLY LABOR RATE TABLE

Laborers ($/hr) (6,7)

General Laborer	69-101	$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Skilled Laborer	69-102	$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Driller's Helper		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Rodmen (reinforcing concrete)		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Cement finisher		$24.34	$0.00	$24.34	$16.87	$0.36	$1.86	$2.68	$0.00			$0	$46.11
Carpenter	69-704	$30.85	$0.00	$30.85	$16.08	$0.46	$2.36	$3.39	$0.00			$0	$53.14

NOTES:

(6) Laborer Source:	
(7) Carpenter Source:	
(8) Zone Basis:	

Project Management and Technical Labor ($/hr) (9)

Project Manager		$76.25	$0.00	$76.25	$16.87	$1.14	$5.83	$8.39	$0.00			$0	$108.47
Foreman		$78.04	$0.00	$78.04	$16.87	$1.16	$5.97	$8.58	$0.00			$0	$110.62
Field Geologist/Engineer		$48.51	$0.00	$48.51	$16.87	$0.72	$3.71	$5.34	$0.00			$0	$75.15
Field Tech/Sampler		$36.37	$0.00	$36.37	$16.87	$0.54	$2.78	$4.00	$0.00			$0	$60.56
Range Scientist		$48.51	$0.00	$48.51	$16.87	$0.72	$3.71	$5.34	$0.00			$0	$75.15
Senior Planning Engineer					$16.87								
Project Engineer					$16.87								
Mechanic/Fitter					$16.87								
Surveyor		$39.96	$0.00	$39.96	$16.87	$0.60	$3.06	$4.40	$0.00			$0	$64.88
Electrician		$56.28	$0.00	$56.28	$16.87	$0.84	$4.31	$6.19	$0.00			$0	$84.48
					$16.87								
					$16.87								

NOTES:

(9) Project Manager:	
(9) Foreman Source:	
(9) Techical Labor Source:	
Other Labor Source:	
Other Labor Source:	
†Additional User Markups	
(These are added by the user to the	
base rate to account for site-specific	
conditions or corporate requirements)	

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xls
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Monthly Rental Basis: 176 hrs month

EQUIPMENT RENTAL RATE TABLE

EQUIPMENT TYPE (1)	Monthly Owner/Rental Rate	Equipment Hourly Rate	Fuel/Lube/ Wear	Total Rate
Bulldozers				
D6R	$12,220.00	$69.43	$28.50	$97.93
D6R w/ Winch	$13,060.00	$74.20	$18.66	$92.86
D7R	$16,640.00	$94.55	$32.45	$126.99
D8R	$19,890.00	$113.01	$43.79	$156.81
D9R	$27,500.00	$156.25	$64.43	$220.68
D10R	$33,340.00	$189.43	$83.01	$272.44
D11R	$62,000.00	$352.27	$120.50	$472.78
Wheeled Dozers				
824G			$32.09	$32.09
834G			$37.61	$37.61
844			$44.78	$44.78
854G			$56.72	$56.72
Motor Graders				
120H	$10,430.00	$59.26	$31.80	$91.06
14G/H	$16,910.00	$96.08	$44.88	$140.96
16G/H	$23,530.00	$133.69	$54.39	$188.08
24M			$46.27	$46.27
Track Excavators				
312C	$6,250.00	$35.51	$13.12	$48.63
320C	$7,490.00	$42.56	$22.96	$65.51
325C	$8,920.00	$50.68	$28.99	$79.67
330C	$10,730.00	$60.97	$35.48	$96.44
345B	$17,110.00	$97.22	$45.40	$142.62
365BL	$26,050.00	$148.01	$39.40	$187.41
385BL	$32,700.00	$185.80	$70.50	$256.29
Scrapers				
631G	$33,930.00	$192.78	$69.23	$262.01
637G	$34,500.00	$196.02	$101.88	$297.91
Wheeled Loaders				
924G	$5,730.00	$32.56	$18.96	$51.51
928G	$6,840.00	$38.86	$21.66	$60.53
950G	$9,690.00	$55.06	$29.02	$84.08
966G	$13,890.00	$78.92	$40.67	$119.59
972G	$15,060.00	$85.57	$43.25	$128.82
980G	$19,260.00	$109.43	$47.36	$156.79
988G	$30,340.00	$172.39	$70.71	$243.10
990	$47,670.00	$270.85	$50.75	$321.60
992G	$65,000.00	$369.32	$136.54	$505.86
994D	$71,500.00	$406.25	$107.46	$513.71
L2350	$78,650.00	$446.88	$197.01	$643.89
Shovels				
PC2000			$110.45	$110.45
PC3000			$149.25	$149.25
PC4000			$208.95	$208.95
PC5500			$355.22	$355.22
PC8000			$444.77	$444.77
Hydraulic Hammers				
H-120 (fits 325)	$3,120.00	$17.73	$5.29	$23.02
H-160 (fits 345)	$4,140.00	$23.52	$10.35	$33.87
H-180 (fits 365/385)	$4,060.00	$23.07	$12.02	$35.09
Demolition Shears				
S340 (fits 322/325/330)				$0.00
S365 (fits 330/345)				$0.00
S390 (fits 365/385)				$0.00
Demolition Grapples				
G315 (fits 322/325)				$0.00
G320 (fits 325/330)				$0.00
G330 (fits 345/365)				$0.00
Other Equipment				
420D 4WD Backhoe	$3,220.00	$18.30	$16.30	$34.59
428D 4WD Backhoe	$5,220.00	$29.66	$16.41	$46.07
CS533E Vibratory Roller	$7,220.00	$41.02	$11.19	$52.22
CS633E Vibratory Roller			$14.18	$14.18
CP533E Sheepsfoot Compactor			$11.19	$11.19
CP633E Sheepsfoot Compactor			$14.18	$14.18
Light Truck - 1.5 Ton	$5,803.60	$32.98	$4.68	$37.66
Supervisor's Truck	$3,586.00	$20.38	$3.19	$23.57
Flatbed Truck	$5,803.60	$32.98	$15.16	$48.13
Air Compressor + tools	$4,642.88	$26.38	$2.99	$29.37
Welding Equipment	$3,025.00	$17.19	$5.97	$23.16
Heavy Duty Drill Rig	$61,380.00	$348.75	$35.82	$384.57
Pump (plugging) Drill Rig	$61,380.00	$348.75	$29.85	$378.60
Concrete Pump	$15,224.00	$86.50	$29.85	$116.35
Gas Engine Vibrator	$703.56	$4.00	$2.99	$6.98
Generator 5KW	$1,065.24	$6.05	$4.48	$10.53
HDEP Welder (pipe or liner)	$8,162.00	$46.38	$5.97	$52.35
5 Ton Crane	$5,975.20	$33.95	$8.96	$42.91
20 Ton Crane	$4,220.00	$23.98	$11.94	$35.92
50 Ton Crane	$15,884.00	$90.25	$14.03	$104.28
120 Ton Crane			$15.52	$15.52
Trucks				
725	$11,000.00	$62.50	$39.30	$101.80
730	$13,460.00	$76.48	$40.80	$117.27
735	$16,970.00	$96.42	$56.15	$152.57
740	$18,110.00	$102.90	$57.51	$160.41
769D	$21,000.00	$119.32	$43.90	$163.22
773E	$27,000.00	$153.41	$55.52	$208.93
777D	$54,000.00	$306.82	$81.74	$388.56
785C			$72.39	$72.39
793C			$124.62	$124.62
797B			$175.37	$175.37
613E (5,000 gal) Water Wagon	$7,700.00	$43.75	$27.68	$71.43
621E (8,000 gal) Water Wagon	$13,000.00	$73.86	$46.53	$120.40
777D Water Truck			$50.00	$50.00
785C Water Truck			$72.39	$72.39
Dump Truck (10-12 yd^3)	$14,762.00	$83.88	$16.43	$100.31

NOTES:

(1) Power Equipment Source:	
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	
(4) Other Equipment Source:	

(5) Drill rig includes support (pipe) truck

Closure Cost Estimate
Equipment Costs

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm

FUEL, LUBE AND WEAR CALCULATIONS

EQUIPMENT TYPE	PM Cost Per Hour (1)	Under carriage or Tires (2)	G.E.T Consumption (3)	Fuel Use Rate gal/hr (4)	Cost@ 2.99/gal	Total Hourly Equipment Cost
Bulldozers						
D6R	$5.21		$4.63	6.25	$18.66	$28.50
D6R w/ Winch				6.25	$18.66	$18.66
D7R	$3.18		$6.88	7.50	$22.39	$32.45
D8R	$5.75		$8.94	9.75	$29.10	$43.79
D9R	$7.99		$13.90	14.25	$42.54	$64.43
D10R	$9.82		$19.46	18.00	$53.73	$83.01
D11R	$12.48		$28.92	26.50	$79.10	$120.50
Wheeled Dozers						
824G		$0.00		10.75	$32.09	$32.09
834G		$0.00		12.60	$37.61	$37.61
844		$0.00		15.00	$44.78	$44.78
854G		$0.00		19.00	$56.72	$56.72
Motor Graders						
120H	$6.11	$4.15	$9.60	4.00	$11.94	$31.80
14G/H	$6.68	$5.68	$13.87	6.25	$18.66	$44.88
16G/H	$5.37	$7.68	$18.95	7.50	$22.39	$54.39
24M				15.50	$46.27	$46.27
Track Excavators						
312C	$3.89		$3.62	1.88	$5.61	$13.12
320C	$4.15		$4.18	4.90	$14.63	$22.96
325C	$4.02		$5.27	6.60	$19.70	$28.99
330C	$5.19		$5.81	8.20	$24.48	$35.48
345B	$7.08		$6.68	10.60	$31.64	$45.40
365BL				13.20	$39.40	$39.40
385BL	$6.11		$12.15	17.50	$52.24	$70.50
Scrapers						
631G	$7.02	$9.84	$7.59	15.00	$44.78	$69.23
637G	$11.61	$9.84	$9.54	23.75	$70.89	$101.88
Wheeled Loaders						
924G	$3.79	$2.97	$3.99	2.75	$8.21	$18.96
928G	$4.12	$2.97	$4.13	3.50	$10.45	$21.66
950G	$4.93	$4.47	$7.68	4.00	$11.94	$29.02
966G	$6.75	$7.12	$9.64	5.75	$17.16	$40.67
972G	$5.27	$7.12	$12.21	6.25	$18.66	$43.25
980G	$5.27	$7.49	$12.21	7.50	$22.39	$47.36
988G	$9.76	$11.76	$13.07	12.10	$36.12	$70.71
990				17.00	$50.75	$50.75
992G	$11.62	$26.23	$30.03	23.00	$68.66	$136.54
994D				36.00	$107.46	$107.46
L2350				66.00	$197.01	$197.01
Shovels						
PC2000				37.00	$110.45	$110.45
PC3000				50.00	$149.25	$149.25
PC4000				70.00	$208.95	$208.95
PC5500				119.00	$355.22	$355.22
PC8000				149.00	$444.77	$444.77
Hydraulic Hammers						
H-120 (fits 325)	N/A		$5.29			$5.29
H-160 (fits 345)	N/A		$10.35			$10.35
H-180 (fits 365/385)	N/A		$12.02			$12.02
Demolition Shears						
S340 (fits 322/325/330)	N/A					$0.00
S365 (fits 330/345)	N/A					$0.00
S390 (fits 365/385)	N/A					$0.00
Demolition Grapples						
G315 (fits 322/325)	N/A					$0.00
G320 (fits 325/330)	N/A					$0.00
G330 (fits 345/365)	N/A					$0.00
Other Equipment						
420D 4WD Backhoe	$3.36	$0.76	$3.22	3.00	$8.96	$16.30
428D 4WD Backhoe	$3.37	$0.76	$3.32	3.00	$8.96	$16.41
CS533E Vibratory Roller				3.75	$11.19	$11.19
CS633E Vibratory Roller				4.75	$14.18	$14.18
CP533E Sheepsfoot Compactor				3.75	$11.19	$11.19
CP633E Sheepsfoot Compactor				4.75	$14.18	$14.18
Light Truck - 1.5 Ton		$0.21		1.50	$4.48	$4.68
Supervisor's Truck		$0.21		1.00	$2.99	$3.19
Flatbed Truck		$1.13		4.70	$14.03	$15.16
Air Compressor + tools			N/A	1.00	$2.99	$2.99
Welding Equipment			N/A	2.00	$5.97	$5.97
Heavy Duty Drill Rig				12.00	$35.82	$35.82
Pump (plugging) Drill Rig				10.00	$29.85	$29.85
Concrete Pump			N/A	10.00	$29.85	$29.85
Gas Engine Vibrator			N/A	1.00	$2.99	$2.99
Generator 5KW			N/A	1.50	$4.48	$4.48
HDEP Welder (pipe or liner)			N/A	2.00	$5.97	$5.97
5 Ton Crane				3.00	$8.96	$8.96
20 Ton Crane				4.00	$11.94	$11.94
50 Ton Crane				4.70	$14.03	$14.03
120 Ton Crane				5.20	$15.52	$15.52
Trucks						
725	$7.32	$15.08	$2.87	4.70	$14.03	$39.30
730	$7.32	$15.08	$2.87	5.20	$15.52	$40.80
735	$7.32	$24.02	$2.87	7.35	$21.94	$56.15
740	$7.32	$25.28	$2.97	7.35	$21.94	$57.51
769D	$8.46	$4.61	$3.22	9.25	$27.61	$43.90
773E	$7.23	$9.61	$3.61	11.75	$35.07	$55.52
777D	$10.48	$17.22	$4.04	16.75	$50.00	$81.74
785C				24.25	$72.39	$72.39
793C				41.75	$124.62	$124.62
797B				58.75	$175.37	$175.37
613E (5,000 gal) Water Wagon	$5.79	$3.98		6.00	$17.91	$27.68
621E (8,000 gal) Water Wagon	$6.76	$7.69		10.75	$32.09	$46.53
777D Water Truck				16.75	$50.00	$50.00
785C Water Truck				24.25	$72.39	$72.39
Dump Truck (10-12 yd3) (5)	N/A	$0.91	N/A	5.20	$15.52	$16.43

Notes:

(1) PM Source:	
(2) Undercarriage Source:	NV costs
(3) G.E.T. Source:	NV costs
(4) Fuel Use Source:	Caterpillar Handbook, Edition 35, Ch. 20; or estimated average for smaller vehicles
(5) Dump Truck Oper. Cost Source:	Means Heavy Construction (2008)

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm

TIRE COST TABLES

Equipment	Tire Size	# of Tires Per Piece of Equipment	Cost Per Tire	Tire Cost (1)(2)	Life Expectency Hours (Low/Zone A) (3)	Tire Cost per Hour
Bulldozers						
D6R			N/A			
D6R w/ Winch			N/A			
D7R			N/A			
D8R			N/A			
D9R			N/A			
D10R			N/A			
D11R			N/A			
Wheeled Dozers						
824G	29.5R25	4		$0.00	3,500	$0.00
834G	35/65-R33	4		$0.00	3,500	$0.00
844	45/65-R39	4		$0.00	3,500	$0.00
854G	45/65-R45	4		$0.00	3,500	$0.00
Motor Graders						
120H	13PR24	6	$2,419.20	$14,515.20	3,500	$4.15
14G/H	20.5R25	6	$3,311.84	$19,871.04	3,500	$5.68
16G/H	23.5R25	6	$4,480.00	$26,880.00	3,500	$7.68
24M	23.5R25	6		$0.00	3,500	
Track Excavators						
312C			N/A			
320C			N/A			
325C			N/A			
330C			N/A			
345B			N/A			
365BL			N/A			
385BL			N/A			
Scrapers						
631G	37.25R35	4	$9,840.32	$39,361.28	4,000	$9.84
637G	37.25R35	4	$9,840.32	$39,361.28	4,000	$9.84
Wheeled Loaders						
924G	17.5R25	4	$3,337.60	$13,350.40	4,500	$2.97
928G	17.5R25	4	$3,337.60	$13,350.40	4,500	$2.97
950G	26.5R25	4	$5,028.24	$20,112.96	4,500	$4.47
966G	26.5R25	4	$8,005.76	$32,023.04	4,500	$7.12
972G	26.5R25	4	$8,005.76	$32,023.04	4,500	$7.12
980G	29.5R25	4	$8,428.00	$33,712.00	4,500	$7.49
988G	35/65-33	4	$13,235.60	$52,942.40	4,500	$11.76
990	41.25/70-39	4		$0.00	4,500	
992G	45/65R45	4	$29,513.12	$118,052.48	4,500	$26.23
994D	55/85R57	4		$0.00	4,500	
L2350	55/85R57	4		$0.00	4,500	
Shovels						
PC2000			N/A			
PC3000			N/A			
PC4000			N/A			
PC5500			N/A			
PC8000			N/A			
Hydraulic Hammers						
H-120 (fits 325)			N/A			
H-160 (fits 345)			N/A			
H-180 (fits 365/385)			N/A			
Demolition Shears						
S340 (fits 322/325/330)			N/A			
S365 (fits 330/345)			N/A			
S390 (fits 365/385)			N/A			
Demolition Grapples						
G315 (fits 322/325)			N/A			
G320 (fits 325/330)			N/A			
G330 (fits 345/365)			N/A			
Other Equipment						
420D 4WD Backhoe	340/80R18-19.5LR24	2	$1,145.03	$2,290.06	3,000	$0.76
428D 4WD Backhoe	340/80R18-16.9R28	2	$1,145.03	$2,290.06	3,000	$0.76
CS533E Vibratory Roller			N/A			
CS633E Vibratory Roller			N/A			
CP533E Sheepsfoot Compactor			N/A			
CP633E Sheepsfoot Compactor			N/A			
Light Truck - 1.5 Ton		4	154	$616.00	3,000	$0.21
Supervisor's Truck		4	154	$616.00	3,000	$0.21
Flatbed Truck		22	154	$3,388.00	3,000	$1.13
Air Compressor + tools			N/A			
Welding Equipment			N/A			
Heavy Duty Drill Rig		4		$0.00	3,000	
Pump (plugging) Drill Rig		4		$0.00	3,000	
Concrete Pump			N/A			
Gas Engine Vibrator			N/A			
Generator 5KW			N/A			
HDEP Welder (pipe or liner)			N/A			
5 Ton Crane		4		$0.00	3,000	
20 Ton Crane		4		$0.00	3,000	
50 Ton Crane		6		$0.00	3,000	
120 Ton Crane		6		$0.00	3,000	
Trucks						
725	23.5R25	6	$5,028.24	$30,169.44	2,000	$15.08
730	23.5R25	6	$5,028.24	$30,169.44	2,000	$15.08
735	26.5R25	6	$8,005.76	$48,034.56	2,000	$24.02
740	29.5R25	6	$8,428.00	$50,568.00	2,000	$25.28
769D	18.00R33	6	$4,607.46	$27,644.76	6,000	$4.61
773E	24.00R35	6	$8,005.76	$48,034.56	5,000	$9.61
777D	27.00R49	6	$14,348.96	$86,093.76	5,000	$17.22
785C	33.00R51	6		$0.00	4,000	
793C	40.00R57	6		$0.00	4,000	
797B	40.00R57	6		$0.00	4,000	
613E (5,000 gal) Water Wagon	23.5R25	6	$3,979.50	$23,877.00	6,000	$3.98
621E (8,000 gal) Water Wagon	33.25R29	6	$10,247.83	$61,486.98	8,000	$7.69
777D Water Truck	27.00R49	6		$0.00	5,000	
785C Water Truck	33.00R51	6		$0.00	4,000	
Dump Truck (10-12 yd3)		10	$544.88	$5,448.80	6,000	$0.91

Notes:

(1) Unit Cost Basis:	NV costs
(2) Cost Basis:	NV costs
(3) Tire Cost Source:	NV costs
(4) Tire Wear Source:	NV costs

Closure Cost Estimate
Material Costs

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation F
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_2016
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Revegetation Materials

Seed Mixes

Seed Mix	Description	Cost/Acre
None		
Mix 1	Basins	$139.00
Mix 2	Low Hills	$299.00
Mix 3	Uplands	$37.00
Mix 4	Riparian or Custom	
User Mix 1		
User Mix 2		
User Mix 3		
User Mix 4		

	Cost/lb	lbs/Acre	Cost/Acre
User Mix 5 (from Seed Mix sheet)	$9.94	$27.21	$270.48

Notes:

Mulch

Item	Cost/lb	lbs/Acre	Cost/Acre
None			
Straw Mulch	$0.18	10	$1.80
Hydro Mulch		10	
Timber Mulch		10	
		10	

Notes:

Amendments

Item	Cost/lb	lbs/Acre	Cost/Acre
None			
Organic Matter		10	
Treated Sludge		10	
Chemical		10	
		10	

Notes:

Closure Cost Estimate
Material Costs

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation F
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_2016
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Cost Estimate Type: Surety Cost Basis: Polymet

Well Abandonment Materials

Description	Cost/50lb bag	Units	Cost/unit*
Cement	$7.18	cy	$34.19
Grout (Low Grade Bentonite)	$9.96	cy	$47.43
Inert Material/Cuttings		cy	
		cy	
		cy	

* Assumes 1 bag mixes with water to make 0.21 y3 or 0.16 m3 of grout/cement slurry.

Monitoring Costs

Description	Units	Cost/unit
Monitor Well Pump	ea.	$2,140.00
Sampling Supplies	ea.	$0.00
Water Analysis	ea.	$331.00
Water treatment analyses	ea.	$100.00

(1) WET Labs, Reno, Nevada (May 2014)

Fuel, Etc.

Description	Units	Cost/unit	User Overrides
Off-road Diesel - delivered (1)	$/gal	$2.985	
Pickup Truck Mileage	$/mi	$0.560	
Electical Power	$/kWh	$0.055	

Closure Cost Estimate
Material Costs

Revegetation Method

Slopes

Disturbance Type	Seed Application Method	Labor Cost/Acre	Equipment Cost/Acre	Total Cost/Acre
Waste Rock Dumps	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Heap Leach	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Tailings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Quarries & Borrow Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00

Flat Areas and Undifferentiated

Disturbance Type	Seed Application Method	Labor Cost/Acre	Equipment Cost/Acre	Total Cost/Acre
Exploration Trenches	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Exploration Roads	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Waste Rock Dumps	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Heap Leach	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Tailings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Quarries & Borrow Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Roads	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Pits	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Haul Material	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Foundations & Buildings	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Sediment & Drainge Control	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Process Ponds	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Landfills	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Yards, Etc.	**Mechanical Broadcast**	$139.00	$139.00	$278.00
Revegetation Maintenance	**Mechanical Broadcast**	$139.00	$139.00	$278.00

Closure Cost Estimate
Misc. Unit Costs

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Revegetation

	Means Number	Unit	Crew	Daily Output	Daily Output User	Materials	Labor	Equipment	Total	Notes
Seeding - Broadcast Hand (1)		acres							$0.00	
Seeding - Broadcast Mechanical (1)		acres					$139.00	$139.00	$278.00	
Seeding - Drill (1)		acres		365					$0.00	
Seeding - Hydroseeding (1)				365					$0.00	
Shrub Planting - bare root 6-10 in (150- 250mm) (2)	02910-400-0561	ea.	1 Clab	365			$1.01	$0.00	$1.01	
Tree Planting - bare root 11-16 in (270- 400mm) (3)	02910-400-0562	ea.	1 Clab	260			$1.42	$0.00	$1.42	
Cactus Planting (4)		ea.	1 Clab						$0.00	
NOTES:										
(1) Seeding Source:										
(2) Shrub Source:										
(3) Tree Source:										
(4) Cactus Source:										

Building and Wall Demolition

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Daily Output User	Labor	Equipment	Premium	Total	Notes
Building Demolition										
Lg. steel	02220-110-0012	C.F.	B-8	21500		$0.16	$0.11		$0.27	
Lg. concrete	02220-110-0050	C.F.	B-8	15300		$0.23	$0.16		$0.39	
Lg. masonry	02220-110-0080	C.F.	B-8	20100		$0.18	$0.12		$0.30	
Lg. mixed	02220-110-0100	C.F.	B-8	20100		$0.18	$0.12		$0.30	
Sm. steel	02220-110-0500	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Sm. concrete	02220-110-0600	C.F.	B-3	11300		$0.27	$0.18		$0.45	
Sm. masonry	02220-110-0650	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Sm. wood	02220-110-0700	C.F.	B-3	14800		$0.21	$0.14		$0.35	
Wall Demolition										
Block 4 in (100 mm) thick	02220-130-2000	S.F.	1 Clab	180		$2.05	$0.00	20%	$2.46	
Block 6 in (150 mm) thick	02220-130-2040	S.F.	1 Clab	170		$2.17	$0.00	20%	$2.60	
Block 8 in (200 mm) thick	02220-130-2080	S.F.	1 Clab	150		$2.46	$0.00	20%	$2.95	
Block 12 in (300 mm) thick	02220-130-2100	S.F.	1 Clab	150		$2.46	$0.00	20%	$2.95	
Conc 6 in (150 mm) thick	02220-130-2400	S.F.	B-9	160		$17.74	$1.47	10%	$21.13	
Conc 8 in (200 mm) thick	02220-130-2420	S.F.	B-9	140		$20.28	$1.68	10%	$24.16	
Conc 10 in (250 mm) thick	02220-130-2440	S.F.	B-9	120		$23.66	$1.96	10%	$28.18	
Conc 12 in (300 mm) thick	02220-130-2500	S.F.	B-9	100		$28.39	$2.35	10%	$33.81	

Closure Cost Estimate
Misc. Unit Costs

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Waste Disposal

Unit rates from Means Heavy Construction 2006 Edition by permission of R.S.Means/Reed Construction Data .

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment		Total	Notes
Rubbish Handling										
Dumpster delivery (average for all sizes)	02220-350-0910	ea.			$47.50				$47.50	
Haul (average for all sizes)	02220-350-0920	ea.			$149.00				$149.00	
Rent per month (average for all sizes)	02220-350-0940	ea.			$51.00				$51.00	
Disposal fee per ton (tonne) (average for all sizes)	02220-350-0950	ton			$56.00				$56.00	
NOTES:										
Dumpster Cost Source										
Dumpster Disposal Fee Source:										
Hazardous Material Handling - Solids (+ Liquids in drums)										
Pickup fees 55 gal (200 L). drums	02110-300-1100	ea.			$247.00				$247.00	
Bulk material (average)	02110-300-1220/1230	ton			$403.00				$403.00	
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	02110-300-1260/1270	mile			$5.50				$5.50	
Dump site solid disposal fee	02110-300-6000/6020	ton			$285.00				$285.00	
NOTES:										
Solid Handling Cost Source										
Solid Disposal Fee Source:										
Hazardous Material Handling - Liquids										
Vacuum Truck Pickup (2200 gal/8300 L)	02110-300-3110	hr.			$145.00				$145.00	
Vacuum Truck Pickup (5000 gal/19000 L)	02110-300-3120	hr.			$210.00				$210.00	
Dump site liquid disposal fee	02110-300-6000/6020	ton			$285.00				$285.00	
NOTES:										
Liquid Handling Cost Source										
Liquid Disposal Fee Source:										
Hydrocarbon Contaminated Soils (HCS)										
Insitu Biotreatment	02115-200-2020/2021	C.Y.			$8.00				$8.00	
HCS disposal fee	02115-200-2050/2055	C.Y.			$8.00				$8.00	
NOTES:										
Insitu Treatment Cost Source										
HCS Disposal Fee Source:										

Concrete Structure Installation

Weekly dumpster rental rates from Means Heavy Construction 2005 Edition with permission by R.S.Means/Reed Construction Data .
Weekly dumpster rental rates include haul to off-site disposal site and disposal fees

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Reinforced Concrete Bulkheads and Shaft Covers										
Grade walls - 15 in (400mm) thick, 8 ft (2.5m) high	03310-240-4300	C.Y.	C-14D	80.02	$139.00	$141.69	$14.69		$295.38	includes reinforcing
Grade walls - 15 in (400mm) thick, 12 ft (3.7m) high	03310-240-4350	C.Y.	C-14D	26.2	$139.00	$432.75	$44.85		$616.60	includes reinforcing
Elevated conc, 1-way beam & slab - 15ft (4.6m) span	03310-240-2700	C.Y.	C-14B	20.59	$257.00	$563.11	$57.08		$877.19	includes reinforcing
Elevated conc, 1-way beam & slab - 25ft (7.5m) span	03310-240-2750	C.Y.	C-14B	28.36	$245.00	$408.83	$41.44		$695.27	includes reinforcing
Bat Gate/Foam Plug Installation										
Bat Gate (5)		ea.			$2,870.42					materials $/ea. Installed
Culvert Gate (5)		ea.			$5,740.85					materials $/ea. Installed
Adit Foam Plug (6)		ea./C.Y.			$287.04					materials $/cy placed
Production Opening Foam Plug (6)		ea./C.Y.			$287.04					materials $/cy placed
NOTES:										
(5) Bat Gate Source:										
(6) Foam Plug Source:										

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Misc. Linear Projects

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Fencing Installation										
Barbed 3-strand	02820-170-1650	L.F.	B-80A	760	$0.39	$2.09	$0.40		$2.88	
Barbed 4-strand	extrapolated	L.F.	B-80A	570	$0.52	$2.78	$0.53		$3.83	
Barbed 5-strand	02820-130-0920	L.F.	B-80A	456	$0.65	$3.48	$0.66		$4.79	
Chain link 8-10ft (2.5-3m) Install	02820-130-0920	L.F.	B-80C	180	$33.00	$8.80	$1.67		$43.47	
Wood stockade fence 6 ft (2 m) high - Install	02820-510-1240	L.F.	B-80C	150	$12.70	$10.57	$2.01		$25.28	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
Fencing Removal										
Barbed 3-strand Removal	02220-220-1600	L.F.	2 Clab	430		$2.83	$0.70		$3.53	
Barbed 4-strand Removal	extrapolated	L.F.	2 Clab	355		$3.43	$0.85		$4.28	
Barbed 5-strand Removal	02220-220-1650	L.F.	2 Clab	280		$4.34	$1.08		$5.42	
Chain link 8-10 ft (2.5-3 m) Removal	02220-220-1700	L.F.	B-6	445		$2.73	$1.09		$3.82	
Wood, all types 4-6 ft ("1.5-2 m) high - Removal	02220-220-1775	L.F.	2 Clab	430		$2.83	$0.70		$3.53	
	user	L.F.								
	user	L.F.							$0.00	
	user	L.F.							$0.00	
	user	L.F.							$0.00	
Culvert Removal										
12 in (300 mm) Diameter	02220-220-2900	L.F.	B-6	175		$6.95	$2.77		$9.72	
18 in (450 mm) Diameter	02220-220-2930	L.F.	B-6	150		$8.11	$3.23		$11.34	
24 in (600 mm) Diameter	02220-220-2960	L.F.	B-6	120		$10.13	$4.04		$14.17	
36 in (1m) Diameter	02220-220-3000	L.F.	B-6	90		$13.51	$5.38		$18.89	
Pipeline Removal										
0.75 in (20mm) - 4 in (100 mm) diameter	02220-381-1600	L.F.	B-20	700		$3.00	$0.43		$3.43	
6 in (150 mm) - 8 in (200 mm)	02220-381-1700	L.F.	B-20	500		$4.20	$0.60		$4.80	
10 in (250 mm) - 18 in (450 mm)	02220-381-1800	L.F.	B-20	300		$7.00	$1.00		$8.00	
20 in (500 mm) - 36 in (1 m)	02220-381-1900	L.F.	B-20	200		$10.50	$1.51		$12.01	
Pipe and Drainpipe Installation										
Water 4in (100mm) 40ft (12m) length, welded HDPE	02510-760-0100	L.F.	B-22A	400	$3.74	$6.35	$5.24		$15.33	
Water 6in (150mm) 40ft (12m) length, welded HDPE	02510-760-0200	L.F.	B-22A	380	$7.45	$6.69	$5.52		$19.66	
Water 12in (300mm) 40ft (12m) length, welded HDPE	02510-760-0500	L.F.	B-22A	260		$9.77	$8.07		$17.84	
Drain 4in (100mm) perforated PVC	02620-630-2100	L.F.	B-14	315	$1.32	$10.53	$1.83		$13.68	
Drain 6in (150mm) perforated PVC	02620-630-2110	L.F.	B-14	300	$2.98	$11.06	$1.93		$15.97	
Drain 4in (100mm) corrugated, perf or plain	02620-660-0040	L.F.	2 Clab	1200	$0.46	$1.01	$0.25		$1.72	
Drain 6in (150mm) corrugated., perf or plain	02620-660-0060	L.F.	2 Clab	900	$1.33	$1.35	$0.33		$3.01	

Closure Cost Estimate
Misc. Unit Costs

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Drain Rock Preparation										
Crushing		C.Y.							$0.50	
Screening		C.Y.							$0.50	
TOTAL									$1.00	
Misc.										
Backhoe work	02210-700-0120	C.Y.	B-11M	28		$17.08	$9.88		$26.96	
Powerline and Transformer Removal										
Single Pole		mile							$39,894.00	
Double Pole		mile							$45,593.00	
Transformer (9)		ea.							$5,000.00	
NOTES:										
(7) Single Pole Source:										
(8) Double Pole Source:										
(9) Transformer Source:										

Erosion and Sedimentation Control

Hourly productivity rates and crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data .
All equipment, labor and material unit costs are from Labor Costs, Equipment Costs and Material Costs spreadsheets

	Means Number	Unit	Crew	Daily Output	Materials	Labor	Equipment	Premium	Total	Notes
Rip-Rap & Rock Lining										
Rip-Rap 3/8 to 1/4 CY (m3) pieces, grouted	02370-450-0110	S.Y.	B-13	80	$17.70	$35.48	$10.43		$63.61	assumes on-site source of rip-rap
Rip-Rap 18 in (450 mm) min thick, no grout	02370-450-0200	S.Y.	B-13	53	$5.85	$53.56	$15.74		$75.15	assumes on-site source of rip-rap
Gabions, 6 in (150 mm) deep	02370-450-0400	S.Y.	B-13	200	$8.35	$14.19	$4.17		$26.71	assumes on-site source rock fill for gabions
Gabions, 9 in (250 mm) deep	02370-450-0500	S.Y.	B-13	163	$12.15	$17.42	$5.12		$34.69	assumes on-site source rock fill for gabions
Gabions, 12 in (300 mm) deep	02370-450-0200	S.Y.	B-13	153	$16.45	$18.55	$5.45		$40.45	assumes on-site source rock fill for gabions
Gabions, 18 in (450 mm) deep	02370-450-0200	S.Y.	B-13	102	$23.00	$27.83	$8.18		$59.01	assumes on-site source rock fill for gabions
Gabions, 36 in (1m) deep	02370-450-0200	S.Y.	B-13	60	$31.00	$47.31	$13.90		$92.21	assumes on-site source rock fill for gabions
HDEP Liner Installation										
Finish grading large area	2310-100-0100	S.F.	B-11L	54000		$0.02	$0.02		$0.04	
Compaction-riding, vibrating roller - 12in (300mm) lifts	2315-310-5100	C.Y.	B-10Y	2600		$0.33	$0.16		$0.49	
60 mil HDPE	2660-610-0010	S.F.	3 Skwk	1600	$0.53	$0.99	$0.43	10%	$2.15	
40 mil LDPE geomembran	user	S.F.	3 Skwk	5000	$0.55	$0.32	$0.14		$1.01	HRF Cover Sys UC
Non-woven geotextile	user	S.F.	3 Skwk	9000	$0.25	$0.18	$0.08		$0.51	HRF Cover Sys UC
Geogrid	user	S.F.	3 Skwk	9000	$0.20	$0.18	$0.08		$0.46	HRF Cover Sys UC
	user	S.F.	3 Skwk						$0.00	

Construction Management Support

Office Trailer, Furnished, no hook-ups	0150-500-0250	mo.			$167.00				$167.00	
Toilet Portable, chemical	1590-400-6410	mo.			$132.00				$132.00	
TOTAL					$299.00				$299.00	

Pump and Casing Removal

	Pump Type	Measurement	Unit				Labor	Equipment		Total	Notes
Pump Removal											
Submersible		ft to pump	L.F.				$2.51	$5.45		$7.96	
Line Shaft		ft to pump	L.F.				$5.85	$12.72		$18.57	
NOTES:											
(10) Pump Removal Source:											

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Cost Estimate Type: Surety Cost Basis: Polymet

EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
RIPPING						
Rip road						
Waste rock dumps, heaps, tails - rip flat surfaces						
Surface preparation						
Scarify						
Small Dozer w/ multi-shank						
D6R				$97.93	$59.78	$157.71
Totals				$97.93	$59.78	$157.71
Medium Dozer w/ multi-shank						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer w/ multi-shank						
D10R				$272.44	$59.78	$332.22
Totals				$272.44	$59.78	$332.22
Grader w/ multi-shank						
16G/H				$188.08	$59.78	$247.86
Totals				$188.08	$59.78	$247.86
GRADING						
Grading storage and structure areas						
Grading waste rock dumps and heaps						
Grading landfills						
Constructing pit safety berms						
Small Dozer Fleet						
D7R				$126.99	$59.78	$186.77
Totals				$126.99	$59.78	$186.77
Medium Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer Fleet						
D10R				$272.44	$59.78	$332.22
Totals				$272.44	$59.78	$332.22
EXPLORATION GRADING						
Backfilling and grading exploration trenches						
Grading flat exploration roads						
Small Dozer Fleet						
D7R				$126.99	$59.78	$186.77
Totals				$126.99	$59.78	$186.77
Medium Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Large Dozer Fleet						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
EXCAVATING						
Earthen Berms						
Diversion ditch excavation and backfill						
Underground openings backfill - excavate and place						
Pit berm construction (excavator option)						
Small Excavator						
325C				$79.67	$59.78	$139.45
Totals				$79.67	$59.78	$139.45
Medium Excavator						
330C				$96.44	$59.78	$156.22
Totals				$96.44	$59.78	$156.22
Large Excavator						
385BL				$256.29	$59.78	$316.07
Totals				$256.29	$59.78	$316.07
EXCAVATE AND RECONTOUR						
Recontour large roads (haul roads, access roads, etc.)						
Ponds - Excavate and pull liner and bury						
Small Excavator + Dozer						
325C				$79.67	$59.78	$139.45
D7R				$126.99	$59.78	$186.77
Total Equipment				$206.66	$119.56	$326.22
Medium Excavator + Dozer						
330C				$96.44	$59.78	$156.22
D9R				$220.68	$59.78	$280.46
Totals				$317.12	$119.56	$436.68
Large Excavator + Dozer						
385BL				$256.29	$59.78	$316.07
D10R				$272.44	$59.78	$332.22
Totals				$528.73	$119.56	$648.29
EXPLORATION ROAD/PAD RECONTOUR						
Recontour small roads (exploration roads, service roads, etc.)						
Cut and Fill reclamation on slopes						
Drill pad recountour						
Drill sump backfill						
Small Dozer						
D6R				$97.93	$59.78	$157.71
Totals				$97.93	$59.78	$157.71
Large Dozer						
D8R				$156.81	$59.78	$216.59
Totals				$156.81	$59.78	$216.59
Grader						
14G/H				$140.96	$59.78	$200.74
Totals				$140.96	$59.78	$200.74
Small Excavator						
320C				$65.51	$59.78	$125.29
Totals				$65.51	$59.78	$125.29
Medium Excavator						
345B				$142.62	$59.78	$202.40
Totals				$142.62	$59.78	$202.40

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
LOAD, HAUL AND PLACE MATERIAL						
Rock placement						
Haul overburden for backfill						
Haul borrow for backfill						
Haul cover or growth media						
Small Truck/Loader Fleet						
725				$101.80	$59.78	$161.58
966G	**Loader**			$119.59	$59.78	$179.37
D7R		1		$126.99	$59.78	$186.77
Totals				$348.38	$179.34	$527.72
Medium Truck/Loader Fleet						
740				$160.41	$59.78	$220.19
988G	**Loader**			$243.10	$59.78	$302.88
D8R		1		$156.81	$59.78	$216.59
Totals				$560.32	$179.34	$739.66
Large Truck/Loader Fleet						
777D				$388.56	$59.78	$448.34
992G	**Loader**			$505.86	$59.78	$565.64
D10R		1		$272.44	$59.78	$332.22
Totals				$1,166.86	$179.34	$1,346.20
Extra Large Truck/Loader Fleet						
785C				$72.39	$59.78	$132.17
992G	**Loader**			$505.86	$59.78	$565.64
D11R		1		$472.78	$59.78	$532.56
Totals				$1,051.03	$179.34	$1,230.37
Scraper/Dozer Fleet						
631G				$262.01	$59.78	$321.79
D10R				$272.44	$59.78	$332.22
D7R		1		$126.99	$59.78	$186.77
Totals				$661.44	$179.34	$840.78
Tandem Scraper Fleet						
637G				$297.91	$59.78	$357.69
D7R		1		$126.99	$59.78	$186.77
Totals				$424.90	$119.56	$544.46
MISC. LOAD AND HAUL AND EARTHWORKS						
Sludge removal						
Drainage controls						
Misc. - Cat 325B Excavator / 10-12 yd3 Truck						
325C				$79.67	$59.78	$139.45
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$179.98	$119.56	$299.54
Misc. - Cat D9R Dozer/ Loader (5 yd3) / 10-12 yd3 Truck						
D9R				$220.68	$59.78	$280.46
966G				$119.59	$59.78	$179.37
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$440.58	$179.34	$619.92
Misc. - Cat D6 Dozer / Cat 966 Loader / 10-12 yd3 Truck						
D6R				$97.93	$59.78	$157.71
966G				$119.59	$59.78	$179.37
Dump Truck (10-12 yd3)				$100.31	$59.78	$160.09
Totals				$317.83	$179.34	$497.17

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
CONCRETE BREAKING						
Slab demolition Footing demolition Wall demolition						
Small - Cat 325B Excavator w/ H140D s Hammer						
325C				$79.67	$59.78	$139.45
H-120 (fits 325)				$23.02	$0.00	$23.02
D9R				$220.68	$59.78	$280.46
Totals				$323.37	$119.56	$442.93
Medium - Cat 345B Excavator w/ H180D s Hammer						
345B				$142.62	$59.78	$202.40
H-160 (fits 345)				$33.87	$0.00	$33.87
D9R				$220.68	$59.78	$280.46
Totals				$397.17	$119.56	$516.73
Large - Cat 385B Excavator w/ H180D s Hammer						
385BL				$256.29	$59.78	$316.07
H-180 (fits 365/385)				$35.09	$0.00	$35.09
D9R				$220.68	$59.78	$280.46
Totals				$512.06	$119.56	$631.62
DRILL HOLE ABANDONMENT						
Drill Hole - Grout or Cement						
Pump (plugging) Drill Rig				$378.60	$59.78	$438.38
Driller's Helper		2		$0.00	$92.22	$92.22
Totals				$378.60	$152.00	$530.60
Drill Hole - Inert Media (Means Crew B-11M+ 1 Laborer)						
420D 4WD Backhoe				$34.59	$59.78	$94.37
General Laborer		1		$0.00	$46.11	$46.11
Totals				$34.59	$105.89	$140.48
Drill Hole - Casing Perforation or Removal						
Heavy Duty Drill Rig				$384.57	$59.78	$444.35
Driller's Helper		2		$0.00	$92.22	$92.22
Totals				$384.57	$152.00	$536.57
MAINTENANCE FLEET						
Road Grading, Dust Suppression, Clean Up						
Maintenance - Small Water Truck and Cat 14G Grader						
613E (5,000 gal) Water Wagon				$71.43	$59.78	$131.21
120H				$91.06	$59.78	$150.84
Totals				$162.49	$119.56	$282.05
Maintenance - Medium Water Truck and Cat 16G Grader						
613E (5,000 gal) Water Wagon				$71.43	$59.78	$131.21
14G/H				$140.96	$59.78	$200.74
Totals				$212.39	$119.56	$331.95
Maintenance - Large Water Truck and Cat 16G Grader						
777D Water Truck				$50.00	$59.78	$109.78
16G/H				$188.08	$59.78	$247.86
Totals				$238.08	$119.56	$357.64
PROJECT SUPERVISION						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Totals				$23.57	$170.40	$193.97

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
MEANS CREW DEFINITIONS						
Crew composition from Means Heavy Construction 2005 Edition by permission of R.S.Means/Reed Construction Data . For use with misc. unit costs where Means is the source for productivity						
1 Clab - Seedling Planting/Block Wall Demolition						
General Laborer		1		$0.00	$46.11	$46.11
Totals				$0.00	$46.11	$46.11
2 Clab - Barbed Wire/Wood Fence Removal, Drainpipe Installation, Pumping, Evaporation						
General Laborer		2		$0.00	$92.22	$92.22
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$152.00	$189.66
2 Clab + Excavator - Pond Liner Cut and Fold						
General Laborer		2		$0.00	$92.22	$92.22
325C				$79.67	$59.78	$139.45
Totals				$79.67	$152.00	$231.67
2 Clab + Welder - Bat Gates						
General Laborer		2		$0.00	$92.22	$92.22
Welding Equipment				$23.16	$59.78	$82.94
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$60.82	$211.78	$272.60
3 Clab - Foam Adit Plugs						
General Laborer		2		$0.00	$92.22	$92.22
420D 4WD Backhoe				$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$72.25	$211.78	$284.03
3 Clab + Welder - Culvert Bat Gate						
General Laborer		2		$0.00	$92.22	$92.22
Welding Equipment				$23.16	$59.78	$82.94
420D 4WD Backhoe				$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$95.41	$271.56	$366.97
3 Clab D - 3 Laborers + Foreman - Decontamination						
General Laborer		3		$0.00	$138.33	$138.33
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$61.23	$368.51	$429.74
3 SKWK - Liner Installation						
Skilled Laborer		3		$0.00	$138.33	$138.33
HDEP Welder (pipe or liner)		1		$52.35	$0.00	$52.35
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$86.94	$198.11	$285.05

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EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-3 - Small Building Demoltion						
LABOR						
General Laborer		2		$0.00	$92.22	$92.22
Foreman		1		$0.00	$110.62	$110.62
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
EQUIPMENT						
928G		1		$60.53	$59.78	$120.31
Dump Truck (10-12 yd3)		2		$200.62	$119.56	$320.18
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$261.15	$382.18	$643.33
B-6 - Chain Link Fence/Culvert Removal						
General Laborer		2		$0.00	$92.22	$92.22
928G		1		$60.53	$59.78	$120.31
Totals				$60.53	$152.00	$212.53
B-8 - Large Building Demolition						
LABOR						
General Laborer		2		$0.00	$92.22	$92.22
Foreman		1		$0.00	$110.62	$110.62
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
EQUIPMENT						
928G		1		$60.53	$59.78	$120.31
20 Ton Crane		1		$35.92	$59.78	$95.70
Dump Truck (10-12 yd3)		2		$200.62	$119.56	$320.18
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
				$0.00		$0.00
Totals				$297.07	$441.96	$739.03
B-9 - Concrete Wall Demolition						
General Laborer		4		$0.00	$184.44	$184.44
Foreman		1		$0.00	$110.62	$110.62
Air Compressor + tools				$29.37	$59.78	$89.15
Totals				$29.37	$354.84	$384.21
B-10Y - General Compaction						
General Laborer		1		$0.00	$46.11	$46.11
CS533E Vibratory Roller		1		$52.22	$59.78	$112.00
Totals				$52.22	$105.89	$158.11
B-11L - Fine Grading for Evaporation Pond Liner Base						
General Laborer		1		$0.00	$46.11	$46.11
14G/H		1		$140.96	$59.78	$200.74
Totals				$140.96	$105.89	$246.85

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
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Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

EQUIPMENT FLEETS

ACTIVITY AND FLEET		Standard Labor Crew	User Defined Labor Crew	EQUIPMENT UNIT COST (Hourly)	TOTAL LABOR UNIT COST (Hourly)	TOTAL COST (Hourly)
B-11M - Backhoe Work						
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Totals				$34.59	$59.78	$94.37
B-12G - Rip-Rap Machine Placed (Modified)						
966G		1		$119.59	$59.78	$179.37
325C		1		$79.67	$59.78	$139.45
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$236.92	$179.34	$416.26
B-13 - Grouted Rip-Rap & Gabion Baskets						
General Laborer		4		$0.00	$184.44	$184.44
Foreman		1		$0.00	$110.62	$110.62
50 Ton Crane		1		$104.28	$59.78	$164.06
Totals				$104.28	$354.84	$459.12
B-14 PVC Drain Pipe Installation						
Foreman		1		$0.00	$110.62	$110.62
General Laborer		4		$0.00	$184.44	$184.44
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$72.25	$414.62	$486.87
B-20 - Remove Pipelines						
Foreman		1		$0.00	$110.62	$110.62
Skilled Laborer		1		$0.00	$46.11	$46.11
General Laborer		1		$0.00	$46.11	$46.11
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$262.62	$300.28
B-22A - HDEP Installation - Pipe or Liner						
Skilled Laborer		1		$0.00	$46.11	$46.11
General Laborer		2		$0.00	$92.22	$92.22
D7R		1		$126.99	$59.78	$186.77
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
420D 4WD Backhoe		1		$34.59	$59.78	$94.37
Generator 5KW		1		$10.53	$0.00	$10.53
HDEP Welder (pipe or liner)		1		$52.35	$0.00	$52.35
Totals				$262.12	$317.67	$579.79
B-80A - Install Barbed Wire Fence						
General Laborer		3		$0.00	$138.33	$138.33
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$198.11	$235.77
B-80C - Install Chain Link Fence (Flatbed truck has small crane)						
General Laborer		3		$0.00	$138.33	$138.33
Light Truck - 1.5 Ton		1		$37.66	$59.78	$97.44
Totals				$37.66	$198.11	$235.77
C-14B - Elevated Concrete Slabs (Reinforced Concrete Shaft Covers)						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Carpenter		16		$0.00	$850.24	$850.24
General Laborer		2		$0.00	$92.22	$92.22
Rodmen (reinforcing concrete)		4		$0.00	$184.44	$184.44
Cement finisher		2		$0.00	$92.22	$92.22
Gas Engine Vibrator		1		$6.98	$59.78	$66.76
Concrete Pump		1		$116.35	$0.00	$116.35
Totals				$146.90	$1,449.30	$1,596.20
C-14D - Concrete Walls Formed in Place (Reinforced Concrete Adit Bulkheads)						
Foreman		1		$0.00	$110.62	$110.62
Supervisor's Truck		1		$23.57	$59.78	$83.35
Carpenter		18		$0.00	$956.52	$956.52
General Laborer		2		$0.00	$92.22	$92.22
Rodmen (reinforcing concrete)		2		$0.00	$92.22	$92.22
Cement finisher		1		$0.00	$46.11	$46.11
Gas Engine Vibrator		1		$6.98	$59.78	$66.76
Concrete Pump		1		$116.35	$0.00	$116.35
Totals				$146.90	$1,417.25	$1,564.15

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Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Bulldozers

Dozer Specifications

Description	D11R	D10R	D9R	D8R	D7R	D6R
Blade Width (SU) (ft)	18.33	15.92	14.17	12.92	12.08	10.67
Shank Guage (3 shanks) (ft)	9.83	8.67	7.67	7.08	6.5	6.5
Pocket Spacing (ft)	4.75	4.33	3.87	3.58	3.25	3.25
Ripping Width (Ripper + 1 Pocket) (ft)	14.58	13	11.54	10.66	9.75	9.75
Ripping Speed (mph)	1	1	1	1	1	1
Ripping Maneuver (turn) Time (min)	0.25	0.25	0.25	0.25	0.25	0.25
Altitude Deration Factor	1	1	1	1	1	1
Ripping Hourly Production (excluding maneuvering time) (ft)	5,280	5,280	5,280	5,280	5,280	5,280

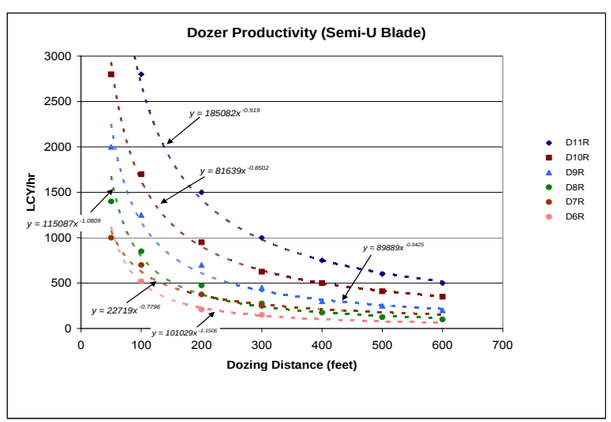
Source: Caterpillar Performance Handbook Edition 35

Dozer Productivity vs. Grading Distance

Average Dozing Distance (feet)	Production (LCY/hr) D11R	D10R	D9R	D8R	D7R	D6R
50	4,800	2,800	2,000	1,400	1,000	
100	2,800	1,700	1,250	850	700	520
200	1,500	950	700	475	375	210
300	1,000	625	450	275	250	150
400	750	500	300	175		
500	600	410	250	125		
600	500	350	200	100		

Source: Caterpillar Performance Handbook Edition 35

dozer productivity = k x Dozing Distance^{p} (see graph)						
k =	185082	81639	89889	115087	22719	101029
p =	-0.919	-0.8502	-0.9425	-1.0809	-0.7796	-1.1506



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
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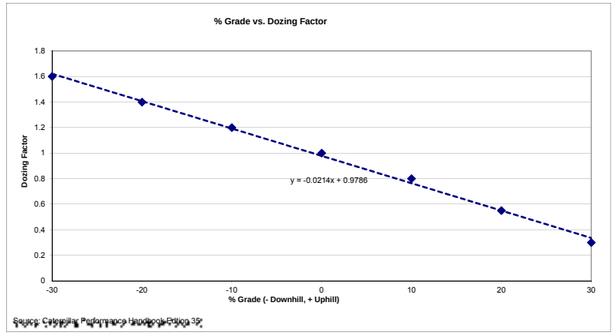
Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Bulldozers (cont.)

% Grade vs. Dozing Factor	
% Grade	Dozing Factor
-30	1.6
-20	1.4
-10	1.2
0	1
10	0.8
20	0.55
30	0.3

Source: Caterpillar Performance Handbook Edition 35
% Grade Dozing Factor = -0.0214x + 0.9786
(see graph)



Source: Caterpillar Performance Handbook Edition 35

Job Condition Correction Factors - Bulldozers	
OPERATOR	
Average	0.75
MATERIAL (1)	
Loose stockpile	1.2
Normal	1
Hard to cut; frozen — with tilt cylinder	0.8
Hard to drift; "dead" (dry,non-cohesive material) or very sticky material	0.8
Rock, ripped or blasted	0.6
SLOT DOZING OR SIDE BY SIDE (1)	1.2
VISIBILITY	
Good conditions	1
JOB EFFICIENCY	
50 min/hr	0.83

(1) Selected in facility worksheets.
Other factors included as standard factors.
Source: Caterpillar Performance Handbook Edition 35

Material Densities(1)		
Material	lb/cy	kg/m^3
Alluvium	2,900	1,720
Basalt	3,300	1,960
Clay - Dry	2,500	1,480
Granite - broken	2,800	1,660
Gravel	2,550	1,510
LS - broken	2,600	1,540
LS - crushed	2,600	1,540
Sandstone	2,550	1,510
Shale	2,100	1,250
Stone - crushed	2,700	1,600
Tailings - Coarse (dry, loose sand)	2,400	1,420
Tailings - Slimes (loose sand & clay)	2,700	1,600
Topsoil	1,600	950

(1) Source: Caterpillar Performance Handbook Edition 35

Note: uses Sand & Gravel - Dry from Caterpillar Handbook

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Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Scrapers

Scraper Specifications

Description	631G	637G
Empty Weight	100,600	112,760
Payload Capacity (cy)		
Struck	24	24
Heaped	34	34
Average	29	29
Loaded by	One D10R	Self*
Load Time (min)	1	1
Maneuver and Spread (min)	1	1
Job Efficiency	1	1
Rolling Resistance**	3	3
Altitude Deration Factor	1	1

* Requires pair

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials			Downhill Scraper Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)											
			631G						637G PP					
Material	lb/cy	Scraper Load lb	Loaded Weight (lbs)	22	16	10	5	1	Loaded Weight (lbs)	25	15	10	5	1
Alluvium	2,900	84,100	184,700	7.5	10	13	33	33	196,860	7	10	18.5	34	34
Basalt	3,300	95,700	196,300	7.5	10	13	24.5	33	208,460	7	10	18.5	25	34
Clay - Dry	2,500	72,500	173,100	7.5	10	13	33	33	185,260	7	10	18.5	34	34
Granite - broken	2,800	81,200	181,800	7.5	10	13	33	33	193,960	7	10	18.5	34	34
Gravel	2,550	73,950	174,550	7.5	10	13	33	33	186,710	7	10	18.5	34	34
LS - broken	2,600	75,400	176,000	7.5	10	13	33	33	188,160	7	10	18.5	34	34
LS - crushed	2,600	75,400	176,000	7.5	10	13	33	33	188,160	7	10	18.5	34	34
Sandstone	2,550	73,950	174,550	7.5	10	13	33	33	186,710	7	10	18.5	34	34
Shale	2,100	60,900	161,500	7.5	10	18	33	33	173,660	10	13.5	18.5	34	34
Stone - crushed	2,700	78,300	178,900	7.5	10	13	33	33	191,060	7	10	18.5	34	34
Tailings - Coarse (dry, loose sand)	2,400	69,600	170,200	7.5	10	13	33	33	182,360	7	10	18.5	34	34
Tailings - Slimes (loose sand & clay)	2,700	78,300	178,900	7.5	10	13	33	33	191,060	7	10	18.5	34	34
Topsoil	1,600	46,400	147,000	7.5	10	18	33	33	159,160	10	13.5	18.5	34	34
			Empty	10	18	24.5	33	33	Empty	10	13.5	18.5	34	34

Source: Caterpillar Performance Handbook Edition 34

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Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

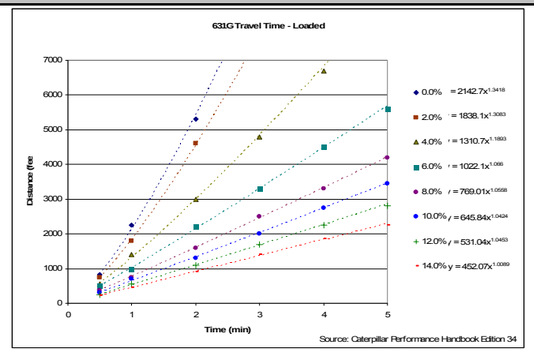
Productivity - Scrapers (cont.)

631G Scraper Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	825	2,250	5,300				2142.7	1.3418
2	750	1,800	4,600				1838.1	1.3083
4	550	1,400	3,000	4,800	6,700		1310.7	1.1893
6	490	1,000	2,200	3,300	4,500	5,600	1022.1	1.066
8	375	750	1,600	2,500	3,300	4,200	769.01	1.0558
10	300	700	1,300	2,000	2,750	3,450	645.84	1.0424
12	250	550	1,100	1,700	2,250	2,800	531.04	1.0453
14	225	450	900	1,400	1,850	2,250	452.07	1.0089

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



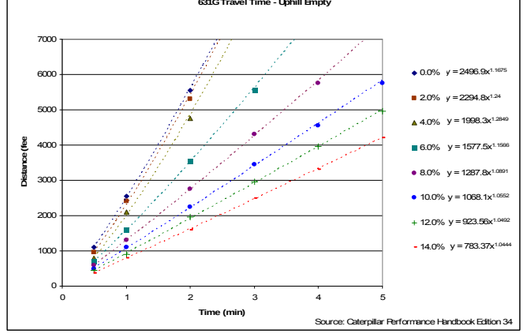
Source: Caterpillar Performance Handbook Edition 34

631G Scraper Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,100	2,550	5,550				2496.9	1.1675
2	950	2,400	5,300				2294.8	1.24
4	800	2,100	4,750				1998.3	1.2849
6	700	1,600	3,550	5,550			1557.5	1.1566
8	600	1,300	2,750	4,300	5,750		1287.8	1.0891
10	500	1,100	2,250	3,450	4,550	5,750	1068.1	1.0552
12	450	900	1,950	2,950	3,950	4,950	923.56	1.0492
14	375	800	1,600	2,500	3,300	4,200	783.37	1.0444

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

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Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

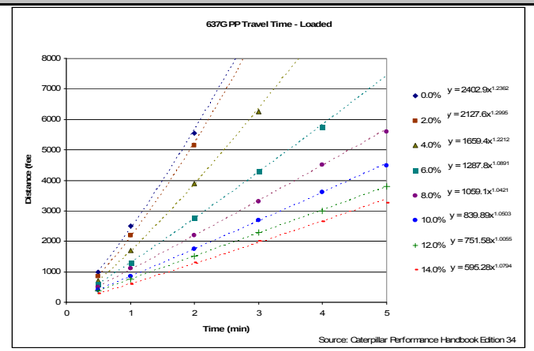
Productivity - Scrapers (cont.)

637G Push-Pull Scraper Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,000	2,500	5,550				2402.9	1.2362
2	850	2,200	5,150				2127.6	1.2995
4	700	1,700	3,900	6,250			1659.4	1.2212
6	600	1,300	2,750	4,300	5,750		1287.8	1.0891
8	500	1,100	2,200	3,300	4,500	5,600	1059.1	1.0421
10	400	850	1,750	2,700	3,600	4,475	839.89	1.0503
12	375	750	1,500	2,300	3,000	3,800	751.58	1.0055
14	275	600	1,300	2,000	2,650	3,250	595.28	1.0794

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35



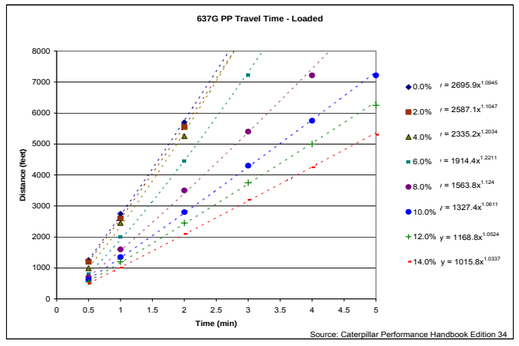
Source: Caterpillar Performance Handbook Edition 34

637G Push-Pull Scraper Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,250	2,750	5,700				2695.9	1.0945
2	1,200	2,600	5,550				2587.1	1.1047
4	990	2,450	5,250				2335.2	1.0234
6	800	2,000	4,450	7,216			1914.4	1.2211
8	700	1,600	3,500	5,400	7,216		1563.8	1.124
10	625	1,350	2,800	4,300	5,750	7,216	1327.4	1.0611
12	550	1,200	2,450	3,750	5,000	6,250	1168.8	1.0524
14	495	1,010	2,100	3,200	4,250	5,300	1015.8	1.0337

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

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Excavator Operator Skill:	Average
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Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Haul Trucks

Haul Truck Specifications

Description	769D	773E	777D	785C	793C	797B
Chassis Weight (lb)	53,506	70,330	113,160	170,000	259,500	473,600
Body Weight (lb)	17,350	20,300	34,785	36,788	70,785	104,200
Standard Liner Weight (lb)	7,000	8,600	12,040	16,846	24,418	8,800
Total Truck Weight (lb)	77,856	99,230	159,985	223,634	354,703	586,600
Payload Capacity (cy)						
Struck	21.6	34.8	55	78.5	126	228
Heaped	31.7	46	78.6	102	169	290
Average	26.65	40.4	66.8	90.25	147.5	259
Maneuver to Load Time (min)	0.7	0.7	0.7	0.7	0.7	0.7
Maneuver and Dump Time (min)	1.1	1.1	1.1	1.1	1.1	1.1
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5	2.5
Altitude Deration Factor	1	1	1	1	1	1

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials

Material	lb/cy	Truck (769D) Load lb	Truck (773E) Load lb	Truck (777D) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
					769D					773E					777D				
Alluvium	2,900	77,285	117,160	193,720	155,141	11	11	15	26	216,390	7	7	13	23	353,705	7	9	12	29
Basalt	3,300	87,945	133,320	220,440	165,801	11	11	11	20	232,550	7	7	13	23	380,425	7	7	12	21
Clay - Dry	2,500	66,625	101,000	167,000	144,481	11	11	15	28	200,230	7	9	13	23	326,985	7	9	16	29
Granite - broken	2,800	74,620	113,120	187,040	152,476	11	11	15	26	212,350	7	7	13	23	347,025	7	9	12	29
Gravel	2,550	67,958	103,020	170,340	145,814	11	11	15	26	202,250	7	9	13	23	330,325	7	9	16	29
LS - broken	2,600	69,290	105,040	173,680	147,146	11	11	15	26	204,270	7	9	13	23	333,665	7	9	12	29
LS - crushed	2,600	69,290	105,040	173,680	147,146	11	11	15	26	204,270	7	9	13	23	333,665	7	9	12	29
Sandstone	2,550	67,958	103,020	170,340	145,814	11	11	15	26	202,250	7	9	13	23	330,325	7	9	16	29
Shale	2,100	55,965	84,840	140,280	133,821	11	11	15	26	184,070	7	9	13	31	300,265	7	9	16	29
Stone - crushed	2,700	71,955	109,080	180,360	149,811	11	11	15	26	208,310	7	7	13	23	340,345	7	9	12	29
Tailings - Coarse (dry, loose sand)	2,400	63,960	96,960	160,320	141,816	11	11	15	26	196,190	7	9	13	23	320,305	7	9	16	29
Tailings - Slimes (loose sand & clay)	2,700	71,955	109,080	180,360	149,811	11	11	15	26	208,310	7	7	13	23	340,345	7	9	12	29
Topsoil	1,600	42,640	64,640	106,880	120,496	11	11	15	26	163,870	7	9	17	31	266,865	9	12	16	29
					Empty	15	15	26	36	Empty	13	17	23	42	Empty	16	16	29	39

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials

Material	lb/cy	Truck (785C) Load lb	Truck (793C) Load lb	Truck (797B) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
					785C					793C					797B				
Alluvium	2,900	261,725	427,750	751,100	485,359	8	8	14	27	782,453	7	7	10	17	1,337,700	7	7	9	17
Basalt	3,300	297,825	486,750	854,700	521,459	8	8	14	27	841,453	7	7	10	17	1,441,300	7	7	9	17
Clay - Dry	2,500	225,625	368,750	647,500	449,259	8	11	14	36	723,453	7	7	10	25	1,234,100	7	7	9	23
Granite - broken	2,800	252,700	413,000	725,200	476,334	8	8	14	27	767,703	7	7	10	17	1,311,800	7	7	9	17
Gravel	2,550	230,138	376,125	660,450	453,772	8	8	14	36	730,828	7	7	10	25	1,247,050	7	7	9	23
LS - broken	2,600	234,650	383,500	673,400	458,284	8	8	14	27	738,203	7	7	10	25	1,260,000	7	7	9	23
LS - crushed	2,600	234,650	383,500	673,400	458,284	8	8	14	27	738,203	7	7	10	25	1,260,000	7	7	9	23
Sandstone	2,550	230,138	376,125	660,450	453,772	8	8	14	36	730,828	7	7	10	25	1,247,050	7	7	9	23
Shale	2,100	189,525	309,750	543,900	413,159	8	11	14	36	664,453	7	7	10	25	1,130,500	7	7	13	23
Stone - crushed	2,700	243,675	398,250	699,300	467,309	8	8	14	27	752,953	7	7	10	17	1,285,900	7	7	9	23
Tailings - Coarse (dry, loose sand)	2,400	216,600	354,000	621,600	440,234	8	11	14	36	708,703	7	7	10	25	1,208,200	7	7	9	23
Tailings - Slimes (loose sand & clay)	2,700	243,675	398,250	699,300	467,309	8	8	14	27	752,953	7	7	10	17	1,285,900	7	7	9	23
Topsoil	1,600	144,400	236,000	414,400	368,034	8	11	19	36	590,703	7	10	13	25	1,001,000	7	9	13	23
					Empty	14	19	36	36	Empty	10	13	17	33	Empty	13	17	23	42

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

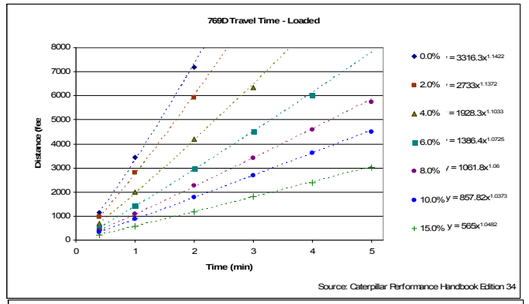
Productivity - Haul Trucks (cont.)

769D Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,148	3,428	7,183				3316.3	1.1422
4	689	1,984	4,198	6,330			1928.3	1.1033
6	508	1,427	2,952	4,510	6,002		1386.4	1.0725
8	394	1,082	2,263	3,411	4,592	5,740	1061.8	1.06
10	328	869	1,771	2,690	3,608	4,510	857.82	1.0373
15	213	574	1,181	1,804	2,394	3,018	565	1.0482

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



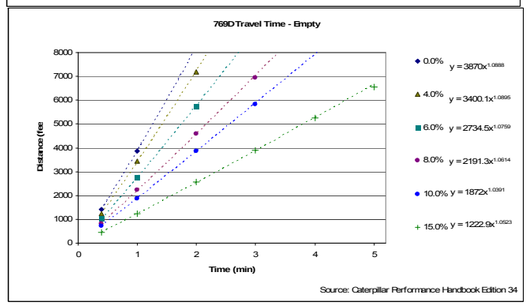
Source: Caterpillar Performance Handbook Edition 34

769D Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,427	3,870					3870	1.0888
4	1,246	3,444	7,183				3400.1	1.0895
6	1,017	2,755	5,740				2734.5	1.0759
8	820	2,230	4,592	6,954			2191.3	1.0614
10	722	1,870	3,870	5,838			1872	1.0391
15	459	1,246	2,558	3,903	5,248	6,560	1222.9	1.0523

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

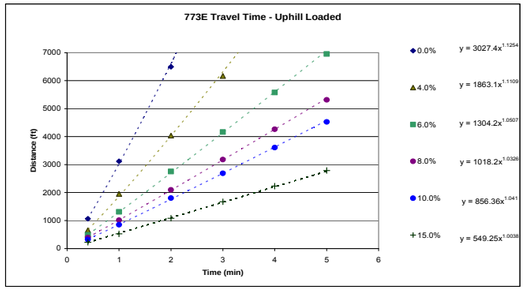
Productivity - Haul Trucks (cont.)

773E Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,066	3,117	6,496				3027.4	1.1254
4	656	1,952	4,035	6,168			1863.1	1.1109
6	492	1,312	2,756	4,167	5,577	6,955	1304.2	1.0507
8	394	1,017	2,100	3,182	4,265	5,315	1018.2	1.0326
10	328	853	1,804	2,690	3,609	4,528	856.36	1.041
15	226	525	1,083	1,673	2,231	2,789	549.25	1.0038

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

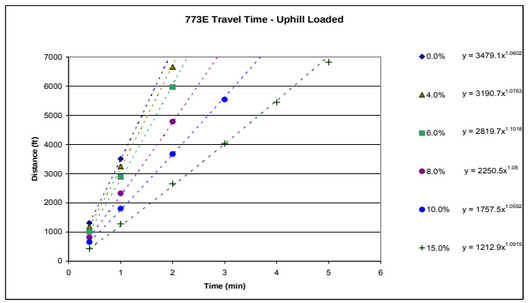


773E Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,312	3,510	7,218				3479.1	1.0602
4	1,181	3,248	6,660				3190.7	1.0763
6	1,017	2,887	5,971				2819.7	1.1018
8	820	2,329	4,790	7,218			2250.5	1.08
10	656	1,804	3,675	5,545			1757.5	1.0592
15	427	1,280	2,657	4,035	5,446	6,824	1212.9	1.0915

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

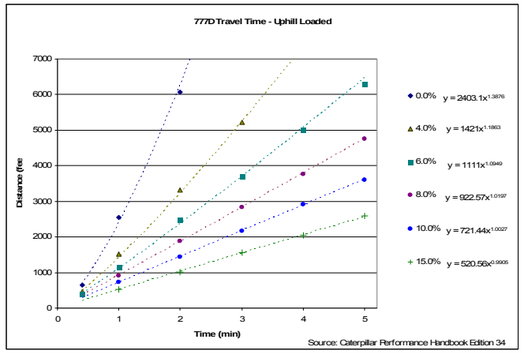
Productivity - Haul Trucks (cont.)

777D Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	656	2,558	6,068				2403.1	1.3876
4	459	1,509	3,313	5,215	7,085		1412	1.1863
6	394	1,148	2,460	3,706	5,018	6,298	1111	1.0949
8		918	1,886	2,837	3,772	4,756	922.57	1.0197
10		722	1,443	2,165	2,919	3,608	721.44	1.0027
15		525	1,017	1,558	2,034	2,591	520.56	0.9905

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



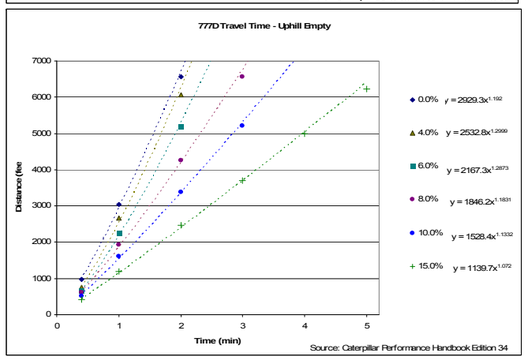
Source: Caterpillar Performance Handbook Edition 34

777D Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	968	3,034	6,560				2929.3	1.192
4	754	2,657	6,068				2532.8	1.2999
6	656	2,247	5,182				2167.3	1.2873
8	607	1,935	4,248	6,560			1846.2	1.1831
10	525	1,607	3,378	5,215	7,282		1528.4	1.1332
15	410	1,197	2,460	3,706	4,986	6,232	1139.7	1.072

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Source: Caterpillar Performance Handbook Edition 34

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

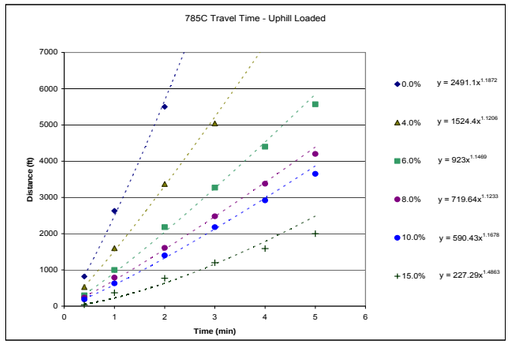
Productivity - Haul Trucks (cont.)

785C Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	820	2,630	5,500				2491.1	1.1872
4	530	1,600	3,370	5,040			1524.4	1.1206
6	300	1,000	2,180	3,270	4,400	5,570	923	1.1469
8	240	790	1,610	2,480	3,380	4,200	719.64	1.1233
10	190	630	1,400	2,180	2,920	3,650	590.43	1.1678
15	40	370	770	1,200	1,590	2,000	227.29	1.4863

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35

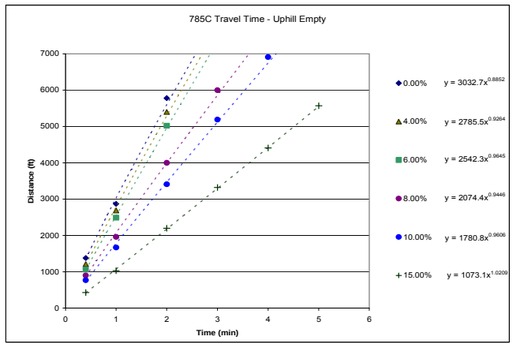


785C Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.4	1	2	3	4	5	k	p
0	1,380	2,870	5,780				3032.7	0.8852
4	1,210	2,690	5,400				2785.5	0.9264
6	1,060	2,490	5,020				2542.3	0.9645
8	900	1,960	4,000	6,000			2074.4	0.9446
10	770	1,670	3,410	5,190	6,910		1780.8	0.9606
15	430	1,030	2,200	3,320	4,410	5,570	1073.1	1.0209

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

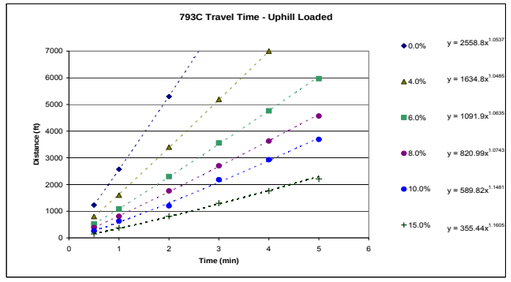
Productivity - Haul Trucks (cont.)

793C Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,230	2,570	5,300				2558.8	1.0537
4	800	1,600	3,400	5,190	7,000		1634.8	1.0485
6	520	1,090	2,300	3,560	4,760	5,970	1091.9	1.0635
8	390	810	1,760	2,700	3,630	4,570	820.99	1.0743
10	260	630	1,200	2,180	2,930	3,690	589.82	1.1481
15	150	380	810	1,300	1,760	2,210	355.44	1.1605

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

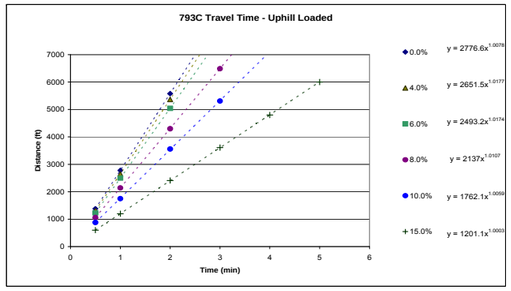


793C Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	1,380	2,780	5,580				2776.6	1.0078
4	1,310	2,650	5,370				2651.5	1.0177
6	1,230	2,500	5,040				2493.2	1.0174
8	1,060	2,140	4,300	6,490			2137	1.0107
10	880	1,750	3,560	5,310			1762.1	1.0059
15	600	1,200	2,410	3,610	4,800	6,000	1201.1	1.0003

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

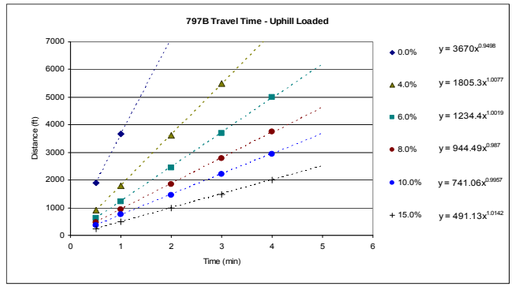
Productivity - Haul Trucks (cont.)

797B Haul Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,900	3,670					3670	0.9498
4	900	1,800	3,620	5,480			1805.3	1.0077
6	620	1,230	2,450	3,700	5,000		1234.4	1.0019
8	480	940	1,850	2,790	3,750		944.49	0.987
10	370	750	1,460	2,220	2,950		741.06	0.9957
15	240	500	1,000	1,480	2,000		491.13	1.0142

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

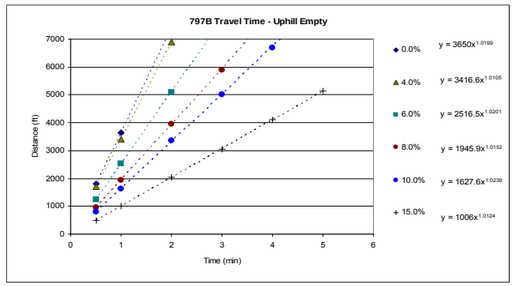


797B Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	1,800	3,650					3650	1.0199
4	1,700	3,400	6,900				3416.6	1.0105
6	1,240	2,520	5,100				2516.5	1.0201
8	960	1,950	3,960	5,900			1945.9	1.0152
10	800	1,620	3,350	5,000	6,700		1627.6	1.0239
15	500	1,000	2,040	3,050	4,100	5,130	1006	1.0124

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Articulated Trucks

Articulated Truck Specifications

Description	725	730	735	740
Chassis Weight (lb)				
Body Weight (lb)				
Standard Liner Weight (lb)				
Operating Weight (Empty) (lb)	50,120	51,220	65,830	72,070
Payload Capacity (cy)				
Struck	14.5	17.1	19.3	23.3
Heaped	18.8	22.1	31.8	30.2
Average	16.65	19.6	25.55	26.75
Maneuver to Load Time (min)	0.7	0.7	0.7	0.7
Maneuver and Dump Time (min)	1.1	1.1	1.1	1.1
Job Efficiency	0.83	0.83	0.83	0.83
Rolling Resistance**	2.5	2.5	2.5	2.5
Altitude Deration Factor	1	1	1	1

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials				Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)									
				725					730				
Material	lb/cy	Truck (725) Load lb	Truck (730) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	2,900	48,285	56,840	98,405	9	9	13	30	108,060	5	8	13	29
Basalt	3,300	54,945	64,680	105,065	5	9	13	22	115,900	5	8	13	29
Clay - Dry	2,500	41,625	49,000	91,745	9	13	13	30	100,220	8	8	13	29
Granite - broken	2,800	46,620	54,880	96,740	9	13	13	30	106,100	5	8	13	29
Gravel	2,550	42,458	49,980	92,578	9	13	13	30	101,200	8	8	13	29
LS - broken	2,600	43,290	50,960	93,410	9	13	13	30	102,180	8	8	13	29
LS - crushed	2,600	43,290	50,960	93,410	9	13	13	30	102,180	8	8	13	29
Sandstone	2,550	42,458	49,980	92,578	9	13	13	30	101,200	8	8	13	29
Shale	2,100	34,965	41,160	85,085	9	13	22	30	92,380	8	13	13	29
Stone - crushed	2,700	44,955	52,920	95,075	9	13	13	30	104,140	8	8	13	29
Tailings - Coarse (dry, loose sand)	2,400	39,960	47,040	90,080	9	13	13	30	98,260	8	8	13	29
Tailings - Slimes (loose sand & clay)	2,700	44,955	52,920	95,075	9	13	13	30	104,140	8	8	13	29
Topsoil	1,600	26,640	31,360	76,760	9	13	22	30	82,580	8	13	22	35
				Empty	13	13	22	30	Empty	13	13	22	35

Source: Caterpillar Performance Handbook Edition 35

Weight of Materials				Downhill Haul Truck Speed - Grade Retarding vs. Effective Grade (Grade - Rolling Resistance)									
				735					740				
Material	lb/cy	Truck (735) Load lb	Truck (740) Load lb	Loaded Weight (lbs)	20	15	10	5	Loaded Weight (lbs)	20	15	10	5
Alluvium	2,900	74,095	77,575	139,925	7	9	13	27	149,645	7	9	17	23
Basalt	3,300	84,315	88,275	150,145	7	9	13	27	160,345	7	9	13	23
Clay - Dry	2,500	63,875	66,875	129,705	7	9	13	27	138,945	9	13	17	31
Granite - broken	2,800	71,540	74,900	137,370	7	9	13	27	146,970	7	9	17	23
Gravel	2,550	65,153	68,213	130,983	7	9	13	27	140,283	7	9	17	31
LS - broken	2,600	66,430	69,550	132,260	7	9	13	27	141,620	7	9	17	31
LS - crushed	2,600	66,430	69,550	132,260	7	9	13	27	141,620	7	9	17	31
Sandstone	2,550	65,153	68,213	130,983	7	9	13	27	140,283	7	9	17	31
Shale	2,100	53,655	56,175	119,485	9	9	18	27	128,245	7	13	17	31
Stone - crushed	2,700	68,985	72,225	134,815	7	9	13	27	144,295	7	9	17	23
Tailings - Coarse (dry, loose sand)	2,400	61,320	64,200	127,150	7	9	13	27	136,270	9	13	17	31
Tailings - Slimes (loose sand & clay)	2,700	68,985	72,225	134,815	7	9	13	27	144,295	7	9	17	23
Topsoil	1,600	40,880	42,800	106,710	9	13	18	36	114,870	9	13	17	31
				Empty	13	18	27	42	Empty	17	17	23	31

Source: Caterpillar Performance Handbook Edition 35

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

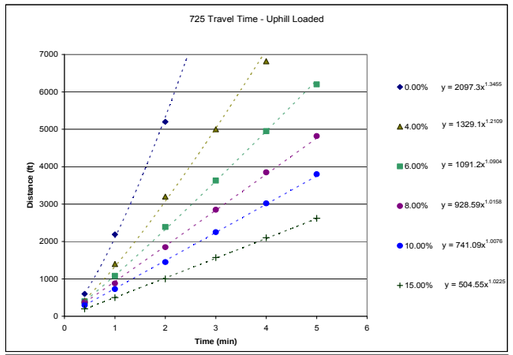
Productivity - Articulated Trucks (cont.)

725 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	600	2,190	5,200				2097.3	1.3455
4	420	1,400	3,200	5,000	6,820		1329.1	1.2109
6	400	1,080	2,390	3,630	4,950	6,200	1091.2	1.0904
8	380	880	1,850	2,850	3,850	4,820	928.59	1.0158
10	300	729	1,450	2,250	3,020	3,800	741.09	1.0076
15	200	500	1,000	1,570	2,100	2,620	504.55	1.0225

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35

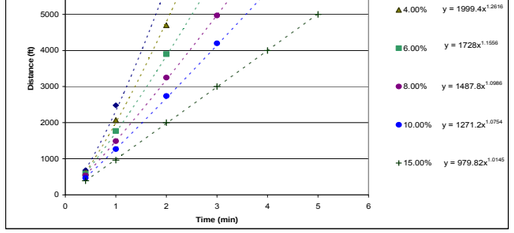


725 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	680	2,480	5,570				2326.3	1.3122
4	620	2,070	4,700				1999.4	1.2616
6	590	1,770	3,900	6,020			1728	1.1556
8	540	1,490	3,250	4,970	6,730		1487.8	1.0986
10	470	1,270	2,740	4,200	5,600	7,050	1271.2	1.0754
15	390	960	2,000	3,000	4,000	5,000	979.82	1.0145

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

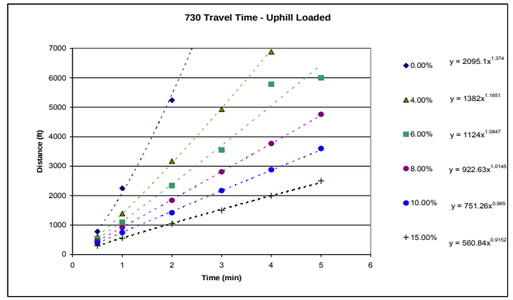
Productivity - Articulated Trucks (cont.)

730 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	780	2,250	5,240				2095	1.374
4	610	1,390	3,170	4,930	6,880		1382	1.1651
6	540	1,100	2,340	3,550	5,780	6,000	112	1.0847
8	460	920	1,840	2,810	3,770	4,760	922.63	1.0145
10	390	750	1,420	2,170	2,880	3,600	751.26	0.965
15	300	560	1,050	1,500	1,995	2,500	560.84	0.9152

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35

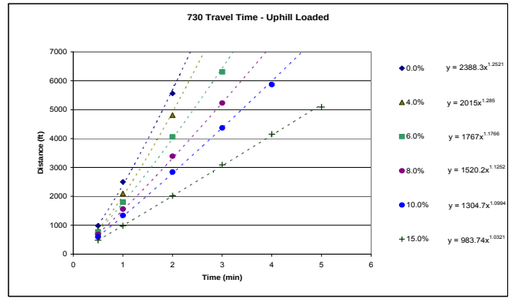


730 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	980	2,500	5,560				2388	1.25621
4	810	2,100	4,810				2015	1.285
6	770	1,800	4,060	6,310			1767	1.1766
8	680	1,560	3,390	5,230	7,070		1520.2	1.1252
10	595	1,340	2,840	4,370	5,870		1304.7	1.0994
15	480	980	2,020	3,090	4,150	5,090	983.74	1.0321

$$\text{Travel Time (min)} = \sqrt[p]{\frac{\text{distance}}{k}}$$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

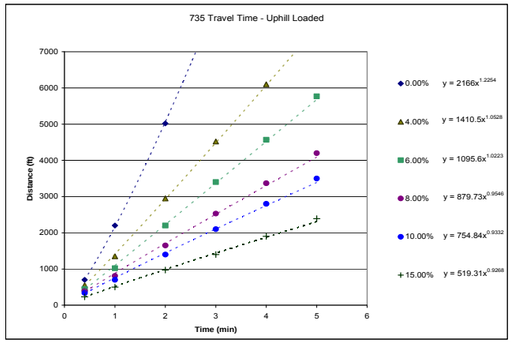
Productivity - Articulated Trucks (cont.)

735 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	700	2,200	5,020				2166	1.2254
4	550	1,350	2,950	4,520	6,100		1410.5	1.0528
6	450	1,020	2,200	3,400	4,570	5,770	1095.6	1.0223
8	390	810	1,650	2,530	3,370	4,200	879.73	0.9546
10	340	700	1,400	2,100	2,800	3,500	754.84	0.9332
15	230	500	970	1,400	1,900	2,390	519.31	0.9268

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35

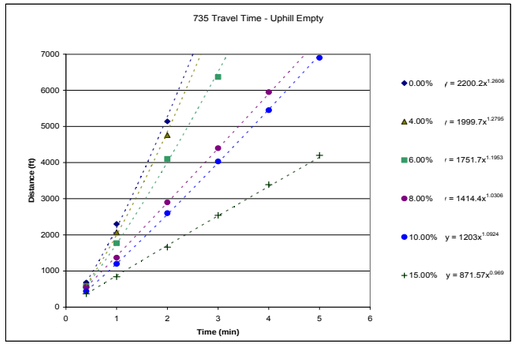


735 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min) 0.5	1	2	3	4	5	k	p
0	680	2,300	5,140				2200.2	1.2606
4	610	2,070	4,760				1999.7	1.2795
6	580	1,770	4,100	6,370			1751.7	1.1953
8	560	1,370	2,900	4,400	5,950		1414.4	1.0306
10	440	1,200	2,600	4,030	5,450	6,900	1203	1.0924
15	370	840	1,660	2,540	3,390	4,200	871.57	0.969

Travel Time (min) = $\sqrt[p]{\frac{\text{distance}}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

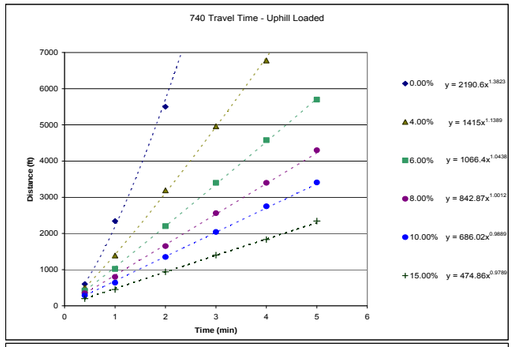
Productivity - Articulated Trucks (cont.)

740 Articulated Truck Travel Time - Uphill Loaded

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	600	2,340	5,500				2190.6	1.3823
4	500	1,390	3,190	4,960	6,780		1415	1.1389
6	420	1,020	2,200	3,400	4,580	5,700	1066.4	1.0438
8	350	800	1,650	2,560	3,400	4,300	842.87	1.0012
10	290	640	1,350	2,040	2,750	3,410	686.02	0.9889
15	200	450	940	1,400	1,830	2,340	474.86	0.9789

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35

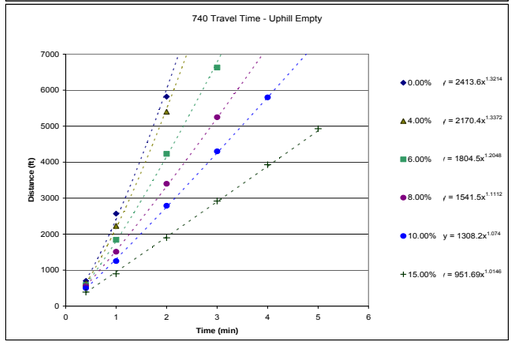


740 Haul Truck Travel Time - Uphill Empty

Total Resistance (%) (rolling + grade)	Time (min)						k	p
	0.5	1	2	3	4	5		
0	700	2,570	5,820				2413.6	1.3214
4	630	2,230	5,400				2170.4	1.3372
6	590	1,840	4,230	6,630			1804.5	1.2048
8	560	1,510	3,400	5,250	7,120		1541.5	1.1112
10	500	1,250	2,790	4,300	5,800		1308.2	1.074
15	390	900	1,900	2,920	3,930	4,930	951.69	1.0146

Travel Time (min) = $\sqrt[p]{\frac{distance}{k}}$

Source: Caterpillar Performance Handbook Edition 35



Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Wheel Loaders

Wheel Loader Specifications

Description	924G	928G	950G	966G	972G	972G (2)	980G	988G	988G(2)	990	992G	992G(2)	994D	L2350
Payload Capacity (cy)														
Struck	2.2	2.5	3.46	4.46	4.71	4.71	6.34	6.9	6.9	9.5	13.2	13.2	18	
Heaped	2.7	3.25	4	5.25	5.5	5.5	7.25	8.33	8.33	11.25	16	16	22.5	
Average	2.45	2.875	3.73	4.855	5.105	5.105	6.795	7.615	7.615	10.375	14.6	14.6	20.25	53
Matched Truck	N/A	N/A	N/A	725	730	735	N/A	740	769D	773D	777D	785C	793C	797B
Average Cycle Time (min)	0.45	0.45	0.5	0.5	0.5	0.5	0.55	0.55	0.55	0.55	0.6	0.6	0.6	0.75
Passes to Fill Truck	N/A	N/A	N/A	3	4	5	N/A	4	3	4	5	6	7	5
Altitude Deration Factor	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Operator Efficiency	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Time to Fill Truck	N/A	N/A	N/A	1.5	2	2.5	N/A	2.2	1.65	2.2	3	3.6	4.2	3.75
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Loader matched to small truck fleet
Loader matched to medium truck fleet
Loader matched to large truck fleet
Loader matched to extra large truck fleet

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered
992G (2) - can be used to load 785 with 6 passes

Source: Caterpillar Performance Handbook Edition 35; LeTourneau/actual Chilean mine operating data for L2350.

Wheeled Loaders	General Purpose	Spade Nose-Rock
928G	3.25 cubic yard	not available
966G	5.0 cubic yard	not available
972G	5.5 cubic yard	not available
988G	not available	8.3 cubic yard
992G	not available	16.0 cubic yard

note: capacities are 2:1 heaped, SAE standards
NOTES: Buckets for both Track Excavators and Wheel Loaders are offered by CECo & available for the rental rates quoted. Bucket sizes and capacities obtained from CATERPILLAR PERFORMANCE HANDBOOK, ED 34; Section 12, Wheel Loader and Section 4, Excavators

Bucket capacity and width dictated by material weight and configuration, ie., shot, loose, tight bank, stockpile, rock, etc. Typical Nevada applications were used to determine above bucket capacities as related to materials & densities. Job site specifics may alter specific bucket requirements. (Cashman Equipment, Elko, Nevada - February 21, 2005)

Productivity - Shovels

Shovel Specifications (Komatsu equivalent)

Description	PC2000	PC3000	PC4000	PC5500	PC8000
Payload Capacity (cy)					
Struck	10.46	18.84	26.16	33.48	47.09
Heaped	14.39	25.9	35.97	46.04	64.75
Average	12.43	22.37	31.07	39.76	55.92
Matched Truck	740	777D	785C	793C	797B
Average Cycle Time (min)	0.49	0.49	0.59	0.59	0.69
Passes to Fill Truck	2.05	2.84	3.38	4.69	5.11
Altitude Deration Factor	1	1	0.9	1	1
Operator Efficiency	1	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83	0.83
Time to Fill Truck	1.68	2.33	3.32	4.61	5.86
Rolling Resistance**	2.5	2.5	2.5	2.5	2.5

Shovel matched to small truck fleet
Shovel matched to medium truck fleet
Shovel matched to large truck fleet
Shovel matched to extra large truck fleet

**A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered
992G (2) - can be used to load 785 with 6 passes

Source: Caterpillar Performance Handbook Edition 35; Komatsu actual Peruvian mine (Lagunas Norte) operating data for PC4000.

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Productivity - Motor Graders

Motor Grader Specifications

Description	120H	14G/H	16G/H	24M
Grader Width (ft)	8	9.25	10.08	14.04
Blade Width (ft)	12	14	16	16
Ripper Width (7 shanks) (ft)	7.6	8.5	9.75	12.83
Road Maintence Speed (mph)				
Minimum	3	3	3	3
Maximum	9.5	9.5	9.5	9.5
Average	6.25	6.25	6.25	6.25
Hourly Production	33,000	33,000	33,000	33,000
Ripping Speed (mph)	1	1	1	1
Minimum	0	0	0	0
Maximum	3	3	3	3
Average	1.5	1.5	1.5	1.5
Altitude Deration Factor	1	1	1	1
Hourly Production (with job efficiency correction & altitude deration factors) (excluding manuever time)	6,574	6,574	6,574	6,574
Maneuver time per pass (min)	0.5	0.5	0.5	0.5
Operator Efficiency	1	1	1	1
Job Efficiency	0.83	0.83	0.83	0.83

Source: Caterpillar Performance Handbook Edition 35

Productivity - Excavators

Track Excavator Specifications

Description	312C	320C	325C	330C	345B	365BL	385BL
Bucket Capacity (cy)	0.68	1.57	2.22	2.22	3	4.6	7.3
Fill Factor	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Average Bucket Load (cy)	0.612	1.413	1.998	1.998	2.7	4.14	6.57
Soil Type	packed earth	hard clay	hard clay	hard clay	hard clay	hard clay	hard clay
Job Condition	med-hard	med-hard	med-hard	med-hard	med-hard	med-hard	med-hard
Cycle Times (minutes) - based on hard clay							
Load Bucket	0.07	0.09	0.09	0.09	0.13	0.1	0.19
Swing Loaded	0.06	0.06	0.06	0.07	0.07	0.09	0.06
Dump Bucket	0.03	0.03	0.04	0.04	0.02	0.04	0.03
Swing Empty	0.05	0.05	0.06	0.07	0.06	0.07	0.07
Total Cycle Time	0.21	0.23	0.25	0.27	0.28	0.3	0.35
Job Efficiency	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Operator Efficiency	1	1	1	1	1	1	1
Altitude Deration Factor	1	1	1	1	1	1	1
Corrected Productivity (LCY/hr)	145	306	398	369	480	687	935
Exploration Road Cycle Time (1) (min)	N/A	0.38	0.4	N/A	0.42	N/A	N/A
Exploration Road Corr Prod (LCY/hr)	N/A	185	249	N/A	320	N/A	N/A
Track Width (ft)	8.17	9.17	9.83	10.5	11.42	11.5	11.5
Ditch/Trench Excavation							
Bucket Capacity (cy)	0.42	0.58	0.88	0.89	2.09	3.27	2.75
Fill Factor	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Corrected Productivity (LCY/hr)	50	63	88	82	186	271	196

Source: Caterpillar Performance Handbook Edition 35

Track Excavators	Hvy Duty Rock	Extreme Service Exc (e.g. haulroad recontour)	Hvy Duty Trench
312C	30", 0.68 cubic yd	47", 0.94 cubic yd	22", .42 cubic yd
320C	30", 0.90 cubic yd	55.1", 1.57 cubic yd	23.6", .58 cubic yd
325C	36", 1.25 cubic yd	60", 2.22 cubic yd	30", .88 cubic yd
330C	36", 1.25 cubic yd	60", 2.22 cubic yd	30", .89 cubic yd
345B	43.2", 1.69 cubic yd	65", 3.0 cubic yd	48", 2.09 cubic yd
365BL	60", 3.25 cubic yd	82", 4.6 cubic yd	59", 3.27 cubic yd
385BL	85", 6.30 cubic yd.	96.0, 7.30 cubic yd	57", 2.75 cubic yd

Note: capacities are 2:1 heaped, SAE standards
NOTES: Buckets for both Track Excavators and Wheel Loaders are offered by CECo &

available for the rental rates quoted. Bucket sizes and capacities obtained from CATERPILLAR PERFORMANCE HANDBOOK, ED 34; Section 12, Wheel Loader and Section 4, Excavators
Bucket capacity and width dictated by material weight and configuration, ie., shot, loose, tight bank, stockpile, rock, etc. Typical Nevada applications were used to determine above bucket capacities as related to materials & densities. Job site specifics may alter specific bucket requirements (Cashman Equipment, Elko, Nevada - February 21, 2005)

(1) Exploration cycle time assumes feathering/smoothing performed by excavator

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
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Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Concrete Breaking Production

Track Excavator w/Hammer Specifications

Description	325C	345B	385BL
Hydraulic Hammer	H120D s	H160D s	H180D s
Material	reinforced concrete		
Min Shift Production (yd3/8hr)	160	300	350
Max Shift Production (yd3/8hr)	300	850	1,550
Avg Shift Production (8hr)	230	575	950
Job Efficiency	0.83	0.83	0.83
Altitude Deration Factor	1	1	1

Source: Caterpillar Performance Handbook Edition 35

Drill Hole Plugging Productivity

Drill Hole Plugging Productivity

Description	Drill Rig	Pump Rig
Move-to-hole, set-up, tear-down[1,2]	2	2
Trip in tremmie pipe [1,2]	500	
Pulling casing (threaded, not cemented)	200	
Single-pass perforating (water wells)	Productivity(all p	Passes
4	60	4
6	60	4
8	50	4
12	45	6
18	40	9
24	28	12
Perforation setup,trip in/out,tear-down	2	
Perforation tool cost (wear cost)[3,2]	2.5	
Inert Material Placement (backfill)		
Grouting/Cement [4] (cy/hr)		5.33
Cuttings (see below) (cy/hr)		3.5

Sources:
1. Drillers daily logs from Newmont, Barrick, New West Gold, Agnico Eagle, Idaho General Mines Inc.
2. Drillers daily logs from Newmont, Barrick, Target Minerals
3. Drillers daily logs from Newmont
4. WDC Exploration, Dec 2005

Source: WDC Exploration, Dec 2005

Cuttings Placement Productivity

Shift productivity (Means 02210-700-0120; Crew B11M)	28	cy / shift
Shift length	8	hours
Estimated Hourly Productivity	3.5	cy / hour

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Dozer Operator Skill:	Average
Grader Operator Skill:	Average
Truck/Scraper Operator:	Average
Loader Operator Skill:	Average
Excavator Operator Skill:	Average
Dozer Job Efficiency:	50 min/hr
Truck Job Efficiency:	50 min/hr
Scraper Job Efficiency:	50 min/hr
Loader Job Efficiency:	50 min/hr
Excavator Job Efficiency:	50 min/hr
Grader Job Efficiency:	50 min/hr

Altitude Deration Table

	Elevation											
	0-760 m (0-2500')		760-1500 m (2500-5000')		1500-2300 m (5000-7000')		2300-3000 m (7500-10,000')		3000-3800 m (10,000-12,000')		3800-4600 m (12,500-15,000')	
MODEL	CAT	User	CAT	User	CAT	User	CAT	User	CAT	User	CAT	User
Bulldozers												
D6R	100		100		100		100		92		84	
D6R w/ Winch	100		100		100		100		92		84	
D7R	100		100		100		100		100		96	
D8R	100		100		100		93		85		77	
D9R	100		100		100		93		85		77	
D10R	100		100		100		100		97		89	
D11R	100		100		100		93		85		77	
Wheeled Dozers												
824G	100		100		100		100		92		84	
834G	100		100		100		100		92		84	
844	100		100		100		100		100		96	
854G	100		100		100		93		85		77	
Graders												
120H	100		100		100		100		96		93	
14G/H	100		100		100		100		98		96	
16G/H	100		100		100		100		98		96	
24M	100		100		100		100		98		96	
Excavators												
312C	100		100		100		83		78		73	
320C	100		100		90		87		83		76	
325C	100		100		100		100		100		100	
330C	100		100		100		100		100		100	
345B	100		100		100		100		93		93	
365BL	100		100		100		86		86		86	
385BL	100		100		100		93		85		78	
Scrapers												
631G	100		100		100		100		97		90	
637G	100		100		100		95		87		80	
Loaders												
924G	100		100		100		100		97		89	
928G	100		100		100		100		92		85	
950G	100		100		100		100		100		100	
966G	100		100		100		100		96		88	
972G	100		100		92		84		77		70	
980G	100		100		100		100		96		88	
988G	100		100		100		95		85		75	
990	100		100		100		100		92		85	
992G	100		100		100		100		93		87	
994D	100		100		100		100		96		88	
L2350	100		100		100		100		96		90	
Shovels												
PC2000	100		100		100		100		96		90	
PC3000	100		100		100		100		96		90	
PC4000	100		100		100		100		96		90	
PC5500	100		100		100		100		96		90	
PC8000	100		100		100		100		96		90	
Other Equipment												
420D 4WD Backhoe	99		97		95		91		91		91	
428D 4WD Backhoe	99		97		95		91		91		91	
CS533E Vibratory Roller	100		100		98		95		91		86	
CS633E Vibratory Roller	100		100		100		100		91		86	
CP533E Sheepsfoot Compactor	100		100		98		95		91		100	
CP633E Sheepsfoot Compactor	100		100		100		100		91		86	
Light Truck - 1.5 Ton												
Supervisor's Truck												
Flatbed Truck												
Air Compressor + tools												
Welding Equipment												
Heavy Duty Drill Rig												
Pump (plugging) Drill Rig												
Concrete Pump												
Gas Engine Vibrator												
Generator 5KW												
HDEP Welder (pipe or liner)												
5 Ton Crane												
20 Ton Crane												
50 Ton Crane												
120 Ton Crane												
Trucks												
725	100		100		100		100		100		95	
730	100		100		100		100		100		95	
735	100		100		100		100		99		91	
740	100		100		100		100		99		91	
769D	100		100		100		93		88		82	
773E	100		100		100		100		93		85	
777D	100		100		100		100		93		87	
785C	100		100		100		93		86		80	
793C	100		100		100		100		100		93	
797B	100		100		100		100		100		93	
613E (5,000 gal) Water Wagon	100		100		100		100		95		87	
621E (8,000 gal) Water Wagon	100		100		100		100		97		90	
777D Water Truck	100		100		100		100		93		87	
785C Water Truck	100		100		100		93		86		80	
Dump Truck (10-12 yd^3) (5)												

Notes:
User entered deration value will override values from CAT Performance Handbook, except L2350 Loader: data from actual mine performance in Chile.
Komatsu altitude deration assumed from LeTourneau L2350

Closure Cost Estimate
User 1

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
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Cost Estimate Type: Surety Cost Basis: Polymet

Haul distances	
OSLA stockpile to:	ft
Cat 1 stockpile	9973
East pit	8782
Cat 2/3 stockpile	7988
Cat 4 stockpile	6304
Source: Haul Distances_rev_20160616.pdf	

From	Starting Elevation	To	End	Total Length
Liner	1610	East Pit	1620	7554
Cat. 4	1610	East Pit	1620	4611
Cat. 2/3	1600	East Pit	1620	9039

Stockpile Haul Distances				
From	Starting Elevation	To	End	Total Length
Liner	1610	East Pit	1620	7554
Cat. 4	1610	East Pit	1620	4611
Cat. 2/3	1600	East Pit	1620	9039

Closure Cost Estimate
User 2

:ober, 2016
ear01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
n 1.4.1

:t_cost_data_file_177900.020_ft_v7.xlsm
urety Cost Basis: Polymet

Structure Demolition
Demo Data Needed rev 14 Universal Waste Cost Updates.xlsx

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates					Mavo	Arrowhead Consulting & Testing		
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Site Restoration**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**	**Subtotal**	**Mine Year 1**
Pre-Demolition Services			$54,400								
Legacy - demoed as part of construction											
Additive Building & Heating Plant						$1,593,300.00		Included in Lakehead's total demo		$1,593,300	
Bentonite silos	8.1.14					inc in above		n/a		$0	
Area 2 Water Tower (price separate from Heating & Additives buildings)	8.1.29					$30,000.00	$2,500.00	n/a		$32,500	
Legacy Tailings Basin Buildings - Demoed as part of construction										$0	
Foreman's Office (Bldg. 718)	8.1.28	No ACT report				$9,350	$400	$6,500	$1,100	$17,350	
Reporting Building (Bldg. 719)	8.1.28	No ACT report				$9,900	$400	$6,500	$1,100	$17,900	
Lube House (Bldg. 720)	8.1.28	No ACT report				$2,500	$400	$2,500	$850	$6,250	
Reporting Building (Bldg. 724)	8.1.28	No ACT report				$3,300	$400	$2,500	$900	$7,100	
Lube Oil Building (Bldg. 725)	8.1.28	No ACT report				$2,500	$400	$2,500	$850	$6,250	
										$0	
										$0	
Legacy Area 1 - used by project											
Area 1 Shop and Truck Storage (Bldg. 220)	8.1.6	ACT Report Zone H		$2,900.00	$106,900	$103,332	$74,669	$82,500		$370,301	x
Area 1 Cold Storage (Bldg. 221)	8.1.6	ACT Report Zone H		$400.00	$48,970	$10,860	$13,400	$5,000		$78,630	x
Area 1 Reporting Building (Bldg. 231)	8.1.6	No ACT report				$9,900		$5,000	$850	$15,750	x
Area 1 Boiler House (Bldg. 226)	8.1.6	ACT Report Zone H		$200.00	$13,500	$9,875	$3,000	$2,500		$29,075	x
Area 1 Fire Pump House & Water Tank (Bldg. 228)	8.1.6	TE-8-142 and TE-8-144, ACT Report Zone H		$410.00		$11,250		$2,500		$14,160	x
Area 1 Locomotive Fueling	8.1.6	ACT Report Zone H		$500.00	$22,500	$10,100	$6,250	n/a		$39,350	x
										$0	x
Legacy Area 2 - used by project											
Area 2 Service Shop (Bldg. 201)	8.1.7	ACT Report Zone I		$2,200.00	$160,900	$38,990	$37,334	$93,050		$332,474	x
Area 2 Truck Storage (Bldg. 202)	8.1.7	ACT Report Zone I		$2,000.00	$63,190	$9,175	$13,988	$3,000		$91,353	x
Area 2 Cold Storage (204)	8.1.7	ACT Report Zone I		$697.00	$42,560	$13,080	$14,100	$3,000		$73,437	x
Area 2 Shop Locomotive Service Shop (Bldg. 203)	8.1.7	ACT Report Zone I		$3,400.00	$20,500	$12,300	$11,113	$52,150		$99,463	x
Area 2 Locomotive Fueling	8.1.7	ACT Report Zone I		$2,000.00	$20,900	$11,800	$6,250	$2,500		$43,450	x
Hose House (Bldg. 209) Not to be used in project	8.1.7	No ACT report			$3,000	$9,150		$2,500	$850	$15,500	x
Sample House (Bldg. 208) Not to be used in project	8.1.7	No ACT report			$25,400	$20,300		$5,000	$950	$51,650	x
Reporting Building (Bldg. 425) Not to be used in project	8.1.7	No ACT report			$3,300	$9,200		$3,500	$850	$16,850	x
Legacy Plant Area - used by project											
Rebuild Shop (Bldg 602)	8.1.9	ACT Report Zone A		$3,000.00	$70,200	$125,600	$27,560	$85,000		$311,360	x
General Shop (Bldg. 601) Includes Acetylene Building (Bldg.604)	8.1.8	ACT Report Zone A		$15,000.00	$199,190	$353,600	$182,300	$480,800		$1,230,890	x
Carpenter Shop (Bldg. 603)	8.1.21	ACT Report Zone A		$2,000.00	$10,200	$13,250	$3,300	$2,500		$31,250	x
Coarse Crusher	8.1.1			$10,000.00	$313,345	$1,551,800	$593,890	$1,070,618		$3,539,653	x
Drive House 1 conv and housings	8.1.2	Drive Houses 1 & 2 and conveyors are all considered	$133,200	$7,500.00	$165,569	$141,540	$46,900	incl. in above		$494,709	x
Drive House 2 inc conv and housings	8.1.3	to be one structure for demo purposes.	inc in above		inc in above	inc in above	inc in above	incl. in Fines Crusher		$0	x
Fine Crusher	8.1.4			$45,000.00	$302,430	$1,373,460	$203,400	$439,686		$2,363,976	x
Warehouse 49 (Bldg. 920)	8.1.16	ACT Report Zone A		$6,500.00	$27,586	$82,800	$15,947	$49,000		$181,833	x
Warehouse 45 (Bldg. 921, Electrical)	8.1.15	ACT Report Zone A		$2,500.00	$35,159	$72,700	$15,947	$13,500		$139,806	x
Lube House (Bldg. 926)	8.1.10	ACT Report Lubricant Storage Building		$578.00	$17,000	$20,550	$7,385	$52,000		$97,513	x
Rubber Shop (Bldg. 605)	8.1.26	ACT Report Rubber Storage Building		$1,000.00	$30,464	$36,550	$11,269	$24,000		$103,283	x
Concentrator Building and Thickeners	8.1.5 AND 8.1.25			$100,000.00	$1,248,260	$5,895,850	$1,145,998	$1,535,236		$9,925,344	x
A-Lab	8.1.11			$500.00	$9,400	$14,560	$2,940	included in Concentrator		$27,400	x
Hinsdale Bridge	8.1.24			$0.00	$16,700	$616,300	$15,200	n/a		$648,200	x
Water Reservoir	8.1.12			$5,000.00		$98,100	$914,400	n/a		$1,017,500	x
Plant Site Water Tower	8.1.12	TG-7-005, Similar to Area 2 water tower				$30,000	$2,500	n/a		$32,500	x
Water Treatment Plant & Storage Tanks	8.1.27	TG-6-021		$1,000.00	$20,000	$72,600	$2,250	$45,000		$140,850	x
Colby Pump House	8.1.13				$41,000	$8,260	$1,500	$2,500	$1,000	$54,260	x
Administration Building	8.1.17			$3,900.00		$157,935	$18,200	$850,000		$1,030,035	x
Main Gate	8.1.18			$100.00		$11,400	$875	$5,000	$900	$18,275	x

Closure Cost Estimate
User 2

:ober, 2016
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Structure Demolition
Demo Data Needed rev 14 Universal Waste Cost Updates.xlsx

Demo and Asbestos Abatement Cost Summary

			Lakehead / Rachel 2016 Updates					Mavo	Arrowhead Consulting & Testing		
Scope of Work Description	**Demo Specification Section Number**	**Reference Information / Drawings**	**Miscellaneous**	**Universal Waste Collection**	**Galbestos Removal**	**Demolition**	**Site Restoration**	**Asbestos Lead Paint Mold**	**Pre - Demo Building Inspection**	**Subtotal**	**Mine Year 1**
Booster Pump House #1	8.1.19			$300.00		$23,500	$9,200	included in Concentrator		$33,000	x
Sewage Treatment Plant	8.1.20	No ACT report		$0.00		$62,700	$19,520	$5,000	$900	$88,120	x
Portable Pump Houses	8.1.22	No ACM materials - See Dwg. TB-7-095		$0.00		$9,890	$3,400	n/a		$13,290	x
Return Water Barge	8.1.23	No ACT report		$0.00		$44,900		$5,000	$1,300	$51,200	x
General Infrastructure (railroads, tunnels, roadways, etc)						$4,988,921	$1,504,000			$6,492,921	x
Railroads	8.2.5	Figure 7 and Krech & Ojard Dwg. C1		$0.00		$380,000				$380,000	x
Tunnels (Service & Electrical)	8.2.2	TJ-63		$0.00		$1,856,000		$2,127,767		$3,983,767	x
Galleries	8.2.2	Was estimated as a portion of the concentrator						included in Concentrator		$0	x
Sanitary Systems and Wells	8.2.1					$17,500	included in associated areas			$17,500	x
Pipelines				$0.00		$2,190,000	$591,000			$2,781,000	x
Colby Lake water supply	8.2.2					$900,000	$98,000			$998,000	x
Inter pit pipeline	8.2.2					$562,000				$562,000	x
Natural Gas line	8.2.2					$150,000				$150,000	x
Tailings management above ground	8.2.2					$378,000				$378,000	x
Tailings management underground						$200,000				$200,000	x
Power Lines	8.2.3	Figures 5 & 5.1		$0.00		$97,810.00				$97,810	x
Roads and Parking Lots	8.2.6	Figure 9		$0.00		$465,000	$195,000			$660,000	x
New - Phase 1 - Plant Site											
Flotation Plant and Reagent Building	9.1.1			$75,000		$621,800	$147,600			$844,400	x
Concentrate Storage and Loadout Facility	9.1.2			$12,000		$273,760	$48,100			$333,860	x
Plant Site Sewage Treatment Plant	9.1.3	See Barr SOW 23 & Dwg. TL-2		$1,000.00		$118,000	$30,000			$149,000	x
Railroads	9.3.3	See Barr SOW 19		$0.00		$185,000	$111,000			$296,000	x
Pipelines	9.3.1	SOW 12 and 14		$0.00		$1,555,000	$375,000			$1,930,000	x
Power Lines	9.3.2	SK-11-255		$0.00						$0	x
Roads and Parking Lots	9.3.4			$0.00						$0	x
~~Plant Site Wastewater Treatment Plant (WWTP)~~	~~9.5.2~~	~~See Barr SOW 29~~		~~$0.00~~		~~$245,000~~				~~$245,000~~	
New - Phase 1 - Mine Site											
Maintenance Service and Fueling Facility	9.2.1			$1,100		$19,210	$7,300			$27,610	x
Rail Transfer Hopper	9.2.2	See Barr SOW 15		$1,100.00		$40,000	$45,000			$86,100	x
Rail Transfer Hopper Control Bldg	9.2.2	See Barr SOW 15		$100.00		$18,600				$18,700	x
Rail Transfer Hopper Platform	9.2.2	See Barr SOW 15				$60,000				$60,000	x
Central Pumping Station	9.2.3	See Barr SOW 7		$500.00		$14,000	$1,200			$15,700	x
Railroads	9.2.4	See Barr SOW's 16, 17, 18		$0.00		$45,000	$33,750			$78,750	x
Pipelines	9.3.1	See Barr SOW'S 05, 06, and 08		$0.00		$580,133	$217,000			$797,133	x
Power Lines	9.3.2	See Barr SOW 13		$0.00		$83,900				$83,900	x
Roads and Parking Lots	9.3.4	See Barr SOW 1		$0.00		$392,000	$132,000			$524,000	x
~~Mine Site Wastewater Treatment Facility (WWTF):~~	~~9.5.1~~	~~See Barr SOW 06~~		~~$0~~		~~$498,000~~	~~$14,000~~			~~$512,000~~	
New - Phase 2											
Reagent Building	9.4.1	Bldg. Dims: 270' x 85' x 75' tall		$15,000.00		$820,000	$4,100			$839,100	
Oxygen Plant	9.4.1	310' x 310' x 75' tall		$65,000.00		$4,238,600	$16,600			$4,320,200	
Limestone Preparation	9.4.1	125' x 70' x 60' tall		$7,500.00		$345,000	$1,750			$354,250	
Hydrometallurgical Plant	9.4.1	525' x 144' x 90' tall		$49,000.00		$4,365,000	$13,500			$4,427,500	
Hydrometallurgical Reagents	9.4.1	144' x 90' x 90' tall		$15,000.00		$815,000	$2,200			$832,200	
Railroads	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00						$0	
Pipelines	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$1,450,000				$1,450,000	
Power Lines	9.4.1	Already bid, part of existing / Phase 1 infrastructure		$0.00						$0	
Roads and Parking Lots	9.4.1	Based on size of buildings and quantities in other buildings on site.		$0.00		$156,000	$59,225			$215,225	

subtotal $ 44,791,841

Closure Cost Estimate
User 2

NorthMet Contingency Reclamation Estimate

9/4/2014

Above Ground Storage Tanks

Name	Tank #	Fluid	Gallons	Location	Fluid Removal/ Disposal	Demolition/ Removal	Asbestos Lead Paint	Site Restoration	~~Assets Recovery~~	Notes	Subtotal	Mine Year 1
Legacy - Area 1 Shop					$0	$24,100	$0	$3,000		**to Demo tab**		
Portable tank on skids (silver)	048	Fuel Oil	1,800	E of Area 1 Shop		$600				Out of Service - Disconnected, Labeled lube oil, Silver tank	$ 600.00	x
Storage Tank	080		20,000	Area 1 - South of Rail Road Grade		$1,000				BASIS: Costs based on conceptual plan; site experience and historical knowledge.	$ 1,000.00	x
Storage Tank	358	Used Anti-freeze		N. Side Area 1 Shop		$0				Included as part of Area 1 Shop demo	$ -	x
Storage Tank	420	Used Anti-freeze		N. Side Area 1 Shop		$0				Included as part of Area 1 Shop demo	$ -	x
Black Tank	n/a		20,000	N of Area 1 Shop		$7,500		$1,000.00			$ 8,500.00	x
Black Tank	n/a		20,000	N of Area 1 Shop		$7,500		$1,000.00			$ 8,500.00	x
3 Blue			20,000	N of Area 1 Shop		$7,500		$1,000.00		Out of Service. Disconnected, Labeled "save for conc."	$ 8,500.00	
~~Locomotive Fueling~~		~~# 1,2 Fuel Oil~~		~~West end of Panel Yard~~		-				This tank is no longer on site.	$ -	
Legacy - Area 2 Shop					$0	$0	$0	$0		**to Demo tab**	**$ -**	
Locomotive Fueling		# 1,2 Fuel Oil									$ -	x
Legacy - Plant Area					$0	$199,525	$0	$25,700		**to Demo tab**	**$ 225,225.00**	
Storage Tank	015	# 1,2 Fuel Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	032	# 2, 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00	x
Storage Tank	033	# 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00	x
Storage Tank	034	# 6 Fuel Oil	3,384,000	Tank Farm		$62,000		$8,100.00			$ 70,100.00	x
Storage Tank	304	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	305	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	306	Mineral Oil	12,000	E. Side Concentrator		$600					$ 600.00	x
Storage Tank	408	Lube oil	20,000	SW of Tailings Basin Reporting Area		$0				Out of Service, but piping still in place and no signs are posted	$ -	x
Storage Tank	421	Alcohol	10,000	E side Concentrator		$500					$ 500.00	x
Storage Tank	506	Fuel Oil	500	Heating Plant		$25					$ 25.00	x
WTP Backwash (green)			16,000	NE of Drivehouse 1		$5,000		$700.00			$ 5,700.00	x
Tank (white)			14,000	SE of Tailings Basin Reporting Area		$5,000		$700.00		Out of Service. Disconnected, no visible labels	$ 5,700.00	x
Dispensing Tanks at Main Gate	121	Gasoline	6,000	See gas station dwg's for reference		$600					$ 600.00	x
Dispensing Tanks at Main Gate	122	Gasoline	6,000	See gas station dwg's for reference		$600					$ 600.00	x
New - Phase 1 - Plant Site					$0	$0	$0	$0		**to Demo tab**	**$ -**	
Storage Tank	TBD	CuSO4				$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Magnafloc 10	10,600			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	PAX	3,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Lime	22,500			$0				tanks provided by supplier	$ -	
New - Phase 1 - Mine Site					$0	$0	$0	$0		**to Demo tab**	**$ -**	
Mine Site Truck Fueling	TBD	# 1,2 Fuel Oil		Fueling and Maintenance Facility		$0					$ -	
New - Phase 2 - Plant Site					$0	$0	$0	$0		**to Demo tab**	**$ -**	
Storage Tank	TBD	H2SO4	40,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	HCl	60,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Liquid SO2	21,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Magnafloc 342/351				$0				tanks provided by supplier	$ -	
Storage Tank	TBD	Mg(OH)	80,000			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	NaHS	13,200			$0				tanks provided by supplier	$ -	
Storage Tank	TBD	NaOH	40,000			$0				tanks provided by supplier	$ -	
Removed											$ -	
Day Tanks	083	# 6 Fuel Oil	20,000	Tank Farm							$ -	
Day Tanks	084	# 6 Fuel Oil	20,000	Tank Farm							$ -	
Day Tanks	085	# 6 Fuel Oil	20,000	Tank Farm							$ -	
Blue		Waste oil		W side of Coarse Crusher							$ -	
Blue		Lube oil		NE cor. Fine Crusher							$ -	
White		Anti-Freeze		NW cor. Fine Crusher							$ -	

subtotal $ 244,425

Closure Cost Estimate
User 3

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Table 4-1 Sump and Pond Excess Capacity

Infrastructure	Sump/Pond Name	Required Capacity (acre-feet)	Design Volume (acre-feet)	Freeboard Volume (acre-feet)	Excess Capacity(1)
Category 2/3 Waste Rock Stockpile	S23-1	14.9	14.9	15.7	33%
	S23-2	11.9	12		
	PW-S23-1	21.4	21.5		
	S23-3	6.6	6.6	6.4	54%
	PW-S23-3	5.3	5.3		
Category 4 Waste Rock Stockpile	S4	10.1	12.5	10.6	81%
	PW-S4	8.1	9.9		
Ore Surge Pile	SOSP	8.5	8.7	5.6	47%
	PW-SOSP	4.8	5.3		
Overburden Storage and Laydown Area	PW-OSLA	10.7	14.5	14.1	167%
Haul Roads	PW-HRE	10.7	10.7	4.2	39%
	PW-HRN	4.4	4.6	2.8	69%
	PW-HRC	6.1	6.9	3	61%
	PW-HRW	3.7	4	2.6	77%
Rail Transfer Hopper	PW-RTH(3)	0.7	0.7	0.3	43%

Excess capacity compares the total capacity (design volume plus freeboard volume) to required capacity.PW-OSLA was oversized to allow for storage of Peat within the pond, as described in Section 2.1.5.1.PW-RTH was sized based on available area with a larger pump capacity.
Source: Water_Management_Plan_-_Mine_v4_MAR2015.pdf

Closure Cost Estimate
User 4

t NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
ober, 2016
ear01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
n 1.4.1

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urety Cost Basis: Polymet

AoC Compilation

AoC No.	WBS No.	Site Name	Phase I ESA/SAP	Implement SAP	Complete Phase II	Remediation	Total Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Updated
01	731-1	Area 1 Legacy Items 1,2,3,4 Asbestos & Lead Paint Removal.	$7,500	$208,615	$235,615	$380,000	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	$831,730	06/10/14
06	731-2	Oily Waste Disposal Area	$7,500	$53,190	$100,450	$73,270	$234,410	$234,410	$226,910	$173,720	$73,270	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
07	731-3	Bull Gear Disposal	$7,500	$35,600	$0	$0	$43,100	$43,100	$35,600	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
09	731-4	Railroad Panel Yard	$0	$0	$23,010	$1,352,397	$1,375,407	$1,375,407	$1,352,397	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
10	731-5	Airport	$7,500	$29,180	$57,580	$60,240	$154,500	$154,500	$147,000	$117,820	$60,240	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
11	731-6	Stoker Coal Ash Disposal	$7,500	$30,180	$38,868	$245,120	$321,668	$321,668	$314,168	$283,988	$245,120	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
13	731-7	2001 Storage Area	$7,500	$29,180	$57,580	$0	$94,260	$94,260	$86,760	$57,580	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
14	731-8	Sandblasting and large Equipment Painitng Area	$7,500	$57,796	$29,460	$43,570	$138,326	$138,326	$130,826	$73,030	$43,570	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
35	731-9	Dunka Water Treatment Plant Sludge	$4,000	$20,800	$37,800	$0	$62,600	$62,600	$58,600	$37,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
37	731-10	Line 9 Area 5 Petroleum Contaminated Soil	$7,500	$0	$0	$0	$7,500	$7,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	03/23/16
38	731-11	Area 2 Shops, legacy Nos. 17 to 24	$0	$0	$242,110	$179,796	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	$421,906	06/10/14
40	731-12	Heavy Duty Garage	$7,500	$21,000	$40,000	$0	$68,500	$68,500	$61,000	$40,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
42	731-13	Bunker C Tank Farm	$415,000	$276,667	$0	$138,333	$830,000	$830,000	$415,000	$138,333	$138,333	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	TBD
43	731-14	Administration Building	$7,500	$20,600	$0	$0	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	$28,100	06/10/14
44	731-15	Main Gate Vehicle Fueling Area	$7,500	$17,000	$34,900	$24,200	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	$83,600	06/10/14
46	731-16	Plant Site and General Shops	$7,500	$59,344	$189,760	$644,690	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	$901,294	06/10/14
47	731-17	Tailings Basin Reporting	$7,500	$0	$0	$0	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	06/10/14
48	731-18	Booster Pump House with Transformer	$7,500	$20,900	$38,700	$0	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	$67,100	06/10/14
49	731-19	Coarse Crusher Petroleum Contaminated Soil	$7,500	$16,700	$35,100	$0	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	$59,300	06/10/14
51	731-20	Tailings Basin Salvage and Scrap Areas	$7,500	$83,308	$22,450	$408,244	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	$521,502	06/10/14
52	731-21	Cell 2W Salvage Area	$7,500	$21,000	$0	$0	$28,500	$28,500	$21,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
53	731-22	Hornfels Burial	$7,500	$0	$0	$0	$7,500	$7,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
59	731-23	Colby Lake Pumping Station	$7,500	$21,000	$0	$0	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	$28,500	06/10/14
61	731-24	Pellet Plant	$7,500	$98,926	$58,425	$258,546	$423,397	$423,397	$415,897	$316,971	$258,546	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	06/10/14
								$6,740,200	$6,215,690	$4,189,774	$3,769,611	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	$2,950,532	

Closure Cost Estimate
User 6

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

SITE REMOVAL & RESTORATION	SCOPE	CODE	RATE	UNIT	DETAILS	REF
Remove & Dispose of Stockpile/Pond Liners	Break into Section/Remove/Dispose	remove_3	300	acre	Remove and haul to pit or landfill	Ames Estimate 18-Jun-13
Remove & Dispose of Collection pipe	Cut-Up/Remove/Dispose	remove_4	2.25	LF	$0.25 /LF to dismantle plus $200 /100 FT to collect	Ames Estimate 18-Jun-13

Closure Cost Estimate
User 7

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Water Treatment Costs for NorthMet Closure at the End of Mine Year 1
CRE_MY1 Closure_OPEX Memo_10 SO4.pdf

Plant

Period	Activity	Annual Opex	Annual Replacement	Equipment Modification	Annual subtotal	# years	total
1-2	WWTP treats FTB seepage capture system water and discharges (concentrate trucked to WWTF)	$ 3,400,461	$ 2,386,168		$ 5,786,629	2	$ 11,573,258
2	WWTP filtration equipment expanded, chemical precipitation added to treat concentrate, and effluent stabilization expanded			$ 26,916,396	$ 26,916,396	1	$ 26,916,396
3-4	WWTP treats FTB seepage capture system water and discharges	$ 5,743,009	$ 2,386,168		$ 8,129,177	2	$ 16,258,354
5-8	WWTP treats FTB seepage capture system water and discharges	$ 6,518,496	$ 2,386,168		$ 8,904,664	4	$ 35,618,656
9-50	WWTP treats FTB seepage capture system water and discharges	$ 5,289,493	$ 2,386,168		$ 7,675,661	42	$ 322,377,762
			$ 119,308,400	**$ 26,916,396**			**$ 412,744,426**

Mine

Period	Activity	Annual Opex	Annual Replacement		Annual subtotal	# years	total
1-2	WWTF operates to flood East Pit while East Pit backfilled	$2,250,929	$0		$2,250,929	2	$4,501,858
3-4	WWTF operates to flush East Pit	$1,351,560	$0		$1,351,560	2	$2,703,120
5-8	WWTF on standby (Cat 1 SP Cont Sys to pit and pit not overflowing) - building heat and equipment replacement only		$0		$0	4	$0
9-50	WWTF treats East Pit water and discharges to Partridge River; effluent stabilization equipment added		$5,855		$5,855	42	$245,910
		$ 7,204,978	**$ 245,910**	**$ -**			**$ 7,450,888**

Plant site water treatment	$	412,744,426
Mine site water treatment	$	7,450,888
	$	**420,195,314** <--Other User

Closure Cost Estimate
User 7

Water Treatment Costs for NorthMet Closure at the End of Mine Year 1
CRE_MY1 Closure_OPEX Memo_10 SO4.pdf

Plant

Period	Activity	Variance	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
1-2	WWTP treats FTB seepage capture system water and discharges (concentrate trucked to WWTF)	$ -	$ 5,786,629	$ 5,786,629										
2	WWTP filtration equipment expanded, chemical precipitation added to treat concentrate. and effluent stabilization expanded	$ -		$ 26,916,396										
3-4	WWTP treats FTB seepage capture system water and discharges	$ -			$ 8,129,177	$ 8,129,177								
5-8	WWTP treats FTB seepage capture system water and discharges	$ -					$ 8,904,664	$ 8,904,664	$ 8,904,664	$ 8,904,664				
9-50	WWTP treats FTB seepage capture system water and discharges	$ -									$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661
			$ 5,786,629	**$ 32,703,025**	**$ 8,129,177**	**$ 8,129,177**	**$ 8,904,664**	**$ 8,904,664**	**$ 8,904,664**	**$ 8,904,664**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**

Mine

Period	Activity	Variance	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
1-2	WWTF operates to flood East Pit while East Pit backfilled	$0	$2,250,929	$2,250,929										
3-4	WWTF operates to flush East Pit	$0			$1,351,560	$1,351,560								
5-8	WWTF on standby (Cat 1 SP Cont Sys to pit and pit not overflowing) - building heat and equipment replacement only	$0					$0	$0	$0	$0				
9-50	WWTF treats East Pit water and discharges to Partridge River; effluent stabilization equipment added	$0									$5,855	$5,855	$5,855	$5,855
		$ -	**$ 2,250,929**	**$ 2,250,929**	**$ 1,351,560**	**$ 1,351,560**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**
		User 12--->	**$ 8,037,558**	**$ 34,953,954**	**$ 9,480,737**	**$ 9,480,737**	**$ 8,904,664**	**$ 8,904,664**	**$ 8,904,664**	**$ 8,904,664**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**

Plant site water treatment	$	412,744,426
Mine site water treatment	$	7,450,888
	$	**420,195,314**

Closure Cost Estimate
User 7

Water Treatment Costs for NorthMet Closure at the End of Mine Year 1
CRE_MY1 Closure_OPEX Memo_10 SO4.pdf

Plant

Period	Activity	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24
1-2	WWTP treats FTB seepage capture system water and discharges (concentrate trucked to WWTF)												
2	WWTP filtration equipment expanded, chemical precipitation added to treat concentrate. and effluent stabilization expanded												
3-4	WWTP treats FTB seepage capture system water and discharges												
5-8	WWTP treats FTB seepage capture system water and discharges												
9-50	WWTP treats FTB seepage capture system water and discharges	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661
		$ 7,675,661	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**

Mine

Period	Activity	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24
1-2	WWTF operates to flood East Pit while East Pit backfilled												
3-4	WWTF operates to flush East Pit												
5-8	WWTF on standby (Cat 1 SP Cont Sys to pit and pit not overflowing) - building heat and equipment replacement only												
9-50	WWTF treats East Pit water and discharges to Partridge River; effluent stabilization equipment added	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855
		$ 5,855	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**
		$ 7,681,516	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**

Plant site water treatment	$	412,744,426
Mine site water treatment	$	7,450,888

Closure Cost Estimate
User 7

Water Treatment Costs for NorthMet Closure at the End of Mine Year 1
CRE_MY1 Closure_OPEX Memo_10 SO4.pdf

Plant

Period	Activity	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37
1-2	WWTP treats FTB seepage capture system water and discharges (concentrate trucked to WWTF)													
2	WWTP filtration equipment expanded, chemical precipitation added to treat concentrate. and effluent stabilization expanded													
3-4	WWTP treats FTB seepage capture system water and discharges													
5-8	WWTP treats FTB seepage capture system water and discharges													
9-50	WWTP treats FTB seepage capture system water and discharges	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661
		$ 7,675,661	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**

Mine

Period	Activity	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37
1-2	WWTF operates to flood East Pit while East Pit backfilled													
3-4	WWTF operates to flush East Pit													
5-8	WWTF on standby (Cat 1 SP Cont Sys to pit and pit not overflowing) - building heat and equipment replacement only													
9-50	WWTF treats East Pit water and discharges to Partridge River; effluent stabilization equipment added	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855
		$ 5,855	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**
		$ 7,681,516	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**

Plant site water treatment	$	412,744,426
Mine site water treatment	$	7,450,888
	$	**420,195,314**

Closure Cost Estimate
User 7

Water Treatment Costs for NorthMet Closure at the End of Mine Year 1
CRE_MY1 Closure_OPEX Memo_10 SO4.pdf

Plant

Period	Activity	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50
1-2	WWTP treats FTB seepage capture system water and discharges (concentrate trucked to WWTF)													
2	WWTP filtration equipment expanded, chemical precipitation added to treat concentrate. and effluent stabilization expanded													
3-4	WWTP treats FTB seepage capture system water and discharges													
5-8	WWTP treats FTB seepage capture system water and discharges													
9-50	WWTP treats FTB seepage capture system water and discharges	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661	$ 7,675,661
		$ 7,675,661	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**	**$ 7,675,661**

Mine

Period	Activity	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50
1-2	WWTF operates to flood East Pit while East Pit backfilled													
3-4	WWTF operates to flush East Pit													
5-8	WWTF on standby (Cat 1 SP Cont Sys to pit and pit not overflowing) - building heat and equipment replacement only													
9-50	WWTF treats East Pit water and discharges to Partridge River; effluent stabilization equipment added	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855	$5,855
		$ 5,855	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**	**$ 5,855**
		$ 7,681,516	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**	**$ 7,681,516**

Plant site water treatment	$	412,744,426
Mine site water treatment	$	7,450,888

Closure Cost Estimate
User 8

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Category 1 cover/borrow sources

- 6-inch Geomembrane Bedding Layer **(assume processed Cat 1 rock, source is Cat 1 stockpile; material can be processed and kept in a pile on the top)**
- 1-foot Granular Soil Cover above Geomembrane **(assume processed Cat 1 rock, source is Cat 1 stockpile; material can be processed and kept in a pile on the top)**
- 1.5-foot Rooting Zone above Granular Cover **(assume unsaturated overburden; assume source is at the Overburden Storage and Laydown Area, which is about 1 mile from the Category 1 stockpile ramp)**

e-mail Jim Scott 5/5/2015 1:22 PM

Layer	Cover Thickness Slopes (in)	Cover Thickness Flat Areas (in)	From	To	Grade (%)	Distance (ft)	Remarks
additional soil for uniform foundation layer	6	6	Cat 1 stockpile	Cat 1 stockpile	-5	5000	SOW 3 page 15.
geomembrane bedding layer	6	6	Cat 1 stockpile	Cat 1 stockpile	-5	5000	
geotextile							
geomembrane							see Other User #2
granular soil cover above geomembrane	12	12	Cat 1 stockpile	Cat 1 stockpile	-5	5000	
rooting zone above granular cover	**18**	**18**	**Overburden storage and laydown area**	**Cat 1 stockpile**	**-5**	**10000**	

Closure Cost Estimate
User 11

:t NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
:ober, 2016
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urety Cost Basis: Polymet
NorthMet Project Feature Changes Over Time v1.7 SEPT2016.pdf

	Units that Vary by Closure Year																					
Year of Closure	0 - Stage 1	0 - Stage 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Category 2/3 Stockpile Liner (acres)	63	63	63	63	119	119	119	181	181	181	181	181	181	181	181	181	150	120	90	60	30	0
Category 2/3 Stockpile Piping (LF)	8,000	8,000	8,000	8,000	10,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0	0
Category 2/3 Stockpile Sump/Pond (acres)	6.7	6.7	6.7	6.7	9.2	9.2	9.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	9.2	9.2	6.7	6.7	6.7	0.0
Category 2/3 Stockpile Pumps	2	2	2	2	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Category 2/3 Stockpile Overliner and Underdrain Piping (LF)	45,300	45,300	45,300	45,300	76,500	76,500	76,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	94,800	71,100	47,400	23,700	0
Category 2/3 Stockpile Relocation (tons)	0	0	5,238,766	9,671,631	13,968,736	17,624,295	20,039,335	24,388,312	26,954,315	31,286,526	35,946,676	40,017,183	44,021,108	44,021,108	38,281,584	32,542,061	26,802,537	21,063,014	15,323,491	9,583,967	3,844,444	0
Category 4 Stockpile Liner (acres)	29	29	29	29	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Piping (LF)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Sump/Pond (acres)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Overliner and Underdrain Piping (LF)	21,590	21,590	21,590	21,590	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Relocation (tons)	0	0	1,489,201	2,251,698	3,379,412	4,206,959	4,648,816	5,314,412	5,863,428	5,974,068	6,107,575	6,184,408	6,206,813	0	0	0	0	0	0	0	0	0
OSP Liner (acres)	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
OSP Piping (LF)	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
OSP Sump/Pond (acres)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
OSP Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OSP Overliner and Underdrain Piping (LF)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
OSP Relocation (tons)	0	0	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Footprint to Reclaim (acres)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Cover (acres)	0	0	205	205	369	369	458	526	526	526	526	526	526	526	526	460	394	328	262	196	130	64
Category 1 Stockpile Containment System Completion (LF)	0	0	2,800	2,800	2,800	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Containment System Breach & Reclaim (acres)	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Exposed/Unblasted Rock to Reclaim (Acres)	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Wall Unreclaimed (Acres)	0	0.0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
West Pit Exposed/Unblasted Rock to Reclaim (Acres)	0	0	0	0	0	4	40	0	0	0	0	52	65	0	0	0	0	0	0	0	0	0
West Pit Wall Unreclaimed (Acres)	0	0	0	8.7	8.7	8.7	8.9	8.9	8.9	11.0	11.0	16.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Central Pit Wall Unreclaimed (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Fence - 4 strand barb wire (LF)	0	0	1,100	1,400	1,400	1,400	1,400	1,400	1,400	1,700	1,700	1,600	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	1,400
Fence - non climbable (LF)	0	0	11,000	19,900	19,900	21,200	20,700	20,700	20,700	22,100	22,100	30,100	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	33,700
Pit Access Gates	0	0	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Mine Drainage Pond (acres)	19.4	19.4	19.4	19.4	21.6	21.6	21.6	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Mine Drainage Pond Liner (acres)	12.4	12.4	12.4	12.4	14.6	14.6	14.6	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Mine Drainage Pond Pumps	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Mine Drainage Pond Pipe (LF)	9,000	9,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Mine Drainage Pond Underdrains	4,500	4,500	4,500	5,200	6,000	6,000	6,000	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
Stormwater Pond (acres)	17.4	17.4	17.4	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
Stormwater Ditch (LF)	5,200	5,200	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	8,300	8,300
Unreclaimed Haul Road (LF)	22,000	22,000	22,000	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	31,500	31,500	31,500	29,500	27,500	27,500	27,500	27,500	21,500	21,500
FTB Beach to Reclaim (acres)	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTB Beach to Amend with Bentonite (acres)	0	0	95	95	93	92	91	89	87	203	207	211	212	212	212	212	216	219	222	225	420	428
FTB Pond Bottom to Amend with Bentonite (acres)	0	0	421	424	427	430	432	434	443	1068	1093	1118	1124	1130	1136	1142	1136	1129	1122	1116	905	905
FTB Borrow Area to Reclaim (acres)	31.6	31.6	44.7	16.9	16.5	16.5	15.9	15.9	12.0	12.0	12.0	12.0	18.0	22.4	22.4	22.4	26.8	26.8	26.8	26.8	21.5	19.5
HRF Disturbed Acres to Reclaim (acres)	5	5	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HRF cover (acres)	0	0	0	0	49	49	49	49	49	49	49	49	49	54	60	65	71	76	82	87	93	98
HRF drainage (years)	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9

Closure Cost Estimate
User 11

SOW 3: Category 1 Cover System: Year 0 (no waste rock on pile)
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization/Demobilization	LS	1	See Comments and Notes		$ 25,000	$ 25,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Assume Environmental Protection Measures from Year 0 Site Work Remain In Place and Are Effective
3	Construction QA/QC	LS	1	See Comments and Notes		$ 5,000	$ 5,000	See Note 1.
4	Final Sloping of Category 1 Stockpile	AC	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Final Sloping
5	Furnish and Install 6-inch Geomembrane Bedding Layer	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geomembrane Bedding Layer
6	Furnish and Install 1-foot Granular Soil Cover above Geomembrane	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Granular Soil Cover above Geomembrane
7	Furnish and Install 1.5-foot Rooting Zone above Granular Cover	CY	32,000	See Comments and Notes		$ 5.5	$ 176,000	Year 0 - 13 acre Area of Disturbance; assume 25% of 127,000 Cubic Yards Excavated is Replaced/Regraded to Facilitate Vegetation Establishment.
8	Furnish and Install 6-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
9	Furnish and Install 9-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
10	Furnish and Install 12-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
11	Furnish and Install 18-Inch Riprap Systems on Stockpile Covers	CY	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; Assume No Steep Slope and No Rip-Rap Required.
12	Furnish and Install Vegetation (grass) on Stockpile Cover Systems	Acre	13	See Comments and Notes		$ 635	$ 8,255	Year 0 - Assume Furnish and Install Vegetation on 13-acre Disturbed Area [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
	Cat 1 Stockpile Footprint Restoration		13			**$ 14,173**	$ 184,255	
13	Reseeding 5% of Vegetation on Stockpile Cover Systems	Acre	1	See Comments and Notes		$ 635	$ 445	Year 0 - Assume Furnish and Install Vegetation on 1-acre of 13-acre Restored Area for Vegetation that Does Not Establish Initially [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
14	Procure and Install 40-mil Geomembrane - Textured	SF	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geomembrane Cover
15	Furnish and Install Geotextile above and below Geomembrane	SF	-	See Comments and Notes		$ -	$ -	Year 0 - No Waste Rock Placed; No Geotextile Required
							$ 398,955	

Notes:
1) Limited QA/QC required. Assume limited amount of surveying for grade confirmation and site review and submittal review to confirm compliance of site restoration activities with specifications.

Closure Cost Estimate
User 11

SOW 3: Category 1 Cover System: End of Year 1

May 2016 Contingency Reclamation Estimate **M**

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization/Demobilization	LS	1	See Comments and Notes		$ 1,345,000.00	$ 1,345,000	
2	Environmental Protection Measures	LS	1	See Comments and Notes		$ 10,000.00	$ 10,000	
3	Construction QA/QC	LS	1	See Comments and Notes		$ 275,000.00	$ 275,000	See Note 1
~~4~~	~~Final Sloping of Category 1 Stockpile~~	~~CY~~	~~260,000~~	~~See Comments and Notes~~				~~Estimated as 15,000' Stockpile Perimeter by 1.4H:1V Slope Flattened to 3.75H:1V Slope for 40' High Pile (ref. Golder Stockpile Design Drawings for Typical Section).~~
5	Subgrade Grading	AC	190	See Comments and Notes		$ 2,100.00	$ 399,000	Estimate of Area Covered by CAT 1 Waste Rock at End of Year 1
6	Furnish and Install 6-inch Geomembrane Bedding Layer	CY	150,000	See Comments and Notes		$ 8.00	$ 1,200,000	
~~7~~	~~Furnish and Install 1-foot Granular Soil Cover above Geomembrane~~	~~CY~~	~~300,000~~	~~See Comments and Notes~~		~~$ 8.00~~		
~~8~~	~~Furnish and Install 1.5 foot Rooting Zone above Granular Cover~~	~~CY~~	~~450,000~~	~~See Comments and Notes~~		~~$ 5.50~~		
9	Furnish and Install 9-Inch Riprap Systems on Stockpile Covers	CY	900	See Comments and Notes		$ 65.00	$ 58,500	See Note 2
10	Furnish and Install 12-Inch Riprap Systems on Stockpile Covers	CY	1,700	See Comments and Notes		$ 77.00	$ 130,900	See Note 2
11	Furnish and Install 18-Inch Riprap Systems on Stockpile Covers	CY	400	See Comments and Notes		$ 89.00	$ 35,600	See Note 2
~~12~~	~~Furnish and Install Vegetation (grass) on Stockpile Cover Systems~~	~~AC~~	~~190~~	~~See Comments and Notes~~		~~$ 635.00~~		~~[$1985 replaced by D&T $295 seed/fertilize + $340 mulch]~~
	Unit Cost Earthwork Variable		190			**$ 9,600.00**	$ 1,824,000	
13	Reseeding 5% of Vegetation on Stockpile Cover Systems	AC	10	See Comments and Notes		$ 1,985.00	$ 18,858	
14	Procure and Install 40-mil Geomembrane - Textured	SF	8,280,000	See Comments and Notes		$ 0.35	$ 2,898,000	Assume LLDPE Geomembrane for Improved Interface Friction Angle.
15	Furnish and Install Geotextile above and below Geomembrane	SF	16,560,000	See Comments and Notes		$ 0.15	$ 2,484,000	Requirement for Geotextile Dependent on Gradation and Particle Shape for Materials Above and Below Geomembrane.
	Unit Cost Membrane/Textile Variable		190			**$ 28,326.32**	$ 5,382,000	
							$ 10,678,858	

Closure Cost Estimate
User 11

SOW 11: Hydromet Residue Facility: End of Year 1 (no residue, only grading/seeding)

ıcy Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 25,000.00	$ 25,000	To Be Determined By Contractor - Mob for General Earthwork and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Assume Environmental Protection Measures for One-Third (assume northwest segment where discharge from site could occur) Perimeter of 25-acre Disturbed Area Associated with Future HRF Area Pre-Load
3	Construction QA/QC	LS	1	See Comments and Notes		$ 5,000.00	$ 5,000	See Note 2
4	Regrade Pre-Load Fill	CY	62,000	See Comments and Notes		$ 2.50	$ 155,000	Assumes 25-percent of Year 1 Pre-load Fill Requires Regrading to Flatten Perimeter Slopes Prior to Restoration.
5	Common Borrow for Pre-Load Fill Area Restoration	CY	6,000	See Comments and Notes		$ 8.00	$ 48,000	Assume 6,000 CY of Misc. Earthwork/Common Borrow for Miscellaneous Restoration.
6	~~Furnish and Install Vegetation on Disturbed Areas~~	~~Acre~~	~~25~~	~~See Comments and Notes~~				
7	Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	1.25	See Comments and Notes		$ 2,524.00	$ 3,155	
							$ 236,155	

Closure Cost Estimate
User 11

SOW 14: Flotation Tailings Basin: End of Year 1 (with PolyMet Tails)

Contingency Reclamation Estimate **Ma**

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1.00	See Comments and Notes		$ 1,225,000.00	$ 1,225,000	To Be Determined By Contractor - Mob for General Earthwork, Bentonite Placement, Site Grading and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Construction is within FTB Footprint. Assume Dust Control is Ancillary to Earthwork Items and no Additional Environmental Protection Measures are Required.
3	LTVSMC Coarse Tailings Borrow Area Regrading Quantity	CY	105,000.00	See Comments and Notes		$ 2.50	$ 262,500	See Note 1
4	LTVSMC Coarse Tailings Borrow Area - Seed, Mulch and Fertilize	Acre	65.00	See Comments and Notes		$ 730.00	$ 47,450	See Note 2 [$2524 replaced by $730 D&T]
	Borrow Area Restoration Unit Cost		65.00			**$ 4,768.46**	$ 309,950	
5	LTVSMC Coarse Tailings Borrow Area - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	3.25	See Comments and Notes		$ 2,524.00	$ 8,203	
!ser" 6	Dam - Exterior Face Bentonite Augmentation	Acre	-	See Comments and Notes		$ -	$ -	Performed Incrementally as Routine Construction Item Through-out Year 1; Already Complete - No Additional Action Required
7	Dam - Exterior Face Seed, Mulch and Fertilize	Acre	-	See Comments and Notes		$ -	$ -	Performed Incrementally as Routine Construction Item Through-out Year 1; Already Complete - No Additional Action Required
8	Beach Area and Dam Crest - Remove and Replace 30" Tailings Cover Layer to Facilitate Bentonite Augmentation of Soil Layer 30" Below Beach Surface	Acre	100.00	See Comments and Notes		$ 13,000.00	$ 1,300,000	Beach and Dam Crest Area at End of Year 1 is Estimated
9	Beach Area and Dam Crest - Till Bentonite to 18" Depth	Acre	100.00	See Comments and Notes		$ 1,750.00	$ 175,000	Beach and Dam Crest Area at End of Year 1 is Estimated
10	Beach Area and Dam Crest - Compact 18" Layer of Bentonite Amended Soil	Acre	100.00	See Comments and Notes		$ 800.00	$ 80,000	Beach and Dam Crest Area at End of Year 1 is Estimated
11	Beach Area and Dam Crest - Lightly Compact Upper Cover Layer	Acre	100.00	See Comments and Notes		$ 800.00	$ 80,000	
12	Beach Area and Dam Crest - Seed, Fertilize and Mulch	Acre	100.00	See Comments and Notes		$ 2,524.00	$ 252,400	Beach and Dam Crest Area at End of Year 1 is Estimated [$2524 replaced by D&T $880]
	Beach Bentonite Ammendment Unit Cost		100.00			**$ 18,874.00**	$ 1,887,400	
13	Beach Area and Dam Crest - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	5.00	See Comments and Notes		$ 2,524.00	$ 12,620	Beach and Dam Crest Area at End of Year 1 is Estimated
14	Pond Bottom - Bentonite Amended Pond Bottom	Acre	350.00	See Comments and Notes		$ 28,092.00	$ 9,832,200	Pond Area at End of Year 1 is Estimated
							$ 15,472,723	

Closure Cost Estimate
User 11

SOW 21: Category 1 Groundwater Containment System: End of Year 1

:ontingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobiliza	LS	1	See Comments and Notes		$ 125,000	$ 125,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment
2	Environmental Protection Me	LS	1	See Comments and Notes		$ 10,000	$ 10,000	Assume Environmental Protection Measures from Year 0 Construction Remain in Place and Are Effective. Assume Dust Control is Ancillary to Earthwork Activities.
3	Construction QA/QC	LS	1	See Comments and Notes		$ 45,000	$ 45,000	Includes General Confirmatory Survey, Construction Observation, Material Testing, Test Data and Submittal Review, and Construction Documentation
4	Grubbing	AC	3	See Comments and Notes		$ 2,500	$ 7,500	
5	Temporary Dewatering and P	LS	1	See Comments and Notes		$ 75,000	$ 75,000	
6	Common Excavation and Sto	N/A	-	See Comments and Notes		$ -	$ -	
7	Portion that is Assumed t	CY	5,900	See Comments and Notes		$ 8	$ 44,250	
8	Portion that is Assumed t	CY	11,600	See Comments and Notes		$ 5	$ 58,000	
9	Portion that is Assumed t	CY	9,400	See Comments and Notes		$ 5	$ 47,000	
10	Portion that is Assumed to	CY	2,600	See Comments and Notes		$ 46	$ 119,600	
11	Clay Borrow, Backfill and Con	CY	5,200	See Comments and Notes		$ 12	$ 62,400	
12	Common Borrow Backfill and	CY	4,300	See Comments and Notes		$ 5	$ 21,500	
13	1-Inch Minus Rock	CY	6,200	See Comments and Notes		$ 20	$ 124,000	
14	Surface Runoff and Seepage	N/A	-	See Comments and Notes		$ -	$ -	
15	Furnish and Install 36-inc	LF	2,300	See Comments and Notes		$ 150	$ 345,000	
16	Furnish and Install 12-inc	LF	60	See Comments and Notes		$ 36	$ 2,160	
17	Furnish and Install 12-inc	LF	35	See Comments and Notes		$ 45	$ 1,575	
18	Furnish and install 12-inc	EA	12	See Comments and Notes		$ 275	$ 3,300	
19	Furnish and install 12x36	EA	12	See Comments and Notes		$ 2,600	$ 31,200	
20	Furnish and install 12-inc	EA	12	See Comments and Notes		$ 200	$ 2,400	
21	Granular Drainage Material	CY	4,700	See Comments and Notes		$ 16	$ 75,200	
22	Furnish and install 60-inch LC	LS	2	See Comments and Notes		$ 16,000	$ 32,000	Assume Total Manhole Height of 16' Each with Concrete Base, Steps, Concrete Top and Cast/Locking Manway Hatch.
23	Furnish and Install Vegetation on Disturbed Areas	AC	41	See Comments and Notes		$ 635	$ 26,035	Assume Average Width of Restoration Zone is 100' and add 20% Additional for Misc. Restoration Areas; 100'x15,000' +20% = 1,800,000 SF = 41 Acre [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]

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Closure Cost Estimate
User 11

	Cat 1 Cont Sys Ext Variable $/LF	2,300			**$ 469**	$ 1,078,120		
24	Reseeding 5% of Vegetation to Correct for Limited Growth	AC	2	See Comments and Notes	$ 2,524	$ 5,174		
						$ 2,341,414		<--"Other U

Closure Cost Estimate
User 11

SOW 21: Category 1 Groundwater Containment System: Year 0
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 15,000.00	$ 15,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	Assume Environmental Protection Measures from Year 0 Construction Remain in Place and Are Effective. Assume Dust Control is Ancillary to Earthwork Activities.
3	Construction QA/QC	LS	1	See Comments and Notes		$ 3,000.00	$ 3,000	Includes General Confirmatory Survey and Periodic Reclamation Review
4	Cutoff Wall Breach for CRE	CY	3,400	See Comments and Notes		$ 10.00	$ 34,000	Assume 5' Thick Cutoff Wall - 8' Wide Breach at 200-Foot Spacing with Average Breach Depth of 10' and Average Trench Excavation Slopes of 1H:1V [8'x{(10'x10')+(5'x10')}] /27 Breach = 45 CY/Breach for 15,000'
5	Cutoff Wall Breach Backfill for CRE	CY	3,400	See Comments and Notes		$ 10.00	$ 34,000	Assume 5' Thick Cutoff Wall - 8' Wide Breach at 200-Foot Spacing with Average Breach Depth of 10' and Average Trench Excavation Slopes of 1H:1V [8'x{(10'x10')+(5'x10')}] /27 Breach = 45 CY/Breach for 15,000'
6	Seepage Collection Pipe Modifications for CRE	LF	-	See Comments and Notes		$ -	$ -	No Seepage Collection Pipe Modifications Anticipated
7	Riser Pipe Modifications for CRE	LS	75	See Comments and Notes		$ 400.00	$ 30,000	Quantity Unconfirmed - Assume 200' Riser Pipe Spacing. Assume Risers are Cut Off Below Ground Surface, Filled with Granular Soil, and Capped with Solid Cap
8	Mine Drainage Ditch Modifications for CRE	CY	21,000	See Comments and Notes		$ 10.00	$ 210,000	Assume Ditch is Backfilled Using Adjacent Berm and Roadway Soil. Quantity is [(2.5'x3') + (10'x3')]/27 Per Foot of Trench = 1.4 CY/LF for 15,000 LF
9	Berm Modifications for CRE	CY	-	See Comments and Notes		$ -	$ -	Ancillary to Mine Drainage Ditch Modifications
10	Stormwater Ditch Modifications for CRE	CY	25,500	See Comments and Notes		$ 10.00	$ 255,000	Assume Ditch is Backfilled Using Adjacent Berm and Roadway Soil. Quantity is [(3'x3') + (12'x3')]/27 Per Foot of Trench = 1.7 CY/LF for 15,000 LF
11	Perimeter Dike Modifications for CRE	CY	-	See Comments and Notes		$ -	$ -	Ancillary to Perimeter Ditch Modifications
12	Sump/Manhole Modifications	LS	3	See Comments and Notes		$ 1,000.00	$ 3,000	Remove and Salvage Manhole Internals, Remove and Recycle Upper Manhole Riser Section, Fill Manhole with Granular Material and Restore to Surrounding Grade
13	Furnish and Install Vegetation on Disturbed Areas	AC	41	See Comments and Notes		$ 635.00	$ 26,035	Assume Average Width of Restoration Zone is 100' and add 20% Additional for Misc. Restoration Areas; 100'x15,000' +20% = 1,800,000 SF = 41 Acre [$2524 replaced by D&T $295 seed/fertilize + $340 mulch]
	Cat 1 Cont Sys Breach and Restore Variable Unit Cost		41			**$ 14,439.88**	$ 592,035	

Closure Cost Estimate
User 11

SOW 14: Flotation Tailings Basin: Year 0 (without PolyMet Tails)
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 52,000.00	$ 52,000	To Be Determined By Contractor - Mob for General Earthwork, Site Grading and Vegetation Establishment Construction is within FTB Footprint. Assume Dust Control is Ancillary to Earthwork Items and no Additional Environmental Protection Measures are Required.
2	Environmental Protection Measures	LS	-	See Comments and Notes		$ -	$ -	
3	LTVSMC Coarse Tailings Borrow Area Regrading Quantity	CY	105,000	See Comments and Notes		$ 2.50	$ 262,500	See Note 1
4	LTVSMC Coarse Tailings Borrow Area - Seed, Mulch and Fertilize	Acre	65	See Comments and Notes		$ 730.00	$ 47,450	See Note 2 [$1985 replaced by $730 D&T]
	Borrow Area Restoration Unit Cost		65			**$ 4,768.46**	$ 309,950	
5	LTVSMC Coarse Tailings Borrow Area - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	3.25	See Comments and Notes		$ 1,985.00	$ 6,451	
6	Dam - Exterior Face Bentonite Augmentation	Acre	-	See Comments and Notes		$ -	$ -	Performed Incrementally as Routine Construction Item Through-out Year 0; Already Complete - No Additional Action Required
7	Dam - Exterior Face Seed, Mulch and Fertilize	Acre	-	See Comments and Notes		$ -	$ -	
8	Beach Area and Dam Crest - Remove and Replace 30" Tailings Cover Layer to Facilitate Bentonite Augmentation of Soil Layer 30" Below Beach Surface	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required
9	Beach Area and Dam Crest - Till Bentonite to 18" Depth	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required
10	Beach Area and Dam Crest - Compact 18" Layer of Bentonite Amended Soil	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required
11	Beach Area and Dam Crest - Lightly Compact Upper Cover Layer	Acre	-	See Comments and Notes		$ -	$ -	
12	Beach Area and Dam Crest - Seed, Fertilize and Mulch	Acre	40	See Comments and Notes		$ 880.00	$ 35,200	Establish Vegetation on New Dam Construction Areas (Lift 1 Crest and Interior Slope) Only - Vegetation Already In Place Elsewhere. Estimated Restoration Length is 7,000' and Estimated Restoration Width is 250'. [$2524 replaced by D&T $880]
13	Beach Area and Dam Crest - Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	2	See Comments and Notes		$ 2,524.00	`	Establish Vegetation on New Dam Construction Areas (Lift 1 Crest and Interior Slope) Only - Vegetation Already In Place Elsewhere. Estimated Restoration Length is 7,000' and Estimated Restoration Width is 250'.
14	Pond Bottom - Bentonite Amended Pond Bottom	Acre	-	See Comments and Notes		$ -	$ -	No Flotation Tailings Deposition at End of Year 0 - This Item Not Required

Closure Cost Estimate
User 11

SOW 11: Hydroment Residue Facility: Year 0 (no residue, only grading/seeding)
May 2016 Contingency Reclamation Estimate

Item	Description	Unit	Quantity	Basis for Quantities (drawing # or describe)	Status of Drawing (prelim/complete)	Unit Cost	Cost Extension	Comments
1	Mobilization and Demobilization	LS	1	See Comments and Notes		$ 5,000.00	$ 5,000	To Be Determined By Contractor - Mob for General Earthwork and Vegetation Establishment
2	Environmental Protection Measures	LS	1	See Comments and Notes		$ 5,000.00	$ 5,000	Assume Environmental Protection Measures for Year 0 Construction Remain In Place and Are Effective
3	Construction QA/QC	LS	1	See Comments and Notes		$ 2,000.00	$ 2,000	See Note 2
4	General Site Grading	CY	2,000	See Comments and Notes		$ 7.75	$ 15,500	Assume General Grading (not soil import) of 6" Surface in Isolated Areas (assume 2.5 acres) in Prep. for Vegetion Establishment.
5	Furnish and Install Vegetation on Disturbed Areas	Acre	5	See Comments and Notes		$ 2,524.00	$ 12,620	Year 0 - Assume Furnsih and Install Vegetation on 5-acre Disturbed Area
6	Reseeding 5% of Vegetation to Correct for Limited Growth	Acre	1	See Comments and Notes		$ 2,524.00	$ 2,524	Rounded Up to Nearest Acre
							$ 42,644	

Notes:
1) Per Hydrometallurgical Residue Management Plan v4 DEC2014 Figure 4-1; Year 0 Activities Include Removal of Various Structures, Rock and Soil from the HRF Footprint Prior Initiation of Year 1 - Lift 1 Pre-Load. Some limited tree clearing and grubbing also anticipated. Assume 20-percent of 25-acre Pre-Load Footprint is Disturbed in Year 0 in Preparation for Access and Delivery of Preload Materials in Year 1.1

2) Limited QA/QC required. Assume limited amount of site review and submittal review to confirm compliance of site restoration activities with specifications.

Closure Cost Estimate
User 12

			Quantity	Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year
A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals								
Exploration	$ -	$ -								
Exploration Roads & Drill Pads	$ -	$ -								
Roads	$ -	$ -								
Grading Costs		$ -		cy			-	1	-	
Cover Placement Cost		$ -		cy			-	1	-	
Ripping/Scarifying Cost		$ -		acres			-	1	-	
Well Abandonment	$ -	$ 25,711								
Production, Dewatering, Infiltration Wells		$ 4,886	5	ct	0.25	20	0.01	1	0.01	528
Monitoring Wells		$ 20,825	49	ct	0.25	196	0.09	1	0.09	528
Pits	$ -	$ -								
Quarries & Borrow Areas	$ -	$ 31,189								
Grading Costs		$ 31,189	101,281	cy	703	144	0.07	1	0.07	1,485,455
Cover Placement Cost		$ -		cy			-	1	-	
Topsoil Placement Cost		$ -		cy			-	1	-	
Ripping/Scarifying Cost		$ -	45	acres			-	1	-	
Safety Berm Construction Cost		$ -		cy			-	1	-	
Underground Openings	$ -	$ -								
Process Ponds	$ -	$ 562,089								
Backfilling - Mine Site WWTF Pond - 1		$ 20,157	11,217	LCY	546	21	0.01	1	0.01	1,153,152
Liner Cut & Fold - Mine Site WWTF Pond - 1		$ 380	820	ft	500	1.6	0.00	1	0.00	1,056,000
Backfilling - Mine Site WWTF Pond - 2		$ 62,390	35,704	LCY	546	65	0.03	1	0.03	1,153,152
Liner Cut & Fold - Mine Site WWTF Pond - 2		$ 630	1360	ft	500	2.7	0.00	1	0.00	1,056,000
Backfilling - Mine Site WWTF Pond - 3		$ 120,941	68,815	LCY	546	126	0.06	1	0.06	1,153,152
Liner Cut & Fold - Mine Site WWTF Pond - 3		$ 917	1980	ft	500	4.0	0.00	1	0.00	1,056,000
Backfilling - Mine Site CPS Pond		$ 28,796	16,444	LCY	546	30	0.01	1	0.01	1,153,152
Liner Cut & Fold - Mine Site CPS Pond		$ 445	960	ft	500	1.9	0.00	1	0.00	1,056,000
Backfilling - Mine Site PW-OSLA		$ 41,273	23,393	LCY	546	43	0.02	1	0.02	1,153,152
Liner Cut & Fold - Mine Site PW-OSLA		$ 602	1300	ft	500	2.6	0.00	1	0.00	1,056,000
Backfilling - Mine Site PW-HRE		$ 30,715	17,263	LCY	546	32	0.02	1	0.02	1,153,152
Liner Cut & Fold - Mine Site PW-HRE		$ 509	1100	ft	500	2.2	0.00	1	0.00	1,056,000
Backfilling - Mine Site PW-RTH		$ 1,919	1,129	LCY	546	2	0.00	1	0.00	1,153,152
Liner Cut & Fold - Mine Site PW-RTH		$ 370	800	ft	500	1.6	0.00	1	0.00	1,056,000
Backfilling - Mine Site Temporary pond		$ 22,077	12,673	LCY	546	23	0.01	1	0.01	1,153,152
Liner Cut & Fold - Mine Site Temporary pond		$ 445	960	ft	500	1.9	0.00	1	0.00	1,056,000
Backfilling - Mine Site S4, PW-S4		$ 63,350	36,139	LCY	546	66	0.03	1	0.03	1,153,152
Liner Cut & Fold - Mine Site S4, PW-S4		$ 815	1760	ft	500	3.5	0.00	1	0.00	1,056,000
Backfilling - Mine Site SOSP, PW-SOSP		$ 39,354	22,587	LCY	546	41	0.02	1	0.02	1,153,152
Liner Cut & Fold - Mine Site SOSP, PW-SOSP		$ 640	1380	ft	500	2.8	0.00	1	0.00	1,056,000
Backfilling - Mine Site PW-HRC		$ 19,197	11,132	LCY	546	20	0.01	1	0.01	1,153,152
Liner Cut & Fold - Mine Site PW-HRC		$ 436	940	ft	500	1.9	0.00	1	0.00	1,056,000
Backfilling - Mine Site S23-1		$ 42,233	24,039	LCY	546	44	0.02	1	0.02	1,153,152
Liner Cut & Fold - Mine Site S23-1		$ 872	1880	ft	500	3.8	0.00	1	0.00	1,056,000
Backfilling - Mine Site PW-S23-1		$ 61,431	34,687	LCY	546	64	0.03	1	0.03	1,153,152
Liner Cut & Fold - Mine Site PW-S23-1		$ 1,195	2580	ft	500	5.2	0.00	1	0.00	1,056,000
check:		PASS								
Heaps	$ -	$ -								
Waste Rock Dumps	$ -	$ 3,029,751								
Grading Costs		$ 24,042	163,766	cy	1,476	111	0.05	1	0.05	3,117,312
Cover Placement Cost		$ 1,192,336	332,460	cy	508	655	0.31	1	0.31	1,072,896
Topsoil Placement Cost		$ 1,785,773	498,689	cy	508	981	0.46	1	0.46	1,072,896
Ripping/Scarifying Cost		$ 27,600	206	acres	5.7	36	0.02	1	0.02	12,089
Landfills	$ -	$ -								
Tailings	$ -	$ 13,879								
Embankment Regrading Cost		$ -		cy			-	1	-	-
Tailings Surface Grading Cost		$ -		cy			-	1	-	-
Cover Placement Cost		$ -		cy			-	1	-	-
Topsoil Placement Cost		$ -		cy			-	1	-	-
Ripping/Scarifying Cost		$ 13,879	112	acres	1.3	88	0.04	1	0.04	2,694
Foundation & Buildings Areas	$ -	$ -								
Yards, Etc.	$ -	$ 86,101								
Regrading Cost		$ 86,101	54,853	cy	119	461	0.22	1	0.22	251,302
Cover Placement Cost		$ -		cy			-	1	-	-
Growth Media Placement Cost		$ -		cy			-	1	-	-
Ripping/Scarifying Cost		$ -		acres			-	1	-	-
Drainage & Sediment Control	$ -	$ -								
Removal of ditches around Pits (Large Figure 13 - Water Management Plan - Mine)		$ -		LCY			-	1	-	
Construction of ditches around Pits (ASSUMED)		$ -		LCY			-	1	-	
Generic Material Hauling	$ -	$ 13,724,972								

Closure Cost Estimate
User 12

				Quantity	Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year
A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals									
Exploration	$ -	$ -									
Exploration Roads & Drill Pads	$ -	$ -									
Roads	$ -	$ -									
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer		$ -			cy			-	1	-	-
Cover Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer		$ 446,673	166,230		cy	521	319	0.15	1	0.15	1,100,352
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer		$ -	-		cy			-	1	-	-
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) geomembrane bedding layer		$ -			cy			-	1	-	-
Cover Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer		$ 446,673	166,230		cy	521	319	0.15	1	0.15	1,100,352
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer		$ -	-		cy			-	1	-	-
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to West Pit		$ 7,251,791	2,993,581		cy	578	5,179	2.45	1	2.45	1,220,736
Cover Placement Cost - Category 2/3 stockpile relocation to West Pit		$ -			cy			-	1	-	-
Topsoil Placement Cost - Category 2/3 stockpile relocation to West Pit		$ 161,974	50,820		cy	578	88	0.04	1	0.04	1,220,736
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to West Pit		$ 1,849,122	850,972		cy	543	1,567	0.74	1	0.74	1,146,816
Cover Placement Cost - Category 4 stockpile relocation to West Pit		$ -			cy			-	1	-	-
Topsoil Placement Cost - Category 4 stockpile relocation to West Pit		$ 66,437	23,393		cy	564	41	0.02	1	0.02	1,191,168
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to West Pit		$ 3,427,763	1,300,000		cy	531	2,448	1.16	1	1.16	1,121,472
Cover Placement Cost - Ore Surge Stockpile to West Pit		$ -			cy			-	1	-	-
Topsoil Placement Cost - Ore Surge Stockpile to West Pit		$ 74,539	25,813		cy	564	46	0.02	1	0.02	1,191,168
check:		PASS									
Other User Costs (from Other User sheet)	$ (1)	$ 26,387,736									
SOW 3: Category 1 Cover System: Year 1		$ 10,678,858		1	sf	5,000	0	0.00	1	0.00	10,560,000
SOW 11: Hydroment Residue Facility: Year 1		$ 236,155		1	sf	9,000	0	0.00	1	0.00	19,008,000
SOW 14: Flotation Tailings Basin: Year 1		$ 15,472,723		1	sf	9,000	0	0.00	1	0.00	19,008,000
check:		PASS									
Other**	$ -	$ -						-	1	-	-
Mob/Demob if included in Other User sheet	$ -	$ -									
Mob/Demob	$ -	$ -									
Subtotal "A"	$ (1)	$ 43,861,428									
B. Revegetation/Stabilization	"Cost Schedule" sheet variance	Subtotals									
Exploration	$ -	$ -									
Exploration Roads & Drill Pads	$ -	$ -									
Roads	$ -	$ -									
Well Abandonment											
Pits	$ -	$ -									
Quarries & Borrow Areas	$ -	$ 18,846		45	acres						
Underground Openings											
Process Ponds	$ -	$ 8,965									
Heaps	$ -	$ -									
Waste Rock Dumps	$ -	$ 86,303									
Landfills	$ -	$ -									
Tailings	$ -	$ 47,008									
Foundation & Buildings Areas	$ -	$ -									
Yards, Etc.	$ -	$ 14,178									
Drainage & Sediment Control											
Generic Material Hauling	$ -	$ 39,060		536	acres	1.0	536	0.25	1	0.25	2,112
Other User Costs (from Other User sheet)	$ -	$ -									
Other**	$ -	$ -						-	1	-	-
Subtotal "B"	$ -	$ 214,360									
check:		PASS									
C. Detoxification/Water Treatment/Disposal of Wastes**	"Cost Schedule" sheet variance	Subtotals									
Process Ponds/Sludge	$ -	$ -									
Heaps	$ -	$ -									
Dumps (Waste & Landfill)	$ -	$ -									
Tailings	$ -	$ -									
Surplus Water Disposal	$ -	$ -									
Monitoring	$ -	$ -									
Miscellaneous	$ -	$ -									
Solid Waste - On Site	$ -	$ -									
Solid Waste - Off Site	$ -	$ -									
Hazardous Materials	$ -	$ -									
Hydrocarbon Contaminated Soils	$ -	$ -									
Pumping (from Solution Mgmt sheet)	$ -	$ -									
check:		PASS									
Evaporation (from Solution Mgmt sheet)	$ -	$ -									
Treatment (from Solution Mgmt sheet)	$ -	$ -									

Closure Cost Estimate
User 12

			Quantity	Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year
A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals								
Exploration	$ -	$ -								
Exploration Roads & Drill Pads	$ -	$ -								
Roads	$ -	$ -								
	check:	PASS								
Decontamination (from Solution Mgmt sheet)	$ -	$ -								
Other User Costs (from Other User sheet)	$ -	$ 430,879,028								
Areas of concern, legacy remediation (quote from NTS)		$ 6,740,200	1	LS			1	1	1.00	1
SOW 21: Category 1 Groundwater Containment System: Year 1		$ 2,341,414	1	LS			1	1	1.00	1
NorthMet Project – CRE O&M for water treatment during reclamation and long-term		$ 420,195,314								
FTB containment system NMT development costs		$ 1,081,100	1	LS			1	1	1.00	1
FTB Pond Overflow NMT development costs		$ 521,000	1	LS			1	1	1.00	1
	check:	PASS								
Other**	$ -	$ -								
Subtotal "C"	$ -	$ 430,879,028								
D. Structure, Equipment and Facility Removal, and Misc.	"Cost Schedule" sheet variance	Subtotals								
Foundation & Buildings Areas	$ -	$ -								
Other Demolition	$ -	$ 45,097,091								
Demo and Asbestos Abatement Cost Summary - User 2		$ 44,791,841	1	LS			1	1	1.00	1
Above Ground Storage Tanks - User 2		$ 244,425	1	LS			1	1	1.00	1
Remove & Dispose of Stockpile/Pond Liners - OSP		$ 9,600	32	acres			1	1	1.00	32
Remove & Dispose of Collection pipe - OSP		$ 6,975	3,100	LF			1	1	1.00	3,100
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile		$ 18,900	63	acres			1	1	1.00	63
Remove & Dispose of Collection pipe - Category 2/3 Stockpile		$ 10,800	4,800	LF			1	1	1.00	4,800
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile		$ 8,700	29	acres			1	1	1.00	29
Remove & Dispose of Collection pipe - Category 4 Stockpile		$ 5,850	2,600	LF			1	1	1.00	2,600
	check:	PASS								
Equipment Removal	$ -	$ -								
	check:	PASS								
Fence Removal	$ -	$ -								
Fence Installation	$ -	$ 46,343								
Fence installation around pit per Mine Plan 6.2.3		$ 46,343	12,100	ft	71	170	0.08	1	0.08	150,480
Culvert Removal	$ -	$ -								
Pipe Removal	$ -	$ -								
	check:	PASS								
Powerline Removal	$ -	$ -								
	check:	PASS								
Transformer Removal	$ -	$ -								
	check:	PASS								
Rip-rap, rock lining, gabions	$ -	$ -								
Category 1 stockpile cover rip-rap; W=6LY		$ -	-	S.Y.	7	-	-	4	-	13,992
Other Misc. Costs	$ -	$ -								
Other User Costs (from Other User sheet)	$ -	$ -								
	check:	PASS								

Closure Cost Estimate
User 12

			Quantity	Units	Productivity (unit/hr)	Fleet/crew hours	Duration (years)	# fleets	Effective Duration (years)	Output unit/year
A. Earthwork/Recontouring	"Cost Schedule" sheet variance	Subtotals								
Exploration	$ -	$ -								
Exploration Roads & Drill Pads	$ -	$ -								
Roads	$ -	$ -								
Other**	$ -	$ -								
Subtotal "D"	$ -	$ 45,143,434								
E. Monitoring	"Cost Schedule" sheet variance	Subtotals								
Reclamation Monitoring and Maintenance	$ -	$ 20,049								
Revegetation Maintenance		$ 20,049	1	time	0.0200	50	0.02	1	0.02	42
Erosion Maintenance		$ -	-	cy			-	1	-	-
Reclamation Monitoring		$ -					-	1	-	-
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)	$ -	$ 5,618,272								
(this one schedules automatically)										
Other User Costs (from Other User sheet)	$ -	$ 2,725,820								
Closure - Landfill SW-619 Water and Gas Monitoring		$ 40,600	4	years	0.00047	8,448	4.00	1	4.00	1
Closure - Landfill SW-619 Annual Report		$ 21,120	4	years	0.00047	8,448	4.00	1	4.00	1
Closure - Coal Ash Landfill Monitoring		$ 10,560	4	years	0.00047	8,448	4.00	1	4.00	1
Post-Closure - Landfill SW-619 Water and Gas Monitoring		$ 263,900	26	years	0.00047	54,912	26.00	1	26.00	1
Post-Closure - Landfill SW-619 Annual Report		$ 137,280	26	years	0.00047	54,912	26.00	1	26.00	1
Post-Closure - Coal Ash Landfill Monitoring		$ 23,760	9	years	0.00047	19,008	9.00	1	9.00	1
Dam safety monitoring - instrumentation data collection		$ 768,600	50	years	0.00047	105,600	50.00	1	50.00	1
Dam safety monitoring - instrumentation report		$ 285,000	50	years	0.00047	105,600	50.00	1	50.00	1
Dam safety monitoring - geotechnical inspection		$ 500,000	50	years	0.00047	105,600	50.00	1	50.00	1
Dam safety monitoring - annual report		$ 675,000	50	years	0.00047	105,600	50.00	1	50.00	1
check:		PASS								
Subtotal "E"	$ -	$ 8,364,141								
F. Construction Management & Support	"Cost Schedule" sheet variance	Subtotals								
Construction Management	$ -	$ -								
Construction Support	$ -	$ -								
Road Maintenance	$ -	$ 955,722								
Active Reclamation		$ 289,613								
Monitoring & Maintenance		$ 666,109								
Other User Costs (from Other User sheet)	$ -	$ 1,000								
Other**	$ -	$ -								
Subtotal "F"	$ -	$ 956,722								
G. Closure Planning, G&A, Human Resources	"Cost Schedule" sheet variance	Subtotals								
Closure Planning	$ -	$ -								
General & Administration	$ -	$ -								
Human Resources	$ -	$ 18,544,781								
Other User Costs (from Other User sheet)	$ -	$ 1,733,355								
Closure - Pickup Trucks - Closure Year 1		$ 21,440	4	each	0.00047	8,448	2.00	1	2.00	4
Closure - Pickup Trucks - Closure Year 2		$ 21,440	4	each	0.00047	8,448	4.00	1	4.00	4
Closure - Pickup Trucks - Closure Year 3		$ 21,440	4	each	0.00047	8,448	4.00	1	4.00	4
Closure - Pickup Trucks - Closure Year 4		$ 21,440	4	each	0.00047	8,448	4.00	1	4.00	4
Closure - Snow Plowing - Closure Year 1		$ 23,089	1	each	0.00047	2,112	1.00	1	1.00	1
Closure - Snow Plowing - Closure Year 2		$ 23,089	1	each	0.00047	2,112	1.00	1	1.00	1
Closure - Snow Plowing - Closure Year 3		$ 23,089	1	each	0.00047	2,112	1.00	1	1.00	1
Closure - Snow Plowing - Closure Year 4		$ 23,089	1	each	0.00047	2,112	1.00	1	1.00	1
Post-Closure - Pickup Trucks		$ 493,129	46	years	0.00047	97,152	46.00	1	46.00	1
Post-Closure - Snow Plowing		$ 1,062,107	46	years	0.00047	97,152	46.00	1	46.00	1
check:		PASS								
Other**	$ -	$ -								
Subtotal "G"	$ (1)	$ 20,278,136								
	$ (1)	$ 549,697,249								

Closure Cost Estimate
User 12

	$/year	Unit Cost	Activity Group	Activity Group Year	Add Year Before Item Starts	Activity Beginning Year	Check	2016
A. Earthwork/Recontouring								
Exploration								
Exploration Roads & Drill Pads								
Roads								
Grading Costs			MMJ	1	-	1	PASS	
Cover Placement Cost			MMJ	1	1	2	PASS	
Ripping/Scarifying Cost			MMJ	1	2	3	PASS	
Well Abandonment								
Production, Dewatering, Infiltration Wells	$ 515,962	$ 977.20	CCC	1	3	4	PASS	
Monitoring Wells	$ 224,400	$ 425.00	CPC	5	45	50	PASS	
Pits								
Quarries & Borrow Areas								
Grading Costs	$ 457,439	$ 0.31	MMA	1	1	2	PASS	
Cover Placement Cost			MMA	1	-	1	PASS	
Topsoil Placement Cost			MMA	1	-	1	PASS	
Ripping/Scarifying Cost		$ -	MMA	1	2	3	PASS	
Safety Berm Construction Cost			MMA	1	3	4	PASS	
Underground Openings								
Process Ponds								
Backfilling - Mine Site WWTF Pond - 1	$ 2,072,219	$ 1.80	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site WWTF Pond - 1	$ 489,366	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site WWTF Pond - 2	$ 2,015,045	$ 1.75	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site WWTF Pond - 2	$ 489,176	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site WWTF Pond - 3	$ 2,026,642	$ 1.76	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site WWTF Pond - 3	$ 489,067	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site CPS Pond	$ 2,019,348	$ 1.75	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site CPS Pond	$ 489,500	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site PW-OSLA	$ 2,034,542	$ 1.76	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site PW-OSLA	$ 489,009	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site PW-HRE	$ 2,051,733	$ 1.78	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site PW-HRE	$ 488,640	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site PW-RTH	$ 1,960,052	$ 1.70	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site PW-RTH	$ 488,400	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site Temporary pond	$ 2,008,848	$ 1.74	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site Temporary pond	$ 489,500	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site S4, PW-S4	$ 2,021,422	$ 1.75	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site S4, PW-S4	$ 489,000	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site SOSP, PW-SOSP	$ 2,009,171	$ 1.74	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$ 489,739	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site PW-HRC	$ 1,988,597	$ 1.72	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site PW-HRC	$ 489,804	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site S23-1	$ 2,025,919	$ 1.76	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site S23-1	$ 489,804	$ 0.46	MMF	1	-	1	PASS	
Backfilling - Mine Site PW-S23-1	$ 2,042,243	$ 1.77	MMF	1	-	1	PASS	
Liner Cut & Fold - Mine Site PW-S23-1	$ 489,116	$ 0.46	MMF	1	-	1	PASS	
check:								
Heaps								
Waste Rock Dumps								
Grading Costs	$ 457,643	$ 0.15	MMD	1	-	1	PASS	
Cover Placement Cost	$ 3,847,840	$ 3.59	MMD	1	1	2	PASS	
Topsoil Placement Cost	$ 3,841,971	$ 3.58	MMD	1	2	3	PASS	
Ripping/Scarifying Cost	$ 1,619,200	$ 133.94	MMD	1	3	4	PASS	
Landfills								
Tailings								
Embankment Regrading Cost			PFA	1	-	1	PASS	
Tailings Surface Grading Cost			PFA	1	-	1	PASS	
Cover Placement Cost			PFA	1	-	1	PASS	
Topsoil Placement Cost			PFA	1	-	1	PASS	
Ripping/Scarifying Cost	$ 333,096	$ 123.65	PFA	1	-	1	PASS	
Foundation & Buildings Areas								
Yards, Etc.								
Regrading Cost	$ 394,458	$ 1.57	MMK	1	-	1	PASS	
Cover Placement Cost			MMK	1	-	1	PASS	
Growth Media Placement Cost			MMK	1	-	1	PASS	
Ripping/Scarifying Cost			MMK	1	-	1	PASS	
Drainage & Sediment Control								
Removal of ditches around Pits (Large Figure 13 - Water Management Plan - Mine)			MMA	1	-	1	PASS	
Construction of ditches around Pits (ASSUMED)			MMA	1	-	1	PASS	
Generic Material Hauling								

Closure Cost Estimate
User 12

	$/year	Unit Cost	Activity Group	Activity Group Year	Add Year Before Item Starts	Activity Beginning Year	Check	2016
A. Earthwork/Recontouring								
Exploration								
Exploration Roads & Drill Pads								
Roads								
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer			MMD	1		1	PASS	
Cover Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ 2,956,732	$ 2.69	MMD	1	1	2	PASS	
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer			MMD	1	1	2	PASS	
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) geomembrane bedding layer			MMD	1		1	PASS	
Cover Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ 2,956,732	$ 2.69	MMD	1	3	4	PASS	
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer					3	3	PASS	
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to West Pit	$ 2,957,168	$ 2.42	MMD	1		1	PASS	
Cover Placement Cost - Category 2/3 stockpile relocation to West Pit			MMD	1		1	PASS	
Topsoil Placement Cost - Category 2/3 stockpile relocation to West Pit	$ 3,890,742	$ 3.19				-	PASS	
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to West Pit	$ 2,491,977	$ 2.17	MMD	1		1	PASS	
Cover Placement Cost - Category 4 stockpile relocation to West Pit			MMD	1		1	PASS	
Topsoil Placement Cost - Category 4 stockpile relocation to West Pit	$ 3,382,962	$ 2.84				-	PASS	
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to West Pit	$ 2,957,031	$ 2.64	MMD	1	1	2	PASS	
Cover Placement Cost - Ore Surge Stockpile to West Pit			MMD	1		1	PASS	
Topsoil Placement Cost - Ore Surge Stockpile to West Pit	$ 3,439,680	$ 2.89			1	1	PASS	
check:								
Other User Costs (from Other User sheet)								
SOW 3: Category 1 Cover System: Year 1	############	$ 10,678,857.50	MMD	1	-	1	PASS	
SOW 11: Hydroment Residue Facility: Year 1	############	$ 236,155.00	MMD	1	-	1	PASS	
SOW 14: Flotation Tailings Basin: Year 1	############	$ 15,472,723.00	MMD	1	-	1	PASS	
check:								
Other**			MMD	1	-	1	PASS	
Mob/Demob if included in Other User sheet								
Mob/Demob								
Subtotal "A"								
B. Revegetation/Stabilization								
Exploration							PASS	
Exploration Roads & Drill Pads							PASS	
Roads							PASS	
Well Abandonment							PASS	
Pits							PASS	
Quarries & Borrow Areas			MMA	1	-	1	PASS	
Underground Openings							PASS	
Process Ponds							PASS	
Heaps							PASS	
Waste Rock Dumps			MMD	1	-	1	PASS	
Landfills							PASS	
Tailings			PFA	1	-	1	PASS	
Foundation & Buildings Areas							PASS	
Yards, Etc.			MMK	1	-	1	PASS	
Drainage & Sediment Control					-	-	PASS	
Generic Material Hauling	$ 153,868	$ 72.85	MMD	1	-	1	PASS	
Other User Costs (from Other User sheet)			PFA	1	-	1	PASS	
Other**			MMD	1	-	1	PASS	
Subtotal "B"								
check:								
C. Detoxification/Water Treatment/Disposal of Wastes**								
Process Ponds/Sludge			CCC	1	-	1	PASS	
Heaps			CCC	1	-	1	PASS	
Dumps (Waste & Landfill)			CCC	1	-	1	PASS	
Tailings			CCC	1	-	1	PASS	
Surplus Water Disposal			CCC	1	-	1	PASS	
Monitoring			CCC	1	-	1	PASS	
Miscellaneous			CCC	1	-	1	PASS	
Solid Waste - On Site			CCC	1	2	3	PASS	
Solid Waste - Off Site			CCC	1	-	1	PASS	
Hazardous Materials			CCC	1	-	1	PASS	
Hydrocarbon Contaminated Soils			CCC	1	-	1	PASS	
Pumping (from Solution Mgmt sheet)								
check:								
Evaporation (from Solution Mgmt sheet)								
Treatment (from Solution Mgmt sheet)								

Closure Cost Estimate
User 12

	$/year	Unit Cost	Activity Group	Activity Group Year	Add Year Before Item Starts	Activity Beginning Year	Check	2016
A. Earthwork/Recontouring								
Exploration								
Exploration Roads & Drill Pads								
Roads								
	check:							
Decontamination (from Solution Mgmt sheet)								
Other User Costs (from Other User sheet)								
Areas of concern, legacy remediation (quote from NTS)	$ 6,740,200	$ 6,740,199.50	PPF	1	-	1	PASS	
SOW 21: Category 1 Groundwater Containment System: Year 1	$ 2,341,414	$ 2,341,414.20	MMD	1	-	1	PASS	
NorthMet Project – CRE O&M for water treatment during reclamation and long-term							PASS	
FTB containment system NMT development costs	$ 1,081,100	$ 1,081,100.00	PWA	1	-	1	PASS	
FTB Pond Overflow NMT development costs	$ 521,000	$ 521,000.00	PWA	1	-	1	PASS	
	check:							
Other**								
Subtotal "C"								
D. Structure, Equipment and Facility Removal, and Misc.								
Foundation & Buildings Areas								
Other Demolition								
Demo and Asbestos Abatement Cost Summary - User 2	$ 44,791,841	$ 44,791,841.00	PPA	1	-	1	PASS	
Above Ground Storage Tanks - User 2	$ 244,425	$ 244,425.00	PPA	1	-	1	PASS	
Remove & Dispose of Stockpile/Pond Liners - OSP	$ 9,600	$ 300.00	MMF	1	-	1	PASS	
Remove & Dispose of Collection pipe - OSP	$ 6,975	$ 2.25	MMF	1	-	1	PASS	
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile	$ 18,900	$ 300.00	MMF	1	-	1	PASS	
Remove & Dispose of Collection pipe - Category 2/3 Stockpile	$ 10,800	$ 2.25	MMF	1	-	1	PASS	
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile	$ 8,700	$ 300.00	MMF	1	-	1	PASS	
Remove & Dispose of Collection pipe - Category 4 Stockpile	$ 5,850	$ 2.25	MMF	1	-	1	PASS	
	check:							
Equipment Removal								
	check:							
Fence Removal								
Fence Installation								
Fence installation around pit per Mine Plan 6.2.3	$ 576,338	$ 3.83	MMA	1	-	1	PASS	
Culvert Removal								
Pipe Removal								
	check:							
Powerline Removal								
	check:							
Transformer Removal								
	check:							
Rip-rap, rock lining, gabions								
Category 1 stockpile cover rip-rap; W=6LY			MMC	1	-	1	PASS	
Other Misc. Costs								
Other User Costs (from Other User sheet)								
	check:							

Closure Cost Estimate
User 12

	$/year	Unit Cost	Activity Group	Activity Group Year	Add Year Before Item Starts	Activity Beginning Year	Check	2016
A. Earthwork/Recontouring								
Exploration								
Exploration Roads & Drill Pads								
Roads								
Other**								
Subtotal "D"								
E. Monitoring								
Reclamation Monitoring and Maintenance								
Revegetation Maintenance	$ 846,870	$ 20,049.00	CCC	1	-	1	PASS	
Erosion Maintenance			CCC	1	-	1	PASS	
Reclamation Monitoring			CCC	1	-	1	PASS	
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)								
(this one schedules automatically)								
Other User Costs (from Other User sheet)								
Closure - Landfill SW-619 Water and Gas Monitoring	$ 10,150	$ 10,150.00	PPC	1	-	1	PASS	
Closure - Landfill SW-619 Annual Report	$ 5,280	$ 5,280.00	PPC	1	-	1	PASS	
Closure - Coal Ash Landfill Monitoring	$ 2,640	$ 2,640.00	PPB	1	-	1	PASS	
Post-Closure - Landfill SW-619 Water and Gas Monitoring	$ 10,150	$ 10,150.00	PPC	1	4	5	PASS	
Post-Closure - Landfill SW-619 Annual Report	$ 5,280	$ 5,280.00	PPC	1	4	5	PASS	
Post-Closure - Coal Ash Landfill Monitoring	$ 2,640	$ 2,640.00	PPB	1	4	5	PASS	
Dam safety monitoring - instrumentation data collection	$ 15,372	$ 15,372.00	PPC	1		1	PASS	
Dam safety monitoring - instrumentation report	$ 5,700	$ 5,700.00	PPC	1		1	PASS	
Dam safety monitoring - geotechnical inspection	$ 10,000	$ 10,000.00	PPC	1		1	PASS	
Dam safety monitoring - annual report	$ 13,500	$ 13,500.00	PPC	1		1	PASS	
	check:							
Subtotal "E"								
F. Construction Management & Support								
Construction Management							PASS	
Construction Support								
Road Maintenance								
Active Reclamation							PASS	
Monitoring & Maintenance								
Other User Costs (from Other User sheet)								
Other**								
Subtotal "F"								
G. Closure Planning, G&A, Human Resources								
Closure Planning								
General & Administration								
Human Resources								
Other User Costs (from Other User sheet)								
Closure - Pickup Trucks - Closure Year 1	$ 21,440	$ 5,360.10	CCC	1	-	1	PASS	
Closure - Pickup Trucks - Closure Year 2	$ 21,440	$ 5,360.10	CCC	1	1	2	PASS	
Closure - Pickup Trucks - Closure Year 3	$ 21,440	$ 5,360.10	CCC	1	2	3	PASS	
Closure - Pickup Trucks - Closure Year 4	$ 21,440	$ 5,360.10	CCC	1	3	4	PASS	
Closure - Snow Plowing - Closure Year 1	$ 23,089	$ 23,089.28	CCC	1	-	1	PASS	
Closure - Snow Plowing - Closure Year 2	$ 23,089	$ 23,089.28	CCC	1	1	2	PASS	
Closure - Snow Plowing - Closure Year 3	$ 23,089	$ 23,089.28	CCC	1	2	3	PASS	
Closure - Snow Plowing - Closure Year 4	$ 23,089	$ 23,089.28	CCC	1	3	4	PASS	
Post-Closure - Pickup Trucks	$ 10,720	$ 10,720.20	CPC	5	-	5	PASS	
Post-Closure - Snow Plowing	$ 23,089	$ 23,089.28	CPC	5	-	5	PASS	
	check:							
Other**								
Subtotal "G"								

Inflation Rate (r) (%):	**1.1%**
Discount Rate (i)(%):	**8%**

		0
		2016
Grand total	**$ 577,182,110**	$ -
Grand Total (Inflation Adjusted) (FV)	**$ 757,472,647**	$ -
Grand Total Net Present Value (NPV)	**$ 197,390,336**	$ -

Closure Cost Estimate
User 12

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
A. Earthwork/Recontouring													
Exploration													
Exploration Roads & Drill Pads													
Roads				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment				$ -	$ 4,886	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells				$ -	$ 4,886	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Wells													
Pits													
Quarries & Borrow Areas				$ -	$ 31,189	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs				$ -	$ 31,189	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings													
Process Ponds				$ -	$ 562,089	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1				$ -	$ 20,157	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1				$ -	$ 380	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2				$ -	$ 62,390	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2				$ -	$ 630	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3				$ -	$ 120,941	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3				$ -	$ 917	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond				$ -	$ 28,796	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond				$ -	$ 445	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA				$ -	$ 41,273	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA				$ -	$ 602	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE				$ -	$ 30,715	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE				$ -	$ 509	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH				$ -	$ 1,919	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH				$ -	$ 370	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond				$ -	$ 22,077	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond				$ -	$ 445	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4				$ -	$ 63,350	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4				$ -	$ 815	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP				$ -	$ 39,354	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP				$ -	$ 640	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC				$ -	$ 19,197	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC				$ -	$ 436	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1				$ -	$ 42,233	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1				$ -	$ 872	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1				$ -	$ 61,431	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1				$ -	$ 1,195	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:													
Heaps													
Waste Rock Dumps				$ -	$ 3,029,751	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs				$ -	$ 24,042	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost				$ -	$ 1,192,336	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost				$ -	$ 1,785,773	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost				$ -	$ 27,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills													
Tailings				$ -	$ 13,879.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost				$ -	$ 13,879	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas													
Yards, Etc.				$ -	$ 86,101.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regrading Cost				$ -	$ 86,101	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal of ditches around Pits (Large Figure 13 - Water Management Plan - Mine)				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction of ditches around Pits (ASSUMED)				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling				$ -	$ 8,959,617	$ 3,427,900	$ 1,337,454	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
A. Earthwork/Recontouring													
Exploration													
Exploration Roads & Drill Pads													
Roads				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer				$ -	$ 446,673	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) geomembrane bedding layer				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer				$ -	$ 446,673	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to West Pit				$ -	$ 2,957,168	$ 2,957,168	$ 1,337,454	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile relocation to West Pit				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile relocation to West Pit				$ -	$ 161,974	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to West Pit				$ -	$ 1,849,122	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocation to West Pit				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocation to West Pit				$ -	$ 66,437	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to West Pit				$ -	$ 2,957,031	$ 470,732	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to West Pit													
Topsoil Placement Cost - Ore Surge Stockpile to West Pit					74539	0	0	0	0	0	0	0	0
check:													
Other User Costs (from Other User sheet)				$ -	$ 26,387,735.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 1				$ -	$ 10,678,858	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 11: Hydroment Residue Facility: Year 1				$ -	$ 236,155	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 14: Flotation Tailings Basin: Year 1				$ -	$ 15,472,723	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:													
Other**				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet				$ -			$ -						
Mob/Demob													
Subtotal "A"													
B. Revegetation/Stabilization													
Exploration				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment													
Pits				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas				$ -	$ 18,846	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings													
Process Ponds				$ -	$ 8,965	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps				$ -	$ 86,303	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills													
Tailings				$ -	$ 47,008	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas													
Yards, Etc.				$ -	$ 14,178	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control													
Generic Material Hauling				$ -	$ 39,060	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**													
Subtotal "B"													
check:													
C. Detoxification/Water Treatment/Disposal of Wastes**													
Process Ponds/Sludge				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)													
check:													
Evaporation (from Solution Mgmt sheet)													
Treatment (from Solution Mgmt sheet)				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
A. Earthwork/Recontouring													
Exploration													
Exploration Roads & Drill Pads													
Roads				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									
Decontamination (from Solution Mgmt sheet)													
Other User Costs (from Other User sheet)				$ -	$ 18,721,271.70	$ 34,953,954.00	$ 9,480,737.00	$ 9,480,737.00	$ 8,904,664.00	$ 8,904,664.00	$ 8,904,664.00	$ 8,904,664.00	$ 7,681,516.00
Areas of concern, legacy remediation (quote from NTS)				$ -	$ 6,740,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 21: Category 1 Groundwater Containment System: Year 1				$ -	$ 2,341,414	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NorthMet Project – CRE O&M for water treatment during reclamation and long-term				$ -	$ 8,037,558	$ 34,953,954	$ 9,480,737	$ 9,480,737	$ 8,904,664	$ 8,904,664	$ 8,904,664	$ 8,904,664	$ 7,681,516
FTB containment system NMT development costs				$ -	$ 1,081,100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTB Pond Overflow NMT development costs				$ -	$ 521,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									
Other**													
Subtotal "C"													
D. Structure, Equipment and Facility Removal, and Misc.													
Foundation & Buildings Areas													
Other Demolition				$ -	$ 45,097,091	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - User 2				$ -	$ 44,791,841	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2				$ -	$ 244,425	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP				$ -	$ 9,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP				$ -	$ 6,975	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile				$ -	$ 18,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 Stockpile				$ -	$ 10,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile				$ -	$ 8,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Stockpile				$ -	$ 5,850	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									
Equipment Removal				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									
Fence Removal													
Fence Installation				$ -	$ 46,343.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fence installation around pit per Mine Plan 6.2.3				$ -	$ 46,343	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Culvert Removal				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Removal				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									
Powerline Removal				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									
Transformer Removal				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									
Rip-rap, rock lining, gabions				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Category 1 stockpile cover rip-rap; W=6LY				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs													
Other User Costs (from Other User sheet)				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				check:									

Closure Cost Estimate
User 12

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
A. Earthwork/Recontouring													
Exploration													
Exploration Roads & Drill Pads													
Roads				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**													
Subtotal "D"													
E. Monitoring													
Reclamation Monitoring and Maintenance				$ 20,049.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance				$ 20,049	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)													
(this one schedules automatically)													
Other User Costs (from Other User sheet)				$ 80,712	$ 80,712.00	$ 80,712.00	$ 80,712.00	$ 80,712.00	$ 62,642.00	$ 62,642.00	$ 62,642.00	$ 62,642.00	$ 62,642.00
Closure - Landfill SW-619 Water and Gas Monitoring				$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ -	$ -	$ -	$ -	$ -
Closure - Landfill SW-619 Annual Report				$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ -	$ -	$ -	$ -	$ -
Closure - Coal Ash Landfill Monitoring				$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Water and Gas Monitoring				$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150
Post-Closure - Landfill SW-619 Annual Report				$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280
Post-Closure - Coal Ash Landfill Monitoring				$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ 2,640	$ 2,640
Dam safety monitoring - instrumentation data collection				$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372
Dam safety monitoring - instrumentation report				$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700
Dam safety monitoring - geotechnical inspection				$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Dam safety monitoring - annual report				$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500
check:													
Subtotal "E"													
F. Construction Management & Support													
Construction Management													
Construction Support													
Road Maintenance				$ 72,403	$ 72,403.25	$ 72,403.25	$ 72,403.25	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63
Active Reclamation				$ 72,403	$ 72,403	$ 72,403	$ 72,403						
Monitoring & Maintenance								$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
Other User Costs (from Other User sheet)					1000								
Other**													
Subtotal "F"													
G. Closure Planning, G&A, Human Resources													
Closure Planning													
General & Administration													
Human Resources				$ 1,802,632	$ 1,802,632	$ 1,802,632	$ 1,802,632	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397
Other User Costs (from Other User sheet)				$ 211,928.18	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48
Closure - Pickup Trucks - Closure Year 1				$ 21,440	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 2				$ 21,440	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 3				$ 21,440	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 4				$ 21,440	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 1				$ 23,089	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 2				$ 23,089	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 3				$ 23,089	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 4				$ 23,089	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Pickup Trucks				$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720
Post-Closure - Snow Plowing				$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089
check:													
Other**													
Subtotal "G"													

1	2	3	4	5	6	7	8	9	10	11	12	13
2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
$ -	$ -	$ -	$ -	$ 110,906,273	$ 42,683,817	$ 13,741,971	$ 12,337,644	$ 10,018,928	$ 9,825,285	$ 9,823,038	$ 9,823,038	$ 8,538,732

$ -	$ -	$ -	$ -	$ 117,176,981	$ 45,595,994	$ 14,841,907	$ 13,472,561	$ 11,061,561	$ 10,967,750	$ 11,086,525	$ 11,209,150	$ 9,851,390
$ -	$ -	$ -	$ -	$ 79,748,685	$ 28,733,211	$ 8,660,110	$ 7,278,805	$ 5,533,535	$ 5,080,190	$ 4,754,821	$ 4,451,308	$ 3,622,336

Closure Cost Estimate
User 12

	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Wells												
Pits												
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings												
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Heaps												
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills												
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas												
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal of ditches around Pits (Large Figure 13 - Water Management Plan - Mine)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction of ditches around Pits (ASSUMED)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to West Pit												
Topsoil Placement Cost - Ore Surge Stockpile to West Pit	0	0	0	0	0	0	0	0	0	0	0	0
check:												
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 11: Hydroment Residue Facility: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 14: Flotation Tailings Basin: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Other**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet												
Mob/Demob												
Subtotal "A"												
B. Revegetation/Stabilization												
Exploration	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment												
Pits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings												
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills												
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas												
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control												
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**												
Subtotal "B"												
check:												
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)												
check:												
Evaporation (from Solution Mgmt sheet)												
Treatment (from Solution Mgmt sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											
Decontamination (from Solution Mgmt sheet)												
Other User Costs (from Other User sheet)	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00
Areas of concern, legacy remediation (quote from NTS)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 21: Category 1 Groundwater Containment System: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NorthMet Project – CRE O&M for water treatment during reclamation and long-term	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
FTB containment system NMT development costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTB Pond Overflow NMT development costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											
Other**												
Subtotal "C"												
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas												
Other Demolition	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - User 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											
Equipment Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											
Fence Removal												
Fence Installation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fence installation around pit per Mine Plan 6.2.3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Culvert Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											
Powerline Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											
Transformer Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											
Rip-rap, rock lining, gabions	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Category 1 stockpile cover rip-rap; W=6LY	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs												
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	check:											

Closure Cost Estimate
User 12

	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**												
Subtotal "D"												
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)												
(this one schedules automatically)												
Other User Costs (from Other User sheet)	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00
Closure - Landfill SW-619 Water and Gas Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Landfill SW-619 Annual Report	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Water and Gas Monitoring	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150
Post-Closure - Landfill SW-619 Annual Report	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280
Post-Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dam safety monitoring - instrumentation data collection	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372
Dam safety monitoring - instrumentation report	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700
Dam safety monitoring - geotechnical inspection	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Dam safety monitoring - annual report	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500
check:												
Subtotal "E"												
F. Construction Management & Support												
Construction Management												
Construction Support												
Road Maintenance	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63
Active Reclamation												
Monitoring & Maintenance	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
Other User Costs (from Other User sheet)												
Other**												
Subtotal "F"												
G. Closure Planning, G&A, Human Resources												
Closure Planning												
General & Administration												
Human Resources	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397
Other User Costs (from Other User sheet)	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48
Closure - Pickup Trucks - Closure Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Pickup Trucks	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720
Post-Closure - Snow Plowing	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089
check:												
Other**												
Subtotal "G"												

14	15	16	17	18	19	20	21	22	23	24	25
2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207

$ 9,957,120	$ 10,069,903	$ 10,178,604	$ 10,291,187	$ 10,405,015	$ 10,520,102	$ 10,639,262	$ 10,754,109	$ 10,873,057	$ 10,993,321	$ 11,114,915	$ 11,240,812
$ 3,390,011	$ 3,174,453	$ 2,971,037	$ 2,781,388	$ 2,603,845	$ 2,437,634	$ 2,282,634	$ 2,136,365	$ 1,999,996	$ 1,872,331	$ 1,752,815	$ 1,641,360

Closure Cost Estimate
User 12

	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Wells												
Pits												
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings												
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Heaps												
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills												
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas												
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal of ditches around Pits (Large Figure 13 - Water Management Plan - Mine)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction of ditches around Pits (ASSUMED)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to West Pit												
Topsoil Placement Cost - Ore Surge Stockpile to West Pit	0	0	0	0	0	0	0	0	0	0	0	0
check:												
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 11: Hydroment Residue Facility: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 14: Flotation Tailings Basin: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Other**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet												
Mob/Demob												
Subtotal "A"												
B. Revegetation/Stabilization												
Exploration	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment												
Pits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings												
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills												
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas												
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control												
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**												
Subtotal "B"												
check:												
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)												
check:												
Evaporation (from Solution Mgmt sheet)												
Treatment (from Solution Mgmt sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Decontamination (from Solution Mgmt sheet)												
Other User Costs (from Other User sheet)	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00
Areas of concern, legacy remediation (quote from NTS)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 21: Category 1 Groundwater Containment System: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NorthMet Project – CRE O&M for water treatment during reclamation and long-term	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
FTB containment system NMT development costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTB Pond Overflow NMT development costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Other**												
Subtotal "C"												
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas												
Other Demolition	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - User 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Equipment Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Fence Removal												
Fence Installation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fence installation around pit per Mine Plan 6.2.3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Culvert Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Powerline Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Transformer Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Rip-rap, rock lining, gabions	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Category 1 stockpile cover rip-rap; W=6LY	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs												
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												

Closure Cost Estimate
User 12

	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**												
Subtotal "D"												
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)												
(this one schedules automatically)												
Other User Costs (from Other User sheet)	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 60,002.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00
Closure - Landfill SW-619 Water and Gas Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Landfill SW-619 Annual Report	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Water and Gas Monitoring	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ 10,150	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Annual Report	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ 5,280	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dam safety monitoring - instrumentation data collection	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372
Dam safety monitoring - instrumentation report	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700
Dam safety monitoring - geotechnical inspection	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Dam safety monitoring - annual report	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500
check:												
Subtotal "E"												
F. Construction Management & Support												
Construction Management												
Construction Support												
Road Maintenance	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63
Active Reclamation												
Monitoring & Maintenance	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
Other User Costs (from Other User sheet)												
Other**												
Subtotal "F"												
G. Closure Planning, G&A, Human Resources												
Closure Planning												
General & Administration												
Human Resources	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397
Other User Costs (from Other User sheet)	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48
Closure - Pickup Trucks - Closure Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Pickup Trucks	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720
Post-Closure - Snow Plowing	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089
check:												
Other**												
Subtotal "G"												

26	27	28	29	30	31	32	33	34	35	36	37
2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,535,960	$ 8,538,207	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006	$ 8,519,759	$ 8,519,759

$ 11,362,153	$ 11,487,826	$ 11,614,890	$ 11,743,359	$ 11,876,374	$ 11,981,791	$ 12,114,318	$ 12,248,311	$ 12,383,786	$ 12,524,062	$ 12,659,248	$ 12,799,269
$ 1,536,183	$ 1,438,124	$ 1,346,325	$ 1,260,386	$ 1,180,242	$ 1,102,517	$ 1,032,140	$ 966,256	$ 904,577	$ 847,059	$ 792,780	$ 742,175

Closure Cost Estimate
User 12

	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring Wells												
Pits												
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings												
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Heaps												
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills												
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas												
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regrading Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal of ditches around Pits (Large Figure 13 - Water Management Plan - Mine)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction of ditches around Pits (ASSUMED)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to West Pit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to West Pit												
Topsoil Placement Cost - Ore Surge Stockpile to West Pit	0	0	0	0	0	0	0	0	0	0	0	0
check:												
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 11: Hydroment Residue Facility: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 14: Flotation Tailings Basin: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Other**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet												
Mob/Demob												
Subtotal "A"												
B. Revegetation/Stabilization												
Exploration	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment												
Pits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings												
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Landfills												
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas												
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control												
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**												
Subtotal "B"												
check:												
C. Detoxification/Water Treatment/Disposal of Wastes**												
Process Ponds/Sludge	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)												
check:												
Evaporation (from Solution Mgmt sheet)												
Treatment (from Solution Mgmt sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Decontamination (from Solution Mgmt sheet)												
Other User Costs (from Other User sheet)	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00
Areas of concern, legacy remediation (quote from NTS)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SOW 21: Category 1 Groundwater Containment System: Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NorthMet Project – CRE O&M for water treatment during reclamation and long-term	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
FTB containment system NMT development costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTB Pond Overflow NMT development costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Other**												
Subtotal "C"												
D. Structure, Equipment and Facility Removal, and Misc.												
Foundation & Buildings Areas												
Other Demolition	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - User 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Equipment Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Fence Removal												
Fence Installation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Fence installation around pit per Mine Plan 6.2.3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Culvert Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pipe Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Powerline Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Transformer Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												
Rip-rap, rock lining, gabions	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Category 1 stockpile cover rip-rap; W=6LY	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs												
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
check:												

Closure Cost Estimate
User 12

	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065
A. Earthwork/Recontouring												
Exploration												
Exploration Roads & Drill Pads												
Roads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other**												
Subtotal "D"												
E. Monitoring												
Reclamation Monitoring and Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)												
(this one schedules automatically)												
Other User Costs (from Other User sheet)	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00
Closure - Landfill SW-619 Water and Gas Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Landfill SW-619 Annual Report	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Water and Gas Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Annual Report	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Dam safety monitoring - instrumentation data collection	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372
Dam safety monitoring - instrumentation report	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700
Dam safety monitoring - geotechnical inspection	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Dam safety monitoring - annual report	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500
check:												
Subtotal "E"												
F. Construction Management & Support												
Construction Management												
Construction Support												
Road Maintenance	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63
Active Reclamation												
Monitoring & Maintenance	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
Other User Costs (from Other User sheet)												
Other**												
Subtotal "F"												
G. Closure Planning, G&A, Human Resources												
Closure Planning												
General & Administration												
Human Resources	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397
Other User Costs (from Other User sheet)	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48	$ 33,809.48
Closure - Pickup Trucks - Closure Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Post-Closure - Pickup Trucks	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720	$ 10,720
Post-Closure - Snow Plowing	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089	$ 23,089
check:												
Other**												
Subtotal "G"												

38	39	40	41	42	43	44	45	46	47	48	49
2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065
$ 8,519,759	$ 8,519,759	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,522,006	$ 8,519,759	$ 8,519,759	$ 8,519,759	$ 8,519,759

$ 12,940,838	$ 13,083,973	$ 13,232,180	$ 13,375,010	$ 13,522,947	$ 13,672,521	$ 13,823,749	$ 13,980,336	$ 14,131,241	$ 14,287,543	$ 14,445,574	$ 14,605,352
$ 694,800	$ 650,449	$ 609,090	$ 570,059	$ 533,671	$ 499,605	$ 467,714	$ 437,974	$ 409,909	$ 383,744	$ 359,248	$ 336,316

Closure Cost Estimate
User 12

	2066	2067	2068	2069	2070
A. Earthwork/Recontouring					
Exploration					
Exploration Roads & Drill Pads					
Roads	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -
Well Abandonment	$ 20,825.00	$ -	$ -	$ -	$ -
Production, Dewatering, Infiltration Wells	$ -	$ -	$ -	$ -	$ -
Monitoring Wells	$ 20,825	$ -	$ -	$ -	$ -
Pits					
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -
Safety Berm Construction Cost	$ -	$ -	$ -	$ -	$ -
Underground Openings					
Process Ponds	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 1	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 2	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site WWTF Pond - 3	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site CPS Pond	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-OSLA	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRE	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-RTH	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site Temporary pond	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S4, PW-S4	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site SOSP, PW-SOSP	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-HRC	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site S23-1	$ -	$ -	$ -	$ -	$ -
Backfilling - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -
Liner Cut & Fold - Mine Site PW-S23-1	$ -	$ -	$ -	$ -	$ -
	check:				
Heaps					
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -
Grading Costs	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -
Landfills					
Tailings	$ -	$ -	$ -	$ -	$ -
Embankment Regrading Cost	$ -	$ -	$ -	$ -	$ -
Tailings Surface Grading Cost	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas					
Yards, Etc.	$ -	$ -	$ -	$ -	$ -
Regrading Cost	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost	$ -	$ -	$ -	$ -	$ -
Growth Media Placement Cost	$ -	$ -	$ -	$ -	$ -
Ripping/Scarifying Cost	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control	$ -	$ -	$ -	$ -	$ -
Removal of ditches around Pits (Large Figure 13 - Water Management Plan - Mine)	$ -	$ -	$ -	$ -	$ -
Construction of ditches around Pits (ASSUMED)	$ -	$ -	$ -	$ -	$ -
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

		2066	2067	2068	2069	2070
A. Earthwork/Recontouring						
Exploration						
Exploration Roads & Drill Pads						
Roads	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) additional soil for uniform foundation layer	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 1 stockpile (Mine Year 1) geomembrane bedding layer	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 2/3 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -
Topsoil Placement Cost - Category 4 stockpile relocation to West Pit	$ -	$ -	$ -	$ -	$ -	$ -
Hauling/Crush/Screen/Compact - Ore Surge Stockpile to West Pit	$ -	$ -	$ -	$ -	$ -	$ -
Cover Placement Cost - Ore Surge Stockpile to West Pit						
Topsoil Placement Cost - Ore Surge Stockpile to West Pit		0	0	0	0	0
	check:					
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -
SOW 3: Category 1 Cover System: Year 1	$ -	$ -	$ -	$ -	$ -	$ -
SOW 11: Hydroment Residue Facility: Year 1	$ -	$ -	$ -	$ -	$ -	$ -
SOW 14: Flotation Tailings Basin: Year 1	$ -	$ -	$ -	$ -	$ -	$ -
	check:					
Other**	$ -	$ -	$ -	$ -	$ -	$ -
Mob/Demob if included in Other User sheet						
Mob/Demob						
Subtotal "A"						
B. Revegetation/Stabilization						
Exploration	$ -	$ -	$ -	$ -	$ -	$ -
Exploration Roads & Drill Pads	$ -	$ -	$ -	$ -	$ -	$ -
Roads	$ -	$ -	$ -	$ -	$ -	$ -
Well Abandonment						
Pits	$ -	$ -	$ -	$ -	$ -	$ -
Quarries & Borrow Areas	$ -	$ -	$ -	$ -	$ -	$ -
Underground Openings						
Process Ponds	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -
Waste Rock Dumps	$ -	$ -	$ -	$ -	$ -	$ -
Landfills						
Tailings	$ -	$ -	$ -	$ -	$ -	$ -
Foundation & Buildings Areas						
Yards, Etc.	$ -	$ -	$ -	$ -	$ -	$ -
Drainage & Sediment Control						
Generic Material Hauling	$ -	$ -	$ -	$ -	$ -	$ -
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -	$ -
Other**						
Subtotal "B"						
	check:					
C. Detoxification/Water Treatment/Disposal of Wastes**						
Process Ponds/Sludge	$ -	$ -	$ -	$ -	$ -	$ -
Heaps	$ -	$ -	$ -	$ -	$ -	$ -
Dumps (Waste & Landfill)	$ -	$ -	$ -	$ -	$ -	$ -
Tailings	$ -	$ -	$ -	$ -	$ -	$ -
Surplus Water Disposal	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - On Site	$ -	$ -	$ -	$ -	$ -	$ -
Solid Waste - Off Site	$ -	$ -	$ -	$ -	$ -	$ -
Hazardous Materials	$ -	$ -	$ -	$ -	$ -	$ -
Hydrocarbon Contaminated Soils	$ -	$ -	$ -	$ -	$ -	$ -
Pumping (from Solution Mgmt sheet)						
	check:					
Evaporation (from Solution Mgmt sheet)						
Treatment (from Solution Mgmt sheet)	$ -	$ -	$ -	$ -	$ -	$ -

Closure Cost Estimate
User 12

	2066	2067	2068	2069	2070
A. Earthwork/Recontouring					
Exploration					
Exploration Roads & Drill Pads					
Roads	$ -	$ -	$ -	$ -	$ -
check:					
Decontamination (from Solution Mgmt sheet)					
Other User Costs (from Other User sheet)	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00	$ 7,681,516.00
Areas of concern, legacy remediation (quote from NTS)	$ -	$ -	$ -	$ -	$ -
SOW 21: Category 1 Groundwater Containment System: Year 1	$ -	$ -	$ -	$ -	$ -
NorthMet Project – CRE O&M for water treatment during reclamation and long-term	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516	$ 7,681,516
FTB containment system NMT development costs	$ -	$ -	$ -	$ -	$ -
FTB Pond Overflow NMT development costs	$ -	$ -	$ -	$ -	$ -
check:					
Other**					
Subtotal "C"					
D. Structure, Equipment and Facility Removal, and Misc.					
Foundation & Buildings Areas					
Other Demolition	$ -	$ -	$ -	$ -	$ -
Demo and Asbestos Abatement Cost Summary - User 2	$ -	$ -	$ -	$ -	$ -
Above Ground Storage Tanks - User 2	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - OSP	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - OSP	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 2/3 Stockpile	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Stockpile/Pond Liners - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -
Remove & Dispose of Collection pipe - Category 4 Stockpile	$ -	$ -	$ -	$ -	$ -
check:					
Equipment Removal	$ -	$ -	$ -	$ -	$ -
check:					
Fence Removal					
Fence Installation	$ -	$ -	$ -	$ -	$ -
Fence installation around pit per Mine Plan 6.2.3	$ -	$ -	$ -	$ -	$ -
Culvert Removal	$ -	$ -	$ -	$ -	$ -
Pipe Removal	$ -	$ -	$ -	$ -	$ -
check:					
Powerline Removal	$ -	$ -	$ -	$ -	$ -
check:					
Transformer Removal	$ -	$ -	$ -	$ -	$ -
check:					
Rip-rap, rock lining, gabions	$ -	$ -	$ -	$ -	$ -
Category 1 stockpile cover rip-rap; W=6LY	$ -	$ -	$ -	$ -	$ -
Other Misc. Costs					
Other User Costs (from Other User sheet)	$ -	$ -	$ -	$ -	$ -
check:					

Closure Cost Estimate
User 12

	2066	2067	2068	2069	2070
A. Earthwork/Recontouring					
Exploration					
Exploration Roads & Drill Pads					
Roads	$ -	$ -	$ -	$ -	$ -
Other**					
Subtotal "D"					
E. Monitoring					
Reclamation Monitoring and Maintenance	$ -	$ -	$ -	$ -	$ -
Revegetation Maintenance	$ -	$ -	$ -	$ -	$ -
Erosion Maintenance	$ -	$ -	$ -	$ -	$ -
Reclamation Monitoring	$ -	$ -	$ -	$ -	$ -
Ground and Surface Water Monitoring (calculated from user input in Monitoring Sheet)					
(this one schedules automatically)					
Other User Costs (from Other User sheet)	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00	$ 44,572.00
Closure - Landfill SW-619 Water and Gas Monitoring	$ -	$ -	$ -	$ -	$ -
Closure - Landfill SW-619 Annual Report	$ -	$ -	$ -	$ -	$ -
Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Water and Gas Monitoring	$ -	$ -	$ -	$ -	$ -
Post-Closure - Landfill SW-619 Annual Report	$ -	$ -	$ -	$ -	$ -
Post-Closure - Coal Ash Landfill Monitoring	$ -	$ -	$ -	$ -	$ -
Dam safety monitoring - instrumentation data collection	$ 15,372	$ 15,372	$ 15,372	$ 15,372	$ 15,372
Dam safety monitoring - instrumentation report	$ 5,700	$ 5,700	$ 5,700	$ 5,700	$ 5,700
Dam safety monitoring - geotechnical inspection	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Dam safety monitoring - annual report	$ 13,500	$ 13,500	$ 13,500	$ 13,500	$ 13,500
check:					
Subtotal "E"					
F. Construction Management & Support					
Construction Management					
Construction Support					
Road Maintenance	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63	$ 14,480.63
Active Reclamation					
Monitoring & Maintenance	$ 14,481	$ 14,481	$ 14,481	$ 14,481	$ 14,481
Other User Costs (from Other User sheet)					
Other**					
Subtotal "F"					
G. Closure Planning, G&A, Human Resources					
Closure Planning					
General & Administration					
Human Resources	$ 246,397	$ 246,397	$ 246,397	$ 246,397	$ 246,397
Other User Costs (from Other User sheet)	$ 33,809.47	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 1	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 2	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 3	$ -	$ -	$ -	$ -	$ -
Closure - Pickup Trucks - Closure Year 4	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 1	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 2	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 3	$ -	$ -	$ -	$ -	$ -
Closure - Snow Plowing - Closure Year 4	$ -	$ -	$ -	$ -	$ -
Post-Closure - Pickup Trucks	$ 10,720	$ -	$ -	$ -	$ -
Post-Closure - Snow Plowing	$ 23,089	$ -	$ -	$ -	$ -
check:					
Other**					
Subtotal "G"					

50	51	52	53	54
2066	2067	2,068	2069	2070
$ 8,543,872	$ 8,484,259	$ 8,484,259	$ 8,484,259	$ 8,484,259
$ 14,808,692	$ 14,868,019	$ 15,032,470	$ 15,198,740	$ 15,366,850
$ 315,740	$ 293,523	$ 274,786	$ 257,246	$ 240,825

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Monitoring Points Backup

Pages from Water_Management_Plan_-_Plant_v4_MAR2015 Stages 1 2 and MY1_ft.xlsx

Large Table 15 Monitoring Plan – Internal Streams – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	Year 1
Flotation Tailings Basin (FTB) Pond	PS	P	Cell 1E Cell 2E Cell 1/2E	Large Figure 7	Water Level	Daily - Staff Gage Reading	Annual Monitoring Report	Monitoring of pond water levels	x
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of in-pond water quality trends	x
FTB Seepage	S	P	WS126	Large Figure 7	Flow rate	Continuous [Flowmeter installed during Construction]	Annual Monitoring Report	Monitoring of flow from the FTB South Seepage Management System recycled to the FTB Ponds and pumped to the WWTP	
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of trends in water quality of recovered surface seeps	x
	S	P	FTB Containment System	Large Figure 7	Flow rate	Continuous [Flowmeter installed during Construction]	Annual Monitoring Report	Monitoring of flow from the FTB Containment System recycled to the FTB Ponds and pumped to the WWTP	
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of trends in water quality of FTB Containment System	x
Hydrometallurgical Residue Facility [not constructed in Year 1]	PS	P	HRF Pond	Large Figure 7	Water Level	Daily	Annual Monitoring Report	Monitoring of pond water levels	
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of in-pond water quality trends	
	PS	P	HRF Leachate	Large Figure 7	Flow rate	Continuous	Annual Monitoring Report	Monitoring the quantity of leachate collected by the drainage layer.	
					Water Quality (TBD)	Monthly or Quarterly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of leachate water quality.	
Continued Existing Waste Streams	SW	P	WS009	Large Figure 7	Flow Rate	Quarterly during non- frozen conditions (Apr, Jul, Oct)	Annual Monitoring Report	Monitoring the quantity of water that enters the Tailings Basin from the east. Monitoring will cease once the East Dam is constructed in this area, which will cut off this flow.	
					Water Quality (TBD)	Quarterly during non- frozen conditions (Apr, Jul, Oct)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of water entering the Tailings Basin from the east. Monitoring will cease once the East Dam is constructed in this area, which will cut off this flow.	x

Large Table 16 Monitoring Plan – Stormwater – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Stormwater	SW	P	TBD	Large Figure 8	Flow rate	Monthly during non-frozen conditions (approximately April to October)	Annual Monitoring Report	Monitor volume of stormwater outflows from the Plant Site
					Water Quality (TBD)	Monthly during non-frozen conditions (approximately April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitor quality of stormwater outflows from the Plant Site

Large Table 17 Monitoring Plan – Surface Discharges – NorthMet Plant Site

Closure Cost Estimate
User 13

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	
WWTP Effluent	TW	P	TBD	Large Figure 9	Flow rate	Continuous [Flowmeter installed during Construction]	Annual Monitoring Report	Monitoring effluent quantity	
					Water Quality (TBD)	Monthly	Water Quality Monitoring Report • Annual • Quarterly	Monitoring effluent characteristics to document water quality prior to discharge	x
	SW	P	TBD (Unnamed Creek, near SD006)	Large Figure 9	Total Flow [Flowmeter installed during	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Unnamed Creek	
	SW	P	TBD (Trimble Creek)	Large Figure 9	Total Flow [Flowmeter installed during	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Trimble Creek	
	SW	P	TBD (Mud Lake Creek)	Large Figure 9	Total Flow [Flowmeter installed during	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Mud Lake Creek	
	SW	P	SD026 (Second Creek)	Large Figure 9	Total Flow [Flowmeter installed during	Monthly	Annual Monitoring Report	Monitoring of WWTP discharge volume to Second Creek	

Large Table 18 Monitoring Plan – Surface Water – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	
Embarrass River and Tributaries	SW	E	PM-12 (existing NPDES station SW004) PM-12.2 PM-13 (existing NPDES station MLC-2 PM-19 PM-11 (existing NPDES station SW003)	Large Figure 10	Flow rate	Monthly during non-frozen conditions (April to October)	Annual Monitoring Report	Monitoring streamflow in the Embarrass River.	x
									x
									x
									x
									x
					Water Quality (TBD)	Monthly during non-frozen conditions (April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring water quality in the Embarrass River and tributaries.	x
Second Creek	SW	P	PM-7	Large Figure 10	Flow rate	Monthly during non-frozen conditions (April to October)	Annual Monitoring Report	Monitoring streamflow in Second Creek downstream of the FTB South Seepage Management System and downstream of the WWTP discharge	
					Water Quality (TBD)	Monthly during non-frozen conditions (April to October)	Water Quality Monitoring Report • Annual • Quarterly	Monitoring of Second Creek downstream of the FTB South Seepage Management System and downstream of the WWTP discharge	x
Colby Lake Intake [Augmentation from WWTP]	SW	P	TBD (Colby Lake)	See	Flow rate	Continuous	Water Quantity	Monitoring of the Colby Lake intake (existing location)	
	SW	P	TBD (Unnamed Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation of Unnamed Creek.	
	SW	P	TBD (Trimble Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation of Trimble Creek.	
	SW	P	TBD (Mud Lake Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation in Mud Lake Creek.	
	SW	P	TBD (Second Creek)	Large Figure 10	Total Flow	Monthly	Annual Monitoring Report	Monitoring of transfer of Colby Lake water for augmentation in Second Creek.	

Large Table 19 Monitoring Plan – Groundwater – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	
Groundwater	GW	P	GW001	Large Figure 11	Groundwater Elevations	Quarterly during non-frozen conditions (April, July	Water Quality Monitoring Report • Annual • Quarterly	Monitoring groundwater levels	x
			GW002						x
			GW003						x
			GW004						x
			GW005					October)	x
			GW006		Water Quality (TBD)	Quarterly during non-frozen conditions (April, July, October)	Water Quality Monitoring Report • Annual • Quarterly	Monitor groundwater quality trends through time	x
			GW007						x
			GW008						x
			GW009						x
			GW010						x
			GW011						x
			GW012						x
			GW013						x
			GW014						x
			GW015						x
			GW016						x

(1): Monitoring wells GW003 and GW004 are currantly dry and have been dry for a number of years. These wells will be checked during each monitoring event. If they are found to contain water, groundwater elevations will be measured and the feasibility of obtaining groundwater quality samples will be evaluated.

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Large Table 20 Monitoring Plan – Wetland Hydrology – NorthMet Plant Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information
Wetlands – Baseline Monitoring								
Baseline Wetlands for the Plant Site	GW	E	Well TB1 Well TB2 Well TB3 Well TB4 Well TB5 Well TB6 Well TB7 Well TB8 Well TB9 Well TB10 Well TB11 Well TB12 Well TB13 Well TB14 Well TB1M Well TB2M Well TB3M Well TB4M Well TB5M Well TB6M Well TB7M Well TB8M	Large Figure 8 in Reference (13)	Elevation – relative to ground surface	In progress Began in 2010 Ranging from monthly to continuous during non-freezing months	Varies	Provide sufficient hydrology information to allow identification of potential indirect hydrologic impacts to wetlands. There are currently 24 wetland hydrology monitoring wells at the Plant Site; see Section 4.3 of the Wetland Management Plan (Reference (13))
2								
Plant Site Wetlands	GW	E P	TBD in permitting TBD in permitting	Large Figure 8 in Reference (13)	Elevation – relative to ground surface	TBD in permitting	TBD in permitting	This program will provide the necessary information to determine whether indirect hydrologic impacts have occurred and to assess required mitigation measures. Additional information is available in Section 4.4 of the Wetland Management Plan (Reference (13)) Final number of wells is TBD in permitting

Year 1
29

Closure Cost Estimate
User 13

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Large Table 8 Monitoring Plan – Internal Streams - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	Year 1
Pit Water (PW) [Monitored at WWTF]	GW/ SW	P	WS-PW-WW WS-PW-WE WS-PW-C WS-PW-E	Large Figure 10	Flow Rate	Continuous	Monitoring Reports	Monitor pump rates to manage water in the	
					Water Quality (Large Table 13, Internal Streams)	Monthly	Monitoring Reports • Annual • May, August, November	Monitor water quality of pit water in each pit sump	
Stockpile Liner (SL) and Containment System (CS) Drainage [Monitored at WWTF]	S	P	WS-SL-OSP WS-SL-4 WS-SL-231 WS-SL-232 WS-SL-233 WS-CS-1 WS-CS-2	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports	Monitor drainage from stockpile liners to	
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of stockpile liner drainage in each stockpile sump	
Stockpile Underdrain (SU) Drainage [Lined Stockpiles Removed at Closure]	GW	P	WS-SU-OSP WS-SU-4 WS-SU-231 WS-SU-232 WS-SU-233	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports	Monitor drainage from the underdrains	
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of stockpile underdrains (beneath the liner) in each stockpile underdrain sump when flows are present	
Overburden Storage and Laydown Area Runoff [Removed at	SW	P	WS-OSLA	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports	Monitor drainage from OSLA to compare	
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of OSLA drainage in OSLA pond when flows are present	
Monitoring Plan	**Media**	**Status**	**Station ID (Nomenclature)**	**Location Map**	**Parameter Group(s)**	**Frequency**	**Reporting Requirements**	**Additional Information**	
Haul Road (HR) Runoff [Removed at Closure]	SW	P	WS-HRE WS-HRN WS-HRC WS-HRW	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports	Monitor drainage from haul roads to compare	
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of haul road drainage in haul road ponds when flows are present	
Rail Transfer Hopper (RTH) Area Runoff [Removed at Closure]	SW	P	WS-RTH	Large Figure 10	Flow Rate	Continuous	Flow Rate Monitoring Reports	Monitor drainage from RTH to compare water	
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November	Monitor water quality of RTH drainage in RTH pond when flows are present	
Waste Water Treatment Facility (WWTF) Influents [only West Pit and Category 1 Waste Rock Containment System in Closure]	PS	P	Construction water East Pit Haul Road (HRN) (with Central Pit) Category 1 Waste Rock Stockpile Groundwater Containment System Category 2/3 Waste Rock Stockpile and OSP Category 4 Waste Rock Stockpile RTH Haul road HRC Haul road HRE West pit and haul road (HRW)	TBD (at influent splitter structure)	Flow Rate	Continuous [flow meter installed as part	Flow Rate Monitoring Reports • Annual	Operational monitoring of influent streams to evaluate if treatment is required.	x
									x
									x
									x
									x
									x
									x
									x
									x
					Water Quality (Large Table 13, WWTF List 1)	Daily Grab	Water Quality Monitoring Reports • Annual • Monthly		x
Waste Water Treatment Facility (WWTF) Influents	Combined PS	P	Flows from the Category 2/3 waste rock stockpiles	TBD (after EQ Basin inside WWTF Building)	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual • Monthly	Monitor influent characteristics to modify and/or optimize treatment operations.	

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Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

(continued)			Flows from the Category 4 waste rock stockpiles		Water Quality (Large Table 13, WWTF List 2)	Daily: 24-Hr Composite	Water Quality Monitoring Reports • Annual • Monthly		
			Flows from the OSP		Water Quality (Large Table 13, WWTF List 3)	Monthly			
			Flows from haul road Flows from RTH	TBD (after EQ Basin inside WWTF Building)	Flow Rate	Continuous	Flow Rate Monitoring Reports • Annual	Monitor influent characteristics to modify and/or optimize treatment operations.	
					Water Quality (Large Table 13, WWTF List 2)	Daily: 24-Hr Composite	Water Quality Monitoring Reports • Annual • Monthly		
			Flows from pit dewatering						
			Flows from Category 1 Waste Rock Stockpile Groundwater Containment System		Water Quality (Large Table 13, WWTF List 3)	Monthly			
Waste Water Treatment Facility (WWTF) Effluents	TW	P	Effluent □ Consists of whole effluent	TBD	Flow Rate	Continuous [flow	Flow Rate Monitoring Reports	Monitor effluent characteristics to document water quality prior to reuse in closure operations	
					Water Quality (Large Table 13, WWTF List 2)	Daily: 24-Hr Composite	Water Quality Monitoring Reports • Annual • Monthly		x
					Water Quality (Large Table 13, WWTF List 3)	Monthly			
Treated Water Pipeline (PP) Flows [Removed at Closure]	TW	P	WS-PP-1 WS-PP-2	Large Figure 10	Flow Rate and Pressure	Continuous	Flow Rate Monitoring Reports • Annual	Monitoring both ends of the pipeline to detect leaks.	
					Water Quality (Large Table 13, Internal Streams)	Monthly	Water Quality Monitoring Reports • Annual • May, August, November		

Large Table 9 Monitoring Plan – Stormwater - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	
Stormwater (OS)	SW	P	SD-OS-A SD-OS-B SD-OS-C SD-OS-D	Large Figure 10	Flow Rate	Monthly	Monitoring Reports • Annual • May, August, November	Monitor stormwater outflows from Site at 5 pond outlet locations.	
					Water Quality (Large Table 13, Stormwater)	Monthly	Monitoring Reports • Annual • May, August, November	Monitor water quality from stormwater outflows from the Mine Site at 5 pond outlet locations.	

Large Table 10 Monitoring Plan – Groundwater - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	
Monitoring Wells – Surficial Aquifer	GW	E	MW-05-02	Large Figure 11	Elevation	Quarterly	Annual Monitoring Report	Surficial aquifer wells will be generally located downgradient of mine features such as pits and stockpiles. Groundwater is expected to flow toward the mine pit during mine dewatering operations. Groundwater flow direction is expected to revert to the natural flow direction after mine reclamation. Sampling frequency is preliminary and may be revised based on the outcome of ongoing discussions. When nested monitoring wells are installed, they are numbered with MW-# with an S or D following the ID number to indicate a shallow and deep monitoring well.	x
			MW-05-08						x
			MW-05-09						x
			MW-1						x
			MW-2						x
			MW-3						x
			MW-4						x
			MW-5						x
			MW-6S						x
			MW-6D						x
			MW-7						x
			MW-8S						x
			MW-8D						x
			MW-9						x
			MW-10S						x
			MW-10D						x
			MW-11						x
			MW-12						x
			MW-13						x
			MW-14						x
			MW-15						x
			MW-16						x
			MW-17						x
			MW-18		Water Quality (Large Table	Quarterly	Annual Monitoring Report		x
Monitoring Wells – Bedrock	GW	E P	OB-1	Large Table 11	Elevation	Quarterly	Annual Monitoring Report	Number and location of bedrock wells have not yet been identified.	
			OB-2						
			OB-3						
			OB-4						
			OB-5						
			P-1						
			P-2						
			P-3						
			P-4		Water Quality (Large Table	Quarterly	Annual Monitoring Report		

Large Table 11 Monitoring Plan – Wetland Hydrology - NorthMet Mine Site

Closure Cost Estimate
User 13

Project Name: PolyMet NorthMet Mine, Mine Year 1 Bond Cost Estimate - Reclamation Plan
Date of Submittal: October, 2016
File Name: PolyMet_Year01_SRCE_Version_1_4_1_016b_177900.020.0700_ft_FNL_20161031.xlsm
Model Version: Version 1.4.1
Cost Data: User Data
Cost Data File: PolyMet_cost_data_file_177900.020_ft_v7.xlsm
Cost Estimate Type: Surety Cost Basis: Polymet

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	
Wetlands – Baseline Monitoring									
Baseline Wetlands for the Mine Site and Transportation and Utility Corridors	GW	E	Well 1	Large Figure 7 and 8 in Reference (23)	Elevation – relative to ground surface	In progress Began in 2005 Ranging from monthly	Varies	Provide sufficient hydrology information to allow identification of potential indirect hydrologic	
			Well 2						
			Well 4						
			Well 4A						
			Well 6						
			Well 7						
			Well 8						
			Well 9						
			Well 10						
			Well 11						
			Well 12						
			Well 13						
			Well 14						
			Well 15						
			Well 16						
			Well 21						
			Well 22						
			Well 23						
			Well 24						
			Well 25						
			Well 26						
			Well 27						
			Well 28						
			Well 29						
			Well 30						
			Well 31						
			Well 32						
			Well 33						
			Well 34						
			Well 35						
			Well 36						
			Well 37						
			Well 38						
			Well 39						
			Well 40						
			Well 41						
			Well 42						
			Well 43						
			Well 44						
			Well 45						
			Well 46						
			Well 47						
			Well 48						
			Ref 1						
			Ref 2						
			Ref 3						
			Ref 1M						
Wetlands – Operations Monitoring									
Mine Site Wetlands	GW	E P	TBD in permitting TBD in permitting	Large Figure 7 and 8 in Reference (23)	Elevation – relative to ground surface	TBD in permitting	TBD in permitting	This program will provide the necessary information to determine whether indirect	

Large Table 12 Monitoring Plan – Surface Water - NorthMet Mine Site

Monitoring Plan	Media	Status	Station ID (Nomenclature)	Location Map	Parameter Group(s)	Frequency	Reporting Requirements	Additional Information	
Partridge River	SW	E	SW002 (PM-2) SW003 (PM-3) SW004 (PM-16) SW004a SW005 (PM-4)	Large Figure 12	Flow Rate	Monthly	Flow Rate Monitoring Reports	Monitoring of the Partridge River	x x x x x
					Water Quality (Large Table	Monthly	Water Quality Monitoring Reports	Monitoring of the Partridge River	x
Partridge River Tributaries [no Ore Haulage in Closure]	SW	E	WP-1 LN-1 WL-1 PM-5	Large Figure 12	Flow Rate	Monthly	Flow Rate Monitoring Reports	Monitoring of the Partridge River	
					Water Quality (Large Table	Monthly	Water Quality Monitoring Reports	Monitoring of the Partridge River	
Colby Lake	SW	P	LCy-2	Large Figure 12	Water Quality (Large Table	Monthly	Water Quality Monitoring Reports	Monitoring of Colby Lake to	x
					Water Level	Monthly	TBD in permitting	TBD in permitting	
Whitewater Reservoir [no water withdrawn in Closure]	SW	P	Location TBD in permitting	Large Figure 12	Water Level	Monthly	TBD in permitting	TBD in permitting	

Large Table 13 Monitoring Plan – Parameter Lists - NorthMet Mine Site

Internal Streams – Pit Water (Large Table 8)
Internal Streams – Stockpile Drainage, Overburden Storage and Laydown Area Runoff, Haul Road Runoff, Rail Transfer Hopper Runoff (Large Table 8)
Internal Streams – Waste Water Treatment Plant Influent (WWTF List 1) (Large Table 8)
Internal Streams – Waste Water Treatment Plant Daily Influent and Effluent (WWTF List 2) (Large Table 8)
Internal Streams – Waste Water Treatment Plant Monthly Influent and Effluent (WWTF List 3) (Large Table 8)
Stormwater – (Large Table 9)
Groundwater – Surficial Aquifer and Bedrock (Large Table 10)
Surface Water – Partridge River, Partridge River Tributaries, and Colby Lake (Large Table 12)

Format Version:	***SRCE Data File v1.12***
File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Type:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Units of Measure:	**Imperial**

No. of Bases/Regions:	4

Basis/Region	Basis/Region Name	Basis/Region Description
Basis 1	***Northern Nevada***	Churchill, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 2	***Southern Nevada***	Clark, Esmeralda, Lincoln and Nye Counties
Basis 3	***do not use***	From 2014 NDEP Cost Data file and labor from InfoMine 2013 Labor Survey of non-union Surface metal and industrial mines in Western US.
Basis 4	***Polymet***	MN prevailing wages, CAT equipment rates
Basis 5		
Basis 6		
Basis 7		
Basis 8		
Basis 9		
Basis 10		
Basis 11		
Basis 12		
Basis 13		
Basis 14		
Basis 15		

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

MONTHLY EQUIPMENT RATE TABLE [Cost Per Month] (1)

EQUIPMENT TYPE (2)	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$10,800	$10,800	$10,800	$12,220	Caterpillar rental rates
D6R w/ Winch				$13,060	Caterpillar rental rates
D7R	$13,500	$13,500	$13,500	$16,640	Caterpillar rental rates
D8R	$19,000	$19,000	$19,000	$19,890	Caterpillar rental rates
D9R	$22,900	$22,900	$22,900	$27,500	Caterpillar rental rates
D10R	$31,000	$31,000	$31,000	$33,340	Caterpillar rental rates
D11R	$62,000	$62,000	$62,000	$62,000	NV cost
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$9,600	$9,600	$9,600	$10,430	Caterpillar rental rates
14G/H	$14,500	$14,500	$14,500	$16,910	Caterpillar rental rates
16G/H	$21,600	$21,600	$21,600	$23,530	Caterpillar rental rates
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$5,700	$5,700	$5,700	$6,250	Caterpillar rental rates
320C	$7,000	$7,000	$7,000	$7,490	Caterpillar rental rates
325C	$8,200	$8,200	$8,200	$8,920	Caterpillar rental rates
330C	$10,800	$10,800	$10,800	$10,730	Caterpillar rental rates
345B	$9,500	$9,500	$9,500	$17,110	Caterpillar rental rates
365BL				$26,050	Caterpillar rental rates
385BL	$22,500	$22,500	$22,500	$32,700	Caterpillar rental rates
Scrapers					
631G	$16,500	$16,500	$16,500	$33,930	Caterpillar rental rates
637G PP	$34,500	$34,500	$34,500	$34,500.00	NV cost
Wheeled Loaders					
924G	$5,100	$5,100	$5,100	$5,730	Caterpillar rental rates
928G	$5,400	$5,400	$5,400	$6,840	Caterpillar rental rates
950G	$7,600	$7,600	$7,600	$9,690	Caterpillar rental rates
966G	$10,900	$10,900	$10,900	$13,890	Caterpillar rental rates
972G	$13,000	$13,000	$13,000	$15,060	Caterpillar rental rates
980G	$13,000	$13,000	$13,000	$19,260	Caterpillar rental rates
988G	$21,000	$21,000	$21,000	$30,340	Caterpillar rental rates
990				$47,670	average
992G	$65,000	$65,000	$65,000	$65,000	NV cost
994D				$71,500	extrapolated
L-2350				$78,650	extrapolated

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	$7,000	$7,000	$7,000	$3,120	Caterpillar rental rates
H-160 (fits 345)	$8,600	$8,600	$8,600	$4,140	Caterpillar rental rates
H-180 (fits 365/385)	$12,400	$12,400	$12,400	$4,060	Caterpillar rental rates
Demolition Shears					
S340 (fits 322/325/330)					
S365 (fits 330/345)					
S390 (fits 365/385)					
Demolition Grapples					
G315 (fits 322/325)					
G320 (fits 325/330)					
G330 (fits 345/365)					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$3,600	$3,600	$3,600	$3,220	Caterpillar rental rates
428D 4WD Backhoe	$4,200	$4,200	$4,200	$5,220	average
CS533E Vibratory Roller	$7,590	$7,590	$7,590	$7,220	Caterpillar rental rates
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton	$5,804	$5,804	$5,804	$5,804	NV cost
Supervisor's Truck	$3,586	$3,586	$3,586	$3,586	NV cost
Flatbed Truck	$5,804	$5,804	$5,804	$5,804	NV cost
Air Compressor + tools	$4,643	$4,643	$4,643	$4,643	NV cost
Welding Equipment	$3,025	$3,025	$3,025	$3,025	NV cost
Heavy Duty Drill Rig	$61,380	$61,380	$61,380	$61,380	NV cost
Pump (plugging) Drill Rig	$61,380	$61,380	$61,380	$61,380	NV cost
Concrete Pump	$15,224	$15,224	$15,224	$15,224	NV cost
Gas Engine Vibrator	$704	$704	$704	$704	NV cost
Generator 5KW	$1,065	$1,065	$1,065	$1,065	NV cost
HDEP Welder (pipe or liner)	$8,162	$8,162	$8,162	$8,162	NV cost
5 Ton Crane	$5,975	$5,975	$5,975	$5,975	NV cost
20 Ton Crane	$15,884	$15,884	$15,884	$4,220	Caterpillar rental rates
50 Ton Crane	$15,884	$15,884	$15,884	$15,884	NV cost
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$9,900	$9,900	$9,900	$11,000	Caterpillar rental rates
730 (articulated)	$9,900	$9,900	$9,900	$13,460	Caterpillar rental rates
735 (articulated)	$9,900	$9,900	$9,900	$16,970	Caterpillar rental rates
740 (articulated)	$15,000	$15,000	$15,000	$18,110	Caterpillar rental rates
769D	$21,000	$21,000	$21,000	$21,000	NV cost
773E	$27,000	$27,000	$27,000	$27,000	NV cost
777D	$54,000	$54,000	$54,000	$54,000	NV cost
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$7,700	$7,700	$7,700	$7,700	NV cost
621E (8,000 gal) Water Wagon	$13,000	$13,000	$13,000	$13,000	NV cost
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd^3) (5)	$14,762	$14,762	$14,762	$14,762	NV cost

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

NOTES:

(1) Power Equipment Source:	Cashman Equipment Company (July 2014) unless noted	Cashman Equipment Company (July 2014) unless noted	Cashman Equipment Company (July 2014) unless noted		
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)		
(4) Other Equipment Source:	Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)		

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

PREVENTATIVE MAINTENANCE COST [Cost Per Hour] (1)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$5.21	$5.21	$5.21	$5.21	
D6R w/ Winch					
D7R	$3.18	$3.18	$3.18	$3.18	
D8R	$5.75	$5.75	$5.75	$5.75	
D9R	$7.99	$7.99	$7.99	$7.99	
D10R	$9.82	$9.82	$9.82	$9.82	
D11R	$12.48	$12.48	$12.48	$12.48	
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$6.11	$6.11	$6.11	$6.11	
14G/H	$6.68	$6.68	$6.68	$6.68	
16G/H	$5.37	$5.37	$5.37	$5.37	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$3.89	$3.89	$3.89	$3.89	
320C	$4.15	$4.15	$4.15	$4.15	
325C	$4.02	$4.02	$4.02	$4.02	
330C	$5.19	$5.19	$5.19	$5.19	
345B	$7.08	$7.08	$7.08	$7.08	
365BL					
385BL	$6.11	$6.11	$6.11	$6.11	
Scrapers					
631G	$7.02	$7.02	$7.02	$7.02	
637G PP	$11.61	$11.61	$11.61	$11.61	
Wheeled Loaders					
924G	$3.79	$3.79	$3.79	$3.79	
928G	$4.12	$4.12	$4.12	$4.12	
950G	$4.93	$4.93	$4.93	$4.93	
966G	$6.75	$6.75	$6.75	$6.75	
972G	$5.27	$5.27	$5.27	$5.27	
980G	$5.27	$5.27	$5.27	$5.27	
988G	$9.76	$9.76	$9.76	$9.76	
990					
992G	$11.62	$11.62	$11.62	$11.62	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	N/A	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Shears					
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Grapples					
G315 (fits 322/325)	N/A	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A	N/A

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

Other Equipment					
420D 4WD Backhoe	$3.36	$3.36	$3.36	$3.36	
428D 4WD Backhoe	$3.37	$3.37	$3.37	$3.37	
CS533E Vibratory Roller					
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton					
Supervisor's Truck					
Flatbed Truck					
Air Compressor + tools					
Welding Equipment					
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump					
Gas Engine Vibrator					
Generator 5KW					
HDEP Welder (pipe or liner)					
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$7.32	$7.32	$7.32	$7.32	
730 (articulated)	$7.32	$7.32	$7.32	$7.32	
735 (articulated)	$7.32	$7.32	$7.32	$7.32	
740 (articulated)	$7.32	$7.32	$7.32	$7.32	
769D	$8.46	$8.46	$8.46	$8.46	
773E	$7.23	$7.23	$7.23	$7.23	
777D	$10.48	$10.48	$10.48	$10.48	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$5.79	$5.79	$5.79	$5.79	
621E (8,000 gal) Water Wagon	$6.76	$6.76	$6.76	$6.76	
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$7.32	$7.32	$7.32	$7.32	
(1) PM Source:	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)	July 2014 Cashman Equipment PM Rate, Elko, NV (except as noted)		

G.E.T CONSUMPTION [Cost Per Hour] (1) (Wear Items)

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4	Basis 5
	Northern Nevada	***Southern Nevada***	***do not use***	***Polymet***	
Bulldozers					
D6R	$4.63	$4.63	$4.63	$4.63	
D6R w/ Winch					
D7R	$6.88	$6.88	$6.88	$6.88	
D8R	$8.94	$8.94	$8.94	$8.94	
D9R	$13.90	$13.90	$13.90	$13.90	
D10R	$19.46	$19.46	$19.46	$19.46	
D11R	$28.92	$28.92	$28.92	$28.92	
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$9.60	$9.60	$9.60	$9.60	
14G/H	$13.87	$13.87	$13.87	$13.87	
16G/H	$18.95	$18.95	$18.95	$18.95	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	$3.62	$3.62	$3.62	$3.62	
320C	$4.18	$4.18	$4.18	$4.18	
325C	$5.27	$5.27	$5.27	$5.27	
330C	$5.81	$5.81	$5.81	$5.81	
345B	$6.68	$6.68	$6.68	$6.68	
365BL					
385BL	$12.15	$12.15	$12.15	$12.15	
Scrapers					
631G	$7.59	$7.59	$7.59	$7.59	
637G PP	$9.54	$9.54	$9.54	$9.54	
Wheeled Loaders					
924G	$3.99	$3.99	$3.99	$3.99	
928G	$4.13	$4.13	$4.13	$4.13	
950G	$7.68	$7.68	$7.68	$7.68	
966G	$9.64	$9.64	$9.64	$9.64	
972G	$12.21	$12.21	$12.21	$12.21	
980G	$12.21	$12.21	$12.21	$12.21	
988G	$13.07	$13.07	$13.07	$13.07	
990					
992G	$30.03	$30.03	$30.03	$30.03	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000					
KOM PC3000					
KOM PC4000					
KOM PC5500					
KOM PC8000					
Hydraulic Hammers					
H-120 (fits 325)	$5.29	$5.29	$5.29	$5.29	
H-160 (fits 345)	$10.35	$10.35	$10.35	$10.35	
H-180 (fits 365/385)	$12.02	$12.02	$12.02	$12.02	
Demolition Shears					
S340 (fits 322/325/330)					
S365 (fits 330/345)					
S390 (fits 365/385)					
Demolition Grapples					
G315 (fits 322/325)					
G320 (fits 325/330)					
G330 (fits 345/365)					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$3.22	$3.22	$3.22	$3.22	
428D 4WD Backhoe	$3.32	$3.32	$3.32	$3.32	
CS533E Vibratory Roller					
CS663E Vibratory Roller					
CP533E Sheepsfoot Compactor					
CP663E Sheepsfoot Compactor					
Light Truck - 1.5 Ton					
Supervisor's Truck					
Flatbed Truck					
Air Compressor + tools	N/A	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump	N/A	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A	N/A
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$2.87	$2.87	$2.87	$2.87	
730 (articulated)	$2.87	$2.87	$2.87	$2.87	
735 (articulated)	$2.87	$2.87	$2.87	$2.87	
740 (articulated)	$2.97	$2.97	$2.97	$2.97	
769D	$3.22	$3.22	$3.22	$3.22	
773E	$3.61	$3.61	$3.61	$3.61	
777D	$4.04	$4.04	$4.04	$4.04	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon					
621E (8,000 gal) Water Wagon					
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$2.91	$2.91	$2.91	$2.91	
Notes:					
(1) G.E.T. Source:	Cashman Equipment Compan (July 2014) unless noted	Cashman Equipment Compan (July 2014) unless noted	Cashman Equipment Compan (July 2014) unless noted	NV costs	

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	

TIRE COST TABLE [Cost Per Tire(1,2,3)]

EQUIPMENT TYPE	Basis 1 *Northern Nevada*	Basis 2 *Southern Nevada*	Basis 3 *do not use*	Basis 4 *Polymet*	Basis 5
Bulldozers					
D6R	N/A	N/A	N/A	N/A	N/A
D6R w/ Winch	N/A	N/A	N/A	N/A	N/A
D7R	N/A	N/A	N/A	N/A	N/A
D8R	N/A	N/A	N/A	N/A	N/A
D9R	N/A	N/A	N/A	N/A	N/A
D10R	N/A	N/A	N/A	N/A	N/A
D11R	N/A	N/A	N/A	N/A	N/A
Wheeled Dozers					
824G					
834G					
844					
854G					
Motor Graders					
120H	$2,419.20	$2,419.20	$2,419.20	$2,419.20	
14G/H	$3,311.84	$3,311.84	$3,311.84	$3,311.84	
16G/H	$4,480.00	$4,480.00	$4,480.00	$4,480.00	
24M					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Track Excavators					
312C	N/A	N/A	N/A	N/A	N/A
320C	N/A	N/A	N/A	N/A	N/A
325C	N/A	N/A	N/A	N/A	N/A
330C	N/A	N/A	N/A	N/A	N/A
345B	N/A	N/A	N/A	N/A	N/A
365BL	N/A	N/A	N/A	N/A	N/A
385BL	N/A	N/A	N/A	N/A	N/A
Scrapers					
631G	$9,840.32	$9,840.32	$9,840.32	$9,840.32	
637G PP	$9,840.32	$9,840.32	$9,840.32	$9,840.32	
Wheeled Loaders					
924G	$3,337.60	$3,337.60	$3,337.60	$3,337.60	
928G	$3,337.60	$3,337.60	$3,337.60	$3,337.60	
950G	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
966G	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
972G	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
980G	$8,428.00	$8,428.00	$8,428.00	$8,428.00	
988G	$13,235.60	$13,235.60	$13,235.60	$13,235.60	
990					
992G	$29,513.12	$29,513.12	$29,513.12	$29,513.12	
994D					
L-2350					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Shovels					
KOM PC2000	N/A	N/A	N/A	N/A	N/A
KOM PC3000	N/A	N/A	N/A	N/A	N/A
KOM PC4000	N/A	N/A	N/A	N/A	N/A
KOM PC5500	N/A	N/A	N/A	N/A	N/A
KOM PC8000	N/A	N/A	N/A	N/A	N/A
Hydraulic Hammers					
H-120 (fits 325)	N/A	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Shears					
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A	N/A
Demolition Grapples					
G315 (fits 322/325)	N/A	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A	N/A

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Other Equipment					
420D 4WD Backhoe	$1,145.03	$1,145.03	$1,145.03	$1,145.03	
428D 4WD Backhoe	$1,145.03	$1,145.03	$1,145.03	$1,145.03	
CS533E Vibratory Roller	N/A	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	$154.00	$154.00	$154.00	$154.00	
Supervisor's Truck	$154.00	$154.00	$154.00	$154.00	
Flatbed Truck	$154.00	$154.00	$154.00	$154.00	
Air Compressor + tools	N/A	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig					
Pump (plugging) Drill Rig					
Concrete Pump	N/A	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A	N/A
5 Ton Crane					
20 Ton Crane					
50 Ton Crane					
120 Ton Crane					

Equipment Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

Monthly Rental Basis (operating hrs/ period)	***176***	***176***	***176***	***176***	
Trucks					
725 (articulated)	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
730 (articulated)	$5,028.24	$5,028.24	$5,028.24	$5,028.24	
735 (articulated)	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
740 (articulated)	$8,428.00	$8,428.00	$8,428.00	$8,428.00	
769D	$4,607.46	$4,607.46	$4,607.46	$4,607.46	
773E	$8,005.76	$8,005.76	$8,005.76	$8,005.76	
777D	$14,348.96	$14,348.96	$14,348.96	$14,348.96	
785C					
793C					
797B					
613E (5,000 gal) Water Wagon	$3,979.50	$3,979.50	$3,979.50	$3,979.50	
621E (8,000 gal) Water Wagon	$10,247.83	$10,247.83	$10,247.83	$10,247.83	
777D Water Truck					
785C Water Truck					
Dump Truck (10-12 yd3) (5)	$544.88	$544.88	$544.88	$544.88	
Notes:					
(1) Unit Cost Basis:	Cost per tire	Cost per tire	Cost per tire	NV costs	
(2) Cost Basis:	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.	NV costs	
(3) Tire Cost Source:	Purcell Tire Quote 07/28/2014	Purcell Tire Quote 07/28/2014	Purcell Tire Quote 07/28/2014	NV costs	
(4) Tire Wear Source (defined in model):	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	NV costs	

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
EQUIPMENT OPERATORS - Labor Groups and Base Pay Rate ($/hr) (2)								
Bulldozers								
D6R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D6R w/ Winch					Heavy equip op	$23.78	69-201	$35.48
D7R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D8R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D9R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D10R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
D11R	Group 8	$48.69	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Wheeled Dozers								
824G								
834G								
844								
854G								
Motor Graders								
120H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
14G/H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
16G/H	Group 10A	$49.55	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
24M					Heavy equip op	$23.78	69-201	$35.48
Track Excavators								
312C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
320C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
325C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
330C	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
345B	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
365BL					Heavy equip op	$23.78	69-201	$35.48
385BL	Group 11	$49.79	Group 12	$59.02	Heavy equip op	$23.78	69-201	$35.48
Scrapers								
631G	Group 10	$49.36	Group 15	$59.23	Heavy equip op	$23.78	69-201	$35.48
637G PP	Group 11	$49.79	Group 15	$59.23	Heavy equip op	$23.78	69-201	$35.48
Wheeled Loaders								
924G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
928G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
950G	Group 10	$49.36	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
966G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
972G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
980G	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
988G	Group 11	$49.79	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
990					Heavy equip op	$23.78	69-201	$35.48
992G	Group 11A	$51.43	Group 10	$58.85	Heavy equip op	$23.78	69-201	$35.48
994D							69-201	$35.48
L-2350							69-201	$35.48

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Shovels								
KOM PC2000							69-201	$35.48
KOM PC3000							69-201	$35.48
KOM PC4000							69-201	$35.48
KOM PC5500							69-201	$35.48
KOM PC8000							69-201	$35.48
Hydrauilc Hammers								
H-120 (fits 325)								
H-160 (fits 345)								
H-180 (fits 365/385)								
Demolition Shears								
S340 (fits 322/325/330)								
S365 (fits 330/345)								
S390 (fits 365/385)								
Demolition Grapples								
G315 (fits 322/325)								
G320 (fits 325/330)								
G330 (fits 345/365)								

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Other Equipment								
420D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
428D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
CS533E Vibratory Roller	Group 6	$47.85	Group 4	$58.40	Heavy equip op	$23.78	69-201	$35.48
CS663E Vibratory Roller					Heavy equip op	$23.78	69-201	$35.48
CP533E Sheepsfoot Compactor					Heavy equip op	$23.78	69-201	$35.48
CP663E Sheepsfoot Compactor					Heavy equip op	$23.78	69-201	$35.48
Light Truck - 1.5 Ton					Heavy equip op	$23.78	69-201	$35.48
Supervisor's Truck					Heavy equip op	$23.78	69-201	$35.48
Flatbed Truck					Heavy equip op	$23.78	69-201	$35.48
Air Compressor + tools	Group 3	$46.64	Group 1	$55.67	Heavy equip op	$23.78	69-201	$35.48
Welding Equipment	Group 9	$49.01	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Heavy Duty Drill Rig	Group 10	$49.36	Group 2	$56.62	Driller	$27.01	69-201	$35.48
Pump (plugging) Drill Rig	Group 10	$49.36	Group 2	$56.62	Driller	$27.01	69-201	$35.48
Concrete Pump								
Gas Engine Vibrator	Group 6	$47.85	Group 6	$58.62	Heavy equip op	$23.78	69-201	$35.48
Generator 5KW								
HDEP Welder (pipe or liner)								
5 Ton Crane	Group 10A	$49.55	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
20 Ton Crane	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
50 Ton Crane	Group 11	$49.79	Group 8	$58.73	Heavy equip op	$23.78	69-201	$35.48
120 Ton Crane					Heavy equip op	$23.78	69-201	$35.48
Fringe Benefits								
Equip Op Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$17.15
Zone and Area Adjustments - Miles and Rates ($/hr) (3)								
Equipment Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Equipment Zone 2	< 50 miles	$0.00	< 20 Miles	$0.00				
Equipment Zone 3	50 to 150 miles	$2.00	20 to 40 miles	$2.00				
Equipment Zone 4	151 to 300 miles	$3.00	40 to 60 miles	$3.00				
Equipment Zone 5	> 300 miles	$4.00	> 60 miles	$3.50				
Equipment Zone 6								
Equipment Zone 7								
NOTES:								
(1) Equipment Type:	Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent	
(2) Equipment Operator Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010					
(3) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					

Labor Rates

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE [1] OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
TRUCK DRIVERS - Labor Groups and Base Pay Rate ($/hr) [4]								
725 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
730 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
735 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
740 (articulated)	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
769D	Dump Truck Driver > 25 yds < 60 yds	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
773E					Truck operator	$20.01	69-201	$35.48
777D	Dump Truck	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
785C					Truck operator	$20.01	69-201	$35.48
793C					Truck operator	$20.01	69-201	$35.48
797B					Truck operator	$20.01	69-201	$35.48
613E (5,000 gal) Water Wagon	Water Truck > 2,500 gallons	$28.61	Group 3	$46.44	Truck operator	$20.01	69-201	$35.48
621E (8,000 gal) Water Wagon	Water Truck > 2,500 gallons	$28.61	Group 4	$46.62	Truck operator	$20.01	69-201	$35.48
777D Water Truck					Truck operator	$20.01	69-201	$35.48
785C Water Truck					Truck operator	$20.01	69-201	$35.48
Dump Truck (10-12 yd3)	Dump Truck Driver > 8 yds < 18 yds	$29.04	Group 2	$46.23	Truck operator	$20.01	69-201	$35.48
Fringe Benefits								
Truck Driver Fringe Benefits ($/hr)		$13.64		$0.00		$0.00		$17.15

Labor Rates

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HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
Zone and Area Adjustments (5)								
Truck Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Truck Zone 2	< 50 miles	$0.00	< 30 miles	$0.00				
Truck Zone 3	50 to 150 miles	$2.00	30-50 miles	$1.50				
Truck Zone 4	151 to 300 miles	$3.00	50-70 miles	$2.50				
Truck Zone 5	> 300 miles	$4.00	>70 miles	$3.50				
Truck Zone 6								
Truck Zone 7								
NOTES:								
(4) Truck Driver Source:	D-B TEAM0533-002		D-B NV20100064 10/01/2010					
(5) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					
LABORERS - Labor Groups and Base Pay Rate ($/hr) (6,7)								
General Laborer	Group 1	$30.82	Group 1	$42.94	Mill laborer	$17.62	69-101	$24.34
Skilled Laborer	Group 4	$31.32	Group 3	$43.25	Mine laborer	$17.77	69-102	$24.34
Driller's Helper	Group 3	$31.07	Group 2	$43.15	Driller	$27.01		$24.34
Rodmen (reinforcing concrete)	Group 2	$30.92	Group 3A	$43.34	Electrician	$28.83		$24.34
Cement finisher	Group 3	$31.07	Group 3A	$43.34	Electrician	$28.83		$24.34
Carpenter		$38.80		$37.76	Electrician	$28.83	69-704	$30.85
Fringe Benefits								
Laborer Fringe Benefits ($/hr)		$0.00		$0.00				$16.87
Carpenter Fringe Benefits ($/hr)		$0.00		$13.35				$16.08
Zone and Area Adjustments (8)								
Laborer Zone 1	none	$0.00	none	$0.00	none	$0.00	none	$0.00
Laborer Zone 2	< 50 miles	$0.00	< 30 miles	$0.00				
Laborer Zone 3	50 to 150 miles	$2.00	30-50 miles	$1.50				
Laborer Zone 4	151 to 300 miles	$3.00	50-70 miles	$2.50				
Laborer Zone 5	> 300 miles	$4.00	>70 miles	$3.50				
Laborer Zone 6			Laughlin	$2.25				
Laborer Zone 7								
NOTES:								
(6) Laborer Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010					
(7) Carpenter Source:	D-B NV120038 1/6/2012		D-B CARP1780-011					
(8) Zone Basis:	From Washoe Co.		From Las Vegas City Hall					

Labor Rates

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HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
PROJECT MANAGEMENT AND TECHNICAL LABOR - Base Pay Rate ($/hr) (9)								
Project Manager		$66.38		$66.38		$51.87		$76.25
Foreman		$61.88		$61.88		$53.09		$78.04
Field Geologist/Engineer		$96.31		$96.31		$33.00		$48.51
Field Tech/Sampler		$83.75		$83.75		$24.74		$36.37
Range Scientist		$96.31		$96.31		$33.00		$48.51
Senior Planning Engineer								
Project Engineer								
Mechanic/Fitter								
Surveyor								$39.96
Electrician								$56.28
NOTES:								
(9) Project Manager:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31					
(9) Foreman Source:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31					
(9) Techical Labor Source:	SRK Consulting 2012 (Total		SRK Consulting 2012 (Total					
INDIRECT COSTS								
SOCIAL SECURITY, WORKMAN'S COMP, INSURANCE, ETC.								
Unemployment (%)		3.00%		3.00%				1.49%
Retirement/SS/Medicare (%)		7.65%		7.65%				7.65%
Workman's Compensation (%)		8.75%		8.75%				11.00%
Total cost of benefits						40.00%		
NOTES:								
(10) Workman's Comp Source:	RS Means R013113-60 NV		RS Means R013113-60 NV				RS Means R013113-60 MN	
Unemployment tax	NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606				experience rating industry	

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RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4	Basis 5	Basis 6
		Northern Nevada	*Southern Nevada*	*do not use*	*Polymet*		
Revegetation Materials							
Seed Mixes							
Seed Mix	Units						
None							
Mix 1	Cost/Acre	$302.50	$302.50	$475.00	$139.00	atrix_20160511.xlsx	
Mix 2	Cost/Acre	$332.75	$332.75	$570.00	$299.00	atrix_20160511.xlsx	
Mix 3	Cost/Acre	$363.00	$363.00	$275.00	$37.00	atrix_20160511.xlsx	
Mix 4	Cost/Acre	$393.25	$393.25	$812.50			
User Mix 1	Cost/Acre						
User Mix 2	Cost/Acre						
User Mix 3	Cost/Acre						
User Mix 4	Cost/Acre						
User Mix 5 (see Seed Mix sheet)	Cost/Acre						
	Notes:						
Mulch							
Item	Units						
None							
Straw Mulch	Cost/lb	$0.15	$0.15	$0.15	$0.18	atrix_20160511.xlsx	
Hydro Mulch	Cost/lb	$0.25	$0.25	$0.25			
Timber Mulch	Cost/lb						
	Cost/lb						
	Cost/lb						
	Notes:	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)	Straw Spec. 60#/bale, Cert. weed free, $9.05 ea (July 2014)			
		Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (May 2014)			
Amendments							
Item	Units						
None							
Organic Matter	Cost/lb	$0.70	$0.70	$0.70			
Treated Sludge	Cost/lb						
Chemical	Cost/lb	$0.54	$0.54	$0.54			
	Cost/lb						
	Cost/lb						
	Cost/lb						
	Notes:	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)	Granite Seed $0.70/# in 50# bag, 1 ton min order Sustain 4-6-4 (May 2014)			
		Western Nevada Supply $27.11 per 50 # bag (July 2014)	Western Nevada Supply $27.11 per 50 # bag (July 2014)	Western Nevada Supply $27.11 per 50 # bag (July 2014)			

Well Abandonment Materials

Description	Units						
Cement	50lb bag	$7.18	$7.18	$7.18	$7.18		
Grout (Low Grade Bentonite)	50lb bag	$9.96	$9.96	$9.96	$9.96		
Inert Material/Cuttings	cy						
	Notes:	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)	(1) Ferguson Enterprises, Inc. quote (July 2014) Type I, II Cement at $13.50 per 94# bag (1.1 cf/bag)			
		(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added	(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added	(2) Ferguson Enterprises, Inc. (July 2014) 3/8 Chunk Bentonite Hole Plug at $9.96 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids) + 10% for bentonite chips added			

Monitoring Costs

Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Monitor Well Pump	ea.	$2,140.00	$2,140.00	$2,140.00	$2,140.00		
Sampling Supplies	ea.	$5.00	$5.00	$5.00	$0.00		
Water Analysis	ea.	$380.00	$380.00	$380.00	$331.00	s draft 050316.docx	
Water treatment analyses	ea.	$450.00	$450.00	$450.00	$100.00		
	ea.	$150.00	$150.00	$150.00			
	ea.	$50.00	$50.00	$50.00			
	ea.	$430.00	$430.00	$430.00			
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	ea.						
	Notes:	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)	(1) WET Labs, Reno, Nevada (May 2014)		

Fuel, Etc.

Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Off-road Diesel - delivered [1]	$/gal	$3.39	$3.39	$3.39	$2.99	y 12, 2015 9:48 AM	
Pickup Truck Travel	$/mi	$0.56	$0.56	$0.56	$0.56	NV costs	
Electical Power	$/kWh	$0.0853	$0.0853	$0.0853	$0.0780	MP CommercialRates.pdf	
	Notes:	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (July 2014)			
		Source: Federal Government Vehicle Allowance Rate January 1, 2014	Source: Federal Government Vehicle Allowance Rate January 1, 2014	Source: Federal Government Vehicle Allowance Rate January 1, 2014			
		Source: NVEnergy (July 2014)	Source: NVEnergy (July 2014)	Source: NVEnergy (July 2014)			

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
REVEGETATION									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Seeding - Broadcast Manual [1]	$/acres	$270.00	$0.00	$270.00	$0.00				
Seeding - Broadcast Mechanical [1]	$/acres	$70.00	$30.00	$70.00	$30.00			$139.00	$139.00
Seeding - Drill [1]	$/acres	$140.00	$83.00	$140.00	$83.00				
Seeding - Hydroseeding [1]	$/acres	$250.00	$125.00	$250.00	$125.00				
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Shrub Planting - bare root 6-10 in (150- 250mm) [2]	ea.								
Tree Planting - bare root 11-16 in (270- 400mm) [3]	ea.								
Cactus Planting [4]	ea.								
NOTES:									
(1) Seeding Source:		Kelley Erosion Control (July 2014)		Kelley Erosion Control (July 2014)		Kelley Erosion Control (July 2014)			
(2) Shrub Source:									
(3) Tree Source:									
(4) Cactus Source:									
BUILDING and WALL DEMOLITION									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Building Demolition									
Lg. steel	C.F.								
Lg. concrete	C.F.								
Lg. masonry	C.F.								
Lg. mixed	C.F.								
Sm. steel	C.F.								
Sm. concrete	C.F.								
Sm. masonry	C.F.								
Sm. wood	C.F.								
Wall Demolition									
Block 4 in thick	S.F.		20%		20%		20%		20%
Block 6 in thick	S.F.		20%		20%		20%		20%
Block 8 in thick	S.F.		20%		20%		20%		20%
Block 12 in thick	S.F.		20%		20%		20%		20%
Conc 6 in thick	S.F.		10%		10%		10%		10%
Conc 8 in thick	S.F.		10%		10%		10%		10%
Conc 10 in thick	S.F.		10%		10%		10%		10%
Conc 12 in thick	S.F.		10%		10%		10%		10%
WASTE DISPOSAL									

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	*Southern Nevada*	*do not use*	*Polymet*
Item	**Units**	**Materials**	**Materials**	**Materials**	**Materials**
Rubbish and Waste Handling					
Dumpster delivery (average for all sizes)	ea.	$47.50	$47.50	$47.50	$47.50
Haul (average for all sizes)	ea.	$149.00	$149.00	$149.00	$149.00
Rent per month (average for all sizes)	ea.	$51.00	$51.00	$51.00	$51.00
Disposal fee per ton (tonne) (average for all sizes)	ton	$56.00	$56.00	$56.00	$56.00
NOTES:					
Dumpster Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Disposal Fee Source:		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Hazardous Material Handling - Solids					
Pickup fees 55 gal. drums	ea.	$247.00	$247.00	$247.00	$247.00
Bulk material (average)	ton	$403.00	$403.00	$403.00	$403.00
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	mile	$5.50	$5.50	$5.50	$5.50
Dump site disposal fee	ton	$285.00	$285.00	$285.00	$285.00
NOTES:					
Solid Handling Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Solid Disposal Fee Source:		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Hazardous Material Handling - Liquids					
Vacuum Truck Pickup (2200 gal or 9,700 litres)	hr.	$145.00	$145.00	$145.00	$145.00
Vacuum Truck Pickup (5000 gal or 2,000 litres)	hr.	$210.00	$210.00	$210.00	$210.00
Dump site disposal fee	ton	$285.00	$285.00	$285.00	$285.00
NOTES:					
Liquid Handling Cost Source		Means Heavy Construction (2014)	Means Heavy Construction (2014)	Means Heavy Construction (2014)	
Liquid Disposal Fee Source:		2014 Means Heavy Construction, ave. 02 11	2014 Means Heavy Construction, ave. 02 11	2014 Means Heavy Construction, ave. 02 11	
Hydrocarbon Contaminated Soils (HCS)					
Insitu Biotreatment	C.Y	$18.32	$18.32	$18.32	$8.00
HCS disposal fee	C.Y	$275.00	$275.00	$275.00	$8.00
NOTES:					
Insitu Treatement Cost Source		2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	
HCS Disposal Fee Source:		2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	2014 Means Heavy Construction, ave. 02 65	

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
UNDERGROUND OPENING CLOSURE									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Reinforced Concrete Bulkheads and Shaft Covers									
Grade walls - 15 in thick, 8 ft high	C.Y	$139.00		$139.00		$139.00		$139.00	
Grade walls - 15 in thick, 12 ft high	C.Y	$139.00		$139.00		$139.00		$139.00	
Elevated conc, 1-way beam & slab - 15ft span	C.Y	$257.00		$257.00		$257.00		$257.00	
Elevated conc, 1-way beam & slab - 25ft span	C.Y	$245.00		$245.00		$245.00		$245.00	
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Small Adit Plugging									
Bat Gate [5]	ea.	$2,870.42		$2,870.42		$2,870.42		$2,870.42	
Culvert Gate [5]	C.Y	$5,740.85		$5,740.85		$5,740.85		$5,740.85	
Adit Foam Plug [6]	C.Y	$287.04		$287.04		$287.04		$287.04	
Production Opening Foam Plug [6]	C.Y	$287.04		$287.04		$287.04		$287.04	
NOTES:									
(5) Bat Gate Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2014)			
(6) Foam Plug Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2014)			
MISC. LINEAR PROJECTS									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Fencing Installation									
Barbed 3-strand	ft	$0.39		$0.39		$0.39		$0.39	
Barbed 4-strand	ft	$0.52		$0.52		$0.52		$0.52	
Barbed 5-strand	ft	$0.65		$0.65		$0.65		$0.65	
Chain link 8 ft -10 ft Install	ft	$33.00		$33.00		$33.00		$33.00	
Wood stockade fence 6 ft high - Install	ft	$12.70		$12.70		$12.70		$12.70	
	ft								
	ft								
Fencing Removal									
Barbed 3-strand Removal	ft								
Barbed 4-strand Removal	ft								
Barbed 5-strand Removal	ft								
Chain link 8 ft -10 ft Removal	ft								
Wood, all types 4 ft -6 ft high Removal	ft								
	ft								
	ft								
Culvert Removal									
12 in (300 mm) Diameter	ft								
18 in (450 mm) Diameter	ft								
24 in (600 mm) Diameter	ft								
36 in (1m) Diameter	ft								
Pipeline Removal									
Plastic Pipe 3/4 in (mm) - 4 in (100 mm) diameter	ft								
6 in (150 mm) - 8 in (200 mm)	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
10 in (250 mm) - 18 in (450 mm)	ft								
20 in (500 mm) - 36 in (1 m)	ft								
Pipe and Drainpipe Installation									
Water 4in (100mm) 40ft (12m) length, welded HDPE	ft	$3.74		$3.74		$3.74		$3.74	
Water 6in (150mm) 40ft (12m) length, welded HDPE	ft	$7.45		$7.45		$7.45		$7.45	
Water 12in (300mm) 40ft (12m) length, welded HDPE	ft								
Drain 4in (100mm) perforated PVC	ft	$1.32		$1.32		$1.32		$1.32	
Drain 6in (150mm) perforated PVC	ft	$2.98		$2.98		$2.98		$2.98	
Drain 4in (100mm) corrugated, perf or plain	ft	$0.46		$0.46		$0.46		$0.46	
Drain 6in (150mm) corrugated., perf or plain	ft	$1.33		$1.33		$1.33		$1.33	
Drain Rock Preparation									
Item	**Units**		**Total**		**Total**		**Total**		**Total**
Crushing	C.Y		$0.50		$0.50		$0.50		$0.50
Screening	C.Y		$0.50		$0.50		$0.50		$0.50
Misc.									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Backhoe work	C.Y								
Powerline and Transformer Removal			**Total**		**Total**		**Total**		**Total**
Single Pole Powerlines [7]	mile		$39,894		$39,894		$39,894		$39,894
Double Pole Powerlines [8]	mile		$45,593		$45,593		$45,593		$45,593
Substation [9]	unit		$28,591		$28,591		$5,000		$5,000
NOTES:									
(7) Single Pole Source:		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014			
(8) Double Pole Source:		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014		NVEnergy estimate (2009) Adjusted to 2014			
(9) Transformer Source:		Sierra Pacific Power Co. estimate (2004) Adjusted to 2013		Sierra Pacific Power Co. estimate (2004) Adjusted to 2013		PolyMet AOC Schedule #63			

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***PolyMet_cost_data_file_177900.020_ft_v7.xlsm***
Date:	***February, 2016***
Cost Basis:	***User Data***
Author/Source:	***SRK Consulting, 2016***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*do not use*		*Polymet*	
EROSION, EVAPORATION and SEDIMENTATION CONTROL									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Rip-Rap & Rock Lining									
Rip-Rap 3/8 to 1/4 C.Y. pieces, grouted	S.Y.	$17.70		$17.70		$17.70		$17.70	
Rip-Rap 18 in min thick, no grout	S.Y.	$5.85		$5.85		$5.85		$5.85	
Gabions, 6 in deep	S.Y.	$8.35		$8.35		$8.35		$8.35	
Gabions, 9 in deep	S.Y.	$12.15		$12.15		$12.15		$12.15	
Gabions, 12 in deep	S.Y.	$16.45		$16.45		$16.45		$16.45	
Gabions, 18 in deep	S.Y.	$23.00		$23.00		$23.00		$23.00	
Gabions, 36 in deep	S.Y.	$31.00		$31.00		$31.00		$31.00	
Liner Installation									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Site grading	S.F.								
Compaction	S.F.								
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
60 mil HDPE Liner	S.F.		$0.53		$0.53		$0.53		$0.53
Construction Management Support									
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
Office Trailer, Furnished, no hook-ups	month		$167.00		$167.00		$167.00		$167.00
Toilet Portable, chemical	month		$132.00		$132.00		$132.00		$132.00
PRODUCTION OR DEWATERING WELL PUMP REMOVAL									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Pump Type									
Submersible [10]	ft to pump	$2.51	$5.45	$2.51	$5.45	$2.51	$5.45	$2.51	$5.45
Line Shaft [10]	ft to pump	$5.85	$12.72	$5.85	$12.72	$5.85	$12.72	$5.85	$12.72
NOTES:									
(10) Pump Removal Source:		WDC Exploration 12/2005 (adjusted to 2014)		WDC Exploration 12/2005 (adjusted to 2014)		WDC Exploration 12/2005 (adjusted to 2014)			

File Name:	***CostData STD 3.xls***
Date:	***December 1, 2005***
Cost Basis:	***Standardized Data***
Author/Source:	***SRK Consulting, 2016***

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate					
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	5%	5%	5%	5%	
3. Insurance (9)		of labor costs			
4. Bond (10)		of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)		of the O&M costs			
	<=	<=	<=	>	
Variable Rate					

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

EQUIPMENT RENTAL RATE TABLE

EQUIPMENT TYPE (1)	Monthly Owner/Rental Rate	PREVENTATIVE MAINTENANCE COST [Cost Per Hour]	GROUND ENGAGING TOOLS CONSUMPTION [Cost Per Hour] (Wear Items)	TIRE COST TABLE [Cost Per Tire]
Bulldozers				
D6T	12,220			
D6T w/ Ripper	13,060			
D7E	16,640			
D8T	19,890			
D9T	$27,500			
D10T	33,340			
D11R				
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$ 10,430.00			
14M	16,910			
16M	23,530			
24M				
Track Excavators				
312E L	6,250			
320E L	7,490			
326F L	8,920			
329F L	10,730			
349F L	17,110			
374F L	26,050			
390F L	32,700			
Scrapers				
631G	33,930			
637G	N/A			
Wheeled Loaders				
924K	5,730			
930K	6,840			
950M	9,690			
966M	13,890			
972M	15,060			
980M	19,260			
988K	30,340			
990				
992G				
994D				
L2350				
Shovels				
PC2000				

PC3000				
PC4000				
PC5500				
PC8000				
Hydraulic Hammers				
H-120 (fits 325) w/ Machine	12,040			
H-160 (fits 345) w/ Machine	21,250			
H-180 (fits 365/385) w/ Machine	30,110			
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$ 3,220.00			
428D 4WD Backhoe				
CS533E Vibratory Roller	$ 7,220.00			
CS633E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP633E Sheepsfoot Compactor				
Light Truck - 1.5 Ton				
Supervisor's Truck				
Flatbed Truck				
Air Compressor + tools				
Welding Equipment				
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump				
Gas Engine Vibrator				
Generator 5KW				
HDEP Welder (pipe or liner)				
5 Ton Crane				
20 Ton Crane	$ 4,220.00			
50 Ton Crane				
120 Ton Crane				
Trucks				
725	11,000			
730	13,460			
735	16,970			
740	18,110			
773E				
777D				
785C				
793C				
797B				
613E (5,000 gal) Water Wagon				
621E (8,000 gal) Water Wagon				

777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd^3)				
NOTES:				
(1) Power Equipment Source:				
(2) Power Equipment Type:				
(3) Drilliing Equipment Source:				
(4) Other Equipment Source:				
(5) Drill rig includes support (pipe) truck				

Nevada Standardized Bond Calculation
Source Data

Format Version:	***SRCE Data File v1.12***
File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Type:	***User Data***
Author/Source:	**Nevada Division of Environmental Protection (NDEP) & NV BLM**

Units of Measure:	**Imperial**

No. of Bases/Regions:	4

Basis/Region	Basis/Region Name	Basis/Region Description
Basis 1	**Northern Nevada**	Churchill, Douglas, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 2	**Southern Nevada**	Clark, Esmeralda, Lincoln and Nye Counties
Basis 3	**N. Nevada Notice Level**	Notice Level Cost Basis for Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, Washoe, and White Pine Counties
Basis 4	**S. Nevada Notice Level**	Clark, Esmeralda, Lincoln and Nye Counties
Basis 5		
Basis 6		
Basis 7		
Basis 8		
Basis 9		
Basis 10		
Basis 11		
Basis 12		
Basis 13		
Basis 14		
Basis 15		

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

MONTHLY EQUIPMENT RATE TABLE [Cost Per Month] (1)

EQUIPMENT TYPE (2)	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	*Southern Nevada*	*N. Nevada Notice Level*	*S. Nevada Notice Level*
Bulldozers				
D6R	$9,900	$9,900	$3,300	$3,300
D6R w/ Winch				
D7R	$13,200	$13,200	$4,400	$4,400
D8R	$19,000	$19,000	$6,400	$6,400
D9R	$23,100	$23,100	$7,700	$7,700
D10R	$32,000	$32,000	$10,700	$10,700
D11R	$71,000	$71,000	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$9,600	$9,600	$3,200	$3,200
14G/H	$14,500	$14,500	$4,900	$4,900
16G/H	$21,000	$21,000	$7,000	$7,000
24M				
Track Excavators				
312C	$5,700	$5,700	$1,900	$1,900
320C	$7,440	$7,440	$2,480	$2,480
325C	$8,200	$8,200	$2,800	$2,800
330C	$10,800	$10,800	$3,600	$3,600
345B	$9,000	$9,000	$3,000	$3,000
365BL				
385BL	$22,500	$22,500	$7,500	$7,500
Scrapers				
631G	$16,000	$16,000	$5,400	$5,400
637G PP	$35,700	$35,700	N/A	N/A
Wheeled Loaders				
924G	$5,400	$5,400	$1,800	$1,800
928G	$6,000	$6,000	$2,000	$2,000
950G	$7,600	$7,600	$2,600	$2,600
966G	$10,900	$10,900	$3,700	$3,700
972G	$13,000	$13,000	$4,400	$4,400
980G	$13,000	$13,000	$4,400	$4,400
988G	$21,000	$21,000	$7,000	$7,000
990				
992G	$65,000	$65,000	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	$7,000	$7,000	$2,400	$2,400
H-160 (fits 345)	$8,600	$8,600	$2,800	$2,800
H-180 (fits 365/385)	$12,400	$12,400	$4,133	$4,133

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$3,420	$3,420	$1,140	$1,140
428D 4WD Backhoe	$4,200	$4,200	$1,400	$1,400
CS533E Vibratory Roller	$7,260	$7,260	$1,650	$1,650
CS663E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP663E Sheepsfoot Compactor				
Light Truck - 1.5 Ton	$5,073	$5,073	$1,153	$1,153
Supervisor's Truck	$3,225	$3,225	$733	$733
Flatbed Truck	$5,073	$5,073	$1,153	$1,153
Air Compressor + tools	$4,492	$4,492	$1,021	$1,021
Welding Equipment	$3,025	$3,025	$688	$688
Heavy Duty Drill Rig	$59,070	$59,070	$13,425	$13,425
Pump (plugging) Drill Rig	$59,070	$59,070	$13,425	$13,425
Concrete Pump	$14,916	$14,916	$3,390	$3,390
Gas Engine Vibrator	$647	$647	$147	$147
Generator 5KW	$987	$987	$224	$224
HDEP Welder (pipe or liner)	$7,898	$7,898	$1,795	$1,795
5 Ton Crane	$5,707	$5,707	$1,297	$1,297
20 Ton Crane	$15,290	$15,290	$3,475	$3,475
50 Ton Crane	$15,290	$15,290	$3,475	$3,475
120 Ton Crane				
Trucks				
725 (articulated)	$9,900	$9,900	$3,300	$3,300
730 (articulated)	$9,900	$9,900	$3,300	$3,300
735 (articulated)	$9,900	$9,900	$3,300	$3,300
740 (articulated)	$15,000	$15,000	$5,000	$5,000
769D	$21,000	$21,000	N/A	N/A
773E	$33,000	$33,000	N/A	N/A
777D	$54,000	$54,000	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$6,000	$6,000	$2,000	$2,000
621E (8,000 gal) Water Wagon	$11,000	$11,000	$3,700	$3,700
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd^3) (5)	$14,322	$14,322	$3,255	$3,255

NOTES:

(1) Power Equipment Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted
(2) Power Equipment Type:	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels	Catepillar model or equivalent, LeTourneau loader, Komatsu shovels
(3) Drilliing Equipment Source:	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)
(4) Other Equipment Source:	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)	Means Heavy Construction (2015, Q2)

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

PREVENTATIVE MAINTENANCE COST [Cost Per Hour] (1)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Bulldozers				
D6R	$5.18	$5.18	$5.18	$5.18
D6R w/ Winch				
D7R	$3.31	$3.31	$3.31	$3.31
D8R	$5.71	$5.71	$5.71	$5.71
D9R	$7.92	$7.92	$7.92	$7.92
D10R	$9.68	$9.68	$9.68	$9.68
D11R	$12.22	$12.22	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$6.08	$6.08	$6.08	$6.08
14G/H	$6.62	$6.62	$6.62	$6.62
16G/H	$5.33	$5.33	$5.33	$5.33
24M				
Track Excavators				
312C	$3.90	$3.90	$3.90	$3.90
320C	$4.16	$4.16	$4.16	$4.16
325C	$3.38	$3.38	$3.38	$3.38
330C	$5.19	$5.19	$5.19	$5.19
345B	$7.04	$7.04	$7.04	$7.04
365BL				
385BL	$6.07	$6.07	$6.07	$6.07
Scrapers				
631G	$7.01	$7.01	$7.01	$7.01
637G PP	$11.55	$11.55	N/A	N/A
Wheeled Loaders				
924G	$3.80	$3.80	$3.80	$3.80
928G	$4.00	$4.00	$4.00	$4.00
950G	$5.01	$5.01	$5.01	$5.01
966G	$6.69	$6.69	$6.69	$6.69
972G	$5.28	$5.28	$5.28	$5.28
980G	$5.28	$5.28	$5.28	$5.28
988G	$9.65	$9.65	$9.65	$9.65
990				
992G	$11.46	$11.46	$11.46	$11.46
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A
Demolition Grapples				
G315 (fits 322/325)	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A
Other Equipment				
420D 4WD Backhoe	$3.39	$3.39	$3.39	$3.39
428D 4WD Backhoe	$3.40	$3.40	$3.40	$3.40
CS533E Vibratory Roller				
CS663E Vibratory Roller				
CP533E Sheepsfoot Compactor				
CP663E Sheepsfoot Compactor				
Light Truck - 1.5 Ton				
Supervisor's Truck				
Flatbed Truck				
Air Compressor + tools				
Welding Equipment				
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump				
Gas Engine Vibrator				
Generator 5KW				
HDEP Welder (pipe or liner)				
5 Ton Crane				
20 Ton Crane				
50 Ton Crane				
120 Ton Crane				
Trucks				
725 (articulated)	$7.55	$7.55	$7.55	$7.55
730 (articulated)	$7.55	$7.55	$7.55	$7.55
735 (articulated)	$7.55	$7.55	$7.55	$7.55
740 (articulated)	$7.18	$7.18	$7.18	$7.18
769D	$8.37	$8.37	N/A	N/A
773E	$7.28	$7.28	N/A	N/A
777D	$10.40	$10.40	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$5.75	$5.75	$5.75	$5.75
621E (8,000 gal) Water Wagon	$6.75	$6.75	$6.75	$6.75
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$7.55	$7.55	$7.55	$7.55
(1) PM Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

G.E.T CONSUMPTION [Cost Per Hour] (1) (Wear Items)

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Bulldozers				
D6R	$4.72	$4.72	$4.72	$4.72
D6R w/ Winch				
D7R	$7.01	$7.01	$7.01	$7.01
D8R	$9.12	$9.12	$9.12	$9.12
D9R	$14.19	$14.19	$14.19	$14.19
D10R	$19.86	$19.86	$19.86	$19.86
D11R	$29.51	$29.51	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$9.79	$9.79	$9.79	$9.79
14G/H	$14.15	$14.15	$14.15	$14.15
16G/H	$19.33	$19.33	$19.33	$19.33
24M				
Track Excavators				
312C	$3.69	$3.69	$3.69	$3.69
320C	$4.26	$4.26	$4.26	$4.26
325C	$5.37	$5.37	$5.37	$5.37
330C	$5.92	$5.92	$5.92	$5.92
345B	$6.99	$6.99	$6.99	$6.99
365BL				
385BL	$12.38	$12.38	$12.38	$12.38
Scrapers				
631G	$7.74	$7.74	$7.74	$7.74
637G PP	$9.72	$9.72	N/A	N/A
Wheeled Loaders				
924G	$4.07	$4.07	$4.07	$4.07
928G	$4.21	$4.21	$4.21	$4.21
950G	$7.83	$7.83	$7.83	$7.83
966G	$9.83	$9.83	$9.83	$9.83
972G	$12.45	$12.45	$12.45	$12.45
980G	$12.45	$12.45	$12.45	$12.45
988G	$13.33	$13.33	$13.33	$13.33
990				
992G	$30.62	$30.62	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000				
KOM PC3000				
KOM PC4000				
KOM PC5500				
KOM PC8000				
Hydraulic Hammers				
H-120 (fits 325)	$5.34	$5.34	$5.34	$5.34
H-160 (fits 345)	$10.41	$10.41	$10.41	$10.41
H-180 (fits 365/385)	$12.02	$12.02	$12.02	$12.02

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)				
S365 (fits 330/345)				
S390 (fits 365/385)				
Demolition Grapples				
G315 (fits 322/325)				
G320 (fits 325/330)				
G330 (fits 345/365)				
Other Equipment				
420D 4WD Backhoe	$3.28	$3.28	$3.28	$3.28
428D 4WD Backhoe	$3.38	$3.38	$3.38	$3.38
CS533E Vibratory Roller	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	N/A	N/A	N/A	N/A
Supervisor's Truck	N/A	N/A	N/A	N/A
Flatbed Truck	N/A	N/A	N/A	N/A
Air Compressor + tools	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig	N/A	N/A	N/A	N/A
Pump (plugging) Drill Rig	N/A	N/A	N/A	N/A
Concrete Pump	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A
5 Ton Crane	N/A	N/A	N/A	N/A
20 Ton Crane	N/A	N/A	N/A	N/A
50 Ton Crane	N/A	N/A	N/A	N/A
120 Ton Crane	N/A	N/A	N/A	N/A
Trucks				
725 (articulated)	$2.93	$2.93	$2.93	$2.93
730 (articulated)	$2.93	$2.93	$2.93	$2.93
735 (articulated)	$2.93	$2.93	$2.93	$2.93
740 (articulated)	$3.03	$3.03	$3.03	$3.03
769D	$3.28	$3.28	N/A	N/A
773E	$3.68	$3.68	N/A	N/A
777D	$4.12	$4.12	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon				
621E (8,000 gal) Water Wagon				
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$2.93	$2.93	$2.93	$2.93
Notes:				
(1) G.E.T. Source:	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted	Cashman Equipment Company (July 2015) unless noted

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**

TIRE COST TABLE [Cost Per Tire(1,2,3)]

EQUIPMENT TYPE	Basis 1	Basis 2	Basis 3	Basis 4
	Northern Nevada	*Southern Nevada*	*N. Nevada Notice Level*	*S. Nevada Notice Level*
Bulldozers				
D6R	N/A	N/A	N/A	N/A
D6R w/ Winch	N/A	N/A	N/A	N/A
D7R	N/A	N/A	N/A	N/A
D8R	N/A	N/A	N/A	N/A
D9R	N/A	N/A	N/A	N/A
D10R	N/A	N/A	N/A	N/A
D11R	N/A	N/A	N/A	N/A
Wheeled Dozers				
824G				
834G				
844				
854G				
Motor Graders				
120H	$2,056.32	$2,056.32	$2,056.32	$2,056.32
14G/H	$2,815.06	$2,815.06	$2,815.06	$2,815.06
16G/H	$3,808.00	$3,808.00	$3,808.00	$3,808.00
24M				
Track Excavators				
312C	N/A	N/A	N/A	N/A
320C	N/A	N/A	N/A	N/A
325C	N/A	N/A	N/A	N/A
330C	N/A	N/A	N/A	N/A
345B	N/A	N/A	N/A	N/A
365BL	N/A	N/A	N/A	N/A
385BL	N/A	N/A	N/A	N/A
Scrapers				
631G	$8,364.27	$8,364.27	$8,364.27	$8,364.27
637G PP	$8,364.27	$8,364.27	N/A	N/A
Wheeled Loaders				
924G	$2,836.96	$2,836.96	$2,836.96	$2,836.96
928G	$2,836.96	$2,836.96	$2,836.96	$2,836.96
950G	$4,274.00	$4,274.00	$4,274.00	$4,274.00
966G	$6,804.90	$6,804.90	$6,804.90	$6,804.90
972G	$6,804.90	$6,804.90	$6,804.90	$6,804.90
980G	$7,163.80	$7,163.80	$7,163.80	$7,163.80
988G	$11,250.26	$11,250.26	$11,250.26	$11,250.26
990				
992G	$25,086.15	$25,086.15	N/A	N/A
994D				
L-2350				
Shovels				
KOM PC2000	N/A	N/A	N/A	N/A
KOM PC3000	N/A	N/A	N/A	N/A
KOM PC4000	N/A	N/A	N/A	N/A
KOM PC5500	N/A	N/A	N/A	N/A
KOM PC8000	N/A	N/A	N/A	N/A
Hydraulic Hammers				
H-120 (fits 325)	N/A	N/A	N/A	N/A
H-160 (fits 345)	N/A	N/A	N/A	N/A
H-180 (fits 365/385)	N/A	N/A	N/A	N/A

Nevada Standardized Bond Calculation
Equipment Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xls***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Monthly Rental Basis (operating hrs/ period)	**176**	**176**	**40**	**40**
Demolition Shears				
S340 (fits 322/325/330)	N/A	N/A	N/A	N/A
S365 (fits 330/345)	N/A	N/A	N/A	N/A
S390 (fits 365/385)	N/A	N/A	N/A	N/A
Demolition Grapples				
G315 (fits 322/325)	N/A	N/A	N/A	N/A
G320 (fits 325/330)	N/A	N/A	N/A	N/A
G330 (fits 345/365)	N/A	N/A	N/A	N/A
Other Equipment				
420D 4WD Backhoe	$431.73	$431.73	$431.73	$431.73
428D 4WD Backhoe	$431.73	$431.73	$431.73	$431.73
CS533E Vibratory Roller	N/A	N/A	N/A	N/A
CS663E Vibratory Roller	N/A	N/A	N/A	N/A
CP533E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
CP663E Sheepsfoot Compactor	N/A	N/A	N/A	N/A
Light Truck - 1.5 Ton	$130.90	$130.90	$130.90	$130.90
Supervisor's Truck	$130.90	$130.90	$130.90	$130.90
Flatbed Truck	$130.90	$130.90	$130.90	$130.90
Air Compressor + tools	N/A	N/A	N/A	N/A
Welding Equipment	N/A	N/A	N/A	N/A
Heavy Duty Drill Rig				
Pump (plugging) Drill Rig				
Concrete Pump	N/A	N/A	N/A	N/A
Gas Engine Vibrator	N/A	N/A	N/A	N/A
Generator 5KW	N/A	N/A	N/A	N/A
HDEP Welder (pipe or liner)	N/A	N/A	N/A	N/A
5 Ton Crane				
20 Ton Crane				
50 Ton Crane				
120 Ton Crane				
Trucks				
725 (articulated)	$4,274.00	$4,274.00	$4,274.00	$4,274.00
730 (articulated)	$4,274.00	$4,274.00	$4,274.00	$4,274.00
735 (articulated)	$6,804.90	$6,804.90	$6,804.90	$6,804.90
740 (articulated)	$7,163.80	$7,163.80	$7,163.80	$7,163.80
769D	$3,916.34	$3,916.34	N/A	N/A
773E	$6,868.68	$6,868.68	N/A	N/A
777D	$12,196.62	$12,196.62	N/A	N/A
785C				
793C				
797B				
613E (5,000 gal) Water Wagon	$3,382.58	$3,382.58	$3,382.58	$3,382.58
621E (8,000 gal) Water Wagon	$8,710.66	$8,710.66	$8,710.66	$8,710.66
777D Water Truck				
785C Water Truck				
Dump Truck (10-12 yd3) (5)	$463.15	$463.15	$463.15	$463.15
Notes:				
(1) Unit Cost Basis:	Cost per set	Cost per set	Cost per set	Cost per set
(2) Cost Basis:	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.	Total cost for all required tires.
(3) Tire Cost Source:	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015	Purcell Tire Quote 07/28/2015
(4) Tire Wear Source (defined in model):	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20	Caterpillar Handbook, Edition 35; Ch. 20

Nevada Standardized Bond Calculation
Labor Rates

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xl***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
EQUIPMENT OPERATORS - Labor Groups and Base Pay Rate ($/hr) (2)								
Bulldozers								
D6R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D6R w/ Winch								
D7R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D8R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D9R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D10R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
D11R	Group 8	$48.69	Group 6	$58.62	Group 8	$48.69	Group 6	$58.62
Wheeled Dozers								
824G								
834G								
844								
854G								
Motor Graders								
120H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
14G/H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
16G/H	Group 10A	$49.55	Group 10	$58.85	Group 10A	$49.55	Group 10	$58.85
24M								
Track Excavators								
312C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
320C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
325C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
330C	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
345B	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
365BL								
385BL	Group 11	$49.79	Group 12	$59.02	Group 11	$49.79	Group 12	$59.02
Scrapers								
631G	Group 10	$49.36	Group 15	$59.23	Group 10	$49.36	Group 15	$59.23
637G PP	Group 11	$49.79	Group 15	$59.23	Group 11	$49.79	Group 15	$59.23
Wheeled Loaders								
924G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
928G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
950G	Group 10	$49.36	Group 8	$58.73	Group 10	$49.36	Group 8	$58.73
966G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
972G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
980G	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
988G	Group 11	$49.79	Group 10	$58.85	Group 11	$49.79	Group 10	$58.85
990								
992G	Group 11A	$51.43	Group 10	$58.85	Group 11A	$51.43	Group 10	$58.85
994D								
L-2350								
Shovels								
KOM PC2000								
KOM PC3000								
KOM PC4000								
KOM PC5500								
KOM PC8000								
Hydrauilc Hammers								
H-120 (fits 325)								
H-160 (fits 345)								
H-180 (fits 365/385)								
Demolition Shears								
S340 (fits 322/325/330)								
S365 (fits 330/345)								
S390 (fits 365/385)								
Demolition Grapples								
G315 (fits 322/325)								
G320 (fits 325/330)								
G330 (fits 345/365)								

Nevada Standardized Bond Calculation
Labor Rates

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HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
Other Equipment								
420D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Group 10A	$49.55	Group 4	$58.40
428D 4WD Backhoe	Group 10A	$49.55	Group 4	$58.40	Group 10A	$49.55	Group 4	$58.40
CS533E Vibratory Roller	Group 6	$47.85	Group 4	$58.40	Group 6	$47.85	Group 4	$58.40
CS663E Vibratory Roller								
CP533E Sheepsfoot Compactor								
CP663E Sheepsfoot Compactor								
Light Truck - 1.5 Ton								
Supervisor's Truck								
Flatbed Truck								
Air Compressor + tools	Group 3	$46.64	Group 1	$55.67	Group 3	$46.64	Group 1	$55.67
Welding Equipment	Group 9	$49.01	Group 6	$58.62	Group 9	$49.01	Group 6	$58.62
Heavy Duty Drill Rig	Group 10	$49.36	Group 2	$56.62	Group 10	$49.36	Group 2	$56.62
Pump (plugging) Drill Rig	Group 10	$49.36	Group 2	$56.62	Group 10	$49.36	Group 2	$56.62
Concrete Pump								
Gas Engine Vibrator	Group 6	$47.85	Group 6	$58.62	Group 6	$47.85	Group 6	$58.62
Generator 5KW								
HDEP Welder (pipe or liner)								
5 Ton Crane	Group 10A	$49.55	Group 8	$58.73	Group 10A	$49.55	Group 8	$58.73
20 Ton Crane	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
50 Ton Crane	Group 11	$49.79	Group 8	$58.73	Group 11	$49.79	Group 8	$58.73
120 Ton Crane								
Fringe Benefits								
Equip Op Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$0.00
Zone and Area Adjustments - Miles and Rates ($hr) (3)								
Equipment Zone 1	< 50 miles	$0.00	< 20 Miles	$0.00	< 50 miles	$0.00	< 20 Miles	$0.00
Equipment Zone 2	50 to 150 miles	$2.00	20 to 40 miles	$2.00	50 to 150 miles	$2.00	20 to 40 miles	$2.00
Equipment Zone 3	151 to 300 miles	$3.00	40 to 60 miles	$3.00	151 to 300 miles	$3.00	40 to 60 miles	$3.00
Equipment Zone 4	> 300 miles	$4.00	> 60 miles	$3.50	> 300 miles	$4.00	> 60 miles	$3.50
Equipment Zone 5								
Equipment Zone 6								
Equipment Zone 7								
NOTES:								
(1) Equipment Type:	Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent		Catepillar model or equivalent	
(2) Equipment Operator Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010		D-B NV120038 1/6/2012		D-B NV100064 10/01/2010	
(3) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
TRUCK DRIVERS - Labor Groups and Base Pay Rate ($/hr) (4)								
725 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
730 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
735 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
740 (articulated)	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
769D	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
773E								
777D	Dump Truck Driv	$28.61	Group 4	$46.62	Dump Truck Driv	$28.61	Group 4	$46.62
785C								
793C								
797B								
613E (5,000 gal) Water Wagon	Water Truck > 2	$28.61	Group 3	$46.44	Water Truck > 2	$28.61	Group 3	$46.44
621E (8,000 gal) Water Wagon	Water Truck > 2	$28.61	Group 4	$46.62	Water Truck > 2	$28.61	Group 4	$46.62
777D Water Truck								
785C Water Truck								
Dump Truck (10-12 yd3)	Dump Truck Driv	$29.04	Group 2	$46.23	Dump Truck Driv	$29.04	Group 2	$46.23
Fringe Benefits								
Truck Driver Fringe Benefits ($/hr)		$13.64		$0.00		$13.64		$0.00
Zone and Area Adjustments (5)								
Truck Zone 1	< 50 miles	$0.00	< 30 miles	$0.00	< 50 miles	$0.00	< 30 miles	$0.00
Truck Zone 2	50 to 150 miles	$2.00	30-50 miles	$1.50	50 to 150 miles	$2.00	30-50 miles	$1.50
Truck Zone 3	151 to 300 miles	$3.00	50-70 miles	$2.50	151 to 300 miles	$3.00	50-70 miles	$2.50
Truck Zone 4	> 300 miles	$4.00	>70 miles	$3.50	> 300 miles	$4.00	>70 miles	$3.50
Truck Zone 5								
Truck Zone 6								
Truck Zone 7								
NOTES:								
(4) Truck Driver Source:	D-B TEAM0533-002 12/01/2010		D-B NV20100064 10/01/2010		D-B TEAM0533-002 12/01/2010		D-B NV20100064 10/01/2010	

Nevada Standardized Bond Calculation
Labor Rates

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Date:	***August 1, 2015***
Cost Basis:	***User Data***
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HOURLY LABOR RATE TABLE

EQUIPMENT TYPE (1) OR JOB DESCRIPTION	Basis 1		Basis 2		Basis 3		Basis 4	
	Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
(5) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
LABORERS - Labor Groups and Base Pay Rate ($/hr) (6,7)								
General Laborer	Group 1	$30.82	Group 1	$42.94	Group 1	$30.82	Group 1	$42.94
Skilled Laborer	Group 4	$31.32	Group 3	$43.25	Group 4	$31.32	Group 3	$43.25
Driller's Helper	Group 3	$31.07	Group 2	$43.15	Group 3	$31.07	Group 2	$43.15
Rodmen (reinforcing concrete)	Group 2	$30.92	Group 3A	$43.34	Group 2	$30.92	Group 3A	$43.34
Cement finisher	Group 3	$31.07	Group 3A	$43.34	Group 3	$31.07	Group 3A	$43.34
Carpenter		$38.80		$39.56		$38.80		$39.56
Fringe Benefits								
Laborer Fringe Benefits ($/hr)		$0.00		$0.00		$0.00		$0.00
Carpenter Fringe Benefits ($/hr)		$0.00		$14.05		$0.00		$14.05
Zone and Area Adjustments (8)								
Laborer Zone 1	< 50 miles	$0.00	< 30 miles	$0.00	< 50 miles	$0.00	< 30 miles	$0.00
Laborer Zone 2	50 to 150 miles	$2.00	30-50 miles	$1.50	50 to 150 miles	$2.00	30-50 miles	$1.50
Laborer Zone 3	151 to 300 miles	$3.00	50-70 miles	$2.50	151 to 300 miles	$3.00	50-70 miles	$2.50
Laborer Zone 4	> 300 miles	$4.00	>70 miles	$3.50	> 300 miles	$4.00	>70 miles	$3.50
Laborer Zone 5			Laughlin	$2.25			Laughlin	$2.25
Laborer Zone 6								
Laborer Zone 7								
NOTES:								
(6) Laborer Source:	D-B NV120038 1/6/2012		D-B NV100064 10/01/2010		D-B NV120038 1/6/2012		D-B NV100064 10/01/2010	
(7) Carpenter Source:	D-B NV120038 1/6/2012		D-B CARP1780-011 07/01/2011		D-B NV120038 1/6/2012		D-B CARP1780-011 07/01/2011	
(8) Zone Basis:	From Washoe Co. Courthouse		From Las Vegas City Hall		From Washoe Co. Courthouse		From Las Vegas City Hall	
PROJECT MANAGEMENT AND TECHNICAL LABOR - Base Pay Rate ($/hr) (9)								
Project Manager		$65.25		$65.25		$65.25		$65.25
Foreman		$60.75		$60.75		$60.75		$60.75
Field Geologist/Engineer		$92.13		$92.13		$92.13		$92.13
Field Tech/Sampler		$83.75		$83.75		$83.75		$83.75
Range Scientist		$92.13		$92.13		$92.13		$92.13
Senior Planning Engineer								
Project Engineer								
Mechanic/Fitter								
NOTES:								
(9) Project Manager:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31	
(9) Foreman Source:	R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31		R.S.Means 2012 Q2 (01 31	
(9) Techical Labor Source:	SRK Consulting 2012 (Total		SRK Consulting 2012 (Total		SRK Consulting 2012 (Total		SRK Consulting 2012 (Total	
INDIRECT COSTS								
SOCIAL SECURITY, WORKMAN'S COMP, INSURANCE, ETC.								
Unemployment (%)		3.00%		3.00%		3.00%		3.00%
Retirement/SS/Medicare (%)		7.65%		7.65%		7.65%		7.65%
Workman's Compensation (%)		8.75%		8.75%		8.75%		8.75%
State Payroll Tax (13),(15),(17),(18)								
NOTES:								
(10) Workman's Comp Source:	RS Means R013113-60 NV		RS Means R013113-60 NV		RS Means R013113-60 NV		RS Means R013113-60 NV	
Unemployment Tax	NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606		NRS 612.540, NRS 612.606	

Nevada Standardized Bond Calculation
Reclamation Material Costs

File Name:	***SRCE_Cost_Data_File_1_12_Stc***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Revegetation Materials					
Seed Mixes					
Seed Mix	Units				
None					
Mix 1	Cost/Acre	$302.50	$302.50	$302.50	$302.50
Mix 2	Cost/Acre	$332.75	$332.75	$332.75	$332.75
Mix 3	Cost/Acre	$363.00	$363.00	$363.00	$363.00
Mix 4	Cost/Acre	$393.25	$393.25	$393.25	$393.25
User Mix 1	Cost/Acre				
User Mix 2	Cost/Acre				
User Mix 3	Cost/Acre				
User Mix 4	Cost/Acre				
User Mix 5 (see Seed Mix sheet)	Cost/Acre				
	Notes:				
Mulch					
Item	Units				
None					
Straw Mulch	Cost/lb	$0.15	$0.15	$0.15	$0.15
Hydro Mulch	Cost/lb	$0.25	$0.25	$0.25	$0.25
Timber Mulch	Cost/lb				
	Cost/lb				
	Cost/lb				
	Notes:	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)	Straw Spec 60# bale, Cert weed free, $9.05 ea (June 2015)
		Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)	Granite Seed $500 per Ton in 50# bag Wood (Hydro) Mulch (June 2015)
Amendments					
Item	Units				
None					
Organic Matter	Cost/lb	$0.70	$0.70	$0.70	$0.70
Treated Sludge	Cost/lb				
Chemical	Cost/lb	$0.46	$0.46	$0.46	$0.46
	Cost/lb				
	Cost/lb				
	Cost/lb				
	Notes:	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)	Granite Seed $0.70/# in 50# bag 1 ton min order Sustaine 4-6-4 (June 2015)
		Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)	Western Nevada Supply $22.93 per 50 # bag 15-15-15 (June 2015)

Nevada Standardized Bond Calculation
Reclamation Material Costs

File Name:	*SRCE_Cost_Data_File_1_12_Stc*
Date:	*August 1, 2015*
Cost Basis:	*User Data*
Author/Source:	*Nevada Division of Environmental Protection (NDEP) & NV BLM*

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1 *Northern Nevada*	Basis 2 *Southern Nevada*	Basis 3 *N. Nevada Notice Level*	Basis 4 *S. Nevada Notice Level*
Well Abandonment Materials					
Description	Units				
Cement	50lb bag	$6.78	$6.78	$6.78	$6.78
Grout (Low Grade Bentonite)	50lb bag	$7.13	$7.13	$7.13	$7.13
Inert Material/Cuttings	cy				
	Notes:	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag	(1) Jentech Drilling Supply quote (June 2015) Type I,II Cement at $12.75 per 94# bag
		(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added	(2) Jentech Drilling Supply (June 2015) 3/8 Chunk Bentonite Hole Plug at $7.13 per 50# bag (5.75 cf/bag at 43 gallons slurry and 12.1% solids)+ 10% for bentonite chips added
Monitoring Costs					
Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Monitor Well Pump	ea.	$2,140.00	$2,140.00	$2,140.00	$2,140.00
Sampling Supplies	ea.	$5.00	$5.00	$5.00	$5.00
Water Analysis (Profile I) (1)	ea.	$380.00	$380.00	$380.00	$380.00
Leach Test (MWMP) w/ analysis	ea.	$450.00	$450.00	$450.00	$450.00
ABA + S speciation	ea.	$150.00	$150.00	$150.00	$150.00
WAD Cyanide in water	ea.	$50.00	$50.00	$50.00	$50.00
Water Analysis (Profile II) (1)	ea.	$430.00	$430.00	$430.00	$430.00
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	ea.				
	Notes:	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)	(1) WET Labs, Reno, Nevada (June 2015)

Nevada Standardized Bond Calculation
Reclamation Material Costs

File Name:	***SRCE_Cost_Data_File_1_12_Stc***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

RECLAMATION MATERIAL COST TABLE

MATERIAL TYPE		Basis 1	Basis 2	Basis 3	Basis 4
		Northern Nevada	***Southern Nevada***	***N. Nevada Notice Level***	***S. Nevada Notice Level***
Fuel, Etc.					
Description	Units	Cost/unit	Cost/unit	Cost/unit	Cost/unit
Off-road Diesel - delivered (1)	$/gal	$2.66	$2.66	$2.66	$2.66
Pickup Truck Travel	$/mi	$0.58	$0.58	$0.58	$0.58
Electical Power	$/kWh	$0.08	$0.08	$0.08	$0.08
Notes:		(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).	(1) Source: Oil Price Information Service, average annual cost including freight to Nevada (June 2015).
		Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015	Source: Federal Government Vehicle Allowance Rate January 1, 2015
		Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)	Source: NVEnergy (July 2015)

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
REVEGETATION									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Seeding - Broadcast Manual[1]	$/acres	$135.00	$50.00	$135.00	$50.00	$135.00	$50.00	$135.00	$50.00
Seeding - Broadcast Mechanical[1]	$/acres	$93.33	$27.00	$93.33	$27.00	$93.33	$27.00	$93.33	$27.00
Seeding - Drill[1]	$/acres	$140.00	$100.00	$140.00	$100.00	$140.00	$100.00	$140.00	$100.00
Seeding - Hydroseeding[1]	$/acres	$250.00	$125.00	$250.00	$125.00	$250.00	$125.00	$250.00	$125.00
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Shrub Planting - bare root 6-10 in (150- 250mm)[2]	ea.								
Tree Planting - bare root 11-16 in (270- 400mm)[3]	ea.								
Cactus Planting[4]	ea.								
NOTES:									
(1) Seeding Source:		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)		Kelley Erosion Control (July 2015)	
(2) Shrub Source:									
(3) Tree Source:									
(4) Cactus Source:									
BUILDING and WALL DEMOLITION									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Building Demolition									
Lg. steel	C.F.								
Lg. concrete	C.F.								
Lg. masonry	C.F.								
Lg. mixed	C.F.								
Sm. steel	C.F.								
Sm. concrete	C.F.								
Sm. masonry	C.F.								
Sm. wood	C.F.								
Wall Demolition									
Block 4 in thick	S.F.		20%		20%		20%		20%
Block 6 in thick	S.F.		20%		20%		20%		20%
Block 8 in thick	S.F.		20%		20%		20%		20%
Block 12 in thick	S.F.		20%		20%		20%		20%
Conc 6 in thick	S.F.		10%		10%		10%		10%
Conc 8 in thick	S.F.		10%		10%		10%		10%
Conc 10 in thick	S.F.		10%		10%		10%		10%
Conc 12 in thick	S.F.		10%		10%		10%		10%
WASTE DISPOSAL									
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Rubbish and Waste Handling									
Dumpster delivery (average for all sizes)	ea.	$52.50		$52.50		$52.50		$52.50	
Haul (average for all sizes)	ea.	$165.00		$165.00		$165.00		$165.00	
Rent per month (average for all sizes)	ea.	$56.00		$56.00		$56.00		$56.00	
Disposal fee per ton (tonne) (average for all sizes)	ton	$62.00		$62.00		$62.00		$62.00	
NOTES:									
Dumpster Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Disposal Fee Source:		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Hazardous Material Handling - Solids									
Pickup fees 55 gal. drums	ea.	$245.00		$245.00		$245.00		$245.00	
Bulk material (average)	ton	$399.50		$399.50		$399.50		$399.50	
Transport - truck load (80 drums, 25 cy (m3), 18 tons)	mile	$5.46		$5.46		$5.46		$5.46	
Dump site disposal fee	ton	$281.50		$281.50		$281.50		$281.50	
NOTES:									
Solid Handling Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Solid Disposal Fee Source:		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
Hazardous Material Handling - Liquids									
Vacuum Truck Pickup (2200 gal or 9,700 litres)	hr.	$143.00		$143.00		$143.00		$143.00	
Vacuum Truck Pickup (5000 gal or 2,000 litres)	hr.	$208.00		$208.00		$208.00		$208.00	
Dump site disposal fee	ton	$281.50		$281.50		$281.50		$281.50	
NOTES:									
Liquid Handling Cost Source		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)		Mean Heavy Construction (2015)	
Liquid Disposal Fee Source:		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11		2015 Means Heavy Construction, ave. 02 11	
Hydrocarbon Contaminated Soils (HCS)									
Insitu Biotreatment	C.Y	$18.18		$18.18		$18.18		$18.18	
HCS disposal fee	C.Y	$271.50		$271.50		$271.50		$271.50	
NOTES:									
Insitu Treatement Cost Source		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65	
HCS Disposal Fee Source:		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65		2015 Means Heavy Construction, ave. 02 65	
UNDERGROUND OPENING CLOSURE									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Reinforced Concrete Bulkheads and Shaft Covers									
Grade walls - 15 in thick, 8 ft high	C.Y	$133.00		$133.00		$133.00		$133.00	
Grade walls - 15 in thick, 12 ft high	C.Y	$133.00		$133.00		$133.00		$133.00	
Elevated conc, 1-way beam & slab - 15ft span	C.Y	$247.00		$247.00		$247.00		$247.00	
Elevated conc, 1-way beam & slab - 25ft span	C.Y	$234.00		$234.00		$234.00		$234.00	
Item	**Units**	**Materials**		**Materials**		**Materials**		**Materials**	
Small Adit Plugging									
Bat Gate [5]	ea.	$2,911.27		$2,911.27		$2,911.27		$2,911.27	
Culvert Gate [5]	C.Y	$5,822.54		$5,822.54		$5,822.54		$5,822.54	
Adit Foam Plug [6]	C.Y	$291.13		$291.13		$291.13		$291.13	
Production Opening Foam Plug [6]	C.Y	$291.13		$291.13		$291.13		$291.13	
NOTES:									
(5) Bat Gate Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per gate (adjusted to 2015)	
(6) Foam Plug Source:		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)		NV BLM, 2/2006: 8 hr + 1hr mob/demob + 1hr setup per adit; 16 hrs per production opening (adjusted to 2015)	
MISC. LINEAR PROJECTS									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Fencing Installation									
Barbed 3-strand	ft	$0.45		$0.45		$0.45		$0.45	
Barbed 4-strand	ft	$0.60		$0.60		$0.60		$0.60	
Barbed 5-strand	ft	$0.75		$0.75		$0.75		$0.75	
Chain link 8 ft -10 ft Install	ft	$36.50		$36.50		$36.50		$36.50	
Wood stockade fence 6 ft high - Install	ft	$14.15		$14.15		$14.15		$14.15	
	ft								
	ft								
Fencing Removal									
Barbed 3-strand Removal	ft								
Barbed 4-strand Removal	ft								
Barbed 5-strand Removal	ft								
Chain link 8 ft -10 ft Removal	ft								
Wood, all types 4 ft -6 ft high Removal	ft								
	ft								
	ft								
Culvert Removal									
12 in (300 mm) Diameter	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

File Name:	***SRCE_Cost_Data_File_1_12_Std_2015.xlsm***
Date:	***August 1, 2015***
Cost Basis:	***User Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1		Basis 2		Basis 3		Basis 4	
		Northern Nevada		*Southern Nevada*		*N. Nevada Notice Level*		*S. Nevada Notice Level*	
18 in (450 mm) Diameter	ft								
24 in (600 mm) Diameter	ft								
36 in (1m) Diameter	ft								

Nevada Standardized Bond Calculation
Misc. Unit Costs

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MISCELLANEOUS COST TABLE

JOB DESCRIPTION		Basis 1 *Northern Nevada*		Basis 2 *Southern Nevada*		Basis 3 *N. Nevada Notice Level*		Basis 4 *S. Nevada Notice Level*	
Pipeline Removal									
Plastic Pipe 3/4 in (mm) - 4 in (100 mm) diameter	ft								
6 in (150 mm) - 8 in (200 mm)	ft								
10 in (250 mm) - 18 in (450 mm)	ft								
20 in (500 mm) - 36 in (1 m)	ft								
Pipe and Drainpipe Installation									
Water 4in (100mm) 40ft (12m) length, welded HDPE	ft	$2.18		$2.18		$2.18		$2.18	
Water 6in (150mm) 40ft (12m) length, welded HDPE	ft	$5.15		$5.15		$5.15		$5.15	
Water 12in (300mm) 40ft (12m) length, welded HDPE	ft								
Drain 4in (100mm) perforated PVC	ft	$1.28		$1.28		$1.28		$1.28	
Drain 6in (150mm) perforated PVC	ft	$2.89		$2.89		$2.89		$2.89	
Drain 4in (100mm) corrugated, perf or plain	ft	$0.44		$0.44		$0.44		$0.44	
Drain 6in (150mm) corrugated., perf or plain	ft	$1.26		$1.26		$1.26		$1.26	
Drain Rock Preparation									
Item	**Units**		**Total**		**Total**		**Total**		**Total**
Crushing	C.Y		$0.50		$0.50		$0.50		$0.50
Screening	C.Y		$0.50		$0.50		$0.50		$0.50
Misc.									
Item	**Units**		**Premium**		**Premium**		**Premium**		**Premium**
Backhoe work	C.Y								
Powerline and Transformer Removal			**Total**		**Total**		**Total**		**Total**
Single Pole Powerlines [7]	mile		$40,461		$40,461		$40,461		$40,461
Double Pole Powerlines [8]	mile		$46,242		$46,242		$46,242		$46,242
Substation [9]	unit		$28,997		$28,997		$28,997		$28,997
NOTES:									
(7) Single Pole Source:		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015	
(8) Double Pole Source:		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015		NVEnergy estimate (2009) Adjusted to 2015	
(9) Transformer Source:		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015		SPPC estimate (2004) adjusted to 2015	
EROSION, EVAPORATION and SEDIMENTATION CONTROL									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Rip-Rap & Rock Lining									
Rip-Rap 3/8 to 1/4 C.Y. pieces, grouted	S.Y.	$25.50		$25.50		$25.50		$25.50	
Rip-Rap 18 in min thick, no grout	S.Y.	$8.05		$8.05		$8.05		$8.05	
Gabions, 6 in deep	S.Y.	$11.25		$11.25		$11.25		$11.25	
Gabions, 9 in deep	S.Y.	$16.55		$16.55		$16.55		$16.55	
Gabions, 12 in deep	S.Y.	$22.50		$22.50		$22.50		$22.50	
Gabions, 18 in deep	S.Y.	$30.50		$30.50		$30.50		$30.50	
Gabions, 36 in deep	S.Y.	$41.50		$41.50		$41.50		$41.50	
Liner Installation									
Item	**Units**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**	**Materials**	**Premium**
Site grading	S.F.								
Compaction	S.F.								
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
60 mil HDPE Liner	S.F.		$0.50		$0.50		$0.50		$0.50
Construction Management Support									
Item	**Units**		**Materials**		**Materials**		**Materials**		**Materials**
Office Trailer, Furnished, no hook-ups	month		$188.00		$188.00		$188.00		$188.00
Toilet Portable, chemical	month		$130.75		$130.75		$130.75		$130.75
PRODUCTION OR DEWATERING WELL PUMP REMOVAL									
Item	**Units**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**	**Labor**	**Equip**
Pump Type									
Submersible [10]	ft to pump	$2.54	$5.53	$2.54	$5.53	$2.54	$5.53	$2.54	$5.53
Line Shaft [10]	ft to pump	$5.93	$12.91	$5.93	$12.91	$5.93	$12.91	$5.93	$12.91
NOTES:									
(10) Pump Removal Source:		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)		WDC Exploration 12/2005 (adjusted to 2015)	

Nevada Standardized Bond Calculation
Indirect Costs

File Name:	***CostData STD 3.xls***
Date:	***December 1, 2005***
Cost Basis:	***Standardized Data***
Author/Source:	***Nevada Division of Environmental Protection (NDEP) & NV BLM***

Administrative Cost Rates (%)

	Cost Ranges for Indirect Cost Percentages				
	<=	<=	<=	>	
1. Engineering, Design and Construction (ED&C) Plan (7)	$100,000	$25,000,000		$25,000,000	Small Plan
Variable Rate	8.00%	6.00%		4.00%	
	<=	<=	<=	>	
2. Contingency (8)	$500,000	$5,000,000	$50,000,000	$50,000,000	Small Plan
Variable Rate	10.00%	8.00%	6.00%	4.00%	
3. Insurance (9)	1.50%	of labor costs			
4. Bond (10)	3.00%	of the O&M costs if O&M costs are >$100,000			
5. Contractor Profit (11)	10.00%	of the O&M costs			
	<=	<=	<=	>	
6. Contract Administration (12)	$1,000,000	$25,000,000		$25,000,000	
Variable Rate	10.00%	8.00%		6.00%	
Government Indirect Cost (13)	21.00%	of contract administration			

RECLAMATION COST ESTIMATION SUMMARY SHEET FOOTNOTES

1. Federal construction contracts require Davis-Bacon wage rates for contracts over $2,000. Wage rate estimates may include base pay, payroll loading, overhead and profit. To avoid double counting of any of the identified administrative costs the operator must itemize the components of their labor cost estimates or provide BLM with a signed statement, under penalty of USC 1001, that identifies what specific administrative costs are included in the quoted hourly rate.

2. The reclamation cost estimate must include the estimated plugging cost of at least one drill hole for each active drill rig in the project area. Where the submitted Notice or approved Plan of Operations calls for drill holes to be plugged, but doesn't specifically require the drill holes be plugged before the drill rig has been moved from the drill pad, the reclamation cost estimate must include the plugging cost for those drill holes. For all drill holes and wells scheduled to be left open, the estimated plugging cost must be included in the reclamation cost estimate. Where the approved Plan of Operations proposes immediate mining through an area where the drilling is to occur, and the cost of the post-mining reclamation is included in the reclamation cost estimate, the cost estimate does not need to include the plugging costs for those drill holes.

3. Miscellaneous items should be itemized on accompanying worksheets.

4. Fluid management should be calculated only when mineral processing activities are involved. Fluid management represents the costs of maintaining proper fluid management to prevent overflow of solution ponds through premature cessation or abandonment of operations. Calculate a minimum six month direct cost estimate which includes power, supplies, equipment, labor and maintenance.

5. Handling of hazardous materials includes the cost of decontaminating, neutralizing, disposing, treating and/or isolating all hazardous materials used, produced, or stored on the site.

6. Any mitigation measures required in the Plan of Operations must be included in the reclamation cost estimate. Mitigation may include measures to avoid, minimize, rectify and reduce or eliminate the impact, or compensate for the impact.

7. Engineering, design and construction (ED&C) plans are often necessary to provide details on the reclamation needed to contract for the required work. To estimate the cost to develop an ED&C plan use 4-8% of the O&M cost. Calculate the ED&C cost as a percentage of the O&M cost as follows: up to and including $1 million, use 8%; over $1 million to $25 million, use 6%; and over $25 million, use 4%. Inclusion of a line item for the development of an ED&C plan may not be necessary for small operations, such as notice-level exploration. With small, uncomplicated reclamation efforts contracting may be able to proceed without developing an ED&C plan. [ED&C is automatically eliminated if "Notice" is selected on the Property Information Sheet]

8. A contingency cost is included in the reclamation cost estimation to cover unforeseen cost elements. Calculate the contingency cost as a percentage of the O&M cost as follows: up to and including $500,000, use 10%; over $500,000 to $5 million, use 8%; over $5 million to $50 million, use 6%; and greater than $50 million, use 4%. As with the ED&C cost, inclusion of a contingency cost may not be necessary for small operations, such as notice-level exploration.

9. Insurance premiums are calculated at 1.5% of the total labor costs. Enter the premium amount if liability insurance is not included in the itemized unit costs.

10. Federal construction contracts exceeding $100,000 require both a performance and a payment bond (Miller Act, 40 USC 270et seq.). Each bond premium is figured at 1.5% of the O&M cost. Enter the sum of both premium costs on this line.

11. For Federal construction contracts, use 10% of estimated O&M cost for the contractor's profit.

12. To estimate the contract administration cost, use 6 to 10% of the operational and maintenance (O&M) cost. Calculate the contract administration cost as a percentage of the O&M cost as follows: up to and including $1 million, use 10%; over $1 million to $25 million, use 8%; and greater than $25 million use 6%.

13. Government indirect cost rate is 21% of the contract administration costs.

Appendix L: Changes Over Time

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Memorandum

To: Jennifer Saran
From: Pete Kero and Nancy Dent
Subject: NorthMet Project Feature Changes Over Time
Date: October 7, 2016
c: Jim Scott

1.0 Introduction

Some NorthMet Project (Project) features change over the Project's 20-year Life of Mine (LOM). Under Minnesota Rules, PolyMet will update its Contingency Reclamation Estimate (CRE) annually based on these changes to Project features, as well as other regulatory and technological changes that may occur. The purpose of this document is to describe the planned changes in mine features over time, quantify those changes, and provide a basis for the quantities.

Generally, the size and number of Project features grow to a peak in Mine Year 11, then decrease as mining and progressive reclamation take place concurrently through Mine Year 20. After Mine Year 20 (during the reclamation phase), Project features and quantities will change only as a result of closure activities. This memorandum accordingly provides data for only Mine Years 0 through 20, and does not address post-mining reclamation. The changes to facilities over the life of the mine that are described in this memorandum are based on permit-level designs. This document may be updated after final design to reflect any refinements.

Table 1 summarizes the features at several key points in the Project's life: Mine Years 1, 3, 11 and 20. Mine Year 1 is the year Phase 1 operations begin. Mine Year 3 is the year the Hydrometallurgical Plant (Phase 2) begins operations. Mine Year 11 is the year that stockpiles reach their maximum extent. Mine Year 20 is the end of mine life. Data in Table 1 is summarized for Stage 1 and Stage 2 of Pre-Operation Construction. Stage 1 represents the reclamation liability that would exist with all new facilities constructed but no mining operations started (no Duluth Complex rock blasted) and Stage 2 is the reclamation liability that would exist by adding the legacy building demolition to Stage 1. Large Figure 1 illustrates the Pre-Operation Construction features at the Mine Site for both Stage 1 and 2. Large Figure 2 illustrates the Pre-Operation Construction features at the Plant Site for both Stages 1 and 2.

Large Table 1 provides the changes in Project features on a year-by-year basis and is the source for Table 1, except for items related to Water Treatment. Section 2.0 discusses the changes in Project features over time and Section 3.0 provides the basis for how Large Table 1 was developed.

2.0 Changes in Project Features over time

2.1 Mine Site Features

The temporary waste rock stockpiles increase in size until Mine Year 11 at which point the East Pit becomes available for direct disposal of mined Category 2/3 and Category 4 Waste Rock and relocation of the waste rock in the Category 2/3 and Category 4 Waste Rock Stockpiles. The liner acres, collection piping length, the number sumps, and number of pumps/piping length to the WWTF increase during

operations as the stockpile footprints increase. The amount of rock to be relocated increases as mining progresses.

The Category 1 Waste Rock Stockpile footprint increases in size until Mine Year 6 at which point the Category 1 Stockpile has sufficient capacity for disposal of all mined Category 1 Waste Rock. The acres to be covered increase as mining progresses and decrease as progressive reclamation occurs. In the early years of operation while the footprint of the stockpile is being established, the west end of the containment system is open. This means that if there is a contingency closure during those years, closure of the west end of the containment system must be provided. The length of this extension increases as mining progresses and is eliminated when the footprint is fully established in Mine Year 6.

Table 1 Project Feature Changes Over Time

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Category 2/3 Waste Rock Stockpile						
Liner Acres to be Removed and Footprint Reclaimed[4]	Mine Year 1	Mine Year 1	63	119	181	0
Liner Collection Piping Feet to be Removed[3]	Mine Year 1	Mine Year 1	45,300	76,500	118,500	0
Sump/Pond Acres to be Reclaimed[4]	Mine Year 1	Mine Year 1	6.7	9.2	12.2	0
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2	4	6	0
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	8,000	10,000	12,000	0
Tons to Relocate[1]	none	Stage 1	5,238,766	13,968,736	44,021,108	0
Category 4 Waste Rock Stockpile						
Liner Acres to be Removed and Footprint Reclaimed[4]	Mine Year 1	Mine Year 1	29	57	57	0
Liner Collection Piping Feet to be Removed[3]	Mine Year 1	Mine Year 1	21,590	41,690	41,690	0
Sump/Pond Acres to be Reclaimed[4]	Mine Year 1	Mine Year 1	4.5	4.5	4.5	0
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2	2	2	0
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	2,500	2,500	2,500	0
Tons to Relocate[1]	none	Stage 1	1,489,201	3,379,412	6,206,813	0
Ore Surge Pile						
Liner Acres to be Removed and Footprint Reclaimed	Mine Year 1	Mine Year 1	32	32	32	32
Liner Collection Piping Feet to be Removed	Mine Year 1	Mine Year 1	30,000	30,000	30,000	30,000
Sump/Pond Acres to be Reclaimed	Mine Year 1	Mine Year 1	2.3	2.3	2.3	2.3
Pumps to WWTF to be Removed	Mine Year 1	Mine Year 1	2	2	2	2

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Piping Feet to WWTF to be Removed	Mine Year 1	Mine Year 1	1,600	1,600	1,600	1,600
Tons to Relocate	none	Stage 1	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Waste Rock Stockpile						
Footprint Acres to Reclaim	13	Stage 1	0	0	0	0
Acres to Cover[5]	none	Stage 1	205	369	526	64
Containment System Feet to Extend[4]	none	Stage 1	2,800	2,800	0	0
Containment System Acres to Breach & Reclaim	41	Stage 1	0	0	0	0
Pits						
East Exposed/Unblasted Rock Acres to Reclaim	95	Stage 1	0	0	0	0
East Pit Wall Acres to Reclaim[1]	none	Stage 1	10.1	10.1	9.2	9.2
West Pit Exposed/Unblasted Rock Acres to Reclaim	none	Stage 1	0	0	65	0
West Pit Wall Acres to Reclaim[1]	none	Stage 1	0	8.7	13.5	13.5
Central Pit Wall Acres to Reclaim[1]	none	Stage 1	0	0	8.9	8.9
Pit Perimeter Fence - Barb Wire[2]	none	Stage 1	1,100	1,400	2,300	1,400
Pit Perimeter Fence - Non-Climbable[2]	none	Stage 1	11,000	19,900	32,800	33,700
Pit Access Gates[1]	none	Stage 1	1	2	2	3
Mine Water Ponds						
Pond Acres to be Reclaimed[3]	Mine Year 1	Mine Year 1	19.4	21.6	23.1	23.1
Liner Acres to be Removed (not all ponds lined) [3]	Mine Year 1	Mine Year 1	12.4	14.6	16.1	16.1
Pumps to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	4	6	6	6

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
Piping Feet to WWTF to be Removed[3]	Mine Year 1	Mine Year 1	9,000	11,000	11,000	11,000
Pond Underdrain Piping Feet to be Removed	Mine Year 1	Mine Year 1	4,500	6,000	6,900	6,900
Stormwater Systems						
Pond Acres to Reclaim	Mine Year 1	Mine Year 1	17.4	21.7	21.7	21.7
Ditch Feet to Reclaim	Mine Year 1	Mine Year 1	10,700	10,700	10,700	8,300
Haul Roads						
Feet to be Reclaimed[1]	Mine Year 1	Mine Year 1	22,000	28,700	31,500	21,500
Flotation Tailings Basin (FTB)						
Beach Acres to Reclaim	40	Stage 1	0	0	0	0
Beach Acres to Amend[5]	none	Stage 1	95	93	212	428
Pond Acres to Amend[5]	none	Stage 1	421	427	1,124	905
Borrow Area Acres to Reclaim	31.6	Stage 1	44.7	16.5	18	19.5
Hydrometallurgical Residue Facility (HRF)						
Pre-Load Disturbed Acres to Reclaim	5	Stage 1	25	0	0	0
Acres to Cover[5]	none	Stage 1	0	49	49	98
Years to Drain[5]	none	Stage 1	0	1	5	9
Water Treatment						
Legacy Tailings Basin	non-mechanical	Stage 1	none	none	none	none
WWTF Pit Flushing Avg GPM	none	Stage 1	642[6]	899[7]	1,925[7]	1,925[8]
WWTF Pit Flushing Years	none	Stage 1	4[6]	6[7]	14[7]	14[8]
Years from Closure to Pit Overflow	none	Stage 1	9[6]	14[7]	32[7]	32[8][9]
WWTF Pit Overflow Avg GPM	none	Stage 1	0[6]	150[7]	321[7]	321[8]

	Pre-Operation Construction	Pre-Operation Construction	Phase 1	Phase 2	Peak	Life of Mine
	Stage 1	Stage 2	Mine Year 1	Mine Year 3	Mine Year 11	Mine Year 20
WWTP Reclamation Avg GPM	none	Stage 1	2,957(6)	3,066(7)	3,500(7)	3,500(5)
WWTP Reclamation Years	none	Stage 1	8(6)	13(7)	35(7)	35(5)
WWTP Long-term Avg GPM	none	Stage 1	2,534(6)	2,450(7)	2,450(7)	2,450(5)

(1) Assumes Progressive Reclamation (Reference (1))
(2) For most years the total length of fence is based off AutoCAD drawings, except for year 11-20 where the total length was given from the GIS (Reference (1))
(3) Assumes Progressive Reclamation (Reference (2)
(4) Assumes Progressive Reclamation (Reference (3))
(5) Reference (4)
(6) Reference (5)
(7) See Section 2.3 for Mine Year 3 and Mine Year 11 data sources.
(8) Reference (6)
(9) Mine Year 20 value assumes pumping from Plant Site to West Pit to accelerate flooding, see Reference (6)) Section 6.1.2.3.2, Mine Year 1 assumes no Plant Site water.

The pits increase in size as mining progresses, initially mining from the East Pit only. The length of pit perimeter fence and number of pit lake access gates increase as the pits expand. The acres of pit wall to be reclaimed increase as mining progresses and decrease as progressive reclamation occurs.

The haul roads and associated mine water ditches increase in length as mining progresses and decrease as temporary stockpiles are no longer used and the associated roads become inactive.

The mine water management system increases in size as mining progresses. The pond acres, liner acres, number sumps and number of pumps/piping length to the WWTF increase as mining progresses.

The stormwater system increases over time as infrastructure expands. Stormwater ditches, perimeter dikes, ponds, and outlet structures are added as the existing system expands with new facilities. After Mine Year 20, Pond B and the associated portion of the North Perimeter Stormwater Ditch, Pond C-West, Pond C-East and the associated portion of the South Perimeter Stormwater Ditch and Pond D and Ditch D will be removed. Pond A will remain in long-term closure (regraded to drain to the East Pit) as well as the other stormwater ditches.

2.2 Plant Site Features

The Flotation Tailings Basin (FTB) changes as the exterior dams are raised and the tops move inward. The acres of beach and pond change over the Project life to reflect dam raises. The acres of existing tailings that are disturbed change over the Project life, reflecting their use as a borrow source.

The Hydrometallurgical Residue Facility (HRF) changes as the exterior dams are raised and the tops move inward. The acres to be covered change over the Project life to reflect dam raises. The time to drain the material in the facility for placement of the final cover increases with the amount of material in the facility. Because the HRF is planned to be constructed in Phase 2, it is not included in the CRE until Mine Year 3, except the wetlands restoration caused by pre-loading activities.

There are Phase 2 buildings that are also not included in the CRE until Mine Year 3 including the Oxygen Plant and the Hydrometallurgical Plant.

2.3 Water Treatment

Water treatment changes over the life of the Project in response to changes in Project features discussed above. Quantities for water treatment and unblasted rock acres to reclaim are described in detail, with basis for contingency closure in Mine Year 1 in the Technical Memorandum entitled "NorthMet Project – CRE O&M for water treatment during reclamation and long-term closure after Mine Year 1" (Reference (5)). The time-weighted average flow rates from that technical memo are listed in Table 1 as the water treatment flow rates for different periods of reclamation and closure (Reference (5)). Water treatment and unblasted rock acres to reclaim quantities for Mine Year 20 were calculated by water modeling efforts conducted for the Final Environmental Impact Statement (Reference (7)). Based on preliminary modeling of closure after Mine Year 11, water treatment quantities for Mine Year 11 were set equal to those calculated for Mine Year 20. Water treatment quantities for Mine Year 3 were interpolated from Mine Year 1 and Mine Year 11 values.

3.0 Basis for Changes in Project Features over time

Large Table 1 details the Project features that change on a year-to-year basis as the mine develops. It also shows how the quantities change over time (e.g., the acres of West Pit Wall that would need to be reclaimed every year, starting in Mine Year 0 and ending in Mine Year 20). The basis for the changes over time is described below. Drawings referenced below are compiled and attached to this memo.

3.1 Mine Pit

The NorthMet Project Mine Plan (Reference (1)) describes the development and progressive reclamation of mine features over time. Pit wall area needing reclamation (in acres) was determined from measurements using a 3-Dimensional Civil 3D model created by importing year-by-year pit dimensional AutoCAD drawings provided by PEG Engineering. The length of haul roads needing reclamation (in linear feet) and progressive reclamation was estimated by AutoCAD measurements using attached Mine Site and Dunka Road Earthwork Drawings EW-010 and EW-011, Mine Site and Dunka Road Earthwork Haul Road Reclamation Plans A (Mine Years 1-11) and B (Mine Years 11-20). The number of pit access gates relates to the number of active mine pits over time (e.g., one while only the East Pit is active, two when both the East and West Pits are active, etc.). Fencing requirements (4-strand barbed wire and non-climbable fence) were based on the pit perimeter measurements from the AutoCAD drawings for Mine Years 0 through 11, and GIS figures for Mine Years 11 through 20.

3.2 Category 1, 2/3 and 4 Stockpiles and Ore Surge Pile, and associated Liners, Underdrains, Sumps and Ponds

The progressive construction of the Category 1 Waste Rock Stockpile groundwater containment system over the first five years of mining is described in the Rock and Overburden Management Plan (ROMP, Reference (3)). For Mine Years 1 through 4 (prior to full completion of the groundwater containment system in Mine Year 5), the additional length of groundwater containment system that would need to be constructed to close the loop was estimated by AutoCAD measurements using Groundwater Containment System Drawings GCS-003, GCS-004, GCS-005, and GCS-006 for the Category 1 Stockpile Groundwater Containment System Mine Years 0, 2, 3 and 5 Layouts, respectively. Breaching of the Containment System during pre-operation construction was also based on these drawings.

The construction and progressive reclamation of the Category 1 stockpile are described in the ROMP (Reference (3)) and it was assumed that progressive reclamation begins in Mine Year 14 at a rate of 66 acres per year. The construction and progressive reclamation of the Category 2/3 and 4 stockpile and Ore Surge Pile liner systems and associated mine water sumps and overflow ponds are described in the ROMP (Reference (3)). The acres of Category 2/3 and 4 or Ore Surge Pile stockpile liner systems were estimated by AutoCad measurements using Category 1, 2/3, and 4 Stockpile Drawings SKP-003, SKP-004, SKP-005, and SKP-006, Mine Year 1, 2, 11 and 21 Limits, respectively. It was assumed that deconstruction of the Category 4 stockpile liner will be completed by the end of Mine Year 11 and deconstruction of the Category 2/3 stockpile liner begins in Mine Year 14 at a rate of 30 acres per year. The acres of associated stockpile liner sumps/ponds were estimated by AutoCAD measurements for progressive construction and reclamation using Mine Site Mechanical Infrastructure Drawing MD-016 Mine Drainage Infrastructure Reclamation Plan. The length of Category 2/3 and 4 stockpile collection and Ore Surge Pile overliner and underdrain piping over time was estimated by AutoCAD measurements using Category 1, 2/3, and 4 Stockpile Drawings SKP-016, SKP-017, SKP-022, SKP-023, SKP-028 and SKP-029 related to the Category 2/3 and 4 stockpile and Ore Surge Pile underdrain and overliner piping plans.

The Category 2/3 and 4 stockpile and Ore Surge Pile piping and pumping system to the WWTF are detailed in the Water Management Plan - Mine (Reference (2)). The length of piping for the Category 2/3 and 4 stockpiles and Ore Surge Pile was estimated by AutoCAD measurements using Drawing MD-002 Mine Drainage Infrastructure Mine Year 11 General Layout from the Mine Site Mechanical Infrastructure drawing set. The number of stockpile pumps is shown on Mine Site Mechanical Infrastructure Drawing ME-003 Mechanical Infrastructure General Drawings, Mine Site, Mine Drainage Flow Diagram.

The tons of stockpile and Ore Surge Pile to relocate was calculated using year-by-year mining estimates for waste rock and ore as documented in the Mine Plan (Reference (1)).

3.3 Stormwater and Mine Water Ponds

Stormwater pond construction is detailed in the Water Management Plan - Mine (Reference (2)). Also, the construction of mine water ponds, liners, pumps and piping are detailed in the Water Management Plan - Mine (Reference (2)).

Stormwater pond acres to be reclaimed and stormwater ditches to be reclaimed were estimated by AutoCAD measurements for progressive construction and reclamation using Mine Site Stormwater Drawing SW-031 Dikes, Ditches, and Ponds, Reclamation Plan.

The acres of mine water ponds, liners and linear feet of mine water pond piping to be reclaimed was estimated by AutoCAD measurements using Drawing MD-002 Mine Drainage Infrastructure Mine Year 11 General Layout in the Mine Site Mechanical Infrastructure drawing set. The number of mine water pumps is shown on Drawing ME-003 Mechanical Infrastructure General Drawings, Mine Site, Mine Drainage Flow Diagram.

3.4 Flotation Tailings Basin

Acres of beach and pond bottom at the FTB to amend with bentonite was documented in Appendix B of the NorthMet Project Water Quality Modeling Data Package, Volume 1 – Mine Site (Reference (6)). The acreage of the borrow areas within the Tailings Basin that need to be reclaimed was computed using the borrow areas from FTB Support Drawing FTB-003; Existing Conditions.

3.5 Hydrometallurgical Residue Facility

The acres of HRF to cover and years to drain were calculated based on HRF development sequencing (footprint impacted) and timing, the year-by-year accumulation of hydrometallurgical residue, and assumed drainage rate of 115 gallons per cubic yard of material. The acres were estimated using HRF Drawings HRF-005, HRF-008 and HRF-010; Emergency Basin Excavations and Removals, Lift 1 Layout, and Lift 3 Layout, respectively.

References

1. **Poly Met Mining Inc.** NorthMet Project Mine Plan (v5). July 2016.

2. —. NorthMet Project Water Management Plan - Mine Site (v5). July 2016.

3. —. NorthMet Project Rock and Overburden Management Plan (v8). July 2016.

4. —. NorthMet Project Water Modeling Data Package Volume 2 - Plant Site (v11). March 2015.

5. **Barr Engineering Co.** NorthMet Project – CRE O&M for water treatment during reclamation and long-term closure after Mine Year 1 - 10 mg/L WWTP Sulfate Target Technical Memo to Jennifer Saran. October 2016.

6. **Poly Met Mining Inc.** NorthMet Project Water Modeling Data Package Volume 1 - Mine Site (v14). February 2015.

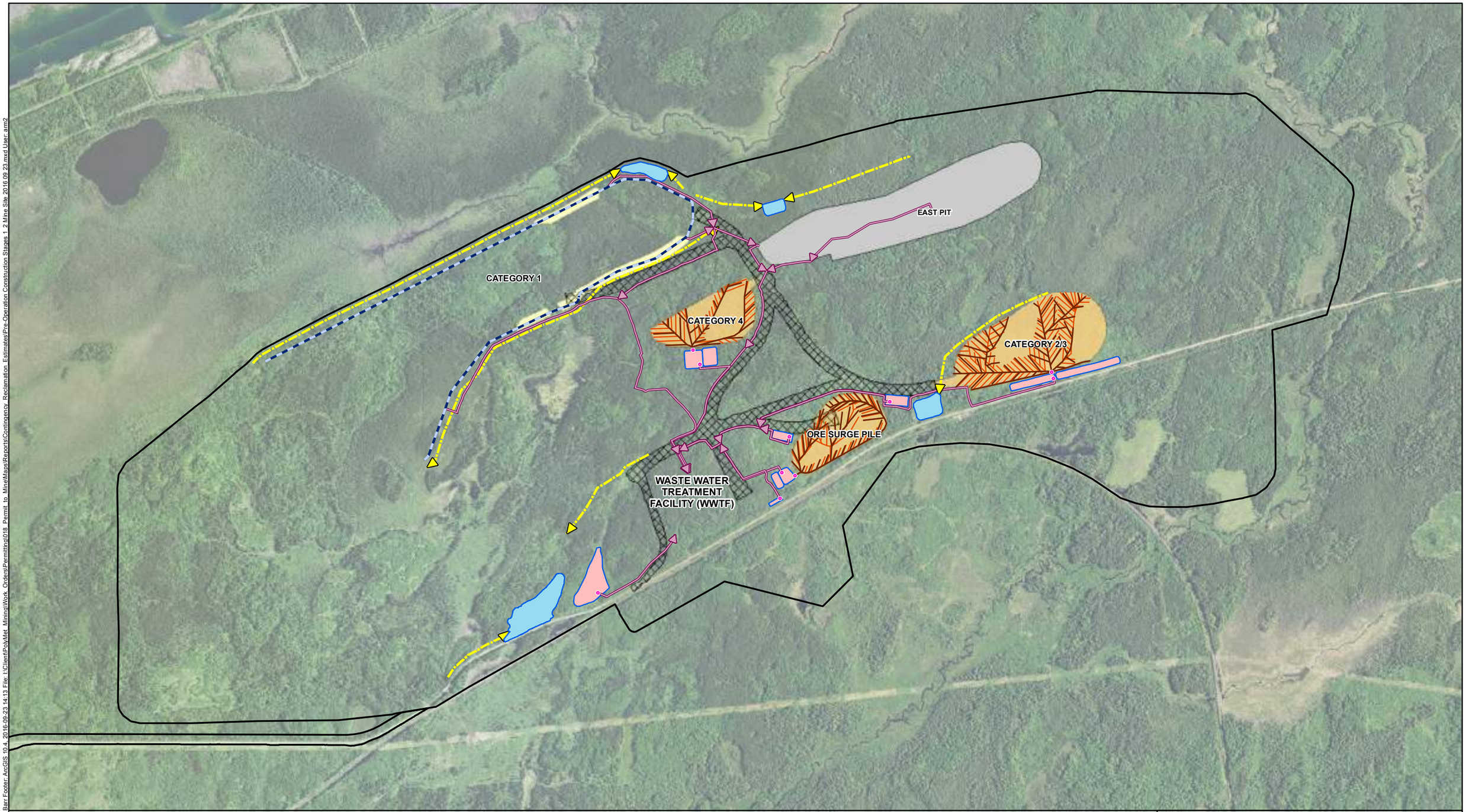
7. **Minnesota Department of Natural Resources, U.S. Army Corps of Engineers and U.S. Forest Service.** Final Environmental Impact Statement: NorthMet Mining Project and Land Exchange. November 2015.

Large Tables

Large Table 1 Reclamation Features that Vary by Closure Year

	Units that Vary by Closure Year																					
Year of Closure	0 - Stage 1	0 - Stage 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Category 2/3 Stockpile Liner (acres)	63	63	63	63	119	119	119	181	181	181	181	181	181	181	181	181	150	120	90	60	30	0
Category 2/3 Stockpile Piping (LF)	8,000	8,000	8,000	8,000	10,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	0	0
Category 2/3 Stockpile Sump/Pond (acres)	6.7	6.7	6.7	6.7	9.2	9.2	9.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	9.2	9.2	6.7	6.7	6.7	0.0
Category 2/3 Stockpile Pumps	2	2	2	2	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Category 2/3 Stockpile Overliner and Underdrain Piping (LF)	45,300	45,300	45,300	45,300	76,500	76,500	76,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	118,500	94,800	71,100	47,400	23,700	0
Category 2/3 Stockpile Relocation (tons)	0	0	5,238,766	9,671,631	13,968,736	17,624,295	20,039,335	24,388,312	26,954,315	31,286,526	35,946,676	40,017,183	44,021,108	44,021,108	38,281,584	32,542,061	26,802,537	21,063,014	15,323,491	9,583,967	3,844,444	0
Category 4 Stockpile Liner (acres)	29	29	29	29	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Piping (LF)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Sump/Pond (acres)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Overliner and Underdrain Piping (LF)	21,590	21,590	21,590	21,590	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	41,690	0	0	0	0	0	0	0	0	0
Category 4 Stockpile Relocation (tons)	0	0	1,489,201	2,251,698	3,379,412	4,206,959	4,648,816	5,314,412	5,863,428	5,974,068	6,107,575	6,184,408	6,206,813	0	0	0	0	0	0	0	0	0
OSP Liner (acres)	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
OSP Piping (LF)	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
OSP Sump/Pond (acres)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
OSP Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OSP Overliner and Underdrain Piping (LF)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
OSP Relocation (tons)	0	0	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000	2,275,000
Category 1 Footprint to Reclaim (acres)	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Cover (acres)	0	0	205	205	369	369	458	526	526	526	526	526	526	526	526	460	394	328	262	196	130	64
Category 1 Stockpile Containment System Completion (LF)	0	0	2,800	2,800	2,800	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Category 1 Stockpile Containment System Breach & Reclaim (acres)	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Exposed/Unblasted Rock to Reclaim (Acres)	95	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Pit Wall Unreclaimed (Acres)	0	0	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
West Pit Exposed/Unblasted Rock to Reclaim (Acres)	0	0	0	0	0	4	40	0	0	0	0	52	65	0	0	0	0	0	0	0	0	0
West Pit Wall Unreclaimed (Acres)	0	0	0	8.7	8.7	8.7	8.9	8.9	8.9	11.0	11.0	16.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Central Pit Wall Unreclaimed (Acres)	0	0	0	0	0	0	0	0	0	0	0	0	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Fence - 4 strand barb wire (LF)	0	0	1,100	1,400	1,400	1,400	1,400	1,400	1,400	1,700	1,700	1,600	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	1,400
Fence - non climbable (LF)	0	0	11,000	19,900	19,900	21,200	20,700	20,700	20,700	22,100	22,100	30,100	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	32,800	33,700
Pit Access Gates	0	0	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Mine Drainage Pond (acres)	19.4	19.4	19.4	19.4	21.6	21.6	21.6	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Mine Drainage Pond Liner (acres)	12.4	12.4	12.4	12.4	14.6	14.6	14.6	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Mine Drainage Pond Pumps	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Mine Drainage Pond Pipe (LF)	9,000	9,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Mine Drainage Pond Underdrains	4,500	4,500	4,500	5,200	6,000	6,000	6,000	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
Stormwater Pond (acres)	17.4	17.4	17.4	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
Stormwater Ditch (LF)	5,200	5,200	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	8,300	8,300
Unreclaimed Haul Road (LF)	22,000	22,000	22,000	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	28,700	31,500	31,500	31,500	29,500	27,500	27,500	27,500	27,500	21,500	21,500
FTB Beach to Reclaim (acres)	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FTB Beach to Amend with Bentonite (acres)	0	0	95	95	93	92	91	89	87	203	207	211	212	212	212	212	216	219	222	225	420	428
FTB Pond Bottom to Amend with Bentonite (acres)	0	0	421	424	427	430	432	434	443	1068	1093	1118	1124	1130	1136	1142	1136	1129	1122	1116	905	905
FTB Borrow Area to Reclaim (acres)	31.6	31.6	44.7	16.9	16.5	16.5	15.9	15.9	12.0	12.0	12.0	12.0	18.0	22.4	22.4	22.4	26.8	26.8	26.8	26.8	21.5	19.5
HRF Disturbed Acres to Reclaim (acres)	5	5	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HRF cover (acres)	0	0	0	0	49	49	49	49	49	49	49	49	49	54	60	65	71	76	82	87	93	98
HRF drainage (years)	0	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9

Large Figures



EIS Project Areas
East Pit Exposed/Unblasted Rock to Reclaim
Stockpile Footprint to Reclaim
Stockpile Liner Acres to be Removed and Footprint Reclaimed
Overliner Collection Piping
Underliner Collection Piping
Haul Roads to be Reclaimed
Stormwater Systems
Ditch to Reclaim
Pond Acres to Reclaim
Groundwater Containment System
Mine Water Systems
Pond/Liner to be Reclaimed (OSLA pond not lined)
Piping to WWTF to be Removed
Pumps to WWTF to be Removed

N

0 750 1,500 3,000
Feet

BARR

PRE-OPERATION CONSTRUCTION CHANGES OVER TIME STAGES 1 & 2 - MINE SITE
NorthMet Project
Poly Met Mining, Inc.

Large Figure 1
Contingency Reclamation Estimate

FLOTATION TAILINGS BASIN

CELL 2E

CELL 2W

CELL 1E

HYDROMETALLURGICAL RESIDUE FACILITY

Booster Pump House

Coarse Crusher

Concentrator

Drive House 1

Water Treatment Plant

Water Tower Plant Site

A-Lab

Rubber Shop

Drive House 2

Lube House

Fine Crusher

West of Concentrator

Warehouse 49

Rebuild Shop

Warehouse Electrical

General Shops

Carpenter's Shop

Area 2 Buildings

Imagery Source: FSA, 2013.

EIS Project Areas
Pre-Load Disturbed Acres to Reclaim
Beach Area to Reclaim
Borrow Area to Reclaim - Stage 1

0 750 1,500 3,000
Feet

BARR

PRE-OPERATION CONSTRUCTION CHANGES OVER TIME STAGES 1 & 2 - TAILINGS BASIN

NorthMet Project
Poly Met Mining, Inc.

Large Figure 2
Contingency Reclamation Estimate

Drawings

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

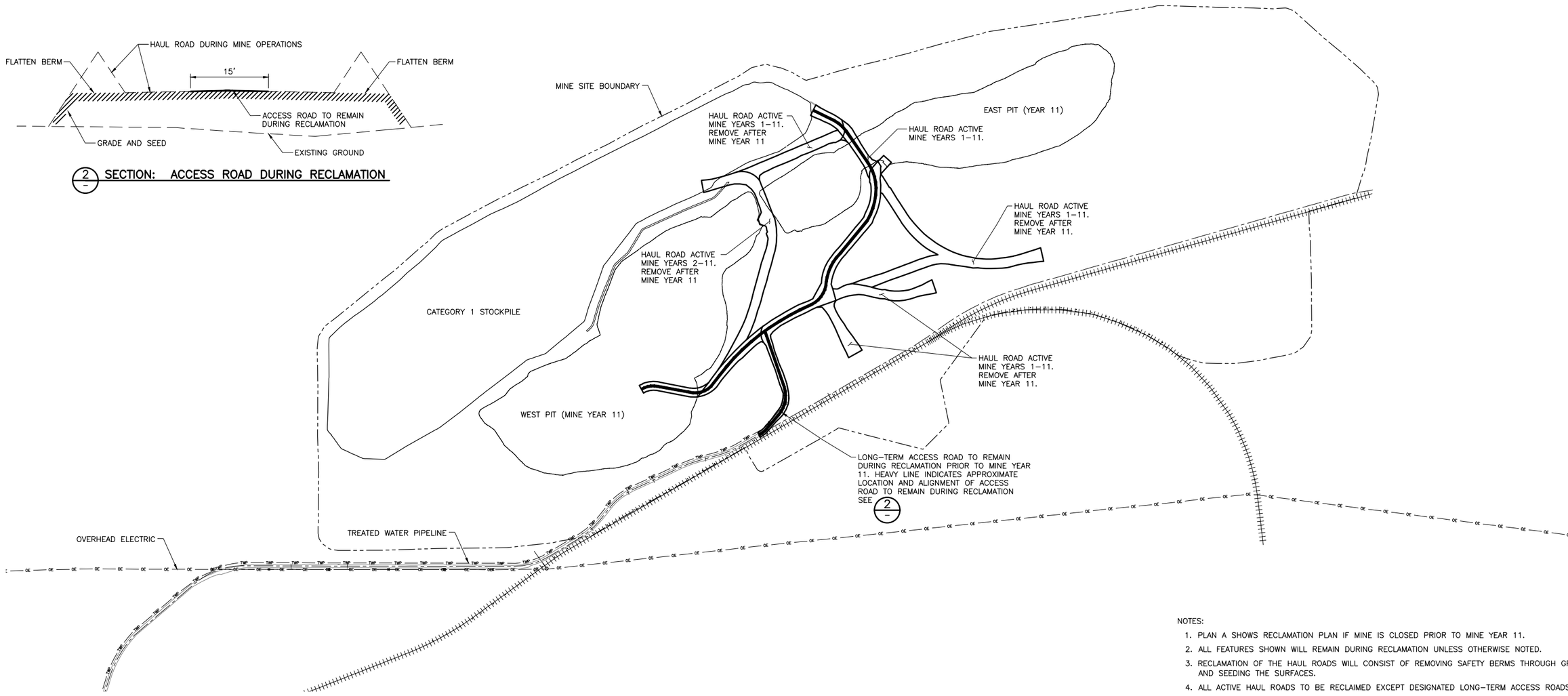
Permit Application Support Drawings: Mine Site and Dunka Road Earthwork

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology “mine drainage” as noted in these drawings will be changed to “mine water”.

2 SECTION: ACCESS ROAD DURING RECLAMATION



NOTES:

1. PLAN A SHOWS RECLAMATION PLAN IF MINE IS CLOSED PRIOR TO MINE YEAR 11.
2. ALL FEATURES SHOWN WILL REMAIN DURING RECLAMATION UNLESS OTHERWISE NOTED.
3. RECLAMATION OF THE HAUL ROADS WILL CONSIST OF REMOVING SAFETY BERMS THROUGH GRADING AND SEEDING THE SURFACES.
4. ALL ACTIVE HAUL ROADS TO BE RECLAIMED EXCEPT DESIGNATED LONG–TERM ACCESS ROADS.

1 PLAN: HAUL ROAD RECLAMATION PLAN A

0 1000 2000
SCALE IN FEET

N

VER NO	DATE	DESCRIPTION
1	5/21/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/21/15
FOR CONSTRUCTION		
NOT APPROVED FOR CONSTRUCTION.		

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/21/15 LICENSE# 20533

DRAWN: KKB
CHECKED: ATS
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

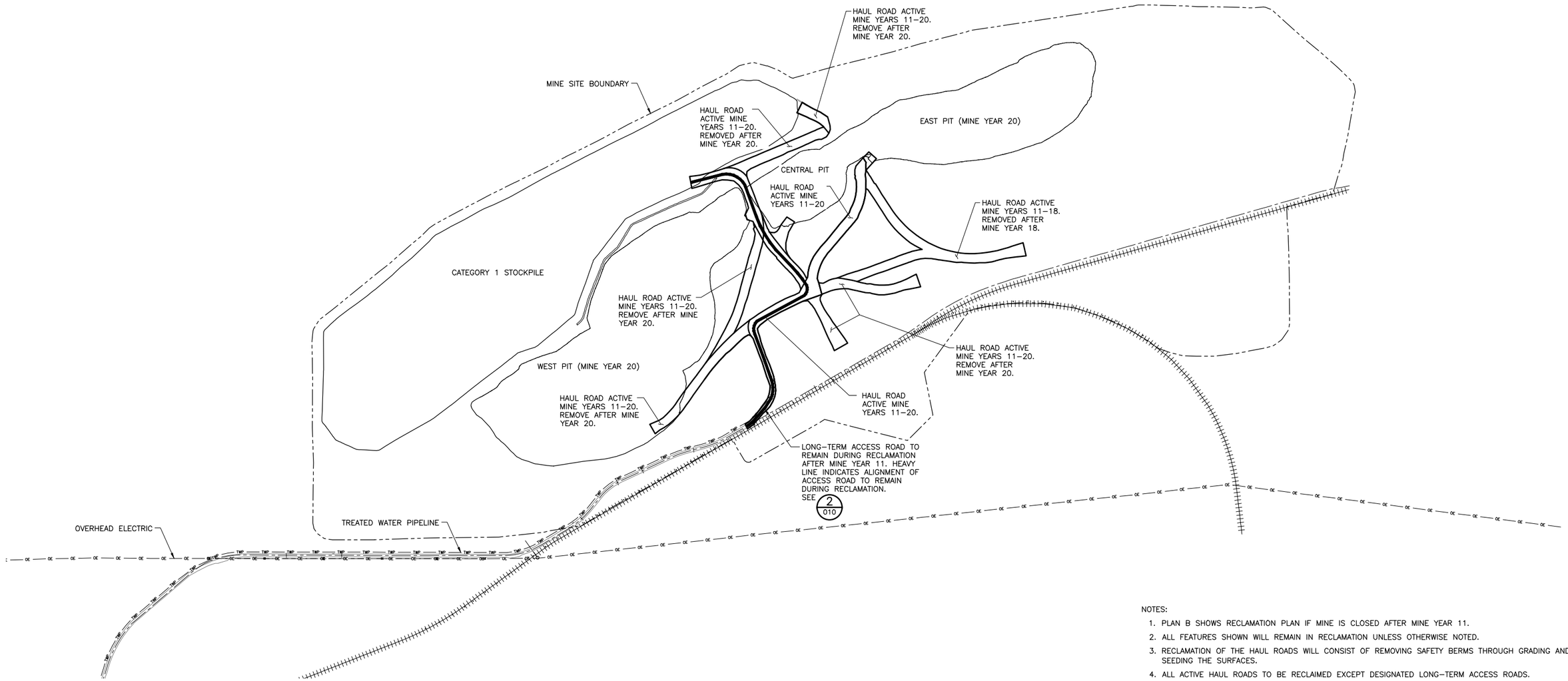
PLANT DRAWING NUMBER:

MINE SITE & DUNKA ROAD EARTHWORK HAUL ROAD RECLAMATION PLAN A MINE YEARS 1–11

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. EW–010
REV



NOTES:

1. PLAN B SHOWS RECLAMATION PLAN IF MINE IS CLOSED AFTER MINE YEAR 11.
2. ALL FEATURES SHOWN WILL REMAIN IN RECLAMATION UNLESS OTHERWISE NOTED.
3. RECLAMATION OF THE HAUL ROADS WILL CONSIST OF REMOVING SAFETY BERMS THROUGH GRADING AND SEEDING THE SURFACES.
4. ALL ACTIVE HAUL ROADS TO BE RECLAIMED EXCEPT DESIGNATED LONG–TERM ACCESS ROADS.

1/– PLAN: HAUL ROAD RECLAMATION PLAN B

0 1000 2000
SCALE IN FEET

N

VER NO	DATE	DESCRIPTION
1	5/21/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/21/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/21/15 LICENSE# 20533

DRAWN: KKB
CHECKED: ATS
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE SITE & DUNKA ROAD EARTHWORK
HAUL ROAD RECLAMATION PLAN B
MINE YEARS 11–20

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. EW–011
REV

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

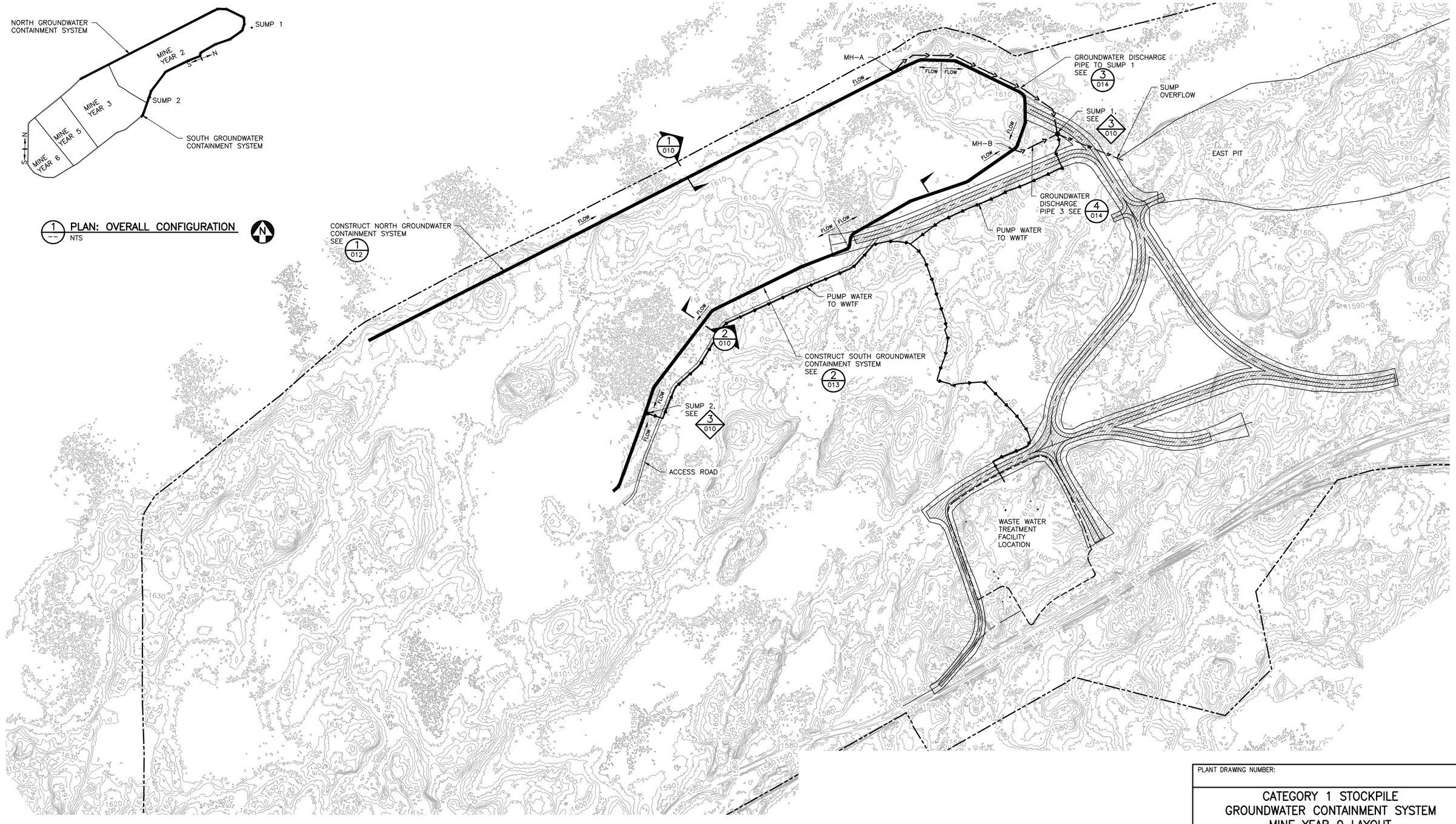
Permit Application Support Drawings: Category 1 Stockpile Groundwater Containment System

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
GCS-003	To meet construction stormwater requirements, a temporary berm will be added on the west side of the Mine Year 0 Category 1 Stockpile footprint to control mine water runoff as the stockpile is built out.

1 PLAN: OVERALL CONFIGURATION
NTS



2 PLAN: GCS – MINE YEAR 0 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

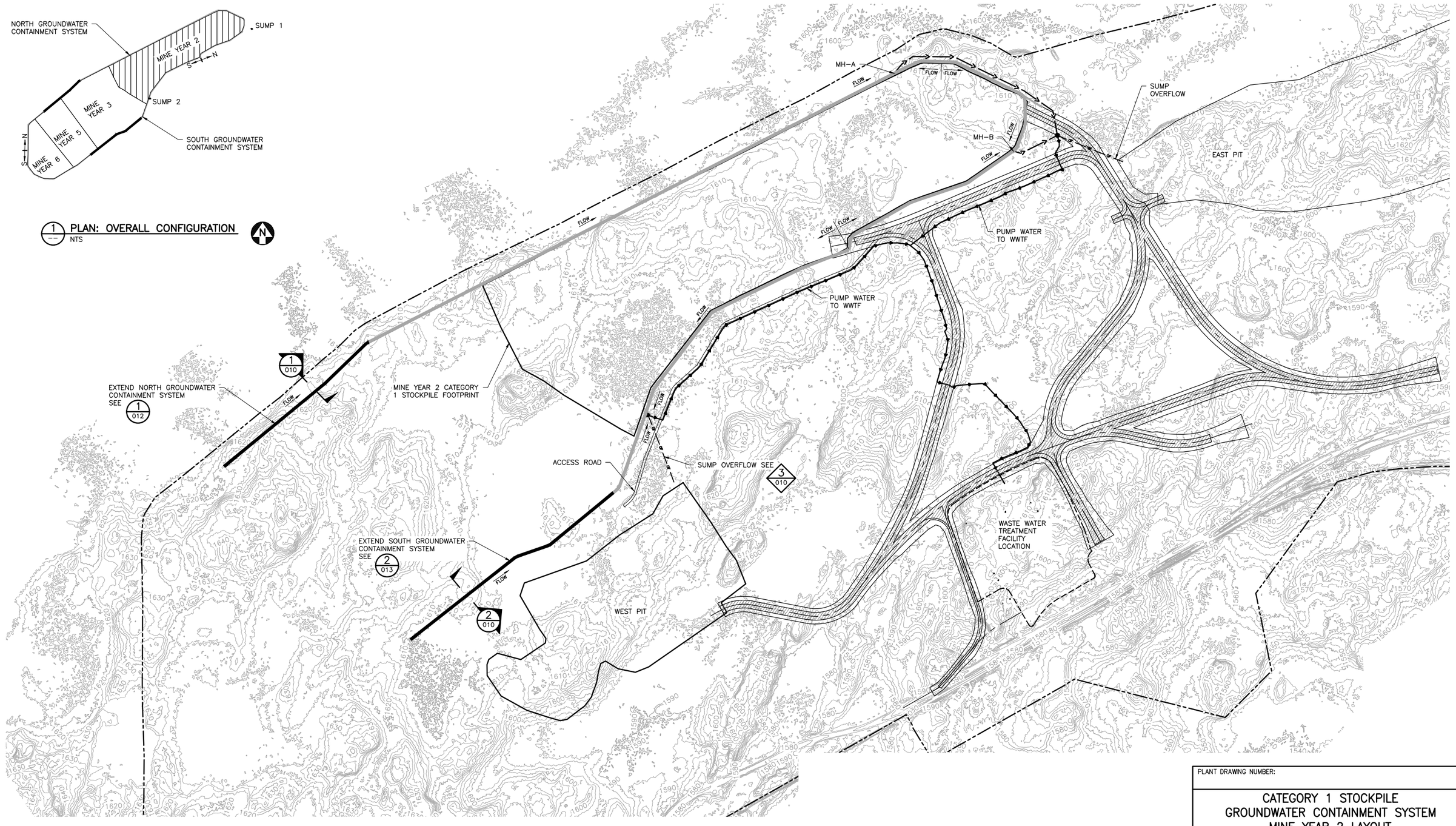
CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 0 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. GCS-003
REV

1 / -- PLAN: OVERALL CONFIGURATION
NTS



2 / -- PLAN: GCS – MINE YEAR 2 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

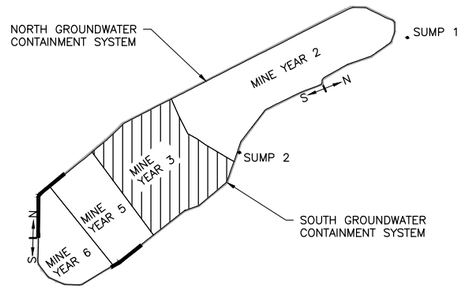
PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE
GROUNDWATER CONTAINMENT SYSTEM
MINE YEAR 2 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. GCS–004
REV



1 / -- PLAN: OVERALL CONFIGURATION
NTS

N

MH–A
MH–B
FLOW
SUMP OVERFLOW
EAST PIT
PUMP WATER TO WWTF
MINE YEAR 3 CATEGORY 1 STOCKPILE FOOTPRINT
ACCESS ROAD
SUMP OVERFLOW
WASTE WATER TREATMENT FACILITY LOCATION
WEST PIT
1 / 010
EXTEND NORTH GROUNDWATER CONTAINMENT SYSTEM SEE 1 / 012
2 / 010
EXTEND SOUTH GROUNDWATER CONTAINMENT SYSTEM SEE 2 / 013

2 / -- PLAN: GCS – MINE YEAR 3 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69–0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 3 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. GCS–005
REV

1 PLAN: OVERALL CONFIGURATION
NTS

2 PLAN: GCS – MINE YEAR 5 LAYOUT
0 500 1000
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN – VERSIONS 5, 6, 7 – ATTACHMENT C
2	5/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	2	5/28/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/28/15 LICENSE# 20951

DRAWN: CAD
CHECKED: CMK2
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 5 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. GCS-006
REV

Errata Sheet

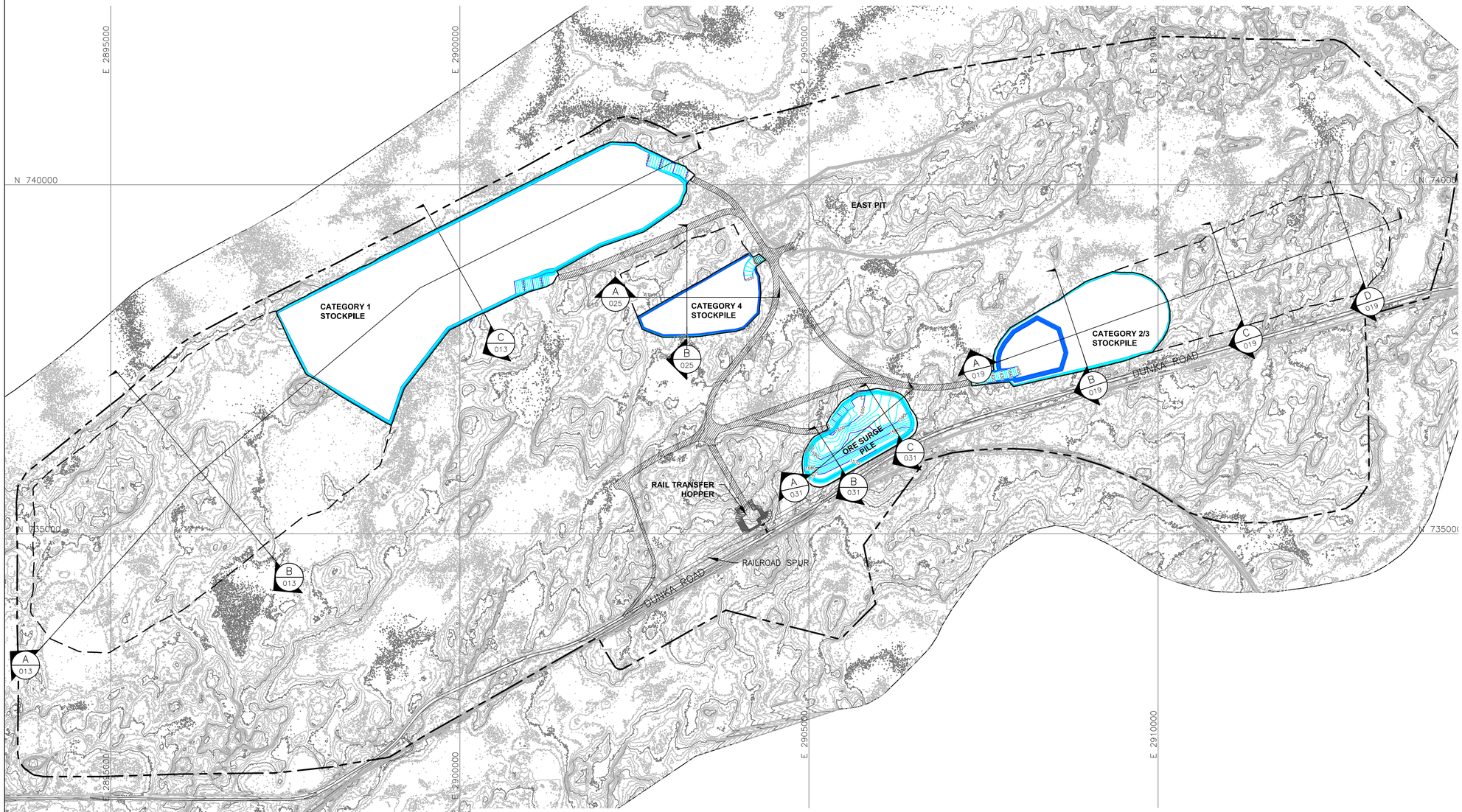
Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Categories 1, 2/3, and 4 Stockpiles and Ore Surge Pile Design

September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology “mine drainage” as noted in these drawings will be changed to “mine water”.



□□□□□D

EXISTING GROUND TOPOGRAPHY (1590, 1580)

PROPOSED STOCKPILE LAYOUTS (1590, 1600)

HAUL ROADS

MINE SITE BOUNDARY

MINE YEAR 1 PIT BOUNDARY (SEE NOTE 1)

MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)

MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)

CROSS SECTION IDENTIFIER (A / 019)

SHEET WHERE SECTION IS LOCATED

□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 1 LIMITS

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-003 REV

□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED GRADING TOPOGRAPHY (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 2 (SEE NOTE 1)
- MINE YEAR 1 AND 2 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 019)
- SHEET WHERE SECTION IS LOCATED

□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
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C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	F	5-22-15
FOR CONSTRUCTION		

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I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

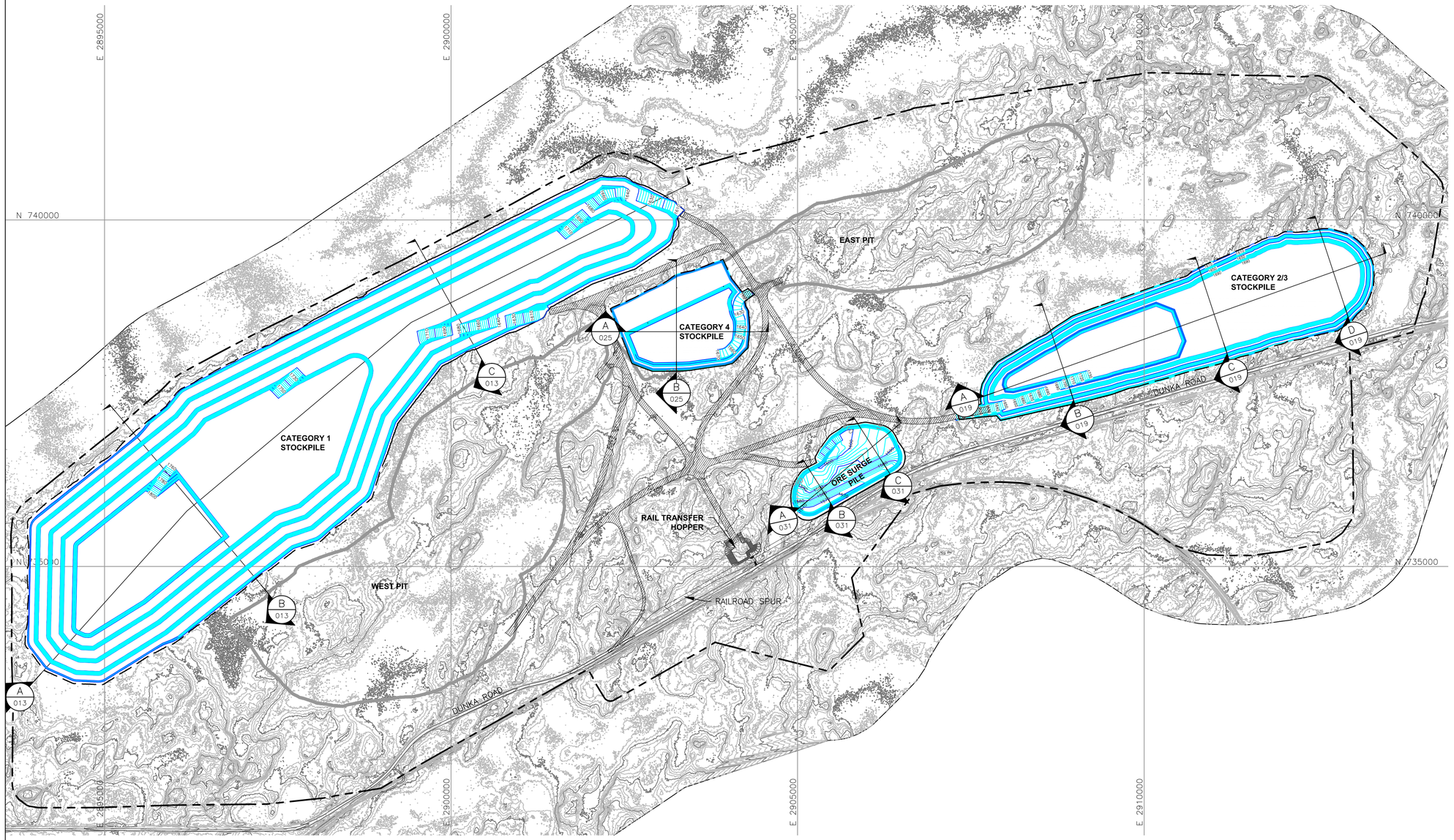
STOCKPILE LAYOUTS – MINE YEAR 2 LIMITS

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-004
REV



□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED LAYOUTS (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 11 (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 025)
- SHEET WHERE SECTION IS LOCATED

□□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 11 LIMITS

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
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FOR CONSTRUCTION		

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SIGNATURE B Bronson
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
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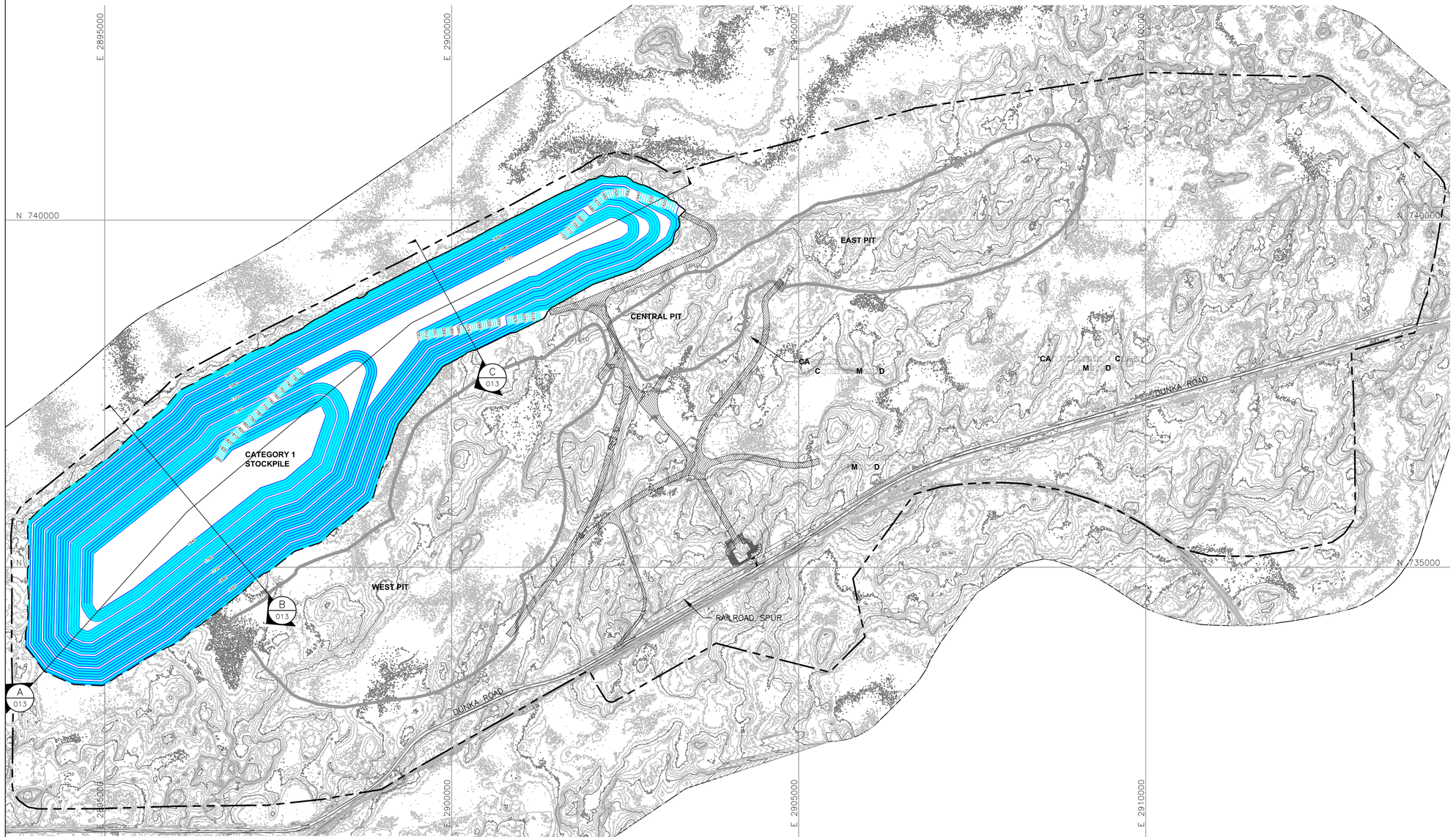
DWG. NO. SKP-005
REV



□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED LAYOUT CONTOURS (1590 / 1600)
- HAUL ROADS
- MINE SITE BOUNDARY
- ULTIMATE PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER (A / 013)
- SHEET WHERE SECTION IS LOCATED

□□□□

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2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

0 800 1600
SCALE IN FEET

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DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS MINE YEAR 21 LIMITS CLOSURE CONFIGURATION

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
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DWG. NO. SKP-006 REV

INCHES 1 2

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Mechanical Infrastructure

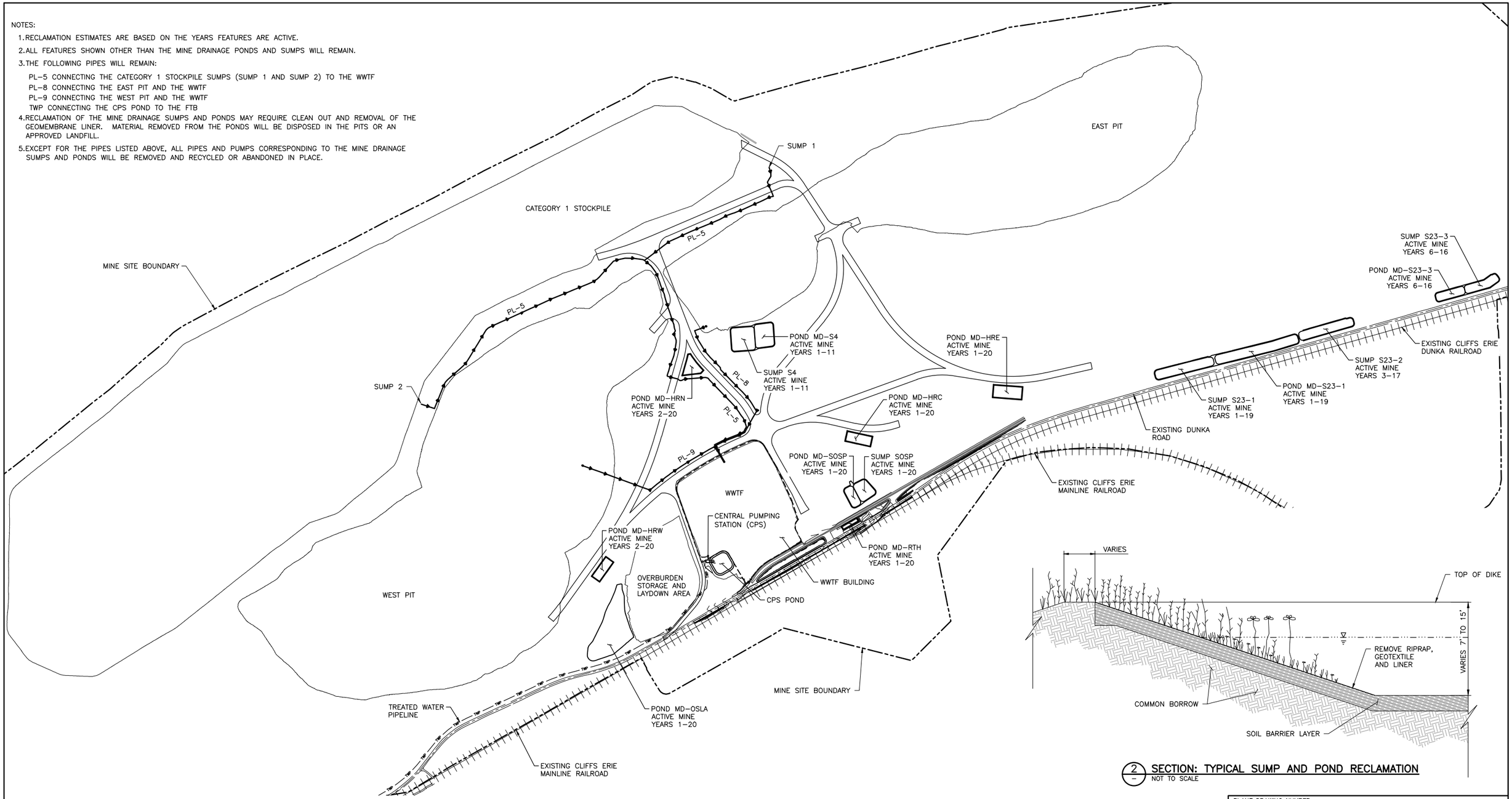
September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
MD-003	The grading for the access road from the Fueling and Maintenance Facility to Pond MD-SOSP & Sump SOSP will be revised to optimize drainage.

NOTES:

1. RECLAMATION ESTIMATES ARE BASED ON THE YEARS FEATURES ARE ACTIVE.
2. ALL FEATURES SHOWN OTHER THAN THE MINE DRAINAGE PONDS AND SUMPS WILL REMAIN.
3. THE FOLLOWING PIPES WILL REMAIN:
   - PL–5 CONNECTING THE CATEGORY 1 STOCKPILE SUMPS (SUMP 1 AND SUMP 2) TO THE WWTF
   - PL–8 CONNECTING THE EAST PIT AND THE WWTF
   - PL–9 CONNECTING THE WEST PIT AND THE WWTF
   - TWP CONNECTING THE CPS POND TO THE FTB
4. RECLAMATION OF THE MINE DRAINAGE SUMPS AND PONDS MAY REQUIRE CLEAN OUT AND REMOVAL OF THE GEOMEMBRANE LINER. MATERIAL REMOVED FROM THE PONDS WILL BE DISPOSED IN THE PITS OR AN APPROVED LANDFILL.
5. EXCEPT FOR THE PIPES LISTED ABOVE, ALL PIPES AND PUMPS CORRESPONDING TO THE MINE DRAINAGE SUMPS AND PONDS WILL BE REMOVED AND RECYCLED OR ABANDONED IN PLACE.



1 PLAN: GENERAL LAYOUT RECLAMATION

0 600 1200

SCALE IN FEET

2 SECTION: TYPICAL SUMP AND POND RECLAMATION

NOT TO SCALE

VER NO.	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: VJS

CHECKED: CMK2

BARR PROJECT NO.: 23/69–0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE RECLAMATION PLAN

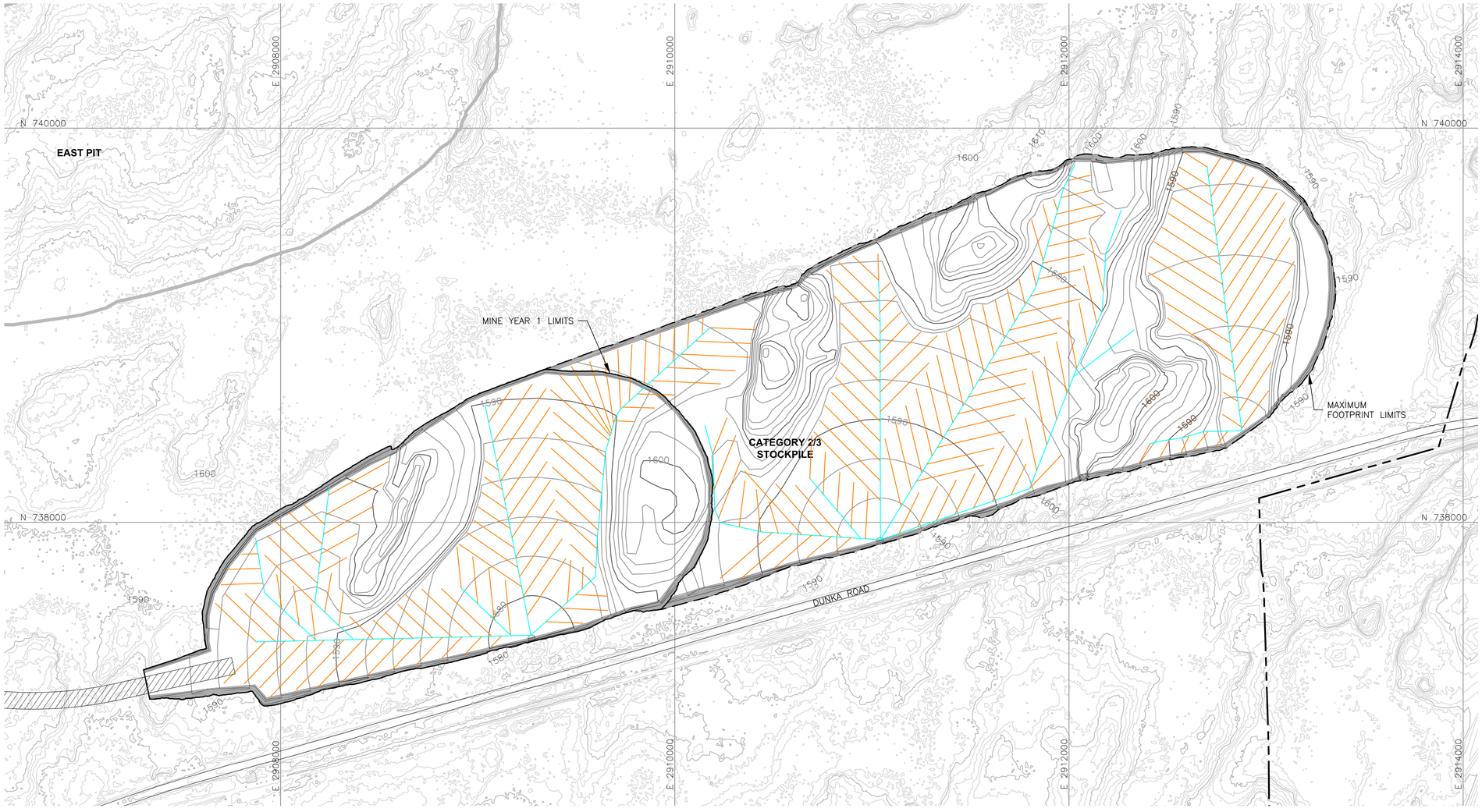
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1–800–632–2277

DWG. NO. MD–016

REV

INCHES 1 2



0 300 600
SCALE IN FEET

□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590, 1580)
- PROPOSED GRADING TOPOGRAPHY (1590, 1600)
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6–INCH

□□□□

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2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER AND LOCATION OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
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PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 2/3 STOCKPILE UNDERDRAIN PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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LAKEWOOD, CO USA 80233
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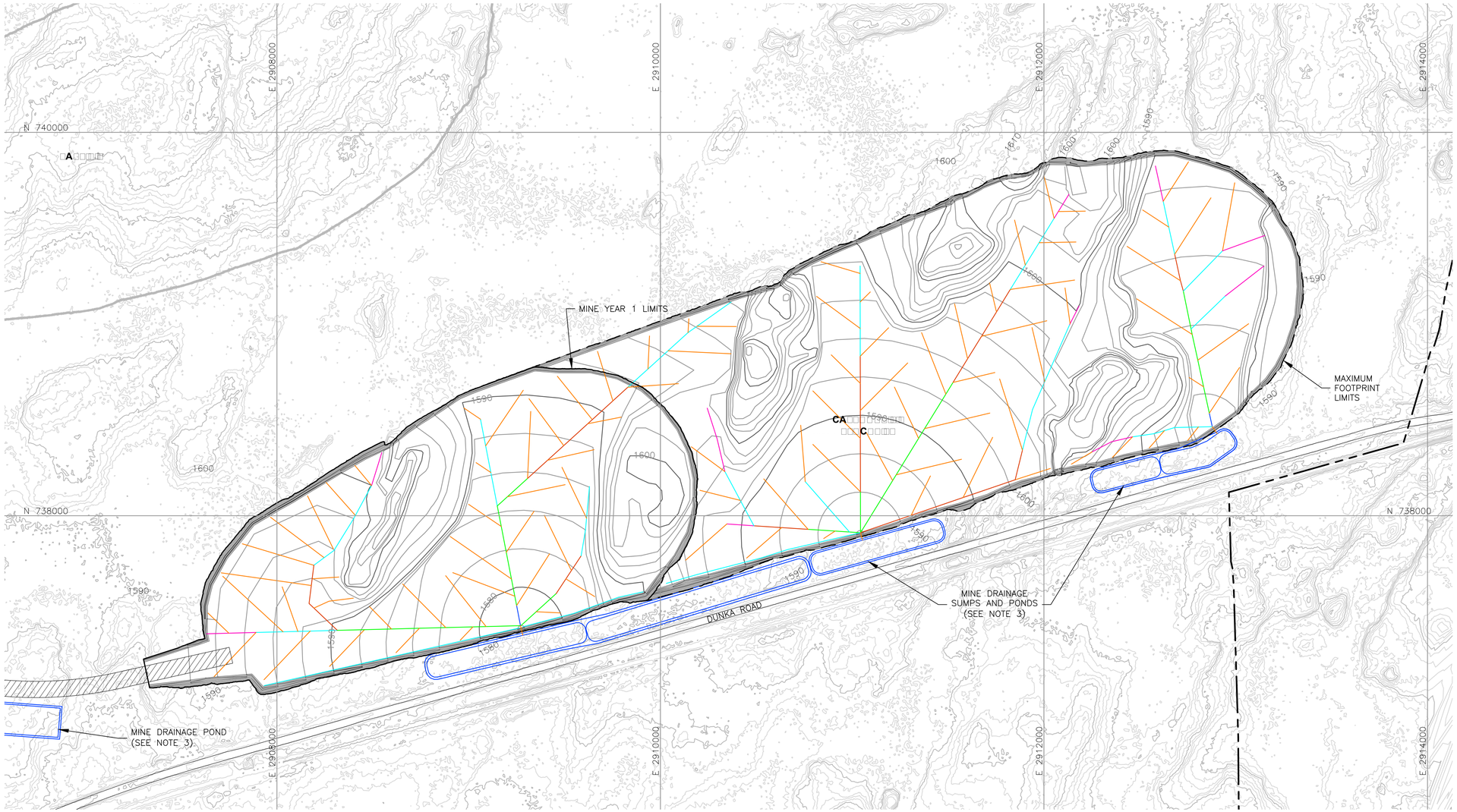
DWG. NO. SKP–016
REV

INCHES 1 2



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SCALE IN FEET

□□□□□D

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

TERTIARY COLLECTION PIPING
- 4–INCH

PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

□□□□□

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2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

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ISSUED	VERSION	DATE
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PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

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CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 2/3 STOCKPILE OVERLINER DRAINAGE PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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DWG. NO. SKP–017
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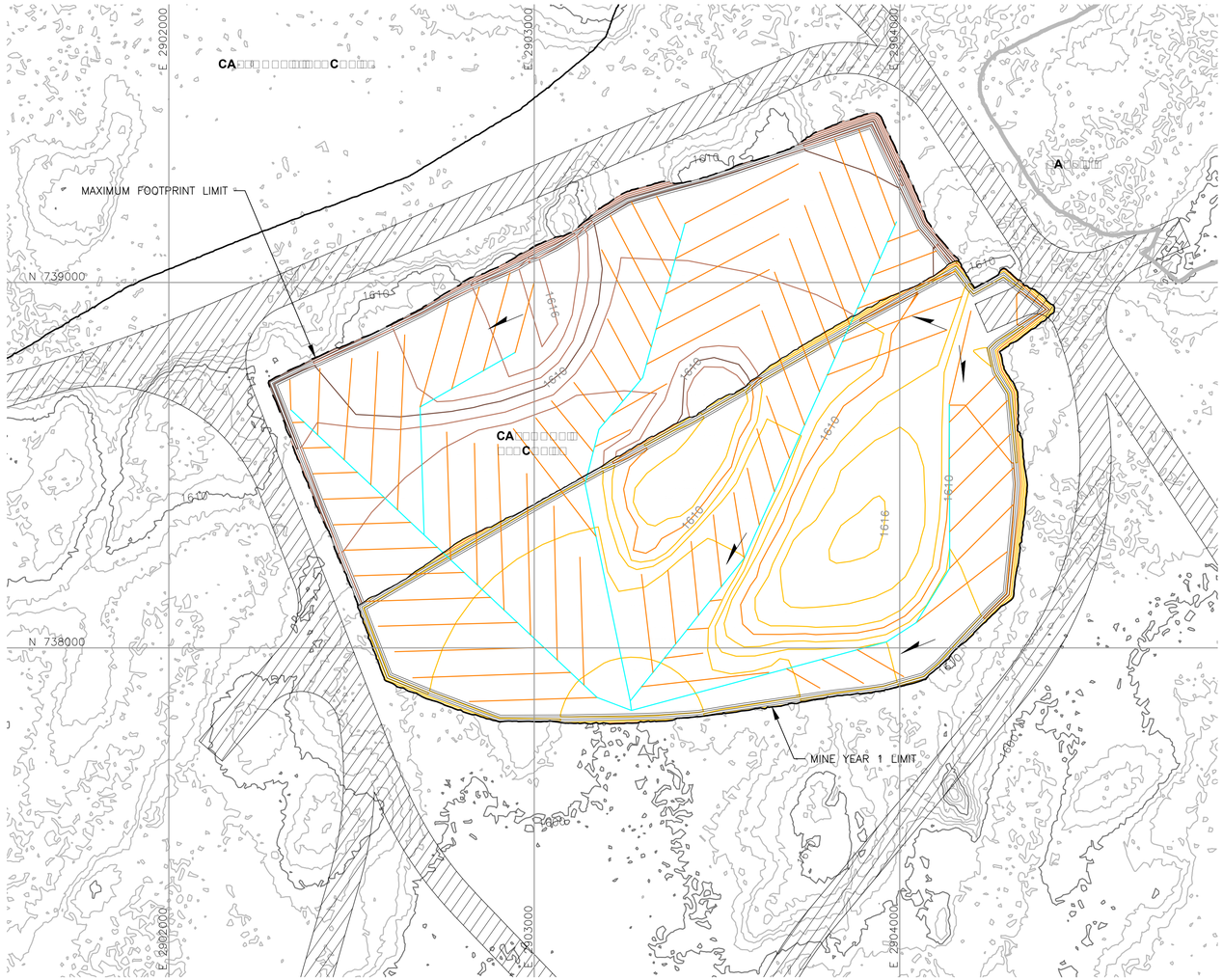

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SCALE IN FEET

□□□□□D

- EXISTING GROUND TOPOGRAPHY
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
6–INCH

□□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER AND LOCATION OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

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PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 4 STOCKPILE
UNDERDRAIN PIPING PLAN
MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
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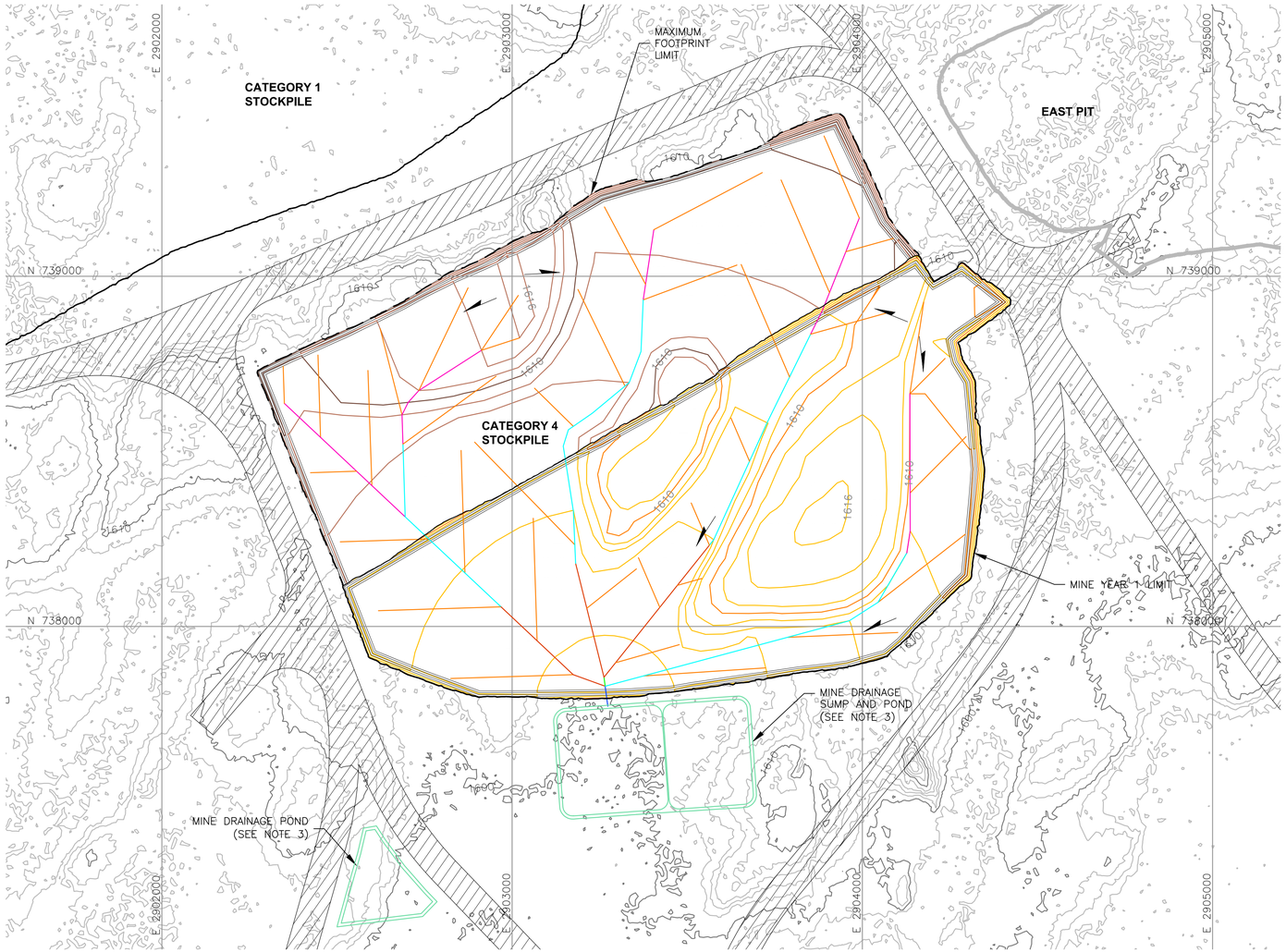

□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY (1590 / 1600)
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY (1590 / 1600)
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

MINE YEAR 1 – TERTIARY COLLECTION PIPING
- 4–INCH

MINE YEAR 1 – PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

□□□□

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2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
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0 200 400
SCALE IN FEET

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FOR CONSTRUCTION		
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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED:
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 4 STOCKPILE OVERLINER DRAINAGE PIPING PLAN MINE YEAR 1 AND MAXIMUM

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
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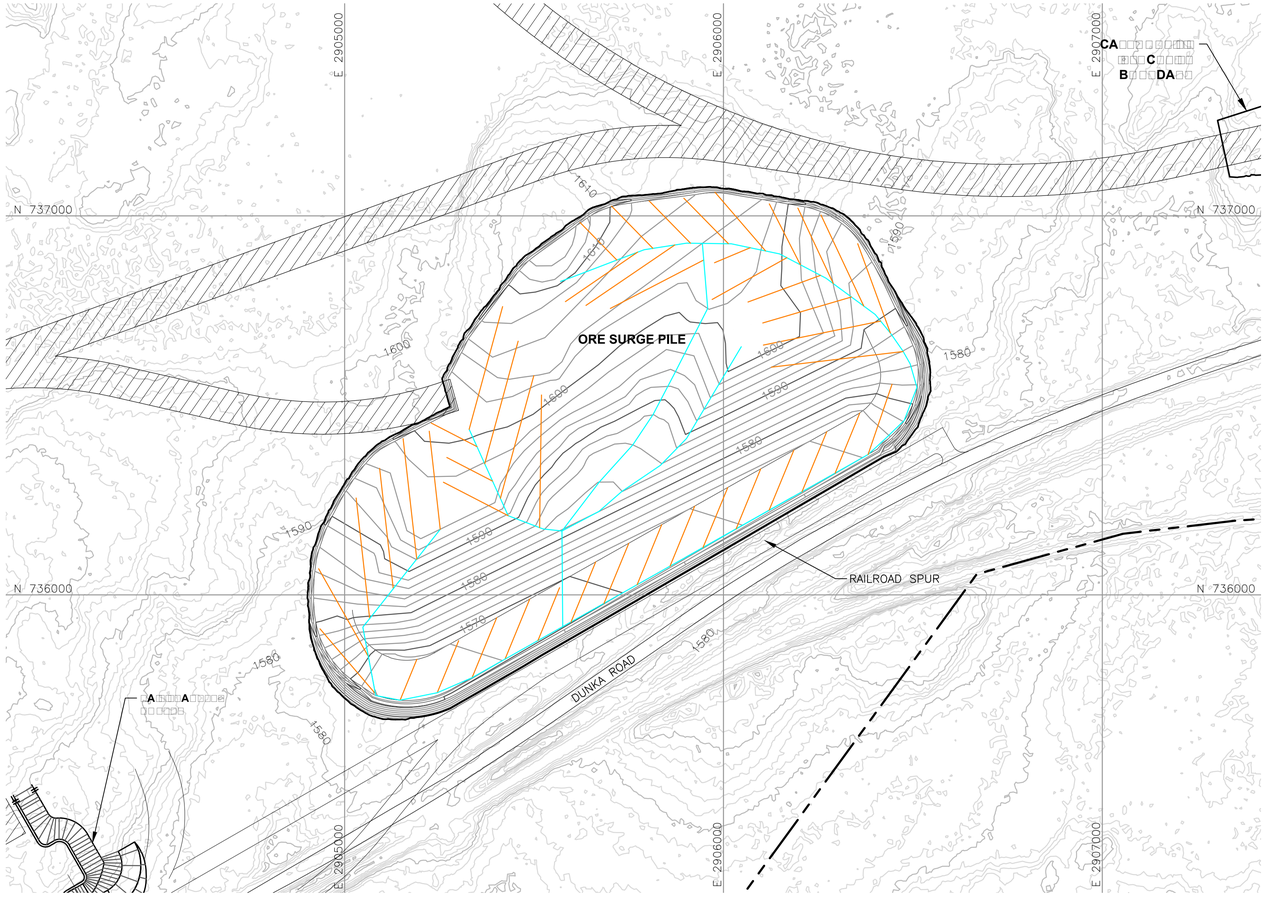
DWG. NO. SKP–023
REV



□□□□□D

- EXISTING GROUND TOPOGRAPHY (1590 / 1580)
- PROPOSED GRADING TOPOGRAPHY (1590 / 1600)
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4–INCH

SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6–INCH

□□□□

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS.
2. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

□□□□□□□C□□

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUED	VERSION	DATE
FOR PERMITTING	F	5–22–15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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SIGNATURE
PRINTED NAME BRENT R. BRONSON
DATE 5/22/15 LICENSE # 46492

DRAWN: MTM
CHECKED: GG
GOLDER PROJECT NO.: 113–2209
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

ORE SURGE PILE UNDERDRAIN PIPING PLAN

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
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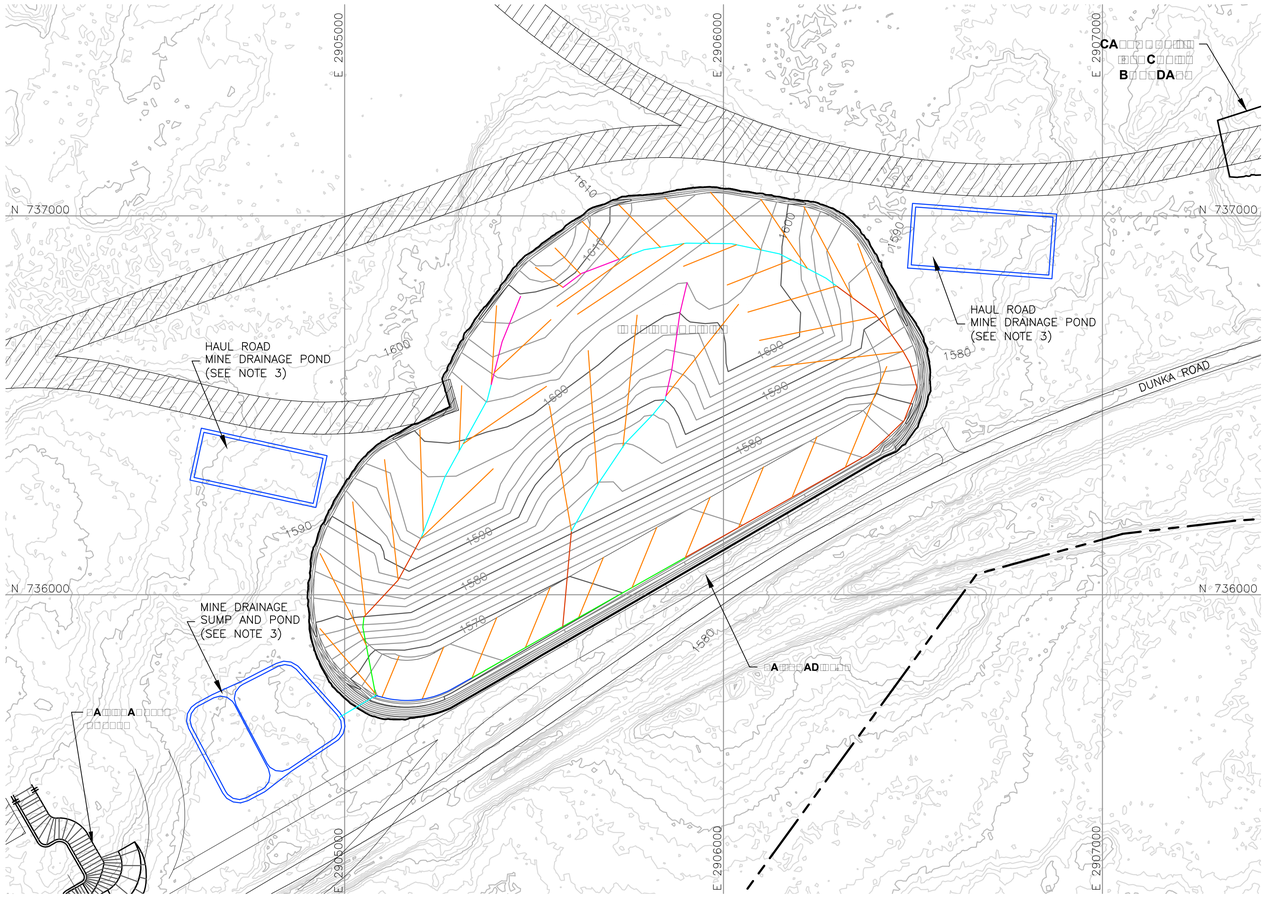
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP–028
REV



0 200 400
SCALE IN FEET

D

- EXISTING GROUND TOPOGRAPHY (1590, 1580)
- PROPOSED GRADING TOPOGRAPHY (1590, 1600)
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE DRAINAGE SUMP/POND (SEE NOTE 3)

MINE YEAR 1 – TERTIARY COLLECTION PIPING
- 4–INCH

MINE YEAR 1 – PRIMARY AND SECONDARY COLLECTION PIPING
- 4–INCH
- 6–INCH
- 8–INCH
- 10–INCH
- 12–INCH

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

C

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

VER NO	DATE	DESCRIPTION
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP
D	1/14/14	ISSUED FOR AGENCY REVIEW
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUED	VERSION	DATE
FOR PERMITTING	F	5–22–15
FOR CONSTRUCTION		

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SIGNATURE

PRINTED NAME BRENT R. BRONSON

DATE 5/22/15 LICENSE # 46492

DRAWN: MTM

CHECKED:

GOLDER PROJECT NO.: 113–2209

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

ORE SURGE PILE OVERLINER DRAINAGE PIPING PLAN

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

Golder Associates
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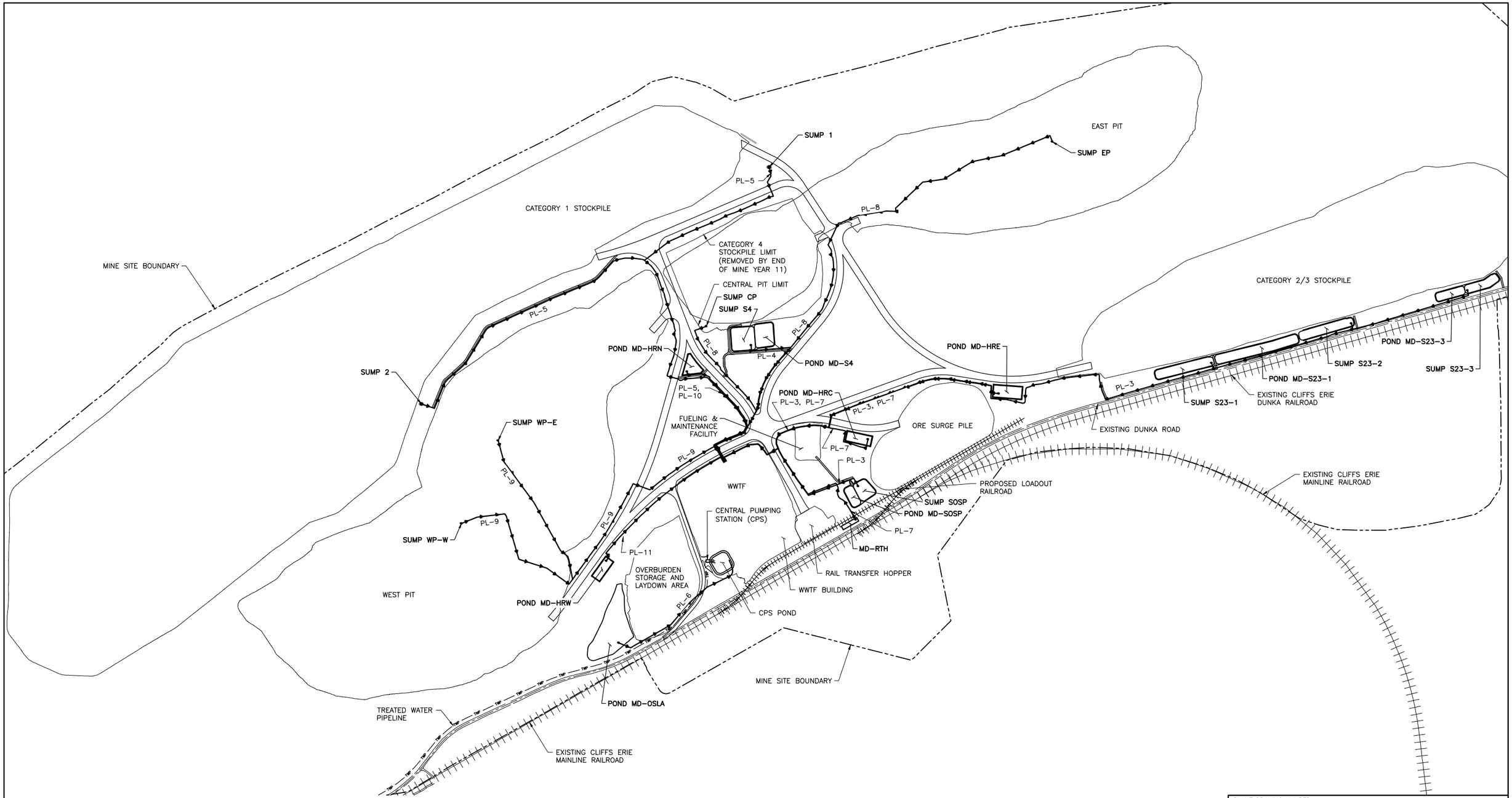
DWG. NO. SKP–029

REV

INCHES 1 2



1 PLAN: GENERAL LAYOUT MINE YEAR 11

0 600 1200

SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/18/15
FOR CONSTRUCTION		
NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: KRM

CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE
MINE YEAR 11 GENERAL LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
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BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
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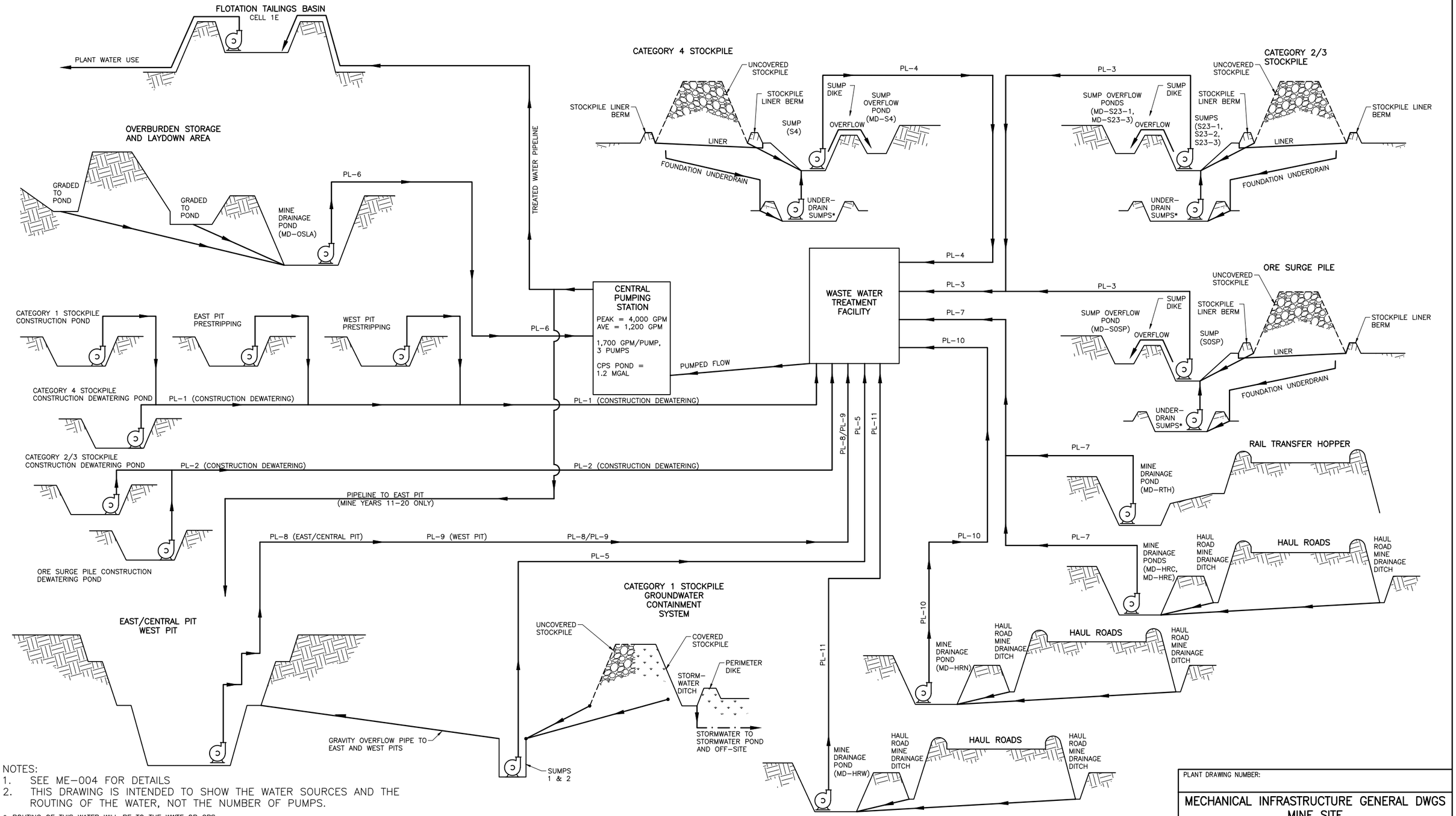
DWG. NO. MD-002

REV

INCHES 1 2



NOTES:
1. SEE ME-004 FOR DETAILS
2. THIS DRAWING IS INTENDED TO SHOW THE WATER SOURCES AND THE ROUTING OF THE WATER, NOT THE NUMBER OF PUMPS.

* ROUTING OF THIS WATER WILL BE TO THE WWTF OR CPS DEPENDING ON WATER QUALITY TESTING RESULTS.

LEGEND

- STORMWATER FLOW
- SITE MINE DRAINAGE FLOW
- COVERED STOCKPILE/GRASS
- UNCOVERED STOCKPILE
- UNCOVERED EARTHWORK
- PUMP

VER NO	DATE	DESCRIPTION
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/18/15
FOR CONSTRUCTION		

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE

DATE 5/18/15 LICENSE# 48864

DRAWN: VJS

CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MECHANICAL INFRASTRUCTURE GENERAL DWGS
MINE SITE
MINE DRAINAGE FLOW DIAGRAM

POLY MET MINING, INC.
NORTHMET PROJECT
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DWG. NO. ME-003

REV

INCHES 1 2

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Mine Site Stormwater

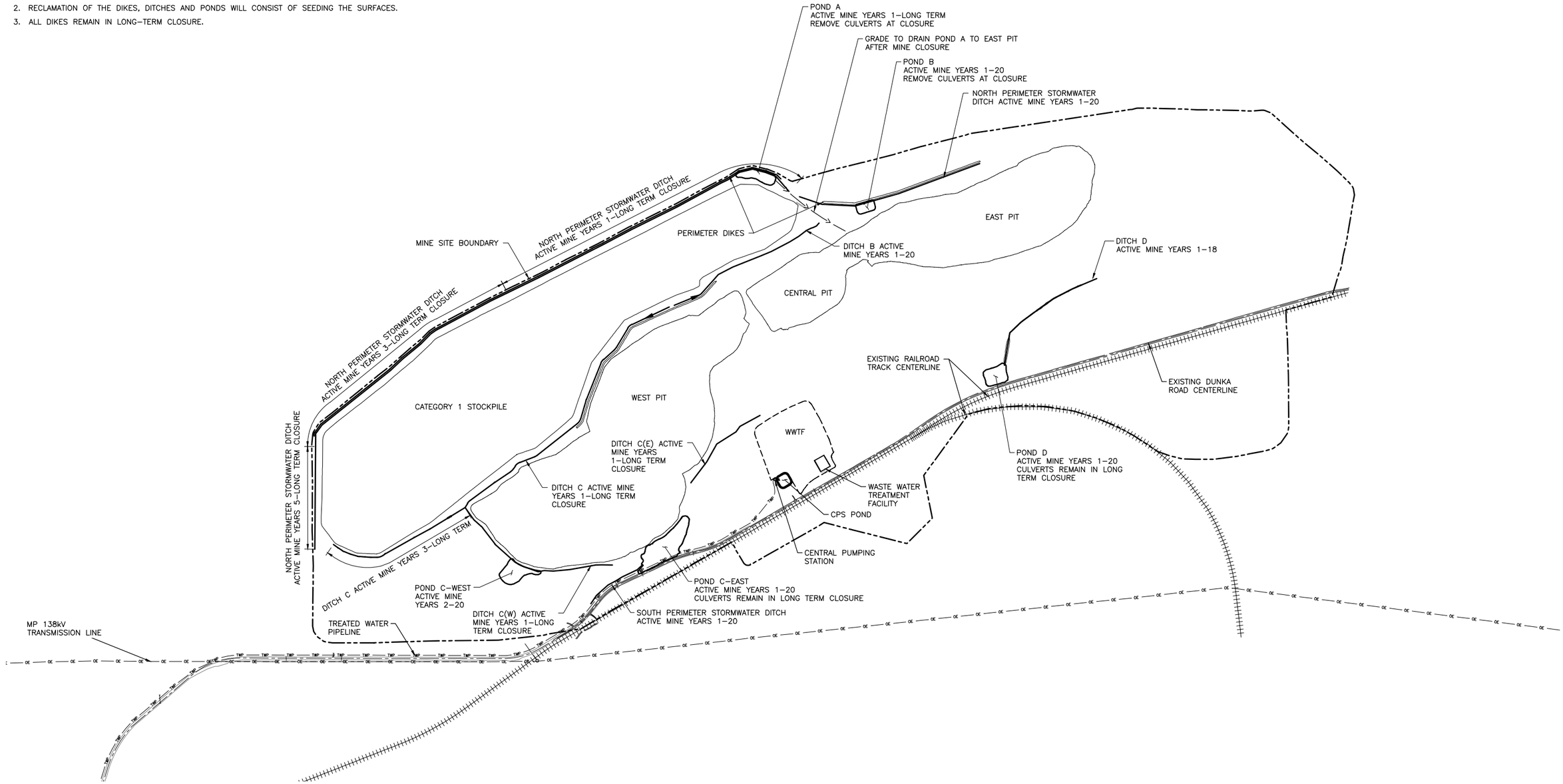
September 2016

Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
SW-031	Temporary sedimentation basins or stormwater infiltration basins may be added to meet construction stormwater requirements. There is currently an infiltration basin shown on the Waste Water Treatment Facility drawings between the Ore Surge Pile and the Rail Transfer Hopper that is not shown on this Mine Site Stormwater drawing set. These construction stormwater features require additional site-specific data and will be evaluated in final design.

NOTES:

1. ALL FEATURES SHOWN WILL REMAIN IN LONG-TERM CLOSURE UNLESS OTHERWISE NOTED.
2. RECLAMATION OF THE DIKES, DITCHES AND PONDS WILL CONSIST OF SEEDING THE SURFACES.
3. ALL DIKES REMAIN IN LONG-TERM CLOSURE.



1 PLAN: STORMWATER DIKES, DITCHES, AND PONDS RECLAMATION PLAN

0 1000 2000
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	5/26/15	ISSUED FOR INCLUSION IN PERMIT APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	1	5/26/15
FOR CONSTRUCTION		

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PRINTED NAME PAUL T. SWENSON
SIGNATURE
DATE 5/26/15 LICENSE# 20533

DRAWN: KKB/ATS
CHECKED: ATS
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE SITE STORMWATER
DIKES, DITCHES, AND PONDS
RECLAMATION PLAN

POLYMET MINING

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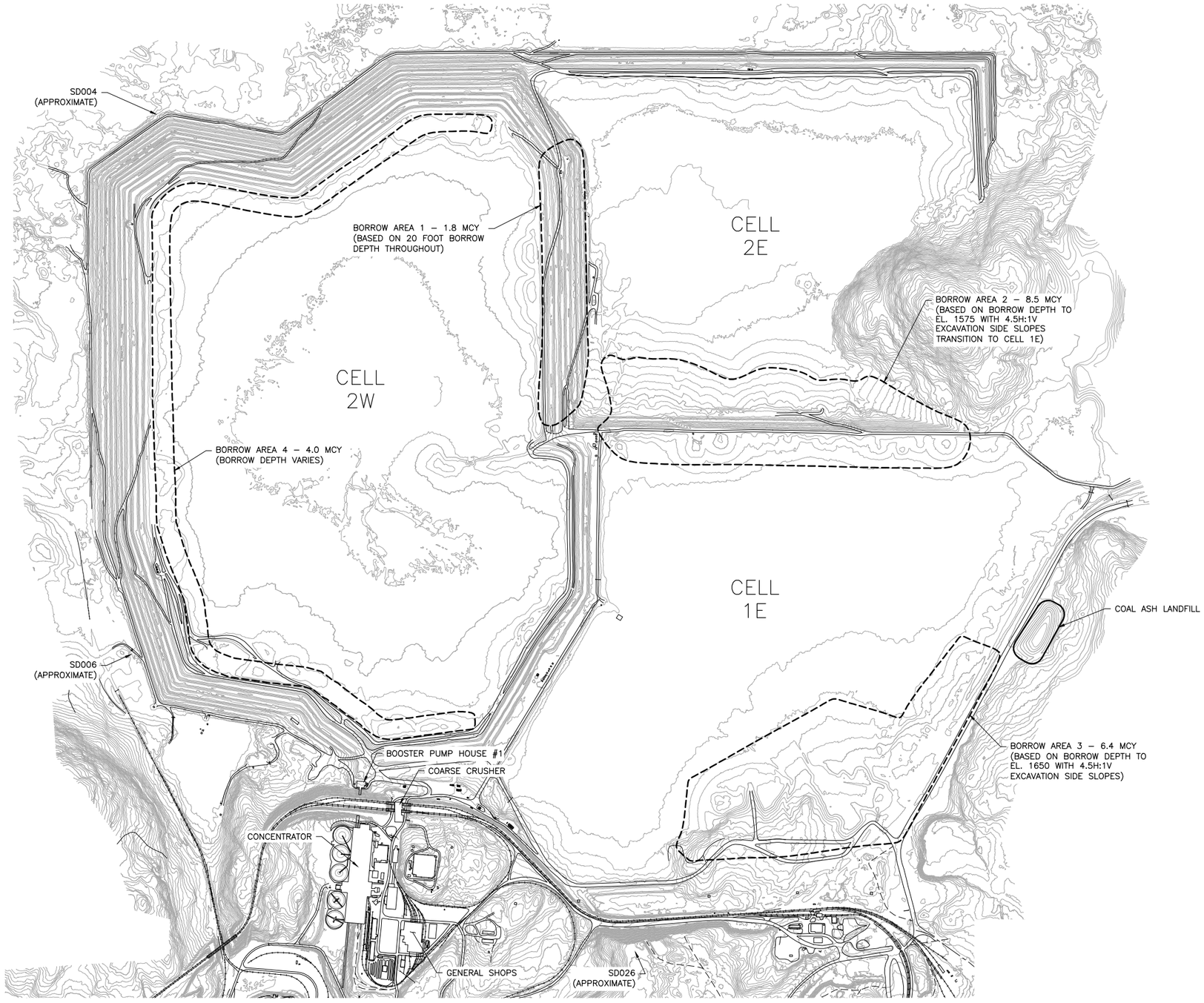
DWG. NO. SW-031 REV

INCHES 1 2



NOTES:

1. CONTOURS DO NOT REFLECT BORROW REMOVAL.
2. BORROW LTVSMC COARSE TAILINGS IN THE NUMERICAL SEQUENCE SHOWN.
3. COAL ASH LANDFILL TO BE RELOCATED TO HYDROMET RESIDUE FACILITY OR ALTERNATE PERMITTED FACILITY PRIOR TO TAILINGS DEPOSITION IN CELL 1E.

1 PLAN: EXISTING CONDITIONS

0 800 1600
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	10/14/11	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	12/07/12	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
3	04/12/13	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 3 – ATTACHMENT A
4	11/25/14	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 4 – ATTACHMENT A
5	03/03/15	FLOTATION TAILINGS MANAGEMENT PLAN – VERSION 5 – ATTACHMENT A
6	5/20/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	6	5/20/15
FOR CONSTRUCTION	–	–

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/20/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

FLOTATION TAILINGS BASIN EXISTING CONDITIONS

POLYMET MINING

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR

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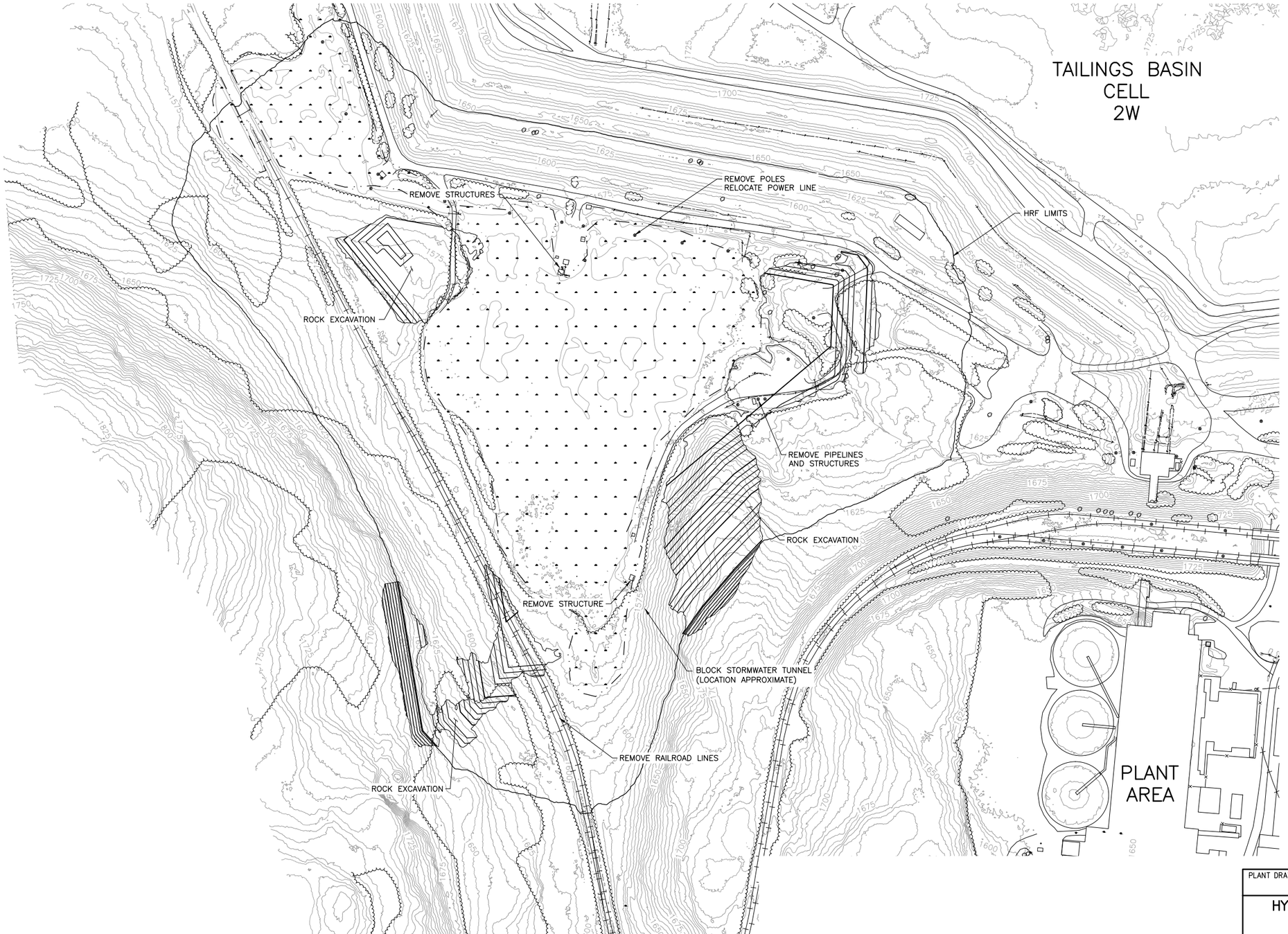
DWG. NO. FTB-003
REV

INCHES 1 2



NOTES:

1. APPROXIMATE SOIL AND ROCK REMOVAL VOLUME = 329,000 CY

2. DISPOSE OF DEMOLITION DEBRIS IN LTVSMC EXISTING INDUSTRIAL LANDFILL. APPROXIMATE DISTANCE TO LANDFILL IS 3 MILES.

1 PLAN: EMERGENCY BASIN REMOVALS

0 200 400
SCALE IN FEET

VER NO	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY EMERGENCY BASIN EXCAVATIONS AND REMOVALS

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Ph: 1-800-632-2277

DWG. NO. HRF-005 REV

INCHES 1 2

DRAINAGE COLLECTION SUMP AND LEAKAGE DETECTION SUMPS AND SIDEWALL RISERS (SEE DWG. HRF-013)

N.=733986.39
E.=2858333.05

N.=733704.15
E.=2858572.88

N.=733672.13
E.=2858581.53

N.=733742.23
E.=2858045.72

N.=733518.63
E.=2858622.98
EL.=1563.45

N.=733437.04
E.=2858526.97
EL.=1563.45

N.=733455.76
E.=2858326.90

DISCHARGE POINT (TYP.), SEE 1/018

DRAINAGE COLLECTION SYSTEM, SEE 5/016

EL 1600.0

N.=733355.01
E.=2860395.68

N.=733382.57
E.=2860412.65

PIPELINES. SEE SHEET HRF-017

N.=733333.94
E.=2860448.37

N.=733324.67
E.=2860417.96

N.=733444.20
E.=2859126.37
EL.=1567.10

N.=733139.95
E.=2858747.38
EL.=1567.10

N.=733273.57
E.=2860323.43
EL.=1576.32

N.=732930.02
E.=2860319.39
EL.=1578.92

N.=732869.74
E.=2858898.42
EL.=1570.14

N.=732827.51
E.=2860121.18
EL.=1578.41

1.0%

N.=733051.48
E.=2858615.15

N.=733068.84
E.=2858639.69

N.=732879.57
E.=2860399.28

N.=732861.09
E.=2860428.53

N.=732643.37
E.=2859868.80
EL.=1578.18

N.=732576.97
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N.=732729.32
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N.=732551.03
E.=2858878.61

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N.=732203.75
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N.=732222.12
E.=2859595.13

EL 1600.0

N.=731958.42
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N.=731821.65
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EL.=1579.39

N.=731973.64
E.=2859422.43

N.=731760.51
E.=2859318.46

N.=731732.03
E.=2859337.94

N.=731703.57
E.=2858996.90

N.=731832.34
E.=2859269.30
EL.=1580.48

TAILINGS BASIN CELL 2W

PLANT AREA

NOTES:

1. UPPER LINER SURFACE SHOWN.
2. DRAINAGE COLLECTION GEOCOMPOSITE SHOWN (SHADED AREA).
3. PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.

1 PLAN: LIFT 1 LAYOUT

0 200 400
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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PRINTED NAME THOMAS J. RADUE
SIGNATURE
DATE 5/19/15 LICENSE# 20951

DRAWN: CAD
CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY
LIFT 1 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
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Ph: 1-800-632-2277

DWG. NO. HRF-008
REV

INCHES 1 2

TAILINGS BASIN CELL 2W

PROPOSED PIEZOMETER AND INCLINOMETER LOCATION

N.=733963.95
E.=2858569.76

N.=733931.93
E.=2858578.40

EL 1650.0

DISCHARGE POINT (TYP.), SEE 1/018

N.=733617.05
E.=2860557.08

N.=733589.48
E.=2860540.10

RELOCATE PIPES FROM LOWER DAM

PIPELINES SEE DWG. HRF-017

N.=733444.76
E.=2857958.77

N.=733441.33
E.=2858001.06

N.=733412.78
E.=2860707.10

N.=733403.52
E.=2860676.69

N.=732921.15
E.=2858430.92

N.=732903.79
E.=2858406.38

SEE DWG. HR-008 FOR CELL BOTTOM GRADES

N.=732708.69
E.=2860647.54

N.=732687.65
E.=2860676.68

N.=732674.78
E.=2860557.98

PROPOSED POND OVERFLOW PIPE

N.=732700.97
E.=2858531.15

N.=732713.59
E.=2858558.61

N.=732647.38
E.=2860570.34

BOOSTER PUMP HOUSE

N.=732481.00
E.=2858601.57

N.=732488.37
E.=2858630.71

N.=732538.03
E.=2860299.14

N.=732512.55
E.=2860315.13

N.=732384.25
E.=2860090.30

N.=732361.57
E.=2860110.09

N.=732207.37
E.=2859918.67

N.=732187.14
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N.=732047.46
E.=2859821.05

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N.=731828.89
E.=2859669.14

N.=731844.11
E.=2859643.19

N.=731588.10
E.=2858787.68

N.=731574.42
E.=2858759.53

EL 1650.0

N.=731565.86
E.=2859540.83

N.=731577.30
E.=2859513.03

N.=731469.22
E.=2858896.60

N.=731438.10
E.=2858884.43

N.=731490.74
E.=2859515.33

PROPOSED PIEZOMETER AND INCLINOMETER LOCATION

N.=731519.01
E.=2859493.24

PLANT AREA

NOTES:

1. LIFT 3 CONSTRUCTION YEAR TO BE BASED ON HRF CAPACITY CONSUMPTION RATE.
2. UPPER LINER SURFACE SHOWN.
3. PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.

1 PLAN: LIFT 3 LAYOUT

0 200 400
SCALE IN FEET

VER NO.	DATE	DESCRIPTION
1	10/14/11	RESIDUE MANAGEMENT PLAN – VERSION 1 – ATTACHMENT A
2	06/29/12	RESIDUE MANAGEMENT PLAN – VERSION 1 – RESPONSE TO COMMENTS
3	12/14/12	RESIDUE MANAGEMENT PLAN – VERSION 2 – ATTACHMENT A
4	5/19/15	ISSUED FOR PERMIT TO MINE APPLICATION

ISSUE STATUS		
ISSUED	VERSION	DATE
FOR PERMITTING	4	5/19/15
FOR CONSTRUCTION		

NOT APPROVED FOR CONSTRUCTION.

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BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILTY
LIFT 3 LAYOUT

POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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DWG. NO. HRF-010 REV

Technical Memorandum

To: Jennifer Saran
From: Jeff Ubl, Todd DeJournett, Bryan Oakley, and Don Richard
Subject: NorthMet Project – O&M for water treatment during reclamation and long-term closure after Mine Year 1 – 10 mg/L WWTP Sulfate Target
Date: October 5, 2016
Project: 23690862.04
c: Jim Scott, Tina Pint

1.0 Overview

This memo outlines the process used to develop an estimate of the operating costs for water treatment associated with the NorthMet Project that can be used to support the calculation of projected reclamation costs for closure at the end of Mine Year 1. In the event of closure at the end of Mine Year 1, the waste water treatment system – consisting of the Waste Water Treatment Plant (WWTP) and the Waste Water Treatment Facility (WWTF) would continue to operate to ensure that any water discharged from the Project to the environment meets applicable standards. For the purpose of this cost estimate, the controlling parameter for establishing equipment needs and operating costs is the proposed target of 10 mg/L for sulfate in water discharged from the Project.

Table 1 below provides a high-level summary of operating, equipment modification, and equipment replacement costs for the WWTP and WWTF in the event that mining operations cease after Mine Year 1. The detailed estimated operating costs for Mine Years[11] 2, 4, 7, and 15 for the WWTF and the WWTP are provided in Appendix A. Appendix B provides the basis for water treatment equipment replacement costs and the value of equipment in service. Documentation to support the unit quantities and unit costs used in the cost estimate are included in Appendix C and Appendix D. The following paragraphs document the water management and water treatment strategies upon which the operating costs are based.

[1] The term "Mine Years" are the years after blasting commences to access ore. For example the start of Mine Year 1 is when blasting commences to access ore.

Table 1 Water Treatment Costs for NorthMet Closure at the End of Mine Year 1

Mine Year of Closure Period	Activity	Plant Site WWTP						
		OPEX ($/1000 gal.)	P50 Annual Average Flow (gpm)	OPEX ($)		Equipment Replacement (S)		Equipment Modification for Long-Term CAPEX ($)
				Annual	Total for Period	Annual*	Total for Period	
2-3	WWTP treats FTB seepage capture system water and discharges (concentrate trucked to WWTF)	$3.23	2,000	$3,400,461	$6,800,922	$2,386,168	$4,772,336	$0
3	WWTP filtration equipment expanded, chemical precipitation added to treat concentrate, and effluent stabilization expanded							$26,916,396
4- 5	WWTP treats FTB seepage capture system water and discharges	$3.68	2,973	$5,743,009	$11,486,018	$2,386,168	$4,772,336	$0
6-9	WWTP treats FTB seepage capture system water and discharges	$4.22	2,941	$6,518,496	$26,073,984	$2,386,168	$9,544,672	$0
10-51	WWTP treats FTB seepage capture system water and discharges	$3.97	2,534	$5,289,493	$222,158,706	$2,386,168	$100,219,055	$0
				subtotals	$266,519,630	NA	$119,308,399	$26,916,396

Mine Year of Closure Period	Activity	Mine Site WWTF						
		OPEX ($/1000 gal.)	P50 Annual Average Flow (gpm)	OPEX ($)		Equipment Replacement ($)		Equipment Modification for Long-Term CAPEX ($)
				Annual	Total for Period	Annual*	Total for Period	
2-3	WWTF operates to flood East Pit while East Pit backfilled	$10.75	398	$2,250,929	$4,501,858	$0	$0	$0
4- 5	WWTF operates to flush East Pit	$2.90	886	$1,351,560	$2,703,120	$0	$0	$0
6-9	WWTF decommissioned	$0.00	0	$0	$0	$0	$0	$0
10-51	WWTF decommissioned; CPS and TWP used to convey mine site water to WWTP	$0.00	0	$0	$0	$5,855	$245,913	$0
				subtotals	$7,204,978	NA	$245,913	$0

High-Level Costs used in Standard Reclamation Cost Estimator						
Mine Year of Closure Period	Activity	Financial Assurance Usage	Average Flow (gpm)	OPEX ($)	50-Year Equipment Replacement Cost ($)	Equipment Modification for Long-Term CAPEX ($)
2-51	WWTP treats FTB seepage capture system water	Mine Year 1	2,563	$266,519,630	$119,308,399	$26,916,396
2-5	WWTF - East Pit Flooding and Flushing	Mine Year 1	642	$7,204,978	$0	$0
6-51	WWTF – Mine Site Long-Term	Mine Year 1	0	$0	$245,913	$0
			Totals	$273,724,608	$119,554,311	$26,916,396

1. Staffing not included - SRK to include with overall staff
2. Process Monitoring not included - SRK to include with overall water quality monitoring

* Annual equipment replacement costs based on long-term closure capital equipment in service, as estimated for Mine Year 15

2.0 Water Management Strategy for closure after Mine Year 1

The overall water management strategy for the Project is modeled using GoldSim. Two linked models are used to describe the water quality and quantity at all locations throughout the Project. These models were developed for the Final Environmental Impact Statement (FEIS). To develop the cost estimates for water treatment after Mine Year 1 closure, the FEIS models described below were used with modifications to represent changes to operations during two periods: Reclamation (Mine Years 2-9) and Long-Term Closure (starting in Mine Year 10).

2.1 Mine Site

The Mine Site conditions that effect water management in the event that mining operations cease after Mine Year 1 include:

- The West Pit has not been developed—only the East Pit will exist at the end of Mine Year 1.
- The Category 1 Waste Rock Stockpile Groundwater Containment System will be approximately 50 percent complete and will need to be completed in the first year after the end of operations (complete by end of Mine Year 2).
- The Category 1 Waste Rock Stockpile geomembrane cover will be completed in the first 3 years of closure (complete by end of Mine Year 4).
- The Ore Surge Pile (OSP) and the Category 4 rock will be backfilled into the East Pit using the same tons per year rate as Mine Year 20 closure. Backfilling will be completed by end of Mine Year 2.
- Category 2/3 rock will be backfilled into the East Pit using the same tons per year rate as Mine Year 20 closure. Backfilling will be completed by end of Mine Year 3.

The following conditions were used to model Mine Year 1 Reclamation and Long-Term Closure in the GoldSim model.

- Mine Site features are consistent with the proposed plan of operations at the end of Mine Year 1.
- Flows to the WWTF will include the Category 1 Waste Rock Stockpile Containment System and the East Pit.
- WWTF capacity at the end of Mine Year 1 is 1,440 gpm through the filtration train and 615 gpm through the chemical precipitation train.
- P50 values from the GoldSim model for water quality will be used as inputs to the water treatment model for the WWTF.
- The WWTF will be used in Reclamation (Mine Years 2-9).
- Exclude cost for WWTF influent charge balance.
- Offsite disposal of sludge.
- The WWTF will not be used in Long-Term Closure (starting in Mine Year 10). Mine Site water will be pumped to WWTP for treatment when the East Pit begins to overflow (Mine Year 10).

2.2 Plant Site

If mining operations cease after Mine Year 1, the following actions would occur at the Plant Site:

- The Beneficiation Plant will stop running at the end of Mine Year 1.
- The Hydrometallurgical Facility does not exist and will not be constructed.
- No water will be conveyed from the Mine Site to the FTB Pond after Mine Year 1.
- Two separate ponds would exist at the Flotation Tailings Basin (FTB).
    - Only Cell 2E would be developed (north dam, north buttress, north beach).
        - The Flotation Tailings north beach will be completed at the end of Mine Year 1 and would be amended with bentonite immediately at the end of operations (at the end of Mine Year 1).
        - The pond bottom in Cell 2E would be amended with bentonite beginning at the end of operations. The amendment would be completed 1 year after the end of operations (in sync with the upsizing of the WWTP described below).
    - No improvements would be completed at Cell 1E (other dams, beaches, and the south buttress).
        - The pond bottom in Cell 1E would not be amended with bentonite and would continue to seep at a relatively high rate.
    - The drainage swale to the east of the FTB exists because it is constructed at the beginning of mining operations.
- The Colby Lake Pumphouse will be demolished after the amendment process has been completed in Cell 2E (at the beginning of Mine Year 3).

Based on the above plan of operations, the GoldSim water model for the Plant Site was amended to model closure at the end of Mine Year 1 as follows:

- Input tables were adjusted to account for the early end of operations, such as the seepage directions through the Flotation Tailings Basin (FTB) and depths to water table as noted above.
- The WWTP will be upsized to 3,000 gpm. This will be completed during the first year of Reclamation (Mine Year 2) and will be available for treatment at the beginning of Mine Year 3.
- During Reclamation and Long-Term Closure, the pond in Cell 2E would be maintained at a target level and the pond level in Cell 1E would be allowed to fluctuate on its own within safe limits. If

the upper safe limit is reached, excess water will flow to the Cell 2E pond. If the lower safe limit is reached, needed water will be provided from the Cell 2E pond.

- P50 output values will be used as inputs to the WWTP treatment model for development of operating costs.
- The WWTP will continue operating during both Reclamation and Long-Term Closure.
- Chemical precipitation will be added to the WWTP when its capacity is increased so that transportation of concentrate between the WWTP and the WWTF can be eliminated at the beginning of Mine Year 4.
- Mine Site water will be pumped to WWTP for treatment during Long-Term Closure (after Mine Year 10). Treatment of Mine water at the WWTP will begin when flooding of the east pit has been completed and the Pit begins to overflow (Mine Year 10).
- Exclude cost for WWTP influent charge balance.
- Offsite disposal of sludge.

3.0 Water Treatment Strategy for Closure after Mine Year 1

Waste water treatment is an integrated strategy that includes both the Mine Site and the Plant Site during the operating phase of the NorthMet Project. If mining operations cease after Mine Year 1, this integrated process will be maintained for the first 2 years while additional chemical precipitation equipment is added to the WWTP. Beginning in Mine Year 4, the two systems will operate independently through the rest of Reclamation. Then, during Long-Term Closure (after Mine Year 10), treatment will be consolidated at the WWTP only. Both plants will use the same treatment processes, which will include:

- Media filtration
- Primary and secondary membrane separation
- Chemical precipitation
- Water conditioning (WWTP only, to prevent toxicity prior to discharge)

When operating as an integrated system (through Mine Year 3), chemical precipitation will only be present at the WWTF and water conditioning will only be present at the WWTP. Concentrate from the WWTP will be transported to the WWTF via truck.

Treated water from the WWTF will be reused within the NorthMet Project. The WWTP will discharge to the environment.

3.1 Influent Flow and Loads

Because the GoldSim models provide a probabilistic output for the water management system, the basis for design of the water treatment systems begins with the selection of the appropriate range of outputs. Two separate values have been used for:

- The design of the equipment for use in and the development of capital costs
- Estimation of operation and maintenance costs

The operating capacity of all of the water treatment process units for the Operations phase of the NorthMet Project were designed using at least the 90th percentile (P90) projected flows or greater when needed to meet the operating constraints of the Project. The equipment designed for mining operations will continue to be used if mining operations cease after Mine Year 1, and will be supplemented with additional equipment at the WWTP as noted in Section 2.2.

For the estimation of power consumption, chemical usage, sludge generation, and related operating expenses for the projected reclamation cost estimate scenario described above, the P50 of the annual average flow and influent chemical concentrations were used.

3.2 Treatment Modeling Approach

The cost to operate the waste water treatment system has been modeled at multiple points throughout the Reclamation and Long-Term closure phases using an equilibrium-chemistry based treatment model.

Modeling at multiple dates was needed to characterize the different operating scenarios described above as well as the variable flows to the treatment systems and the variable load of dissolved constituents. A modeling approach was also needed because the costs for treatment are not linear in proportion to the flow. The load varies independent of flow, which results in costs for chemical usage, sludge management, and disposal that are also independent of the flow rate. Power costs are also independent of the influent flow rate because a primary power user within the treatment systems is the operation and cleaning of the secondary membrane separation unit, which is dependent on both the flow rates and the influent load.

4.0 Reclamation Water Treatment Process Descriptions and Timelines

Reclamation will begin if mining operations cease after Mine Year 1. The water treatment system used during the first 2 years of Reclamation for the NorthMet Project will be the same as the system used during mining operations. Figure 1 shows the combined process flow diagram for the WWTF and the WWTP during the first two years of Reclamation.

During the first 2 years of Reclamation (Mine Years 2 and 3), the WWTF and the WWTP will operate as an integrated system with media filtration and primary and secondary membrane units at both locations and

a single chemical precipitation unit at the WWTF. During this time, concentrate generated at the WWTP will be trucked to the WWTF.

Also during the first 2 years of Reclamation, additional membrane and chemical precipitation capacity will be added to the WWTP. Then, starting in Mine Year 4 and continuing through the end of Reclamation, the water treatment system would be operated as two independent systems, as shown on Figure 2. Concentrate trucking will also stop when the two systems are separated beginning in Mine Year 4.

The only discharge to the environment during Reclamation will be from the WWTP after the water has been conditioned. Water treated at the WWTF will be returned to the East Pit. Additional details on the operation of the water treatment system during Reclamation are provided below.

4.1 Mine Site WWTF Use during Reclamation

The WWTF will be used during Reclamation (Mine Years 2 through 5) to treat the load of dissolved constituents flushed into the water when the East Pit is flooded at the Mine Site and to treat drainage from the Category 1 Waste Rock Stockpile. The designed capacity of the WWTF for the Operations phase was based on treating at least the P90 flow from the Mine Site. During Reclamation at the end of Mine Year 1, the system will have excess capacity to treat the P50 annual average flows from the GoldSim model, which was used as a basis for developing the projected reclamation cost estimate. The time required to flush the load of dissolved constituents from the East Pit was also developed using the GoldSim model.

This time was set at approximately 4 years based on removing the P50 load. Thus, for the last 4 years of Reclamation (from Mine Year 6 through Mine Year 9) the WWTF will be idle.

The projected flow to the WWTF during Reclamation will be significantly lower than the required design capacity of the WWTF for the first year of mining operations. Thus, no additional capital costs are needed to upgrade or modify the WWTF for the Reclamation phase, and some equipment can be taken out of service to reduce maintenance costs.

From Mine Year 3 through Mine Year 5, a single, combined influent flow primarily sourced from the East Pit will report to the WWTF. This flow will have higher concentrations than those expected in the East EQ basin during mining operations, but lower than the concentrations expected for the West EQ basin. In Reclamation, all of the WWTF influent flow will initially report to the membrane separation units. Unlike the mining operations phase, no Mine Site flows will report directly to the chemical precipitation units during Reclamation. Because the concentrations entering the membrane separation units will be higher during Reclamation than during mining, the recovery through the primary separation units is expected to decrease, which results in a greater percentage of the flow into the secondary membrane separation units.

During Reclamation, the primary membrane permeate will be directed to the East Pit. Secondary membrane permeate will also be directed to the East Pit. Chemical precipitation effluent is expected to have concentrations greater than the influent from the East Pit, so rather than return this water to the East Pit it will be directed to the secondary membrane units, in a closed loop.

4.2 Plant Site WWTP Use during Reclamation

At the Plant Site, Reclamation will include treating the water seeping from the toe of the Flotation Tailings Basin (FTB) until the flows and concentrations stabilize. In addition, water from the FTB pond will be treated until it can be discharged as storm water during Long-Term Closure. To treat these flows, the capacity of the WWTP will need to be increased from 2,000 gpm to 3,000 gpm in the first 2 years of Reclamation. In addition, chemical precipitation equipment will be added to the WWTP so that trucking of the concentrate to the WWTF can be eliminated. The WWTP will be operated at its design capacity of 2,000 gpm for the first 2 years of Reclamation and then operated at the increased design capacity of approximately 3,000 gpm for the remainder of the Reclamation phase.

The projected loads into the WWTP, for the development of operational costs, were based on the P50 GoldSim-modeled concentrations into the WWTP. During the end of the Reclamation phase, the influent flow and concentrations are expected to trend downward toward the values used for Long-Term Closure (see Section 5.0).

For the first 2 years of Reclamation, the WWTP operations will include primary membrane separation, secondary membrane separation, and effluent conditioning. The primary effluent will be conditioned and discharged to the environment, while the concentrate will be trucked to the WWTF. After the addition of chemical precipitation equipment in Mine Year 3, the WWTP will operate independently of the WWTF with secondary membrane concentrate conveyed to the chemical precipitation units and the chemical precipitation effluent directed to a dedicated set of secondary membranes in a closed loop.

5.0 Long-Term Closure Water Treatment Process Descriptions and Timelines

During Long-Term Closure, all water from the Mine Site will be conveyed to the WWTP for treatment prior to discharge to the environment. When the Eats Pit begins to overflow, the water will be directed to the Central Pumping Station and then to the WWTP via the Treated Water Pipeline. The other portions of the WWTF facility will be decommissioned and taken out of service, with some equipment and parts stored for future use/replacement within the WWTP.

Water treatment during Long-Term Closure at the Plant Site will consist of mechanical treatment, using primarily the same WWTP systems employed during the final years of Reclamation. The capacity of the WWTP from Reclamation will be sufficient to treat the modeled flows for Long-Term Closure.

The GoldSim P50 modeled flows and concentrations were used to model the WWTP in Long-Term Closure and to estimate the operating costs, including the flows conveyed to the WWTP from the East Pit Overflow at the Mine Site.

6.0 Operating Costs

Detailed estimates for the operating costs are provided in Appendix A. The costs for operation include the following items:

- Maintenance costs for routine replacement of membranes.
- Energy costs for the major water treatment operations, as well as an overall cost for heating, lighting, and other operations. Electrical costs for the unit operations are based on operating flow rates estimated from modeling and vendor data provided in response to a preliminary request for information from potential equipment vendors, which is similar to the currently planned equipment, although some modifications have been made to the operations and others are expected during the continuing design process. Energy costs are calculated on a separate worksheet for each modeled WWT system.
- Costs for chemicals consumed are estimated individually for each of the major unit operations and are also based on the results of water treatment modeling and vendor data included with preliminary equipment proposals. This information is included in Appendix D.
- The cost for disposal of solids generated during the treatment process is based on information from local licensed disposal facilities. This information is included in Appendix D.

The following items are excluded from the cost estimates:

- Periodic replacement of all capital equipment over an extended period of time. The estimated cost of the equipment in service is provided, so that a reasonable percentage of this cost could be applied on an annual basis to account for replacement of capital items.
- Labor costs for management and operation of the WWT system are not included with the treatment costs because they are included in other portions of the projected reclamation costs, per instructions from PolyMet.

6.1 Cost Uncertainties

Uncertainties are built into the cost estimating process due the nature of the information used to develop the WWTP and WWTF model. In particular, the influent information for the WWT modeling is derived from the GoldSim modeling of the water management strategy for the Project in the FEIS. The FEIS GoldSim modeling was developed to provide a probabilistic range of potential outcomes to evaluate the full spectrum of potential environmental effects. The use of this information as influent to the WWT system

first requires an initial conversion of the probabilistic output into a deterministic input for the WWT system. Then, the resulting deterministic input values need to be adjusted to allow chemical balance modeling in support of chemical usage and sludge generation calculations. The uncertainties attributed to these two steps in the cost estimating process are described in the following paragraphs.

6.1.1 Development of Deterministic Input values

As noted previously, the P50 water quality and quantity values were selected from the FEIS models for use as the influent to the WWTF and the WWTP. Selecting the median value provides an overall estimate of the likely flows and loads to the WWTF and the WWTP, but does not necessarily account for the variability in the operation of the systems over the course of hours, days, or weeks due to the inherent variability of the influent flows. The designs and operating strategy of the WWTF and the WWTP account for this variability, as they use the P90 water quality and quantity values.

6.1.2 Charge Balancing of Deterministic WWT Inputs

Selecting the median expected value for each water quality parameter from the FEIS model as the input to the waste water treatment model results in an initial water quality that does not contain equal amounts of cations and anions. Thus, the charge balance of the WWTP and WWTF influent water quality needs to be adjusted prior to use in the process model. To complete this charge balance, alkalinity was added when additional anions were needed and calcium was added when additional cations were needed. These constituents were chosen based on their limited effect on treatment processes. However, both alkalinity and calcium affect the chemical requirements and sludge production in the chemical precipitation train at the WWTF and the WWTP. To reduce some of the cost uncertainty associated with these operations, the mass of chemical used and sludge generated can be quantified and excluded from the costs for treatment and disposal.

To estimate the cost of charge balancing, for removal from the overall O&M costs, the effect was assumed to be proportionate to the fraction of modeled lime requirement that could be attributable to the alkalinity or calcium added for charge balancing that subsequently reported to chemical precipitation. The fraction of additional lime needed was then applied to the costs for lime, CO_2, VSEP membrane chemicals, VSEP module replacement, and sludge disposal. Using these factors, the calculated costs attributable to the charge balance process are shown in the cost estimate tables for the WWTF and WWTP (Appendix A) and include costs resulting from both WWTP and WWTF influent charge balancing. These costs were excluded from the summary of O&M costs shown on Table 1.

7.0 Equipment Replacement Costs

The cost estimates for equipment replacement for the WWTP and WWTF are provided in Appendix B.

The approach used was to use the detailed capital cost estimate developed by PolyMet in 2014 for the Mine Year 1 buildouts for the WWTP and WWTF at that time and update them for inflation to 2016 dollars. The 2016 estimate was then grouped into categories and a service life assigned to each category.

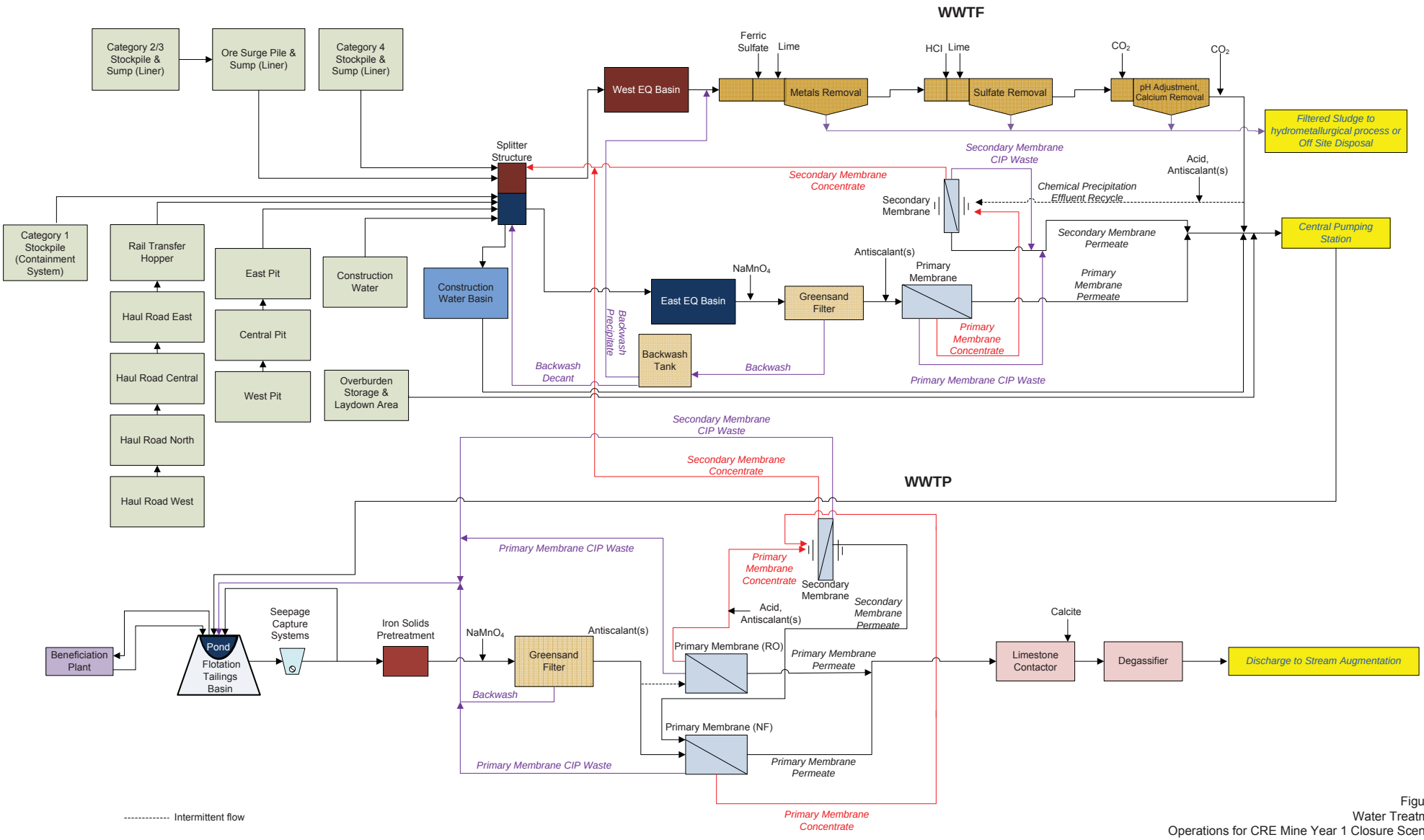
The capital cost for each category was divided by the service life to calculate the annual equipment replacement cost for each category. The total annualized equipment replacement cost was divided by the total capital cost to calculate the overall equipment replacement percentages for the WWTP and WWTF.

The overall equipment replacement percentages were then multiplied by the estimated cost of the equipment in service for Mine Year 15 to calculate annualized equipment replacement costs. See Appendix B for more details on development of equipment replacement costs.

8.0 Cost Assumptions

The cost estimates provided in this memorandum are made on the basis of Barr's experience and represent our best judgment as experienced and qualified professionals familiar with the NorthMet Project. The estimated costs are based on modeling information available to Barr and are subject to change as site-specific information is considered. In addition, since Barr has no control over the cost of labor, materials, equipment, or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, Barr cannot and does not guarantee that the actual costs will not vary from the referenced estimates, proposals, or bids used for the preparation of this estimate.

Figures



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7/21/2016

Figure 1
Water Treatment
Operations for CRE Mine Year 1 Closure Scenario
NorthMet Project
Poly Met Mining, Inc.
Hoyt Lakes, MN

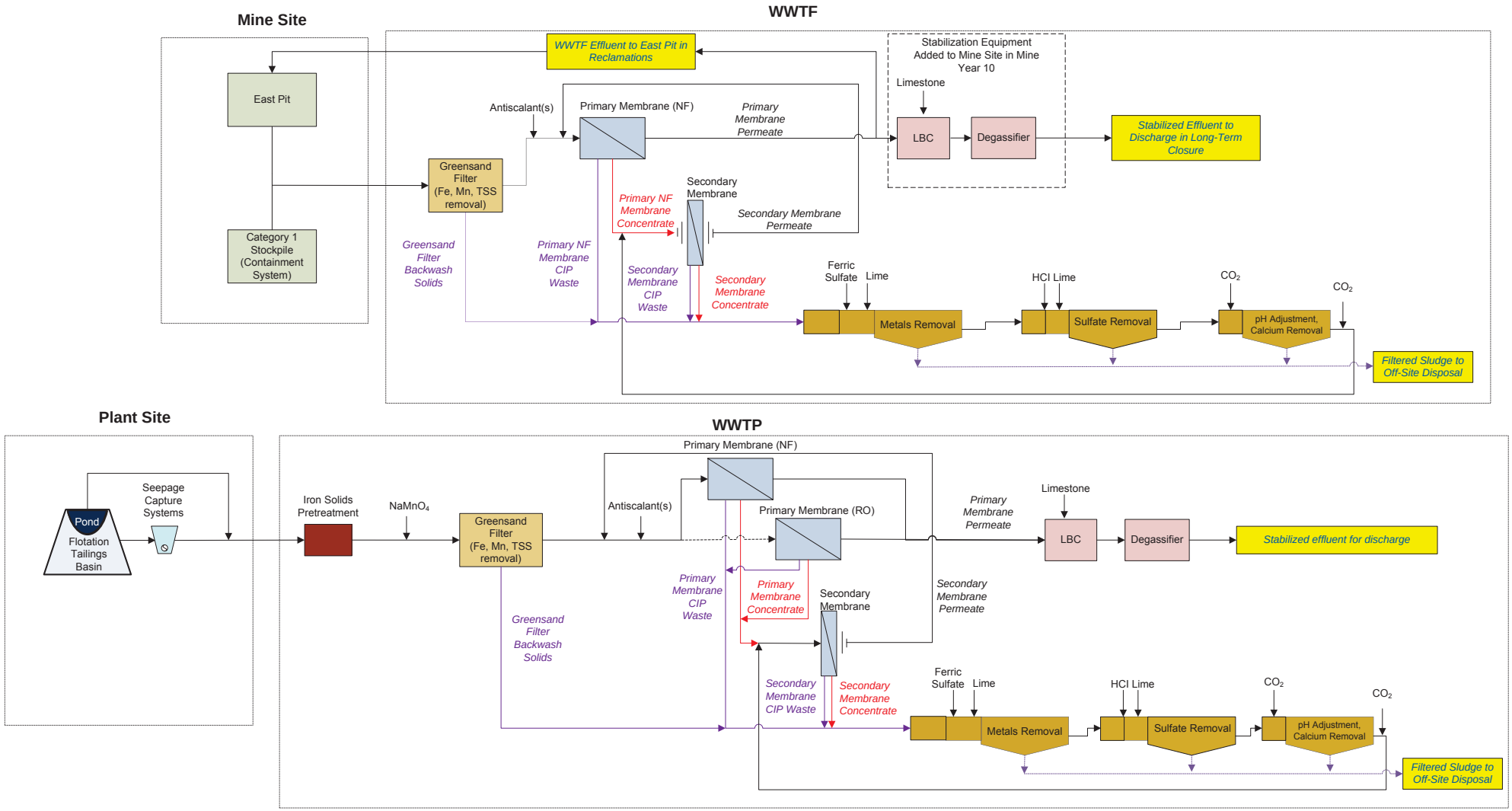

Figure 2
Water Treatment
Long-Term Closure for CRE Mine Year 1 Closure Scenario
NorthMet Project
Poly Met Mining, Inc.
Hoyt Lakes, MN

2/19/2016

Appendix A

Updated Operations Cost Estimates – CRE, Mine Year 1 Closure

Phase		P50 Average Annual Flow (gpm)	$/1000 gal
Plant Site Mine Year 2, MY1 Closure Scenario, 10 mg/L SO4		2,000	$3.23

Item	Description	Unit	Quantity	Unit Cost	Cost Extension	Comments/References for Quantity	Comments/References for Unit Cost
1	Operations Management	LS	0		$0		Manpower covered in Staffing - Closure tab
2	Operations Labor	FTE	0		$0		Manpower covered in Staffing - Closure tab
3	Miscellaneous Operations Costs	day	365	$100	$36,500		Allowance
4	Equipment Maintenance	LS	3.59%	--	$0		Cost of equipment in service less membranes - capital for replacement covered elsewhere in SRK estimate
5	Electrical Cost	KW-Hr	8,672,000	$0.078	$676,416	based on process model flows and assumed pump information	Power costs from Jim Scott's edits
6	Building Heating	KW-Hr	228,600	$0.078	$17,831	Heating and light for 26,500 sf building	
8	NF Membrane Replacement	LS	1	$260,100	$260,100	Based on 5/1/13 vendor cost estimate spreadsheet from GE - module replacement every 3 years	Based on 5/1/13 vendor cost estimate spreadsheet from GE, and 3/31/16 e-mail update - $550 per 4.4 gpm module every 3 years
9	VSEP Module Replacement	LS	1	$476,000	$476,000	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Based on 5/9/13 vendor cost estimate spreadsheet from NLR - $78,000 per 40 gpm module
	O&M Quantities						
10a	Limestone (Granular Calcite)	ton/year	442	$47	$20,758	based on process model to stabilize LSI	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10b	CO2 (VSEP)	ton/year	1,004	$129	$129,484	based on process model to adjust pH	From Jim Tieberg in 3/29/16 e-mail, cost from David Stanaway at Praxair
10c	Sodium Permanganate	lb/year	21,881	$14.50	$317,270	2.5 ppm in GSF feed, based on from Area 5 WWTF pilot	From Hawkins quote e-mail 4/1/16
10d	Sodium Bisulfite	lb/year	12,939	$1.50	$19,408	2 ppm in HDS influent when used, in range of manufacturer recommendations	From Hawkins quote e-mail 4/1/16
10e	Anionic Polymer (Standby)	lbs/year	0	$1.49	$0	2 ppm in HDS influent when used, based on typical polymer feed rates	From Jim Tieberg in 3/29/16 e-mail, cost from David Leingang at Nalco
10f	GE Hypersperse	lbs/year	22,966	$3.22	$73,951	2.2 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10g	Membrane Cleaner 1	lbs/year	7,430	$5.35	$39,751	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10h	Membrane Cleaner 4	lbs/year	7,430	$3.07	$22,810	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10i	NLR 759	gal/yr	3,002	$44	$132,085	10 ppm in secondary feed based on 5/9/13 pre-treatment specs from NLR	From NLR cost estimating spreadsheet
10j	NLR 404	gal/yr	20,847	$16	$333,548	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10k	NLR 505	gal/yr	20,847	$16	$333,548	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10l	Concentrate Hauling to WWTP	day	365	$1,400	$511,000	Based on 4/6/16 quote from Wayne Transports for 81 gpm concentrate	Concentrate volume based on process model
					$3,400,461		

	P50 Annual Average Flow to Chem Precip (gpm)	P50 Annual Average Flow to Membranes (gpm)	$/1000 gal
Mine Site Mine Year 2, MY1 Closure Scenario	206	192	$10.75

Item	Description	Unit	Quantity	Unit Cost	Cost Extension	Comments/References for Quantity	Comments/References for Unit Cost
1	Operations Management	LS	0		$0		Manpower covered in Staffing - Closure tab
2	Operations Labor	FTE	0		$0		Manpower covered in Staffing - Closure tab
3	Miscellaneous Operations Costs	day	365	$100	$36,500		Allowance
4	Equipment Maintenance	LS	3.72%	--	$0	Annualized cost based on capex plus service life, see Appendix B	Cost of equipment in service less membranes, see Appendix B
5	Electrical Cost	KW-Hr	2,800,000	$0.078	$218,400	based on process model flows and assumed pump information	Power costs from Jim Scott's edits
6	Building Heating	KW-Hr	415,000	$0.078	$32,370	Heating and light for 53,000 sf building	Power costs from Jim Scott's edits
8	Filter and RO/NF Membrane Replacement	LS	1	$19,900	$19,900	Based on 5/1/13 vendor cost estimate spreadsheet from GE - module replacement every 3 years	Based on 5/1/13 vendor cost estimate spreadsheet from GE, and 3/31/16 e-mail update - $550 per 4.4 gpm module every 3 years
9	VSEP Module Replacement	LS	1	$162,000	$162,000	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Based on 5/9/13 vendor cost estimate spreadsheet from NLR - $78,000 per 40 gpm module
	O&M Quantities						
10a	Hydrated Lime (Chem Precip)	ton/year	4,508	$153	$689,686	based on process model to remove metals and sulfate	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10b	CO2 (Chem Precip and VSEP)	ton/year	1,044	$129	$134,663	based on process model to adjust pH	From Jim Tieberg in 3/29/16 e-mail, cost from David Stanaway at Praxair
10c	Hydrochloric Acid	lbs/year	200,750	$0.80	$160,600	based on process model to remove sulfate	From Hawkins quote e-mail 4/1/16
10d	Ferric Sulfate	lbs/year	160,600	$0.26	$41,756	based on process model to remove metals	From Hawkins quote e-mail 4/1/16
10e	Sodium Permanganate	lbs/year	2,098	$14.50	$30,425	2.5 ppm in GSF feed, based on from Area 5 WWTF pilot	From Hawkins quote e-mail 4/1/16
10f	MetClear MR2405 (Standby)	lbs/year	0	$4.64	$0	2 ppm in HDS influent when used, in range of manufacturer recommendations	Based on 3/31/16 e-mail from Paul Dillalo at GE
10g	Anionic Polymer (Standby)	lbs/year	0	$1.49	$0	2 ppm in HDS influent when used, based on typical polymer feed rates	From Jim Tieberg in 3/29/16 e-mail, cost from David Leingang at Nalco
10h	Sodium Bisulfite	lbs/year	1,644	$1.50	$2,465	1 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	From Hawkins quote e-mail 4/1/16
10i	GE Hypersperse	lbs/year	1,754	$3.22	$5,648	2.2 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	per GE e-mail 11/19/15
10j	Membrane Cleaner 1	lbs/year	568	$5.35	$3,036	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10k	Membrane Cleaner 4	lbs/year	568	$3.07	$1,742	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10l	NLR 759	gal/yr	1,016	$44	$44,716	10 ppm in secondary feed based on 5/9/13 pre-treatment specs from NLR	From NLR cost estimating spreadsheet
10m	NLR 404	gal/yr	7,057	$16	$112,919	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10n	NLR 505	gal/yr	7,057	$16	$112,919	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10o	Sludge Management	ton/year	19,447	$36	$700,088	based on process model, assumes 50% solids	From Waste Management Quote 4/5/16 from Trevor Long
	Subtotal Cost				$2,509,836		
	Cost Attributable to Mass Added to Charge Balance Influents				$258,906.48		
	Cost Attributable to Plant Site Concentrate				$648,319.35		
	Total Cost				$2,250,929		

CRE Mine Year 1 Closure Scenario
Plant Site WWTP in Mine Year 2

	Average Annual Flow (gpm)	TDH (ft)	Pump Efficiency (%)	Average Annual Power (HP)	Operation (Hours/year)	Energy Use (kW-hr/Year)	Comments
Pretreatment Basin							
Lift Station Pumps	2000	70	60	58.92	8760	380,000	
GS Filters							
Backwash Tank Pump	100	60	60	2.53	8760	17,000	GS Backwash + CIP + % Stabilization Influent
Primary Membranes							
RO Feed Pumps	1881	330	80	195.94	8760	1,262,000	
NF Feed Pumps	504	160	80	25.48	8760	165,000	
Flush Water Pumps	3.3	100	80	0.10	8760	1,000	
CIP Pumps	0.7	100	80	0.02	8760	1,000	From GE info 5/3/13, 200 gal/year per gpm
Secondary Membranes							
Feed Pumps	571	1200	70	247.25	8760	1,592,000	
Flush Water Pumps	0.8	100	80	0.03	8760	1,000	
CIP Pumps	34	100	70	1.22	8760	8,000	VSEP 11/13 32,100 gpd for 375 gpm system
CIP Tank Heaters	34				8760	3,516,000	
Limestone Contactors							
Feed Pump	1814	40	80	22.91	8760	148,000	
Degasifier Blower				0.75	8760	5,000	
Miscellaneous							
Carbon Dioxide Carrier Water	229	180	80	13.02	8760	-	1 gpm per lb/hr CO2, per 1/15/16 call with Greg Brysacz at TomCO
Concentrate Load-Out Pump	86	60	60	2.16	8760	14,000	
Fractional HP Chemical Feed Pumps				10.00	8760	65,000	Assume total of 10 HP required at 2000 gpm and proportion to influent
Local Control Panels				2	8760	13,000	
Air Compressor				10.00	8760	65,000	Assume 20 HP at 50% use at 2000 gpm and proportion to influent
Plant Water (blended permeate)	39	140	80	1.71	8760	12,000	VSEP CIP plus 5 gpm
Plant Water (blended permeate)	5.7	130	80	0.23	8760	2,000	Primary CIP plus 5 gpm
Pumping to and from Plant							
Treated Water Storage Pump (unnamed creek)	1814	50	80	28.64	8760	185,000	all treated effluent pumps assumed to be low head
Treated Water Storage Pump (FTB Pond)	0	50	80	0.00	8760	-	treated effluent discharge to FTB assumed to be insignificant
Treated Water Storage Pump (Trimble Creek)	0	50	80	0.00	8760	-	
Pump Water from FTB Cont Sys to WWTP	2000	300	80	189.39	8760	1,220,000	TDH from SOW 12
Plant Site Total						8,672,000	

CRE Mine Year 1 Closure Scenario
Mine Site WWTF in Mine Year 2

	Average Annual Flow (gpm)	TDH (ft)	Pump Efficiency (%)	Average Annual Power (HP)	Operation (Hours/year)	Energy Use (kW-hr/Year)	Comments
Splitter Building							
West EQ Pumps	82	40	60	1.38	8760	9,000	
East EQ Pumps	192	50	60	4.04	8760	26,000	
GS Filters							
Backwash Decant Pump	5	40	60	0.08	8760	1,000	2.5% of GS Influent
Backwash Precipitate Pump	5	60	60	0.12	8760	1,000	2.5% of GS Influent
Primary Membranes							
NF Feed Pumps	182	160	80	9.20	8760	60,000	
Flush Water Pumps	0.06	100	80	0.00	8760	1,000	200% of required membrane pressure vessel volume every 24 hours (0.5 gpd/gpm)
CIP Pumps	0.07	100	70	0.00	8760	1,000	From GE info 5/3/13, 200 gal/year per gpm
Secondary Membranes (VSEP A)							
Feed Pumps	36	1200	70	15.78	8760	102,000	
Flush Water Pumps	0.05	100	80	0.00	8760	1,000	200% of required membrane pressure vessel volume every 6 hours (2 gpd/gpm)
CIP Pumps	2	100	70	0.08	8760	1,000	VSEP 11/13 32,100 gpd for 375 gpm system
CIP Tank Heaters	2				8760	226,000	assume 70 deg F temperature rise, 85% efficiency
Secondary Membranes (VSEP B)							
Recycle from Chem Precip	157	40	60	2.64	8760	18,000	All of VSEP B feed is from Chem Precip Recycle
Feed Pumps	157	1200	70	67.93	8760	438,000	
Flush Water Pumps	0.22	100	80	0.01	8760	1,000	
CIP Pumps	9	100	70	0.34	8760	3,000	
CIP Tank Heaters	9				8760	973,000	assume 70 deg F temperature rise, 85% efficiency
Chemical Precipitation							
HDS Metals removal							
Rapid Mix (4)				4	8760	26,000	
Metals Removal Reaction Mixer (2)				4	8760	26,000	
HDS Drive (2)				6	8760	39,000	
HDS Recycle	75	40	50	1.51	8760	10,000	
HDS Waste	8	50	50	0.20	8760	2,000	
Sulfate Removal							
Rapid Mix (4)				4	8760	26,000	
Sulfate Removal Reaction Mixer (2)				4	8760	26,000	
Sulfate Drive (2)				6	8760	39,000	
Sludge Recycle	23	40	50	0.46	8760	3,000	
Sludge Waste	13	50	50	0.33	8760	3,000	
Recarbonation							
Rapid Mix (2)				2	8760	13,000	
Recarb Drive (2)				2	8760	13,000	
Sludge Waste	8	50	50	0.21	8760	2,000	
Lime Feed							
Bag House blower				5.25	8760	34,000	
Bin Activator				3	8760	20,000	
Screw Feeder				1	8760	7,000	
Slurry Tank Mixer				3	8760	20,000	
Slurry Pump	200	125	50	12.63	8760	82,000	
Miscellaneous							
Waste Pumping Station	132	50	60	2.78	8760	18,000	Assumes filter press goes from 25% to 60% solids
Effluent Blend Pump	350	40	80	4.42	8760	29,000	
Carbon Dioxide Carrier Water	59	180	80	3.33	8760	22,000	
Fractional HP Chemical Feed Pumps				0.71	8760	5,000	Assume total of 10 HP required at 2700 gpm and proportion to East EQ flow
Local Control Panels				2	8760	13,000	
Air Compressor				0.71	8760	5,000	Assume 20 HP at 50% use at 2700 gpm and proportion to East EQ flow
Plant Water	17	140	80	0.75	8760	5,000	lime water plus VSEP CIP plus 5 gpm, assumes 35% of lime mass needed as water
Filter Press							
Feed Pump	30	320	50	4.77	8760	31,000	
Flush Water	1.48	3350	80	1.56	8760	11,000	5% of feed (assumed) at 1450 psi (per MW Watermark proposal)
Hydraulic Pump				50	120		4 hours per day based on 50% of cycle time and 8 hour operation at 90 dry tons per day.
						5,000	Proportion Operation (hrs/year) with Feed Pump Flow
Pumping to and from the Plant							
Pump Water from Cat 1 Cont Syst to WWTF	121	50	60	2.55	8760	17,000	From GoldSim model, TDH from ME-004
Pump Water from Cat 2/3 Cont Syst to WWTF	43	225	60	4.07	8760	27,000	From GoldSim model, TDH is weighted average of 3 sumps from ME-004
Pump Water Ore Surge Pile to WWTF	19	90	60	0.72	8760	5,000	From GoldSim model, TDH from ME-004
Pump Water from Cat 4 Cont Syst to WWTF	20	50	60	0.42	8760	3,000	From GoldSim model, TDH from ME-004
Pump Water from East Pit to WWTF	11	70	60	0.32	8760	3,000	From GoldSim model, TDH from ME-004 is 120', assume shallower pit
Pump Water from Central Pit to WWTF	0	60	60	0.00	8760	-	From GoldSim model, TDH from ME-004
Pump Water from Haul Road Runoff to WWTF	52	100	60	2.19	8760	15,000	From GoldSim model, TDH is weighted average of 3 sumps from ME-004
Pump Water from Rail Transfer Hopper to WWTF	1	60	60	0.03	8760	1,000	From GoldSim model, TDH from ME-004
Pump WWTP Concentrate from rail cars	81	50	60	1.70	8760	11,000	From GoldSim model
Pump Water from WWTF to FTB	350	450	80	49.72	8760	321,000	Assume 100% of WWTF effluent, TDH from SOW 7
Mine Site Total						**2,800,000**	

			P50 Average Annual Flow (gpm)	$/1000 gal			
Plant Site Mine Year 4, MY1 Closure Scenario 10 mg/L SO4			2,973	$3.68			
Item	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Cost Extension**	**Comments/References for Quantity**	**Comments/References for Unit Cost**
1	Operations Management	LS	0		$0		Manpower covered in Staffing - Closure tab
2	Operations Labor	FTE	0		$0		Manpower covered in Staffing - Closure tab
3	Miscellaneous Operations Costs	day	365	$100	$36,500		Allowance
4	Equipment Maintenance	LS	3.59%	--	$0		Cost of equipment in service less membranes - capital for replacement covered elsewhere in SRK estimate
5	Electrical Cost	KW-Hr	12,281,000	$0.078	$957,918	based on process model flows and assumed pump information	Power costs from Jim Scott's edits
6	Building Heating	KW-Hr	228,600	$0.078	$17,831	Heating and light for 53,000 sf building	Power costs from Jim Scott's edits
8	Filter and RO/NF Membrane Replacement	LS	1	$410,100	$410,100	Based on 5/1/13 vendor cost estimate spreadsheet from GE - module replacement every 3 years	Based on 5/1/13 vendor cost estimate spreadsheet from GE, and 3/31/16 e-mail update - $550 per 4.4 gpm module every 3 years
9	VSEP Module Replacement	LS	1	$860,000	$860,000	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Based on 5/9/13 vendor cost estimate spreadsheet from NLR - $78,000 per 40 gpm module
	O&M Quantities						
10a	Limestone (Granular Calcite)	ton/year	402	$47	$18,871	based on process model to stabilize LSI	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10a	Hydrated Lime (Chem Precip)	ton/year	4,243	$153	$649,116	based on process model to remove metals and sulfate	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10b	CO2 (Chem Precip and VSEP)	ton/year	1,205	$129	$155,381	based on process model to adjust pH	From Jim Tieberg in 3/29/16 e-mail, cost from David Stanaway at Praxair
10c	Hydrochloric Acid (standby)	lbs/year	0	$0.80	$0	based on process model to remove sulfate	From Hawkins quote e-mail 4/1/16
10d	Ferric Sulfate	lbs/year	1,204,500	$0.26	$313,170	based on process model to remove metals	From Hawkins quote e-mail 4/1/16
10e	Sodium Permanganate	lbs/year	32,526	$14.50	$471,622	2.5 ppm in GSF feed, based on from Area 5 WWTF pilot	From Hawkins quote e-mail 4/1/16
10f	MetClear MR2405 (Standby)	lbs/year	0	$4.64	$0	2 ppm in HDS influent when used, in range of manufacturer recommendations	Based on 3/31/16 e-mail from Paul Dillalo at GE
10g	Anionic Polymer (Standby)	lbs/year	0	$1.49	$0	2 ppm in HDS influent when used, based on typical polymer feed rates	From Jim Tieberg in 3/29/16 e-mail, cost from David Leingang at Nalco
10h	Sodium Bisulfite	lbs/year	19,912	$1.50	$29,867	1 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	From Hawkins quote e-mail 4/1/16
10i	GE Hypersperse	lbs/year	36,214	$3.22	$116,609	2.2 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	per GE e-mail 11/19/15
10j	Membrane Cleaner 1	lbs/year	11,716	$5.35	$62,681	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10k	Membrane Cleaner 4	lbs/year	11,716	$3.07	$35,968	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10l	NLR 759	gal/yr	4,144	$44	$182,354	10 ppm in secondary feed based on 5/9/13 pre-treatment specs from NLR	From NLR cost estimating spreadsheet
10m	NLR 404	gal/yr	28,781	$16	$460,491	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10n	NLR 505	gal/yr	28,781	$16	$460,491	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10o	Sludge Management	ton/year	15159	$36	$545,737	based on process model, assumes 50% solids	From Waste Management Quote 4/5/16 from Trevor Long
	Subtotal Cost				$5,784,707		
	Cost Attributable to Mass Added to Charge Balance Influents				$41,698		
	Total cost				$5,743,009		

			P50 Annual Average Flow (gpm)	$/1000 gal			
Mine Site Mine Year 4, MY1 Closure Scenario			886	$2.90			
Item	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Cost Extension**	**Comments/References for Quantity**	**Comments/References for Unit Cost**
1	Operations Management	LS	0		$0		Manpower covered in Staffing - Closure tab
2	Operations Labor	FTE	0		$0		Manpower covered in Staffing - Closure tab
3	Miscellaneous Operations Costs	day	365	$100	$36,500		Allowance
4	Equipment Maintenance	LS	3.72%	--	$0	Annualized cost based on capex plus service life, see Appendix B	Cost of equipment in service less membranes, see Appendix B
5	Electrical Cost	KW-Hr	3,334,000	$0.078	$260,052	based on process model flows and assumed pump information	Power costs from Jim Scott's edits
6	Building Heating	KW-Hr	415,000	$0.078	$32,370	Heating and light for 53,000 sf building	Power costs from Jim Scott's edits
8	Filter and RO/NF Membrane Replacement	LS	1	$120,800	$120,800	Based on 5/1/13 vendor cost estimate spreadsheet from GE - module replacement every 3 years	Based on 5/1/13 vendor cost estimate spreadsheet from GE, and 3/31/16 e-mail update - $550 per 4.4 gpm module every 3 years
9	VSEP Module Replacement	LS	1	$243,000	$243,000	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Based on 5/9/13 vendor cost estimate spreadsheet from NLR - $78,000 per 40 gpm module
	O&M Quantities						
10a	Limestone (Granular Calcite)	ton/year	0	$47	$0	based on process model to stabilize LSI	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10a	Hydrated Lime (Chem Precip)	ton/year	530	$153	$81,140	based on process model to remove metals and sulfate	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10b	CO2 (Chem Precip and VSEP)	ton/year	40	$129	$5,179	based on process model to adjust pH	From Jim Tieberg in 3/29/16 e-mail, cost from David Stanaway at Praxair
10c	Hydrochloric Acid (standby)	lbs/year	0	$0.80	$0	based on process model to remove sulfate	From Hawkins quote e-mail 4/1/16
10d	Ferric Sulfate	lbs/year	40,150	$0.26	$10,439	based on process model to remove metals	From Hawkins quote e-mail 4/1/16
10e	Sodium Permanganate	lbs/year	9,693	$14.50	$140,551	2.5 ppm in GSF feed, based on from Area 5 WWTF pilot	From Hawkins quote e-mail 4/1/16
10f	MetClear MR2405 (Standby)	lbs/year	0	$4.64	$0	2 ppm in HDS influent when used, in range of manufacturer recommendations	Based on 3/31/16 e-mail from Paul Dillalo at GE
10g	Anionic Polymer (Standby)	lbs/year	0	$1.49	$0	2 ppm in HDS influent when used, based on typical polymer feed rates	From Jim Tieberg in 3/29/16 e-mail, cost from David Leingang at Nalco
10h	Sodium Bisulfite	lbs/year	5,816	$1.50	$8,724	1 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	From Hawkins quote e-mail 4/1/16
10i	GE Hypersperse	lbs/year	10,662	$3.22	$34,333	2.2 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	per GE e-mail 11/19/15
10j	Membrane Cleaner 1	lbs/year	3,450	$5.35	$18,455	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10k	Membrane Cleaner 4	lbs/year	3,450	$3.07	$10,590	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10l	NLR 759	gal/yr	1,164	$44	$51,225	10 ppm in secondary feed based on 5/9/13 pre-treatment specs from NLR	From NLR cost estimating spreadsheet
10m	NLR 404	gal/yr	8,085	$16	$129,356	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10n	NLR 505	gal/yr	8,085	$16	$129,356	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10o	Sludge Management	ton/year	3661	$36	$131,793	based on process model, assumes 50% solids	From Waste Management Quote 4/5/16 from Trevor Long
	Subtotal Cost				$1,443,863		
	Cost Attributable to Mass Added to Charge Balance Influents				$92,303		
	Cost Attributable to Plant Site Concentrate				$0		
	Total Cost				$1,351,560		

CRE Mine Year 1 Closure Scenario
Plant Site WWTP in Mine Year 4

	Average Annual Flow (gpm)	TDH (ft)	Pump Efficiency (%)	Average Annual Power	Operation (Hours/year)	Energy Use (kW-hr/Year)	Comments
Chemical Precipitation							
Chem Precip Feed Pumps	243	40	60	4.09	8760	27,000	
HDS Metals removal							
Rapid Mix (4)				4	8760	26,000	
Metals Removal Reaction Mixer (2)				4	8760	26,000	
HDS Drive (2)				6	8760	39,000	
HDS Recycle	85	40	50	1.71	8760	12,000	
HDS Waste	6	50	50	0.15	8760	1,000	
Sulfate Removal							
Rapid Mix (4)				4	8760	26,000	
Sulfate Removal Reaction Mixer (2)				4	8760	26,000	
Sulfate Drive (2)				6	8760	39,000	
Sludge Recycle	0	40	50	0.00	8760	-	
Sludge Waste	14	50	50	0.34	8760	3,000	
Recarbonation							
Rapid Mix (2)				2	8760	13,000	
Recarb Drive (2)				2	8760	13,000	
Sludge Waste	4	50	50	0.11	8760	1,000	
Lime Feed							
Bag House blower				5.25	8760	34,000	
Bin Activator				3	8760	20,000	
Screw Feeder				1	8760	7,000	
Slurry Tank Mixer				3	8760	20,000	
Slurry Pump	200	125	50	12.63	8760	82,000	
Filter Press							
Feed Pump	24	320	50	3.83	8760	25,000	
Flush Water	1.19	3350	80	1.25	8760	9,000	5% of feed (assumed) at 1450 psi (per MW Watermark proposal)
Hydraulic Pump				50	1460	54,000	4 hours per day based on 50% of cycle time and 8 hour operation at 90 dry tons per day. Proportion Operation (hrs/year) with Feed Pump Flow
Pretreatment Basin							
Lift Station Pumps	2973	70	60	87.59	8760	564,000	
GS Filters							
Backwash Tank Pump	152	60	60	3.85	8760	25,000	GS Backwash + CIP + % Stabilization Influent
Primary Membranes							
RO Feed Pumps	724	330	80	75.44	8760	486,000	
NF Feed Pumps	3037	160	80	153.40	8760	988,000	
Flush Water Pumps	5.2	100	80	0.16	8760	2,000	
CIP Pumps	0.3	100	80	0.01	8760	1,000	From GE info 5/3/13, 200 gal/year per gpm
Secondary Membranes							
Feed Pumps	789	1200	70	341.35	8760	2,198,000	
Flush Water Pumps	1.1	100	80	0.03	8760	1,000	
CIP Pumps	47	100	70	1.68	8760	11,000	VSEP 11/13 32,100 gpd for 375 gpm system
CIP Tank Heaters	47				8760	4,854,000	
Limestone Contactors							
Feed Pump	2973	40	80	37.54	8760	242,000	
Degasifier Blower				0.75	8760	5,000	
Miscellaneous							
Waste Pumping Station	177	50	60	3.72	8760	24,000	Assumes filter press goes from 25% to 60% solids
Carbon Dioxide Carrier Water	106	180	80	6.04	8760	39,000	1 gpm per lb/hr CO2, per 1/15/16 call with Greg Brysacz at TomCO
Fractional HP Chemical Feed Pumps				14.87	8760	96,000	Assume total of 10 HP required at 2000 gpm and proportion to influent
Local Control Panels				2	8760	13,000	
Air Compressor				14.87	8760	96,000	Assume 20 HP at 50% use at 2000 gpm and proportion to influent
Plant Water (blended permeate)	52	140	80	2.28	8760	15,000	VSEP CIP plus 5 gpm
Plant Water (blended permeate)	5.3	130	80	0.22	8760	2,000	Primary CIP plus 5 gpm
Pumping to and from Plant							
Treated Water Storage Pump (unnamed creek)	2973	50	80	46.92	8760	303,000	all treated effluent pumps assumed to be low head
Treated Water Storage Pump (FTB Pond)	0	50	80	0.00	8760	-	treated effluent discharge to FTB assumed to be insignificant
Treated Water Storage Pump (Trimble Creek)	0	50	80	0.00	8760	-	
Pump Water from FTB Cont Sys to WWTP	2973	300	80	281.53	8760	1,813,000	TDH from SOW 12
Total						12,281,000	

CRE Mine Year 1 Closure Scenario
Mine Site WWTF in Mine Year 4

	Average Annual Flow (gpm)	TDH (ft)	Pump Efficiency (%)	Average Annual Power (HP)	Operation (Hours/year)	Energy Use (kW-hr/Year)	Comments
Mine **Splitter Building**							
West EQ Pumps	0	40	60	0.00	8760	-	
East EQ Pumps	886	50	60	18.64	8760	121,000	
Chemical Precipitation							
Chem Precip Feed Pumps	70	40	60	1.18	8760	8,000	
HDS Metals removal							
Rapid Mix (4)				4	8760	26,000	
Metals Removal Reaction Mixer (2)				4	8760	26,000	
HDS Drive (2)				6	8760	39,000	
HDS Recycle	90	40	50	1.81	8760	12,000	
HDS Waste	3	50	50	0.07	8760	1,000	
Sulfate Removal							
Rapid Mix (4)				4	8760	26,000	
Sulfate Removal Reaction Mixer (2)				4	8760	26,000	
Sulfate Drive (2)				6	8760	39,000	
Sludge Recycle	8	40	50	0.16	8760	2,000	
Sludge Waste	0	50	50	0.00	8760	1,000	
Recarbonation							
Rapid Mix (2)				2	8760	13,000	
Recarb Drive (2)				2	8760	13,000	
Sludge Waste	0	50	50	0.00	8760	1,000	
Lime Feed							
Bag House blower				5.25	8760	34,000	
Bin Activator				3	8760	20,000	
Screw Feeder				1	8760	7,000	
Slurry Tank Mixer				3	8760	20,000	
Slurry Pump	200	125	50	12.63	8760	82,000	
Filter Press							
Feed Pump	3	320	50	0.47	8760	4,000	
Flush Water	0.15	3350	80	0.15	8760	1,000	5% of feed (assumed) at 1450 psi (per MW Watermark proposal)
Hydraulic Pump				50	1460	54,000	4 hours per day based on 50% of cycle time and 8 hour operation at 90 dry tons per day. Proportion Operation (hrs/year) with Feed Pump Flow
GS Filters							
Backwash Tank Pump	45	60	60	1.15	8760	8,000	GS Backwash + CIP + % Stabilization Influent
Primary Membranes							
RO Feed Pumps	0	330	80	0.00	8760	-	
NF Feed Pumps	1107	160	80	55.93	8760	361,000	
Flush Water Pumps	1.5	100	80	0.05	8760	1,000	
CIP Pumps	0.4	100	80	0.01	8760	1,000	From GE info 5/3/13, 200 gal/year per gpm
Secondary Membranes							
Feed Pumps	221	1200	70	95.89	8760	618,000	
Flush Water Pumps	0.3	100	80	0.01	8760	1,000	
CIP Pumps	13	100	70	0.47	8760	4,000	VSEP 11/13 32,100 gpd for 375 gpm system
CIP Tank Heaters	13				8760	1,364,000	
Miscellaneous							
Waste Pumping Station	90	50	60	1.90	8760	13,000	Assumes filter press goes from 25% to 60% solids
Effluent Blend Pump	886	40	80	11.19	8760	73,000	
Carbon Dioxide Carrier Water	106	180	80	6.04	8760	39,000	
Local Control Panels				2	8760	13,000	
Plant Water (blended permeate)	18	140	80	0.80	8760	6,000	lime water plus VSEP CIP plus 5 gpm, assumes 35% of lime mass needed as water
Plant Water (blended permeate)	5.0	130	80	0.21	8760	2,000	Primary CIP plus 5 gpm
Pumping to and from the Mine Site							
Pump Water from Cat 1 Cont Syst to WWTF	26	50	60	0.55	8760	4,000	From GoldSim model, TDH from ME-004
Pump Water from Cat 2/3 Cont Syst to WWTF		225	60	0.00	8760	-	From GoldSim model, TDH is weighted average of 3 sumps from ME-004
Pump Water Ore Surge Pile to WWTF	0	90	60	0.00	8760	-	From GoldSim model, TDH from ME-004
Pump Water from Cat 4 Cont Syst to WWTF	0	50	60	0.00	8760	-	From GoldSim model, TDH from ME-004
Pump Water from East Pit to WWTF	860	120	60	43.43	8760	280,000	From GoldSim model, TDH from ME-004
Pump Water from Central Pit to WWTF	0	60	60	0.00	8760	-	From GoldSim model, TDH from ME-004
Pump Water from West Pit to WWTF		120	60	0.00	8760	-	From GoldSim model, TDH from ME-004
Pump Water from Haul Road Runoff to WWTF	0	100	60	0.00	8760	-	From GoldSim model, TDH is weighted average of 3 sumps from ME-004
Pump Water from Rail Transfer Hopper to WWTF	0	60	60	0.00	8760	-	From GoldSim model, TDH from ME-004
Treated Water Storage Pump (to East Pit)	886	50	80	13.98	8760	91,000	all treated effluent pumps assumed to be low head
Total						3,334,000	

		P50 Average Annual Flow (gpm)	$/1000 gal
Plant Site Mine Year 7, MY1 Closure Scenario, 10 mg/L SO4		2,941	$4.22

Item	Description	Unit	Quantity	Unit Cost	Cost Extension	Comments/References for Quantity	Comments/References for Unit Cost
1	Operations Management	LS	0		$0		Manpower covered in Staffing - Closure tab
2	Operations Labor	FTE	0		$0		Manpower covered in Staffing - Closure tab
3	Miscellaneous Operations Costs	day	365	$100	$36,500		Allowance
4	Equipment Maintenance	LS	3.59%	--	$0		Cost of equipment in service less membranes - capital for replacement covered elsewhere in SRK estimate
5	Electrical Cost	KW-Hr	13,316,000	$0.078	$1,038,648	based on process model flows and assumed pump information	Power costs from Jim Scott's edits
6	Building Heating	KW-Hr	228,600	$0.078	$17,831	Heating and light for 53,000 sf building	Power costs from Jim Scott's edits
8	Filter and RO/NF Membrane Replacement	LS	1	$414,400	$414,400	Based on 5/1/13 vendor cost estimate spreadsheet from GE - module replacement every 3 years	Based on 5/1/13 vendor cost estimate spreadsheet from GE, and 3/31/16 e-mail update - $550 per 4.4 gpm module every 3 years
9	VSEP Module Replacement	LS	1	$930,000	$930,000	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Based on 5/9/13 vendor cost estimate spreadsheet from NLR - $78,000 per 40 gpm module
	O&M Quantities						
10a	Limestone (Granular Calcite)	ton/year	402	$47	$18,871	based on process model to stabilize LSI	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10a	Hydrated Lime (Chem Precip)	ton/year	6,364	$153	$973,674	based on process model to remove metals and sulfate	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10b	CO2 (Chem Precip and VSEP)	ton/year	2,008	$129	$258,968	based on process model to adjust pH	From Jim Tieberg in 3/29/16 e-mail, cost from David Stanaway at Praxair
10c	Hydrochloric Acid (standby)	lbs/year	0	$0.80	$0	based on process model to remove sulfate	From Hawkins quote e-mail 4/1/16
10d	Ferric Sulfate	lbs/year	803,000	$0.26	$208,780	based on process model to remove metals	From Hawkins quote e-mail 4/1/16
10e	Sodium Permanganate	lbs/year	32,176	$14.50	$466,546	2.5 ppm in GSF feed, based on from Area 5 WWTF pilot	From Hawkins quote e-mail 4/1/16
10f	MetClear MR2405 (Standby)	lbs/year	0	$4.64	$0	2 ppm in HDS influent when used, in range of manufacturer recommendations	Based on 3/31/16 e-mail from Paul Dillalo at GE
10g	Anionic Polymer (Standby)	lbs/year	0	$1.49	$0	2 ppm in HDS influent when used, based on typical polymer feed rates	From Jim Tieberg in 3/29/16 e-mail, cost from David Leingang at Nalco
10h	Sodium Bisulfite	lbs/year	20,403	$1.50	$30,604	1 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	From Hawkins quote e-mail 4/1/16
10i	GE Hypersperse	lbs/year	36,600	$3.22	$117,852	2.2 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	per GE e-mail 11/19/15
10j	Membrane Cleaner 1	lbs/year	11,841	$5.35	$63,349	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10k	Membrane Cleaner 4	lbs/year	11,841	$3.07	$36,352	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10l	NLR 759	gal/yr	4,523	$44	$199,030	10 ppm in secondary feed based on 5/9/13 pre-treatment specs from NLR	From NLR cost estimating spreadsheet
10m	NLR 404	gal/yr	31,413	$16	$502,602	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10n	NLR 505	gal/yr	31,413	$16	$502,602	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10o	Sludge Management	ton/year	19,609	$36	$705,942	based on process model, assumes 50% solids	From Waste Management Quote 4/5/16 from Trevor Long
	Subtotal Cost				$6,522,550		
	Cost Attributable to Mass Added to Charge Balance Influents				$4,054		
	Total cost				$6,518,496		

CRE Mine Year 1 Closure Scenario
Plant Site WWTP in Mine Year 7

	Average Annual Flow (gpm)	TDH (ft)	Pump Efficiency (%)	Average Annual Power (HP)	Operation (Hours/year)	Energy Use (kW-hr/Year)	Comments
Chemical Precipitation							
Chem Precip Feed Pumps	255.6289864	40	60	4.30	8760	28,000	
HDS Metals removal							
Rapid Mix (4)				4	8760	26,000	
Metals Removal Reaction Mixer (2)				4	8760	26,000	
HDS Drive (2)				6	8760	39,000	
HDS Recycle	75	40	50	1.51	8760	10,000	
HDS Waste	10	50	50	0.26	8760	2,000	
Sulfate Removal							
Rapid Mix (4)				4	8760	26,000	
Sulfate Removal Reaction Mixer (2)				4	8760	26,000	
Sulfate Drive (2)				6	8760	39,000	
Sludge Recycle	0	40	50	0.00	8760	-	
Sludge Waste	8	50	50	0.21	8760	2,000	
Recarbonation							
Rapid Mix (2)				2	8760	13,000	
Recarb Drive (2)				2	8760	13,000	
Sludge Waste	6	50	50	0.16	8760	2,000	
Filter Press							
Feed Pump	25	320	50	4.06	8760	27,000	
Flush Water	1.26	3350	80	1.33	8760	9,000	5% of feed (assumed) at 1450 psi (per MW Watermark proposal)
Hydraulic Pump				50	1460	54,000	4 hours per day based on 50% of cycle time and 8 hour operation at 90 dry tons per day. Proportion Operation (hrs/year) with Feed Pump Flow
Pretreatment Basin							
Lift Station Pumps	2941	70	60	86.65	8760	558,000	
GS Filters							
Backwash Tank Pump	151	60	60	3.81	8760	25,000	GS Backwash + CIP + % Stabilization Influent
Primary Membranes							
RO Feed Pumps	2006	330	80	208.95	8760	1,346,000	
NF Feed Pumps	1796	160	80	90.69	8760	584,000	
Flush Water Pumps	5.3	100	80	0.17	8760	2,000	
CIP Pumps	0.8	100	80	0.02	8760	1,000	From GE info 5/3/13, 200 gal/year per gpm
Secondary Membranes							
Feed Pumps	861	1200	70	372.56	8760	2,399,000	
Flush Water Pumps	1.2	100	80	0.04	8760	1,000	
CIP Pumps	51	100	70	1.83	8760	12,000	VSEP 11/13 32,100 gpd for 375 gpm system
CIP Tank Heaters	51				8760	5,298,000	
Limestone Contactors							
Feed Pump	2941	40	80	37.13	8760	240,000	
Degasifier Blower				0.75	8760	5,000	
Lime Silo							
Bag House blower				5.25	8760	34,000	
Bin Activator				3	8760	20,000	
Screw Feeder				1	8760	7,000	
Slurry Tank Mixer				3	8760	20,000	
Slurry Pump	200	125	50	12.63	8760	82,000	
Miscellaneous							
Waste Pumping Station	191	50	60	4.01	8760	26,000	Assumes filter press goes from 25% to 60% solids
Carbon Dioxide Carrier Water	70	180	80	3.96	8760	-	1 gpm per lb/hr CO_2, per 1/15/16 call with Greg Brysacz at TomCO
Fractional HP Chemical Feed Pumps				14.71	8760	95,000	Assume total of 10 HP required at 2000 gpm and proportion to influent
Local Control Panels				2	8760	13,000	
Air Compressor				14.71	8760	95,000	Assume 20 HP at 50% use at 2000 gpm and proportion to influent
Plant Water (blended permeate)	56	140	80	2.47	8760	16,000	VSEP CIP plus 5 gpm
Plant Water (blended permeate)	5.8	130	80	0.24	8760	2,000	Primary CIP plus 5 gpm
Pumping to and from Plant							
Treated Water Storage Pump (unnamed creek)	2941	50	80	46.42	8760	299,000	all treated effluent pumps assumed to be low head
Treated Water Storage Pump (FTB Pond)	0	50	80	0.00	8760	-	treated effluent discharge to FTB assumed to be insignificant
Treated Water Storage Pump (Trimble Creek)	0	50	80	0.00	8760	-	
Pump Water from FTB Cont Sys to WWTP	2941	300	80	278.50	8760	1,794,000	TDH from SOW 12
Total						13,316,000	

			P50 Average Annual Flow (gpm)	$/1000 gal			
Plant Site Mine Year 15, MY1 Closure Scenario, 10 mg/L SO4			2,534	$3.97			
Item	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Cost Extension**	**Comments/References for Quantity**	**Comments/References for Unit Cost**
1	Operations Management	LS	0		$0		Manpower covered in Staffing - Closure tab
2	Operations Labor	FTE	0		$0		Manpower covered in Staffing - Closure tab
3	Miscellaneous Operations Costs	day	365	$100	$36,500		Allowance
4	Equipment Maintenance	LS	0		$0		Cost of equipment in service less membranes - capital for replacement covered elsewhere in SRK estimate
5	Electrical Cost	KW-Hr	11,373,000	$0.078	$887,094	based on process model flows and assumed pump information	Power costs from Jim Scott's edits
6	Building Heating	KW-Hr	415,000	$0.078	$32,370	Heating and light for 53,000 sf building	Power costs from Jim Scott's edits
8	Filter and RO/NF Membrane Replacement	LS	1	$355,400	$355,400	Based on 5/1/13 vendor cost estimate spreadsheet from GE - module replacement every 3 years	Based on 5/1/13 vendor cost estimate spreadsheet from GE, and 3/31/16 e-mail update - $550 per 4.4 gpm module every 3 years
9	VSEP Module Replacement	LS	1	$786,000	$786,000	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Based on 5/9/13 vendor cost estimate spreadsheet from NLR - $78,000 per 40 gpm module
	O&M Quantities						
10a	Limestone (Granular Calcite)	ton/year	1,104	$47	$51,894	based on process model to stabilize LSI	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10a	Hydrated Lime (Chem Precip)	ton/year	3,712	$153	$567,977	based on process model to remove metals and sulfate	From Jim Tieberg in 3/29/16 e-mail, cost from Terry Spooner at Graymont
10b	CO2 (Chem Precip and VSEP)	ton/year	1,124	$129	$145,022	based on process model to adjust pH	From Jim Tieberg in 3/29/16 e-mail, cost from David Stanaway at Praxair
10c	Hydrochloric Acid (standby)	lbs/year	0	$0.80	$0	based on process model to remove sulfate	From Hawkins quote e-mail 4/1/16
10d	Ferric Sulfate	lbs/year	1,405,250	$0.26	$365,365	based on process model to remove metals	From Hawkins quote e-mail 4/1/16
10e	Sodium Permanganate	lbs/year	27,723	$14.50	$401,981	2.5 ppm in GSF feed, based on from Area 5 WWTF pilot	From Hawkins quote e-mail 4/1/16
10f	MetClear MR2405 (Standby)	lbs/year	0	$4.64	$0	2 ppm in HDS influent when used, in range of manufacturer recommendations	Based on 3/31/16 e-mail from Paul Dillalo at GE
10g	Anionic Polymer (Standby)	lbs/year	0	$1.49	$0	2 ppm in HDS influent when used, based on typical polymer feed rates	From Jim Tieberg in 3/29/16 e-mail, cost from David Leingang at Nalco
10h	Sodium Bisulfite	lbs/year	17,444	$1.50	$26,166	1 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	From Hawkins quote e-mail 4/1/16
10i	GE Hypersperse	lbs/year	31,387	$3.22	$101,065	2.2 ppm in membrane feeds, based on 5/1/13 cost estimate spreadsheet from GE	per GE e-mail 11/19/15
10j	Membrane Cleaner 1	lbs/year	10,154	$5.35	$54,325	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10k	Membrane Cleaner 4	lbs/year	10,154	$3.07	$31,174	16.25 gal/year per gpm, from GE e-mail 3/26/15	per GE e-mail 11/19/15, 2.5% solution S.G. = 1.025
10l	NLR 759	gal/yr	3,816	$44	$167,918	10 ppm in secondary feed based on 5/9/13 pre-treatment specs from NLR	From NLR cost estimating spreadsheet
10m	NLR 404	gal/yr	26,502	$16	$424,036	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10n	NLR 505	gal/yr	26,502	$16	$424,036	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	From NLR e-mail update 3/25/16 from Mark Galimberti
10o	Sludge Management	ton/year	12897	$36	$464,277	based on process model, assumes 50% solids	From Waste Management Quote 4/5/16 from Trevor Long
	Subtotal Cost				$5,322,599		
	Cost Attributable to Mass Added to Charge Balance Influents				$33,105		
	Total cost				$5,289,493		

Plant Site WWTP in Mine Year 15

		Average Annual Flow (gpm)	TDH (ft)	Pump Efficiency (%)	Average Annual Power (HP)	Operation (Hours/year)	Energy Use (kW-hr/Year)	Comments
Chemical Precipitation								
Feed Pumps		217.3595353	40	60	3.66	8760	24,000	
HDS Metals removal								
	Rapid Mix (4)				4	8760	26,000	
	Metals Removal Reaction Mixer (2)				4	8760	26,000	
	HDS Drive (2)				6	8760	39,000	
	HDS Recycle	78	40	50	1.59	8760	11,000	
	HDS Waste	5	50	50	0.13	8760	1,000	
Sulfate Removal								
	Rapid Mix (4)				4	8760	26,000	
	Sulfate Removal Reaction Mixer (2)				4	8760	26,000	
	Sulfate Drive (2)				6	8760	39,000	
	Sludge Recycle	0	40	50	0.00	8760	-	
	Sludge Waste	9	50	50	0.22	8760	2,000	
Recarbonation								
	Rapid Mix (2)				2	8760	13,000	
	Recarb Drive (2)				2	8760	13,000	
	Sludge Waste	6	50	50	0.16	8760	2,000	
Lime Feed								
Bag House blower					5.25	8760	34,000	
Bin Activator					3	8760	20,000	
Screw Feeder					1	8760	7,000	
Slurry Tank Mixer					3	8760	20,000	
Slurry Pump		200	125	50	12.63	8760	82,000	
Filter Press								
Feed Pump		20	320	50	3.25	8760	21,000	
Flush Water		1.01	3350	80	1.06	8760	7,000	5% of feed (assumed) at 1450 psi (per MW Watermark proposal)
Hydraulic Pump					50	82	4,000	4 hours per day based on 50% of cycle time and 8 hour operation at 90 dry tons per day. Proportion Operation (hrs/year) with Feed Pump Flow
Pretreatment Basin								
Lift Station Pumps		2534	70	60	74.65	8760	481,000	
GS Filters								
Backwash Tank Pump		130	60	60	3.28	8760	22,000	GS Backwash + CIP + % Stabilization Influent
Primary Membranes								
RO Feed Pumps		1481	330	80	154.31	8760	994,000	
NF Feed Pumps		1779	160	80	89.83	8760	579,000	
Flush Water Pumps		4.5	100	80	0.14	8760	1,000	
CIP Pumps		0.6	100	80	0.02	8760	1,000	From GE info 5/3/13, 200 gal/year per gpm
Secondary Membranes								
Feed Pumps		726	1200	70	314.32	8760	2,024,000	
Flush Water Pumps		1.0	100	80	0.03	8760	1,000	
CIP Pumps		43	100	70	1.55	8760	10,000	VSEP 11/13 32,100 gpd for 375 gpm system
CIP Tank Heaters		43				8760	4,470,000	
Limestone Contactors								
Feed Pump		2534	40	80	31.99	8760	207,000	
Degasifier Blower					0.75	8760	5,000	
Miscellaneous								
Waste Pumping Station		161	50	60	3.38	8760	22,000	Assumes filter press goes from 25% to 60% solids
Carbon Dioxide Carrier Water		9	180	80	0.50	8760	-	1 gpm per lb/hr CO2, per 1/15/16 call with Greg Brysacz at TomCO
Fractional HP Chemical Feed Pumps					12.67	8760	82,000	Assume total of 10 HP required at 2000 gpm and proportion to influent
Local Control Panels					2	8760	13,000	
Air Compressor					12.67	8760	82,000	Assume 20 HP at 50% use at 2000 gpm and proportion to influent
Plant Water (blended permeate)		48	140	80	2.11	8760	14,000	VSEP CIP plus 5 gpm
Plant Water (blended permeate)		5.6	130	80	0.23	8760	2,000	Primary CIP plus 5 gpm
Pumping to and from Plant								
Pump Water from FTB Cont Sys to WWTP		2534	300	80	239.96	8760	1,546,000	TDH from SOW 12
Mine Site - East EQ Pumps		110	50	60	2.31	8760	15,000	
Pump Water from WWTF to FTB		110	450	80	15.63	8760	101,000	Assume 100% of WWTF effluent, TDH from SOW 7
Treated Water Storage Pump (unnamed creek)		2534	50	80	39.99	8760	258,000	all treated effluent pumps assumed to be low head
Treated Water Storage Pump (FTB Pond)		0	50	80	0.00	8760	-	treated effluent discharge to FTB assumed to be insignificant
Treated Water Storage Pump (Trimble Creek)		0	50	80	0.00	8760	-	
Total							**11,373,000**	

Appendix B

Equipment Replacement Cost Estimate – CRE Mine Year 1 Closure

resourceful. naturally.
engineering and environmental consultants

BARR

Technical Memorandum

To: Jennifer Saran
From: Abby Morrisette, Bryan Oakley, Jeff Ubl, Alison Ling, and Don Richard
Subject: Mine Year 1 Closure - Waste Water Treatment Basis for Equipment Replacement Costs
Date: September 28, 2016
Project: 23/69-0862.00
C: Jim Scott

This memorandum describes the process used to develop equipment replacement cost estimates for the Plant Site Waste Water Treatment Plant (WWTP) and Mine Site Waste Water Treatment Facility (WWTF) and associated water conveyance infrastructure for the proposed NorthMet Project by Poly Met Mining, Inc. (PolyMet). These estimates will be used to calculate a portion of the overall Contingency Reclamation Estimate (CRE) for Mine Year 1 closure.

Background

The NorthMet Project has facilities that will continue to operate after mine closure. These facilities include:

- The WWTP and WWTF at Mine Year 1 build out levels
- The Category 1 Stockpile Groundwater Containment System and pumps/piping to convey water to the WWTF
- The Flotation Tailings Basin (FTB) Seepage Capture Systems water conveyance to the WWTP
- Pumps and piping to convey treated water from the WWTF to the WWTP (i.e. the Treated Water Pipeline) and from the WWTP to discharge points for stream augmentation.

Objective and Approach

The objective of this task was to develop equipment replacement cost estimates for the WWTP and WWTF equipment and associated water conveyance infrastructure for the Reclamation period in the event of Mine Year 1 closure.

The approach to develop the WWTP and WWTF equipment replacement costs was to use the detailed capital cost estimate developed by PolyMet in early 2014 (Definitive Estimate, Level-3) relevant to scope listed above for Mine Year 1 buildouts. The 2014 Definitive Estimate is the most comprehensive capital cost estimate available but because it was developed more than two years ago, we adjusted the estimate for inflation by using the Engineering News Record–Construction Cost Index (ENR-CCI) to bring the estimate to March 2016 dollars. It should be noted that replacement of the membrane filters is included in the waste water treatment operating costs and therefore not included in the WWTP and WWTF equipment replacement costs.

Next, the March 2016 Definitive Estimate, Level-3 costs were grouped into categories such as laboratory equipment, tanks, pumping equipment, concrete and foundation, structural steel, piping, building electrical, etc. A service life was then assigned to each category based on one of the following:

1. Information published by the U.S. EPA in "Asset Management: A Handbook for Small Water Systems", September, 2003 (EPA 816-R-03-016)
2. International Association of Certified Home Inspectors (InterNACHI), "Standard Estimated Life Expectancy Chart for Homes" (https://www.nachi.org/life-expectancy.htm) (if no EPA information is available)
3. Estimate of service life by Barr staff (if no EPA or InterNACHI information are available)

The March 2016 capital costs were then divided by the assigned service life in years to calculate the annual equipment replacement costs for Mine Year 1 for each category. No adjustments were made for investment interest rate, future inflation, or future cost discounting.

For Mine Year 1, the total annualized equipment replacement cost was divided by the total capital cost to calculate the overall annualized equipment replacement percentages for the WWTP and WWTF. The overall annualized equipment replacement percentages were then multiplied by the capital cost of the equipment in service for Mine Year 15 to get annual equipment replacement. These costs are included in the overall operation and maintenance cost estimates and are assumed to be constant throughout closure, despite differing estimates for equipment in service during Mine Years 2 through 9. Annual equipment replacement costs for Mine Year 15 are still relevant to the early years of closure, because newly installed equipment is unlikely to require replacement during those years .

During the Reclamation period for Mine Year 1 closure, water conveyance from the Mine Site Category 1 Stockpile Groundwater Containment System and the East Pit to the WWTF will continue and these costs are included in the capital equipment cost estimate. At the Plant Site, water conveyance from the FTB Seepage Capture Systems to the WWTP and treated water discharge from the WWTP for stream augmentation will also continue. We used the same process as described above to estimate the annual equipment replacement costs for these water conveyance systems.

However, conveyance of treated water from the WWTF to the East Pit will occur for only approximately 4 (or 5) years, so equipment replacement costs for this conveyance is not included in the estimate. Then, after the East Pit is flooded and begins to overflow, this water will be conveyed to the WWTP via the Treated Water Pipeline.

The equipment replacement costs and the overall annualize equipment replacement percentages for the WWTP (3.59%) and WWTF (3.72%) including associated water conveyance systems are provided in Tables 1 and 2.

Below is a description of projected process flows and expected equipment capacity at the beginning of Mine Years 1 and 15 (less membranes). These costs were estimated based on the 2014 definitive cost estimate adjusted for inflation to 2016 dollars according to the following method:

- P90 flows for each process at each plant were estimated based on the influent P90 flows projected for each plant during each mine year analyzed.

- Number of units in service for each mine year for each process was estimated based on the P90 estimated process flows
- Process equipment costs for each package, plant, and mine year were estimated by scaling 2014 bid package costs by the anticipated number of units divided by the number of units assumed for the 2014 bid packages.
- Ancillary equipment costs at the WWTP were scaled from the 2014 estimate to the anticipated 3,000 gpm flow. Water conveyance costs at the WWTP is expected to remain the same after Mine Year 1, and was calculated by scaling the 2014 estimate to the anticipated Mine Year 1 design value of 4,000 gpm.
- Ancillary equipment costs at the WWTF were based on the 2014 cost estimate. Water conveyance costs at the WWTF are expected to be insignificant from Mine Years 2 through 5 when WWTF treated effluent is being conveyed to the East Pit. There is no WWTF treated effluent during Mine Years 6 through 9. For Mine Years 10 through 51 the WWTF will not be used and the Mine Site water will be pumped to the WWTP for treatment using the CPS and TWP. The ancillary equipment cost for the CPS and TWP were added and scaled using a flow-dependent scaling factor of 0.03 for long-term closure, to reflect influent flow less than 110/4000 of the Mine Year 1 design flow.
- Capital expenses for required equipment additions were determined by subtracting the cost of equipment in service for the peak flow mine year (Mine Year 7 at 2,983 gpm) from the cost of equipment in service for Mine Year 1.
- Waste water treatment equipment at the WWTF is assumed to be decommissioned and all Mine Site water is conveyed to the WWTP for treatment. Only the Central Pumping Station and the Treated Water Pipeline will remain in service at a significantly reduced operating rate (110 gpm) relative to the design flow rate (4,000 gpm).

The cost of equipment additions for chemical precipitation at the WWTP was estimated using the following method:

- Process equipment cost for each addition was estimated by scaling the bid price for planned chemical precipitation equipment at the WWTF to the anticipated flows of the new processes divided by the planned process flows.
- Anticipated footprint of the equipment addition was estimated by scaling costs of planned chemical precipitation equipment at the WWTF to the anticipated flows of the new processes divided by the planned process flows.
- Additional ancillary equipment costs were estimated by applying the percent footprint increase required to the base ancillary equipment cost estimated for Mine Year 1

The estimate of the capital cost of equipment expected to be in service during those years is provided in Tables 3 and 4. These costs do not include installed membrane modules or elements, as the replacement of these items are covered separately in the O&M cost estimate. The overall annualized equipment

replacement percentages from Tables 1 and 2 was multiplied by the expected equipment to be in service, to calculate the annualized equipment replacement costs for Mine Year 15.

	Beginning of Mine Year	Treatment Train	Influent Process Flow to Equipment (gpm)[1]	Equipment Capacity (gpm)[2],[3]	Description of Equipment in Service
WWTP	1	Filtration	1,937	NA	Influent P90 annual average flow
			1,985	2,100	Greensand filter (loading rate: 3.5 gpm/sf); 2 filters @ 1,050 gpm each)
			2,311	2,880	Primary membrane RO/NF (loading rate: 16 gfd; 4 skids @ 720 gpm each)
			553	560	Secondary membrane (loading rate: 60 gfd; 15 modules a@ 40 gpm each)
			1,757	2,160	Effluent stabilization (loading rate: 3 gpm/sf); 3 contactors @ 720 gpm each)
		Chemical Precipitation	NA	NA	No chemical precipitation treatment train
	2	Filtration	2,000	NA	Influent P90 annual average flow
			2,000	2,100	Greensand filter
			2,385	2,880	Primary membrane RO/NF
			571	600	Secondary membrane
			1,814	2,160	Effluent stabilization
		Chemical Precipitation	NA	NA	No chemical precipitation treatment train
	4	Filtration	2,973	NA	Influent P90 annual average flow
			2,973	3,150	Greensand filter
			3,762	4,320	Primary membrane RO/NF
			1032	1040	Secondary membrane
			2973	3,600	Effluent stabilization
		Chemical Precipitation	243	270	Metals, sulfate, and calcium chemical precipitation equipment added
	7	Filtration	2,941	NA	Influent P90 annual average flow
			2,941	3,150	Greensand filter
			3,802	4,320	Primary membrane RO/NF
			1,116	1,120	Secondary membrane
			2,941	3,600	Effluent stabilization
		Chemical Precipitation	256	270	Same as Mine Year 4
	15	Filtration	2,534	NA	Influent P90 annual average flow
			2,599	3,150	Greensand filter
			3,260	3,600	Primary membrane RO/NF
			943	960	Secondary membrane
			2,534	2,880	Effluent stabilization
		Chemical Precipitation	217	270	Same as Mine Year 4

	Beginning of Mine Year	Treatment Train	Influent Process Flow to Equipment (gpm)[1]	Equipment Capacity (gpm)[2],[3]	Description of Equipment in Service
WWTF	1	Filtration	495	NA	Influent P90 annual average flow
			507	1820	Greensand filter
			471	1440	Primary membrane NF
			287	320	Secondary membrane
			0	0	Effluent stabilization (none in MY1)
		Chemical Precipitation	254	615	Metals, sulfate, and calcium chemical precipitation equipment
	2	Filtration	192	NA	Influent P90 annual average flow
			192	910	Greensand filter
			182	720	Primary membrane NF
			193	200	Secondary membrane
			0	0	Effluent stabilization (none in MY1)
		Chemical Precipitation	207	810	Same as Mine Year 1
	4	Filtration	886	NA	Influent P90 annual average flow
			886	910	Greensand filter
			1107	1440	Primary membrane NF
			291	320	Secondary membrane
			0	0	Effluent stabilization (none in MY1)
		Chemical Precipitation	70	810	Same as Mine Year 1
	7	Filtration	0	NA	No flow to WWTF in Years 7 and 8
		Chemical Precipitation	0	NA	No flow to WWTF in Years 7 and 8
	15	Filtration	0	NA	Mine Site water conveyed directly to WWTP; bypassing WWTF. CPS and TWP are the only infrastructure in service.
			0		
			0		
			0		
			0		
		Chemical Precipitation	0		

[1] Process flows were estimated using annual average P90 influent flows and process modeling using conservative assumptions for recycle loops (i.e. all primary membrane influent flow to RO at WWTP after Year 2)

[2] Equipment capacities for Mine Year 1 are based on peak flow rates expected during P90 spring flood event conditions, which are higher than the listed annual average P90 flows. In later years, spring and summer flows will be equalized in the East Pit, so annual average P90 flows are appropriate design flows.

[3] Equipment capacities were used to select number of units in service for each process for each Mine Year. Equipment unit loadings and capacities are based on pilot test results. Primary membrane unit capacity 720gpm/skid, including 10% redundancy. Secondary membrane unit capacity is 40 gpm/module, not including redundancy.

Table 1 - WWTP Annualized Equipment Cost Summary (Based on 2014 Flows and Loads)

Area		Category	Service Life	Footnote	Total Capital Cost (2016 $)[a]	Annualized Equipment Replacement Cost (2016 $)[b]	Annualized Equipment Replacement Percentage
WWTP	Bid Equipment Packages	CO2 Injection	15	c	$ 245,444	$ 16,363	7%
		Limestone Contactor	15	c	$ 517,866	$ 34,524	7%
		Degasifier	15	c	$ 76,701	$ 5,113	7%
		VSEP	15	c, g	$ 4,090,121	$ 272,675	7%
		GS Filter and RO	15	c, g	$ 2,308,705	$ 153,914	7%
	Ancillary Equipment	Laboratory	7	c, d	$ 44,419	$ 6,346	14%
		Instrumentation	7	c	$ 143,828	$ 20,547	14%
		Equipment	15	c	$ 1,361,880	$ 90,792	7%
		Tanks	60	c	$ 805,671	$ 13,428	2%
		Pumping Equipment	15	c	$ 435,950	$ 29,063	7%
		Concrete and Foundation	100	e	$ 5,336,475	$ 53,365	1%
		Structural Steel	100	e	$ 1,669,068	$ 16,691	1%
		Finishes	40	c	$ 474,501	$ 11,863	3%
		Plumbing	40	c	$ 196,217	$ 4,905	3%
		HVAC	40	c	$ 661,695	$ 16,542	3%
		Switchgear and Power Equipment	40	f	$ 129,806	$ 3,245	3%
		Building Electrical	40	f	$ 1,908,121	$ 47,703	3%
		Electrical Controls	15	f	$ 285,806	$ 19,054	7%
		Motor Control Center	30	f	$ 607,837	$ 20,261	3%
		Piping	40	c	$ 2,940,583	$ 73,515	3%
		Valves	40	c	$ 516,092	$ 12,902	3%
	Bid Equipment Package Subtotal:				$ 7,238,837	$ 482,589	7%
	Ancillary Equipment Subtotal:				$ 17,517,949	$ 440,221	3%
	Subtotal:				$ 24,756,787	$ 922,810	4%
Water transport from FTB seepage capture systems to WWTP and from WWTP to discharge locations		Pumping Equipment	15	c	$ 514,904	$ 34,327	7%
		Piping	40	c	$ 4,645,664	$ 116,142	3%
		Valves	40	c	$ 421,825	$ 10,546	3%
		Instrumentation	7	c	$ 52,897	$ 7,557	14%
	Subtotal:				$ 5,635,290	$ 168,571	3%
				Total:	$ 30,392,076	$ 1,091,381	3.59%

[a] Cost includes installation costs, in March 2016 dollars

[b] Annualized costs include labor, in March 2016 dollars

[c] Service life from EPA publication *"Asset Management: A Handbook for Small Water Systems"*, *EPA 816-R-03-016 Sept. 2003*

[d] "Laboratory Equipment" includes safety shower, eye wash, and analytical equipment associated with facility operation

[e] Service life from InterNACHI, *"Standard Estimated Life Expectancy Chart for Homes"*

[f] Service life estimated by Barr staff

[g] Capital cost and annualized replacement costs do not include the price of membranes (which are accounted for in operational costs)

Table 2 - WWTF Annualized Equipment Cost Summary (Based on 2014 Flows and Loads)

Area		Category	Service Life	Footnote	Total Capital Cost (2016 $)[a]	Annualized Equipment Replacement Cost (2016 $)[b]	Annualized Equipment Replacement Percentage
WWTF	Bid Equipment Packages	Nanofiltration	15	c, g	$ 1,364,270	$ 90,951	7%
		Lime Equipment	15	c	$ 571,217	$ 38,081	7%
		Chemical Precipitation	15	c	$ 3,290,840	$ 219,389	7%
		VSEP	15	c, g	$ 4,155,867	$ 277,058	7%
	Ancillary Equipment	Laboratory	7	c, d	$ 31,149	$ 4,450	14%
		Instrumentation	7	c	$ 236,900	$ 33,843	14%
		Equipment	15	c	$ 3,728,210	$ 248,547	7%
		Tanks	60	c	$ 567,573	$ 9,460	2%
		Pumping Equipment	15	c	$ 495,163	$ 33,011	7%
		Concrete and Foundation	100	e	$ 9,786,715	$ 97,867	1%
		Structural Steel	100	e	$ 1,403,168	$ 14,032	1%
		Finishes	40	c	$ 2,376,831	$ 59,421	3%
		Plumbing	40	c	$ 76,928	$ 1,923	3%
		HVAC	40	c	$ 575,307	$ 14,383	3%
		Switchgear and Power Equipment	40	f	$ 296,449	$ 7,411	3%
		Building Electrical	40	f	$ 2,306,367	$ 57,659	3%
		Electrical Controls	15	f	$ 295,151	$ 19,677	7%
		Motor Control Center	30	f	$ 656,748	$ 21,892	3%
		Piping	40	c	$ 4,409,287	$ 110,232	3%
		Valves	40	c	$ 856,257	$ 21,406	3%
	Bid Equipment Package Subtotal:				$ 9,382,194	$ 625,480	7%
	Ancillary Equipment Subtotal:				$ 28,098,204	$ 755,213	3%
	Subtotal:				$ 37,480,398	$ 1,380,693	4%
Water Transport from Category 1 Stockpile Groundwater Containment System and East Pit to WWTF		Pumping Equipment	15	c	$ 303,404	$ 20,227	7%
		Piping	40	c	$ 1,235,430	$ 30,886	3%
		Valves	40	c	$ 130,248	$ 3,256	3%
		Instrumentation	7	c	$ 198,431	$ 28,347	14%
	Subtotal:				$ 1,867,512	$ 82,716	4%
				Total:	$ 39,347,911	$ 1,463,409	3.72%

[a] Cost includes installation costs, in March 2016 dollars

[b] Annualized costs include labor, in March 2016 dollars

[c] Service life from EPA publication *"Asset Management: A Handbook for Small Water Systems"*, *EPA 816-R-03-016 Sept. 2003*

[d] "Laboratory Equipment" includes safety shower, eye wash, and analytical equipment associated with facility operation

[e] Service life from InterNACHI, *"Standard Estimated Life Expectancy Chart for Homes"*

[f] Service life estimated by Barr staff

[g] Capital cost and annualized replacement costs do not include the price of membranes (which are accounted for in operational costs)

To: Jennifer Saran
From: Abby Morrisette, Bryan Oakley, Jeff Ubl, Alison Ling, and Don Richard
Subject: Mine Year 1 Closure - Waste Water Treatment Basis for Equipment Replacement Costs
Date: September 28, 2016
Page: 8
C: Jim Scott

Table 3 - WWTP Equipment in Service and Annualized Equipment Replacement Costs Summary

		Mine Year	1		7		15 (Long Term Configuration)		Additions Required for Long Term[1]
		P90 Annual Average Flow (all to filtration)	1937 gpm		2941 gpm		2534 gpm		CAPEX (2016 $)
		Unit Description	Units	Capex Cost (2016 $)	Units	Capex Cost (2016 $)	Units	Capex Cost (2016 $)	
Process Equipment Packages	Greensand Filter	1050 gpm filters	2	$ 1,179,014	3	$ 1,768,521	3	$ 1,768,521	$ 589,507
	Primary Membrane, RO and NF[2]	720 gpm skids	4	$ 3,382,253	6	$ 5,073,380	5	$ 4,227,817	$ 1,691,127
	Secondary Membrane, VSEP[2]	40 gpm modules	15	$ 5,112,651	29	$ 9,884,459	25	$ 8,521,085	$ 4,771,808
	CO2 Injection	Lump Sum	1	$ 320,144	1	$ 320,144	1	$ 320,144	
	Chemical Precipitation	270 gpm train (MY3)	0	$ -	1	$ 1,470,311	1	$ 1,470,311	$ 1,470,311
	Stabilization	720 gpm contactors	3	$ 891,851	5	$ 1,486,418	4	$ 1,189,134	$ 594,567
	Process Equipment Subtotal			$ 10,885,913		$ 20,003,232		$ 17,497,012	$ 9,117,319
Building and Ancillary Equipment	Building Expansion for 2016 Flows	Lump Sum	1	$ 300,000	1	$ 300,000	1	$ 300,000	
	Ancillary Equipment Base	Lump Sum	1	$ 23,357,266	1	$ 35,035,898	1	$ 35,035,898	$ 11,678,633
	Ancillary Equipment for Chem Precip[3]	Lump Sum	0	--	1	$ 6,120,444	1	$ 6,120,444	$ 6,120,444
	Water Conveyance Total[4]	Lump Sum	1	$ 7,513,720	1	$ 7,513,720	1	$ 7,513,720	
	Flow-Dependent Scaling Factor[5]			1.00		1.00		1.00	
	Ancillary Equipment and Water Conveyance Subtotal			$ 31,170,986		$ 48,970,063		$ 48,970,063	$ 17,799,077
Total Cost for Required Capital Additions									$ 26,916,396
Total Equipment in Service Less Membranes				$ 42,056,899		$ 68,973,295		$ 66,467,075	
Annualized Equipment Replacement Cost (3.59% of In Service)				$ 1,509,843		$ 2,476,141		$ 2,386,168	

Costs are based on 2014 definitive cost estimate. Bid equipment package costs are scaled to account for the number of treatment units currently planned.
Ancillary costs are scaled according to influent flow for the given year. Water Transport costs planned for 2014 were already designed to accommodate 3,000 gpm
[1] Capital equipment additions reflect the capital cost of equipment required to treat the maximum flow year (Mine Year 7, at 2,983 gpm)
[2] Capital costs do not include individual membrane units. These replacement costs are included separately in the O&M cost estimate.
[3] Building and ancillary equipment for chemical precipitation estimated based on scaling WWTF ancillary costs to the anticipated WWTP chemical precipitation
[4] Water conveyance cost scaled from 2014 definitive cost estimate to allow for 4,000 gpm initial buildout in Mine Year 1.
[5] Scaling factor reflects a reduction in ancillary equipment-in-service cost based on reduced equipment usage in a given year. At WWTP, flow only decreases 10% in closure, so equipment use is not expected to change.

Table 4 - WWTF Equipment in Service and Annualized Equipment Replacement Costs Summary

		Mine Year	1		15 (Long Term Configuration)		Additions Required for Long Term
		P90 Annual Average Flow	495 gpm to filtration, 184 gpm to chem precip		110 gpm to WWTP filtration		CAPEX (2016 $)
		Unit Description	Units	Capex Cost (2016 $)	Units	Capex Cost (2016 $)	
Process Equipment Packages	Greensand Filter	910 gpm filters	1	$ 510,906	0	$ -	
	Primary Membrane, Nanofiltration[1]	720 gpm skids	2	$ 1,691,127	0	$ -	
	Secondary Membrane, VSEP[1]	40 gpm modules	9	$ 3,400,255	0	$ -	
	Chemical Precipitation	405 gpm/40 gpm trains[2]	2	$ 3,957,260	0	$ -	
	Stabilization	175 gpm contactor (MY10)	0	$ -	0	$ -	
	Process Equipment Subtotal			$ 9,559,548		$ -	$ -
Building and Ancillary Equipment	Building Expansion for 2016 Flows	Lump Sum	1	$ 820,000	0	$ -	
	Ancillary Equipment Base	Lump Sum	1	$ 28,098,204	0	$ -	
	Ancillary Equipment for Stabilization[3]	Lump Sum	0	$ -	0	$ -	
	Water Conveyance Total	Lump Sum	1	$ 1,867,512	0	$ -	
	CPS and TWP Conveyance to WWTP	Lump Sum	1	$ 5,723,422	1	$ 5,723,422	
	Flow-Dependent Scaling Factor[4]			1.00		0.03	
	Ancillary Equipment and Water Conveyance Subtotal			$ 36,509,138		$ 157,394	$ -
Total Cost for Required Capital Additions							$ -
Total Equipment in Service Less Membranes				$ 46,068,686		$ 157,394	
Annualized Equipment Replacement Cost (3.72% of In Service)				$ 1,713,755		$ 5,855	

Costs are based on 2014 definitive cost estimate. Bid equipment package costs are scaled to account for the number of treatment units currently planned. Ancillary and water

[1] Capital costs do not include individual membrane units. These replacement costs are included separately in the O&M cost estimate.
[2] Chemical precipitation capital cost estimate based on two 405 gpm trains in Mine Year 1 and one 40 gpm train in long-term closure.
[3] Building and ancillary equipment for stabilization estimated based on scaling WWTP ancillary costs to the anticipated WWTF stabilization design flow.
[4] Scaling factor reflects a reduction in ancillary equipment-in-service cost based on reduced equipment usage in a given year.

Appendix C

Updated Process Model Outputs – CRE, Mine Year 1 Closure

Plant Site WWTP - Year 2
CRE Mine Year 1 Closure Scenario
09/2016

Qualities and Quantities	Preliminary Water Quality Targets	(1) Influent	(2) Green Sand Effluent	(3) RO Feed	NF Rejection	(4) NF Feed	RO Rejection	(5) RO Permeate	VSEP Rejection	(6) NF Permeate	(7) RO Concentrate	(8) NF Concentrate	(9) NF/RO Concentrate w/CO2	(10) VSEP Permeate	(11) VSEP Concentrate	(12) Stabilization Influent	(13) Stabilized Effluent	System Mass Balance	Target Met?
Flow Rate, gpm		**2000**	**1900**	**1881**		**504**		**1411**		**404**	**470**	**101**	**571**	**485**	**86**	**1814**	**1814**	**N/A**	
[Ag] [mg/L]	**0.001**	1.20E-04	1.20E-04	1.20E-04	5.35E-01	2.31E-05	9.96E-01	1.76E-06	9.60E-01	9.73E-06	4.76E-04	7.68E-05	4.06E-04	1.93E-05	2.65E-03	3.53E-06	3.53E-06	100.0%	Target Met
[Al] [mg/L]	**0.125**	1.33E-02	1.33E-02	1.33E-02	9.51E-01	8.21E-04	9.91E-01	1.41E-04	9.94E-01	6.76E-05	5.28E-02	3.85E-03	4.42E-02	3.32E-04	2.98E-01	1.25E-04	1.25E-04	100.0%	Target Met
[As] [mg/L]	**0.01**	4.41E-03	3.25E-05	3.25E-05	9.89E-01	1.18E-04	9.92E-01	5.63E-07	5.06E-01	2.35E-06	1.29E-04	5.83E-04	2.09E-04	1.21E-04	7.17E-04	9.60E-07	9.60E-07	100.0%	Target Met
[B] [mg/L]	**0.5**	3.07E-01	3.07E-01	3.07E-01	2.08E-01	7.40E-01	6.14E-01	1.58E-01	1.50E-01	7.32E-01	7.56E-01	7.70E-01	7.58E-01	7.57E-01	7.72E-01	2.85E-01	2.85E-01	100.1%	Target Met
[Ba] [mg/L]	**2**	1.89E-01	1.89E-01	1.89E-01	9.35E-01	5.41E-02	1.00E+00	0.00E+00	9.38E-01	1.24E-02	7.60E-01	2.22E-01	6.65E-01	4.88E-02	4.23E+00	2.76E-03	2.76E-03	100.0%	Target Met
[Be] [mg/L]	**0.004**	2.68E-04	2.68E-04	2.68E-04	9.51E-01	4.12E-03	9.96E-01	2.49E-06	1.50E-01	3.34E-04	1.07E-03	1.93E-02	4.29E-03	4.28E-03	4.36E-03	7.61E-05	7.61E-05	99.1%	Target Met
[C] [mg/L]		4.05E+02	4.05E+02	4.05E+02	4.88E-01	2.03E+03	9.78E-01	7.01E+00	4.00E-01	1.30E+03	1.60E+03	4.98E+03	3.30E+03	2.09E+03	8.07E+03	2.94E+02	3.60E+02	100.0%	NA
[Ca] [mg/L]		4.47E+01	4.47E+01	4.47E+01	9.26E-01	2.12E+01	9.96E-01	4.77E-01	8.93E-01	5.11E+00	1.78E+02	8.61E+01	1.62E+02	2.03E+01	9.83E+02	1.51E+00	4.60E+01	100.1%	NA
[Cd] [mg/L]	**0.0025**	1.37E-04	1.37E-04	1.37E-04	9.50E-01	1.87E-05	9.99E-01	1.64E-06	9.74E-01	1.57E-06	5.44E-04	8.79E-05	4.64E-04	1.41E-05	3.07E-03	1.62E-06	1.62E-06	100.0%	Target Met
[Cl] [mg/L]	**230**	2.17E+01	2.17E+01	2.17E+01	9.40E-02	7.65E+01	9.83E-01	2.89E-01	1.33E-01	8.66E+01	8.61E+01	3.62E+01	7.74E+01	7.87E+01	7.00E+01	1.94E+01	1.94E+01	100.0%	Target Met
[Co] [mg/L]	**0.005**	2.77E-03	4.29E-05	4.29E-05	9.75E-01	9.88E-06	9.99E-01	4.57E-07	9.51E-01	3.94E-07	1.71E-04	4.81E-05	1.49E-04	8.58E-06	9.63E-04	4.43E-07	4.43E-07	100.0%	Target Met
[Cr] [mg/L]	**0.011**	5.77E-04	5.77E-04	5.77E-04	9.51E-01	2.78E-04	9.99E-01	6.15E-06	8.93E-01	2.29E-05	2.30E-03	1.31E-03	2.12E-03	2.66E-04	1.29E-02	9.87E-06	9.87E-06	100.0%	NA
[Cu] [mg/L]	**0.0093**	5.67E-03	3.47E-04	3.47E-04	9.38E-01	5.85E-05	9.91E-01	4.62E-06	9.66E-01	4.53E-06	1.38E-03	2.76E-04	1.18E-03	4.72E-05	7.76E-03	4.60E-06	4.60E-06	100.0%	Target Met
[F] [mg/L]	**2**	3.92E+00	3.92E+00	3.92E+00	6.50E-01	1.85E+01	9.81E-01	5.74E-02	4.00E-01	3.02E+00	1.56E+01	8.08E+01	2.71E+01	1.91E+01	7.35E+01	7.16E-01	7.16E-01	100.1%	Target Met
[Fe] [mg/L]	**0.3**	2.31E+00	2.43E-02	2.43E-02	9.52E-01	4.71E-03	1.00E+00	0.00E+00	9.60E-01	1.12E-03	9.77E-02	1.92E-02	8.39E-02	3.94E-03	5.47E-01	2.49E-04	2.49E-04	100.0%	Target Met
[K] [mg/L]		9.84E+00	9.84E+00	9.84E+00	5.90E-01	1.79E+01	9.94E-01	1.31E-01	6.27E-01	9.17E+00	3.91E+01	5.31E+01	4.16E+01	1.82E+01	1.77E+02	2.14E+00	2.14E+00	100.1%	NA
[Mg] [mg/L]		7.75E+01	7.75E+01	7.75E+01	9.48E-01	9.31E+01	9.96E-01	6.19E-01	7.60E-01	6.85E+00	3.09E+02	4.40E+02	3.32E+02	9.37E+01	1.71E+03	2.00E+00	2.00E+00	100.1%	NA
[Mn] [mg/L]	**0.05**	3.12E-01	4.93E-02	4.93E-02	9.59E-01	6.30E-02	1.00E+00	0.00E+00	7.45E-01	8.89E-03	1.98E-01	2.81E-01	2.13E-01	6.36E-02	1.08E+00	1.97E-03	1.97E-03	100.0%	Target Met
[Na] [mg/L]		6.98E+01	6.98E+01	6.98E+01	5.76E-01	1.10E+02	9.91E-01	9.30E-01	6.67E-01	5.81E+01	2.78E+02	3.18E+02	2.85E+02	1.11E+02	1.29E+03	1.36E+01	1.36E+01	100.1%	NA
[Ni] [mg/L]	**0.052**	1.58E-02	2.18E-03	2.18E-03	9.74E-01	4.48E-04	9.99E-01	2.32E-05	9.57E-01	1.90E-05	8.67E-03	2.17E-03	7.53E-03	3.80E-04	4.89E-02	2.23E-05	2.23E-05	100.0%	Target Met
[Pb] [mg/L]	**0.0032**	1.25E-03	1.37E-04	1.37E-04	9.72E-01	1.91E-05	9.99E-01	1.64E-06	9.73E-01	8.84E-07	5.43E-04	9.27E-05	4.64E-04	1.45E-05	3.07E-03	1.47E-06	1.47E-06	100.0%	Target Met
[Sb] [mg/L]	**0.031**	6.33E-04	6.33E-04	6.33E-04	9.51E-01	1.57E-04	9.99E-01	6.74E-06	9.47E-01	1.25E-05	2.52E-03	7.38E-04	2.21E-03	1.38E-04	1.42E-02	8.02E-06	8.02E-06	100.0%	Target Met
[Se] [mg/L]	**0.005**	5.73E-04	5.73E-04	5.73E-04	9.72E-01	7.22E-05	9.98E-01	3.81E-06	9.77E-01	2.79E-06	2.29E-03	3.52E-04	1.95E-03	5.26E-05	1.29E-02	3.59E-06	3.59E-06	100.0%	Target Met
[SiO2] [mg/L]		3.48E+01	3.48E+01	3.48E+01	2.21E-01	1.37E+01	9.94E-01	2.78E-01	9.07E-01	1.33E+01	1.39E+02	1.52E+01	1.17E+02	1.28E+01	7.21E+02	3.17E+00	3.17E+00	100.0%	NA
[SO4] [mg/L]	**10**	2.28E+02	2.28E+02	2.28E+02	9.71E-01	1.55E+02	9.93E-01	1.52E+00	8.53E-01	6.18E+00	9.10E+02	7.54E+02	8.82E+02	1.52E+02	5.11E+03	2.55E+00	2.55E+00	100.1%	Target Met
[Tl] [mg/L]	**0.00056**	1.57E-04	1.57E-04	1.57E-04	9.51E-01	3.89E-05	9.95E-01	1.67E-06	9.47E-01	3.15E-06	6.26E-04	1.83E-04	5.48E-04	3.42E-05	3.52E-03	2.00E-06	2.00E-06	100.0%	Target Met
[V] [mg/L]		4.26E-03	4.26E-03	4.26E-03	9.51E-01	2.59E-03	9.95E-01	4.54E-05	8.67E-01	2.13E-04	1.70E-02	1.22E-02	1.61E-02	2.52E-03	9.49E-02	8.27E-05	8.27E-05	100.1%	NA
[Zn] [mg/L]	**0.12**	1.16E-02	2.68E-04	2.68E-04	9.67E-01	6.64E-05	9.98E-01	3.21E-06	9.47E-01	3.40E-06	1.07E-03	3.20E-04	9.34E-04	5.85E-05	6.00E-03	3.25E-06	3.25E-06	100.0%	Target Met
[Alkalinity] [mg/L] as CaCO3	**250**	3.15E+02	3.15E+02	3.15E+02	5.10E-01	7.84E+02	9.78E-01	5.45E+00	5.00E-01	5.01E+02	1.25E+03	1.92E+03	1.37E+03	8.03E+02	4.64E+03	1.16E+02	2.27E+02	113.9%	Target Met
Hardness [mg/L]**	**100**	430.9	430.8	430.8	0.0	436.3	0.0	3.7	0.0	41.0	1718.7	2028.4	1773.8	436.5	9516.1	12.0	123.2	N/A	Target not Met
[Ionic_Strength] [M]		0.016	0.016	0.016	0.000	0.022	0.000	0.000	0.000	0.009	0.058	0.068	0.060	0.022	0.23731	0.00206	0.00524	N/A	NA
[Charge_pct_err]		0.493	0.234	0.234	0.000	-23.947	0.000	-12.302	0.000	-56.489	0.384	-3.809	-0.490	-24.541	14.53389	-53.84528	-25.38486	N/A	NA
[pH] [std units]	**6.5-8.5**	7.4	7.4	7.4	0.0	6.2	0.0	7.5	0.0	6.2	7.3	6.2	6.2	6.2	6.5	6.3	6.8	N/A	Target Met
mEQ-Na^+/mEQ-ΣCations	**0.6**	25%	26%	26%	0%	34%	0%	34%	0%	71%	25%	25%	25%	35%	22%	67%	19%	N/A	Target Met
CO2 [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	803.0	0.0	0.0	0.0	0.0	N/A	
CO2 [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2500.0	0.0	0.0	0.0	0.0	N/A	
CaCO3 [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.2	N/A	
CaCO3 [kg/day]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1100.0	N/A	

****Calculated as the sum of Ca and Mg as CaCO3**

Plant Site WWTP - Year 4
CRE Mine Year 1 Closure Scenario
09/2016

Qualities and Quantities	Preliminary Water Quality Targets	(1) Influent	(2) Green Sand Effluent	(3) RO Feed	Percent RO Rejection	(5) RO Permeate	(7) RO Concentrate	(4) NF Feed	Percent NF Rejection	(6) NF Permeate	(8) NF Concentrate	(9) NF/RO Concentrate w/CO2	Percent VSEP Rejection	(10) VSEP A Permeate	(11) VSEP A Concentrate	(14) VSEP B Permeate	(15) VSEP B Concentrate	(16)Chem Precip Influent	(17) HDS Effluent	(18) Sulfate Effluent	(19) CO2-1 Effluent	(20) CO2-2 Effluent	(12) Stabilization Influent	(13) Stabilized Effluent	Target Met?
Flow Rate, gpm		2973	2897	724		543	181	3037		2430	607	789		670	118	195	49	243	243	243	243	0	2973	2973	
[Ag] [mg/L]	0.001	1.14E-04	1.11E-04	1.11E-04	98.90%	1.63E-06	4.41E-04	2.75E-04	39.20%	3.49E-05	2.75E-04	3.13E-04	95.96%	1.48E-05	2.06E-03	3.86E-07	2.06E-03	1.00E-03	3.91E-05	7.74E-06	7.74E-06	7.72E-06	2.88E-05	2.88E-05	Target Met
[Al] [mg/L]	0.125	1.59E-02	1.55E-02	1.55E-02	99.20%	1.65E-04	6.16E-02	5.23E-02	94.40%	9.19E-04	5.23E-02	5.45E-02	99.36%	4.09E-04	3.70E-01	1.41E-06	3.70E-01	1.79E-01	1.79E-01	1.78E-01	1.78E-04	1.77E-04	7.81E-04	7.81E-04	Target Met
[As] [mg/L]	0.01	3.38E-03	2.43E-05	2.43E-05	98.70%	4.20E-07	9.62E-05	1.94E-04	98.90%	7.85E-07	1.94E-04	1.72E-04	50.60%	9.95E-05	5.94E-04	1.58E-08	5.94E-04	2.88E-04	2.61E-08	2.59E-08	2.59E-08	2.58E-08	7.18E-07	7.18E-07	Target Met
[B] [mg/L]	0.5	3.36E-01	3.28E-01	3.28E-01	61.40%	1.68E-01	8.09E-01	3.71E-01	29.20%	3.53E-01	3.71E-01	4.71E-01	15.00%	4.70E-01	4.84E-01	2.87E-01	4.84E-01	2.75E-01	2.76E-01	2.73E-01	2.73E-01	2.72E-01	3.19E-01	3.19E-01	Target Met
[Ba] [mg/L]	2	1.28E-01	1.25E-01	1.25E-01	100.00%	0.00E+00	5.03E-01	3.95E-01	90.30%	2.21E-02	3.95E-01	4.20E-01	93.75%	3.08E-02	2.69E+00	1.80E-04	2.69E+00	1.30E+00	2.35E-03	2.33E-03	2.33E-03	2.32E-03	1.81E-02	1.81E-02	Target Met
[Be] [mg/L]	0.004	3.29E-04	3.21E-04	3.21E-04	99.30%	2.99E-06	1.28E-03	1.23E-02	94.50%	2.12E-04	1.23E-02	9.76E-03	15.00%	9.73E-03	1.00E-02	3.96E-03	1.00E-02	5.41E-03	3.81E-03	3.77E-03	3.77E-03	3.77E-03	1.74E-04	1.74E-04	Target Met
[C] [mg/L]		5.08E+02	4.95E+02	4.95E+02	98.70%	8.57E+00	1.96E+03	1.81E+03	48.80%	4.73E+02	1.81E+03	2.48E+03	40.00%	1.75E+03	6.80E+03	1.26E+01	6.80E+03	3.29E+03	2.21E+01	7.20E-01	1.76E+01	1.69E+01	3.88E+02	4.25E+02	NA
[Ca] [mg/L]		5.75E+01	5.60E+01	5.60E+01	99.20%	5.97E-01	2.23E+02	1.85E+02	88.60%	1.10E+01	1.85E+02	1.94E+02	89.33%	2.42E+01	1.18E+03	2.05E+00	1.18E+03	5.87E+02	1.93E+01	6.91E+02	1.55E+01	1.55E+01	9.08E+00	3.38E+01	NA
[Cd] [mg/L]	0.0025	1.32E-04	1.28E-04	1.28E-04	99.10%	1.54E-06	5.12E-04	4.45E-04	94.40%	7.95E-06	4.45E-04	4.61E-04	97.41%	1.40E-05	3.07E-03	4.13E-07	3.07E-03	1.50E-03	1.30E-05	1.29E-05	1.29E-05	1.29E-05	6.78E-06	6.78E-06	Target Met
[Cl] [mg/L]	230	2.05E+01	2.00E+01	2.00E+01	99.00%	2.66E-01	7.96E+01	9.92E+00	9.40%	2.38E+01	9.92E+00	2.59E+01	13.33%	2.63E+01	2.36E+01	1.40E+01	2.36E+01	3.14E+02	1.32E+01	1.31E+01	1.31E+01	1.30E+01	1.95E+01	1.95E+01	Target Met
[Co] [mg/L]	0.005	2.65E-03	3.99E-05	3.99E-05	99.20%	4.25E-07	1.59E-04	1.48E-04	97.20%	1.22E-06	1.48E-04	1.51E-04	95.10%	8.66E-06	9.81E-04	1.17E-12	9.81E-04	4.75E-04	2.96E-08	1.94E-11	1.94E-11	1.93E-11	1.07E-06	1.07E-06	Target Met
[Cr] [mg/L]	0.011	5.73E-04	5.58E-04	5.58E-04	99.20%	5.95E-06	2.23E-03	4.96E-03	94.50%	8.69E-05	4.96E-03	4.33E-03	89.33%	5.42E-04	2.65E-02	8.58E-03	2.65E-02	7.05E-02	6.57E-02	6.50E-02	6.50E-02	6.49E-02	7.21E-05	7.21E-05	NA
[Cu] [mg/L]	0.0093	5.74E-03	3.42E-04	3.42E-04	99.00%	4.56E-06	1.36E-03	1.23E-03	93.80%	2.03E-05	1.23E-03	1.26E-03	96.60%	5.03E-05	8.33E-03	9.11E-05	8.33E-03	6.13E-03	2.20E-03	2.18E-03	2.17E-03	2.17E-03	1.74E-05	1.74E-05	Target Met
[F] [mg/L]	2	2.61E+00	2.54E+00	2.54E+00	98.90%	3.72E-02	1.01E+01	2.12E+01	38.60%	7.94E-01	2.12E+01	1.86E+01	40.00%	1.31E+01	5.10E+01	2.26E+00	5.10E+01	2.59E+01	2.59E+01	3.05E+00	3.05E+00	3.04E+00	6.56E-01	6.56E-01	Target Met
[Fe] [mg/L]	0.3	3.11E+00	3.19E-02	3.19E-02	100.00%	0.00E+00	1.28E-01	9.71E-02	100.00%	5.70E-03	9.71E-02	1.04E-01	96.00%	4.89E-03	6.84E-01	1.02E-04	6.84E-01	1.58E+02	2.09E-03	2.07E-03	2.07E-03	2.07E-03	4.66E-03	4.66E-03	Target Met
[K] [mg/L]		9.43E+00	9.20E+00	9.20E+00	99.00%	1.22E-01	3.66E+01	6.36E+01	59.00%	1.10E+01	6.36E+01	5.74E+01	62.67%	2.51E+01	2.46E+02	1.46E+02	2.46E+02	3.19E+02	3.20E+02	3.17E+02	3.17E+02	3.16E+02	9.00E+00	9.00E+00	NA
[Mg] [mg/L]		9.84E+01	9.59E+01	9.59E+01	99.40%	7.66E-01	3.83E+02	4.52E+02	94.60%	7.05E+00	4.52E+02	4.36E+02	76.00%	1.23E+02	2.27E+03	1.08E-03	2.27E+03	1.10E+03	2.42E+02	1.88E-01	3.65E-03	3.65E-03	5.90E+00	5.90E+00	NA
[Mn] [mg/L]	0.05	5.47E-01	8.42E-02	8.42E-02	100.00%	0.00E+00	3.38E-01	3.77E-01	91.10%	1.19E-02	3.77E-01	3.68E-01	74.53%	1.10E-01	1.88E+00	2.86E-03	1.88E+00	9.15E-01	9.16E-01	9.07E-03	9.07E-03	9.06E-03	9.76E-03	9.76E-03	Target Met
[Na] [mg/L]		6.22E+01	6.07E+01	6.07E+01	99.00%	8.08E-01	2.41E+02	3.96E+02	48.58%	7.25E+01	3.96E+02	3.60E+02	66.67%	1.41E+02	1.64E+03	9.77E+02	1.64E+03	2.39E+03	2.39E+03	2.37E+03	2.37E+03	2.37E+03	5.94E+01	5.94E+01	NA
[Ni] [mg/L]	0.052	1.36E-02	1.83E-03	1.83E-03	99.20%	1.95E-05	7.29E-03	6.72E-03	97.10%	5.88E-05	6.72E-03	6.86E-03	95.70%	3.46E-04	4.49E-02	2.64E-10	4.49E-02	2.17E-02	8.89E-07	4.97E-09	4.97E-09	4.96E-09	5.16E-05	5.16E-05	Target Met
[Pb] [mg/L]	0.0032	9.09E-04	9.67E-05	9.67E-05	99.10%	1.16E-06	3.85E-04	3.47E-04	96.90%	3.31E-06	3.47E-04	3.56E-04	97.33%	1.11E-05	2.37E-03	4.66E-08	2.37E-03	1.15E-03	1.42E-06	1.41E-06	1.41E-06	1.41E-06	2.92E-06	2.92E-06	Target Met
[Sb] [mg/L]	0.031	5.78E-04	5.63E-04	5.63E-04	99.20%	6.00E-06	2.25E-03	2.04E-03	94.50%	3.46E-05	2.04E-03	2.09E-03	94.67%	1.30E-04	1.35E-02	2.24E-05	1.35E-02	6.86E-03	6.86E-03	6.80E-03	6.80E-03	3.40E-04	3.39E-04	2.94E-05	2.94E-05	Target Met
[Se] [mg/L]	0.005	5.31E-04	5.18E-04	5.18E-04	99.50%	3.45E-06	2.07E-03	1.89E-03	96.80%	1.50E-05	1.89E-03	1.93E-03	97.70%	5.21E-05	1.29E-02	9.36E-05	1.29E-02	9.49E-03	9.50E-03	6.58E-03	3.29E-03	3.29E-03	1.29E-05	1.29E-05	Target Met
[SiO2] [mg/L]		3.48E+01	3.39E+01	3.39E+01	99.40%	2.71E-01	1.36E+02	4.62E+01	24.10%	4.05E+01	4.62E+01	6.67E+01	90.67%	7.30E+00	4.14E+02	2.48E+02	4.14E+02	2.16E+03	2.16E+03	2.15E+03	2.15E+03	2.15E+03	3.31E+01	3.31E+01	NA
[S] [mg/L]	10	251.49	245.20	245.20	99.50%	1.63	980.21	1317.22	86.70%	1.08E+01	1.32E+03	1.24E+03	8.53E-01	2.13E+02	7.24E+03	7.62E+02	7.24E+03	7.11E+03	7.93E+03	4.20E+03	4200.02	4192.36	9.14E+00	9.14E+00	Target Met
[Ti] [mg/L]	0.00056	1.27E-04	1.24E-04	1.24E-04	99.20%	1.32E-06	4.92E-04	1.26E-03	94.70%	2.17E-05	1.26E-03	1.08E-03	94.68%	6.75E-05	7.01E-03	2.65E-03	7.01E-03	4.09E-02	4.10E-02	4.03E-02	4.03E-02	4.02E-02	1.80E-05	1.80E-05	Target Met
[V] [mg/L]		3.08E-03	3.00E-03	3.00E-03	99.20%	3.20E-05	1.20E-02	1.20E-02	94.50%	2.11E-04	1.20E-02	1.20E-02	86.67%	1.88E-03	7.12E-02	7.67E-08	7.12E-02	3.44E-02	4.70E-07	4.65E-07	4.65E-07	4.64E-07	1.78E-04	1.78E-04	NA
[Zn] [mg/L]	0.12	9.20E-03	2.07E-04	2.07E-04	99.10%	2.48E-06	8.23E-04	8.94E-04	98.40%	9.51E-06	8.94E-04	8.78E-04	94.67%	5.49E-05	5.69E-03	4.07E-04	5.69E-03	8.59E-03	6.23E-03	6.17E-03	6.17E-03	6.16E-03	8.22E-06	8.22E-06	Target Met
[Alkalinity] [mg/L] as HCO3-*	250	4.83E+02	4.71E+02	4.71E+02	97.80%	4.39E+00	1.88E+03	1.99E+03	70.00%	2.12E+02	1.99E+03	1.96E+03	60.00%	2.30E+02	1.21E+04	2.81E+03	1.21E+04	8.92E+03	2.21E+03	7.75E+03	5.68E+03	5.66E+03	1.74E+02	2.49E+02	Target Met
Hardness** [mg/L]	100	548.6	534.9	534.9	0.0	4.6	2135.0	2324.0	0.0	56.5	2324.0	2281.0	0.0	566.4	12299.3	5.1	12299.3	5987.1	1042.9	1727.2	38.8	38.7	47.0	108.7	Target not Met
Ionic_Strength] [M]		0.019	0.018	0.018	0.00	0.00019	0.06606	0.07326	0.00	0.00509	0.1	0.1	0.00	0.07326	0.25490	0.06196	0.25490	0.25292	0.21683	0.21577	0.18795	0.18760	0.00420	0.00595	NA
Charge_pct_err]		0.537	0.221	0.221	0.00	6.39279	0.18908	4.03437	0.00	1.73443	4.03437	3.08311	0.00	33.71585	-9.04700	-14.97455	-9.04700	-20.84387	-24.00463	-21.64908	-24.74796	-24.74358	1.76130	1.33066	NA
[pH] [std units]	6.5-8.5	7.4	7.4	7.4	0.0	6.4	7.4	8.5	0.0	6.2	8.5	6.8	0.0	8.5	9.7	12.5	9.7	10.6	10.8	12.7	12.5	12.5	6.2	6.4	Target Met
meQ-Na^+/meQ-$\sum$Cations	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Target Met
Lime, mg/L				0%	0.00			0%	0.00		0%	0%	0.00						2263.6	3772.7					
Lime, kg/day				0%	0.00			0%	0.00		0%	0%	0.00						3000.0	5000.0					
Sulfuric Acid [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sulfuric Acid [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CO2 [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	754.5	0.0	0.0	0.0	
CO2 [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1000.0	0.0	0.0	0.0	
CaCO3 [mg/L]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61.70629118	
CaCO3 [kg/day]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1000	

*Converted from as CaCO3 to as HCO3-
**Calculated as the sum of Ca and Mg as CaCO3

Temp 7.55
286.76

Plant Site WWTP - Year 7
CRE Mine Year 1 Closure Scenario
09/2016

Qualities and Quantities	Preliminary Water Quality Targets	(1) Influent	(2) Green Sand Effluent	(3) RO Feed	Percent RO Rejection	(5) RO Permeate	(7) RO Concentrate	(4) NF Feed	Percent NF Rejection	(6) NF Permeate	(8) NF Concentrate	(9) NF/RO Concentrate w/CO2	Percent VSEP Rejection	(10) VSEP A Permeate	(11) VSEP A Concentrate	(14) VSEP B Permeate	(15) VSEP B Concentrate	(16)Chem Precip Influent	(17) HDS Effluent	(18) Sulfate Effluent	(19) CO2-1 Effluent	(20) CO2-2 Effluent	(12) Stabilization Influent	(13) Stabilized Effluent	Target Met?
Flow Rate, gpm		2941	2866	2006		1504	501	1796		1437	359	861		732	129	205	51	256	256	256	256	0	2941	2941	
[Ag] [mg/L]	0.001	2.20E-04	2.15E-04	2.15E-04	98.90%	1.14E-06	8.59E-04	3.09E-04	39.20%	6.69E-05	3.09E-04	6.30E-04	95.96%	2.99E-05	4.13E-03	6.92E-07	6.85E-05	2.09E-03	6.99E-05	1.38E-05	1.38E-05	1.38E-05	3.32E-05	3.32E-05	Target Met
[Al] [mg/L]	0.125	1.39E-02	1.35E-02	1.35E-02	99.20%	1.62E-04	5.37E-02	3.16E-02	94.40%	4.04E-04	3.16E-02	4.45E-02	99.36%	3.34E-04	3.02E-01	1.19E-06	7.72E-04	1.52E-01	1.52E-01	1.50E-01	1.51E-04	1.50E-04	2.80E-04	2.80E-04	Target Met
[As] [mg/L]	0.01	5.45E-03	3.91E-05	3.91E-05	98.70%	4.17E-07	1.56E-04	3.91E-04	98.90%	1.08E-06	3.91E-04	2.54E-04	50.60%	1.47E-04	8.77E-04	9.52E-08	4.07E-07	4.41E-04	1.57E-07	1.56E-07	1.56E-07	1.55E-07	7.41E-07	7.41E-07	Target Met
[B] [mg/L]	0.5	3.01E-01	2.94E-01	2.94E-01	61.40%	1.51E-01	7.24E-01	4.52E-01	29.20%	4.28E-01	4.52E-01	6.11E-01	15.00%	6.09E-01	6.26E-01	3.86E-01	2.84E-01	3.70E-01	3.70E-01	3.67E-01	3.67E-01	3.66E-01	2.86E-01	2.86E-01	Target Met
[Ba] [mg/L]	2	3.79E-02	3.70E-02	3.70E-02	100.00%	0.00E+00	1.48E-01	1.01E-01	90.30%	1.75E-03	1.01E-01	1.29E-01	93.75%	9.45E-03	8.25E-01	3.22E-04	2.01E-02	4.18E-01	4.20E-03	4.16E-03	4.16E-03	4.15E-03	8.56E-04	8.56E-04	Target Met
[Be] [mg/L]	0.004	4.03E-04	3.93E-04	3.93E-04	99.30%	2.09E-06	1.57E-03	3.80E-02	94.50%	4.84E-04	3.80E-02	1.68E-02	15.00%	1.67E-02	1.72E-02	9.78E-03	7.20E-03	1.00E-02	9.39E-03	9.29E-03	9.30E-03	9.27E-03	2.38E-04	2.38E-04	Target Met
[C] [mg/L]		2.49E+02	2.43E+02	2.43E+02	98.70%	7.11E+00	9.53E+02	1.97E+03	48.80%	5.13E+02	1.97E+03	2.25E+03	40.00%	1.58E+03	6.14E+03	3.66E+02	1.02E+03	3.28E+03	7.71E-01	5.14E-01	2.18E+00	4.91E+02	2.54E+02	2.92E+02	NA
[Ca] [mg/L]		6.84E+01	6.67E+01	6.67E+01	99.20%	3.55E-01	2.67E+02	2.13E+02	88.60%	4.23E+00	2.13E+02	2.44E+02	89.33%	3.06E+01	1.49E+03	1.31E+01	4.57E+02	8.30E+02	5.20E+02	1.08E+03	9.93E+01	9.90E+01	2.24E+00	2.72E+01	NA
[Cd] [mg/L]	0.0025	3.03E-04	2.96E-04	2.96E-04	99.10%	3.94E-07	1.19E-03	7.36E-04	94.40%	9.63E-06	7.36E-04	9.99E-04	97.41%	3.03E-05	6.64E-03	1.51E-06	2.36E-04	3.38E-03	4.75E-05	4.70E-05	4.71E-05	4.69E-05	4.90E-06	4.90E-06	Target Met
[Cl] [mg/L]	230	1.99E+01	1.94E+01	1.94E+01	99.00%	4.38E-01	7.64E+01	1.59E+01	9.40%	3.82E+01	1.59E+01	5.12E+01	13.33%	5.20E+01	4.66E+01	2.86E+01	1.84E+01	2.18E+02	2.70E+01	2.67E+01	2.67E+01	2.66E+01	1.89E+01	1.89E+01	Target Met
[Co] [mg/L]	0.005	6.14E-03	9.27E-05	9.27E-05	99.20%	1.23E-07	3.72E-04	2.54E-04	97.20%	1.62E-06	2.54E-04	3.23E-04	95.10%	1.86E-05	2.10E-03	1.10E-11	8.87E-10	1.05E-03	4.87E-08	1.81E-10	1.81E-10	1.80E-10	8.55E-07	8.55E-07	Target Met
[Cr] [mg/L]	0.011	1.56E-03	1.52E-03	1.52E-03	99.20%	2.03E-06	6.12E-03	2.34E-02	94.50%	2.98E-04	2.34E-02	1.33E-02	89.33%	1.67E-03	8.13E-02	3.25E-02	1.13E+00	2.52E-01	2.49E-01	2.46E-01	2.46E-01	2.45E-01	1.46E-04	1.46E-04	NA
[Cu] [mg/L]	0.0093	8.27E-02	4.93E-03	4.93E-03	99.00%	5.91E-05	1.96E-02	1.27E-02	93.80%	2.09E-04	1.27E-02	1.67E-02	96.60%	6.66E-04	1.10E-01	5.39E-04	6.39E-02	6.78E-02	1.30E-02	1.28E-02	1.28E-02	1.28E-02	1.32E-04	1.32E-04	Target Met
[F] [mg/L]	2	1.28E+00	1.25E+00	1.25E+00	98.90%	3.16E-02	4.92E+00	4.12E+00	38.60%	1.59E+00	4.12E+00	4.59E+00	40.00%	3.23E+00	1.25E+01	1.61E+00	4.49E+00	7.17E+00	7.18E+00	2.17E+00	2.18E+00	2.17E+00	7.95E-01	7.95E-01	Target Met
[Fe] [mg/L]	0.3	6.90E+00	7.08E-02	7.08E-02	100.00%	0.00E+00	2.84E-01	1.85E-01	100.00%	2.31E-03	1.85E-01	2.43E-01	96.00%	1.14E-02	1.59E+00	2.39E-04	2.39E-02	1.01E+02	4.88E-03	4.83E-03	4.83E-03	4.81E-03	1.13E-03	1.13E-03	Target Met
[K] [mg/L]		1.01E+01	9.82E+00	9.82E+00	99.00%	7.84E-02	3.92E+01	1.14E+02	59.00%	1.96E+01	1.14E+02	7.02E+01	62.67%	3.08E+01	3.01E+02	1.86E+02	1.30E+03	4.05E+02	4.06E+02	4.02E+02	4.02E+02	4.01E+02	9.62E+00	9.62E+00	NA
[Mg] [mg/L]		1.08E+02	1.05E+02	1.05E+02	99.40%	5.62E-01	4.22E+02	4.85E+02	94.60%	6.62E+00	4.85E+02	4.48E+02	76.00%	1.26E+02	2.33E+03	4.11E-03	5.43E-02	1.17E+03	3.30E+01	2.76E-01	1.39E-02	1.38E-02	3.52E+00	3.52E+00	NA
[Mn] [mg/L]	0.05	8.49E-01	1.31E-01	1.31E-01	100.00%	0.00E+00	5.25E-01	6.40E-01	91.10%	6.80E-03	6.40E-01	5.73E-01	74.53%	1.71E-01	2.92E+00	4.61E-03	5.63E-02	1.48E+00	1.48E+00	1.46E-02	1.46E-02	1.46E-02	3.32E-03	3.32E-03	Target Met
[Na] [mg/L]		5.48E+01	5.34E+01	5.34E+01	99.00%	6.40E-01	2.12E+02	5.76E+02	48.58%	1.05E+02	5.76E+02	3.64E+02	66.67%	1.42E+02	1.66E+03	1.03E+03	8.59E+03	2.50E+03	2.50E+03	2.50E+03	2.50E+03	2.49E+03	5.17E+01	5.17E+01	NA
[Ni] [mg/L]	0.052	4.77E-02	6.41E-03	6.41E-03	99.20%	8.54E-06	2.57E-02	1.73E-02	97.10%	1.15E-04	1.73E-02	2.22E-02	95.70%	1.12E-03	1.45E-01	5.31E-09	4.93E-07	7.28E-02	3.63E-06	9.98E-08	9.98E-08	9.95E-08	6.03E-05	6.03E-05	Target Met
[Pb] [mg/L]	0.0032	3.80E-03	4.05E-04	4.05E-04	99.10%	5.39E-07	1.62E-03	1.03E-03	96.90%	7.40E-06	1.03E-03	1.38E-03	97.33%	4.32E-05	9.16E-03	1.30E-06	1.98E-04	4.64E-03	3.98E-05	3.94E-05	3.94E-05	3.93E-05	3.89E-06	3.89E-06	Target Met
[Sb] [mg/L]	0.031	1.57E-03	1.54E-03	1.54E-03	99.20%	2.04E-06	6.16E-03	4.20E-03	94.50%	5.37E-05	4.20E-03	5.34E-03	94.67%	3.34E-04	3.45E-02	5.96E-05	4.41E-03	1.82E-02	1.82E-02	1.80E-02	9.03E-04	9.00E-04	2.73E-05	2.73E-05	Target Met
[Se] [mg/L]	0.005	9.98E-04	9.73E-04	9.73E-04	99.50%	2.59E-06	3.90E-03	2.55E-03	96.80%	1.83E-05	2.55E-03	3.34E-03	97.70%	9.01E-05	2.23E-02	1.68E-04	2.97E-02	1.70E-02	1.70E-02	1.18E-02	5.90E-03	5.89E-03	1.02E-05	1.02E-05	Target Met
[SiO2] [mg/L]		3.48E+01	3.39E+01	3.39E+01	99.40%	2.71E-01	1.35E+02	6.11E+01	24.10%	5.33E+01	6.11E+01	1.04E+02	90.67%	1.14E+01	6.47E+02	3.09E+02	1.25E+04	2.71E+03	2.71E+03	2.68E+03	2.68E+03	2.67E+03	2.62E+01	2.62E+01	NA
[S] [mg/L]	10	505.67	493.01	493.01	99.50%	4.60	1965.53	2073.48	86.70%	1.54E+01	2.07E+03	2.01E+03	8.53E-01	3.46E+02	1.17E+04	4.20E+02	1.02E+04	7.89E+03	4.34E+03	2.31E+03	2313.96	2306.84	9.87E+00	9.87E+00	Target Met
[Tl] [mg/L]	0.00056	1.59E-04	1.55E-04	1.55E-04	99.20%	1.03E-06	6.20E-04	1.37E-03	94.70%	1.74E-05	1.37E-03	9.32E-04	94.68%	5.82E-05	6.03E-03	1.74E-03	1.29E-01	2.71E-02	2.72E-02	2.65E-02	2.65E-02	2.64E-02	9.02E-06	9.02E-06	Target Met
[V] [mg/L]		3.11E-03	3.03E-03	3.03E-03	99.20%	2.02E-05	1.21E-02	1.04E-02	94.50%	1.33E-04	1.04E-02	1.14E-02	86.67%	1.78E-03	6.75E-02	1.93E-07	5.24E-06	3.39E-02	1.18E-06	1.17E-06	1.17E-06	1.17E-06	7.54E-05	7.54E-05	NA
[Zn] [mg/L]	0.12	1.81E-02	4.06E-04	4.06E-04	99.10%	1.08E-06	1.63E-03	2.68E-03	98.40%	2.26E-05	2.68E-03	2.06E-03	94.67%	1.29E-04	1.33E-02	2.82E-03	2.09E-01	4.56E-02	4.31E-02	4.27E-02	4.27E-02	4.26E-02	1.16E-05	1.16E-05	Target Met
[Alkalinity] [mg/L] as HCO3-*	250	2.38E+02	2.32E+02	2.32E+02	97.80%	5.57E+00	9.16E+02	1.06E+03	70.00%	2.63E+02	1.06E+03	9.77E+02	60.00%	2.29E+02	5.34E+03	1.97E+03	1.23E+04	4.82E+03	2.90E+03	6.98E+03	3.99E+03	3.97E+03	1.31E+02	2.07E+02	Target Met
Hardness** [mg/L]	100	616.3	600.9	600.9	0.0	3.2	2402.9	2530.5	0.0	37.8	2530.5	2456.7	0.0	596.4	13305.2	32.8	1142.4	6886.9	1435.1	2707.8	248.0	247.2	20.1	82.5	Target Met
Ionic_Strength] [M]		0.021	0.021	0.021	0.00	0.00023	0.07201	0.08466	0.00	0.00629	0.1	0.1	0.00	0.08466	0.32067	0.05264	0.43435	0.24968	0.16581	0.19585	0.13976	0.13537	0.00320	0.00498	NA
Charge_pct_err]		0.275	-0.394	-0.394	0.00	-36.46273	-0.06944	16.10321	0.00	0.31417	16.10321	7.56771	0.00	22.66804	3.07797	9.44679	2.04350	2.58936	3.51043	3.23646	4.20536	4.35780	-0.63943	-0.45222	NA
[pH] [std units]	6.5-8.5	7.4	7.4	7.4	0.0	6.9	7.4	6.3	0.0	6.3	6.3	6.1	0.0	6.3	6.9	12.1	10.3	8.9	11.2	12.5	12.0	11.4	6.3	6.7	Target Met
mEQ-Na^+/mEQ-$\sum$Cations	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Target Met
Lime, mg/L				0%	0.00			0%	0.00		0%	0%	0.00						5023.6	3588.3					
Lime, kg/day				0%	0.00			0%	0.00		0%	0%	0.00						7000.0	5000.0					
Sulfuric Acid [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sulfuric Acid [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CO2 [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1076.5	358.8	0.0	0.0	
CO2 [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1500.0	500.0	0.0	0.0	
CaCO3 [mg/L]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62.37769591	
CaCO3 [kg/day]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1000	

*Converted from as CaCO3 to as HCO3-
**Calculated as the sum of Ca and Mg as CaCO3

Temp 7.55
246.06

Plant Site WWTP - Year 15
With Softening and NF
09/2016

Qualities and Quantities	Preliminary Water Quality Targets	(1) Influent	(2) Green Sand Effluent	(3) RO Feed	Percent RO Rejection	(5) RO Permeate	(7) RO Concentrate	(4) NF Feed	Percent NF Rejection	(6) NF Permeate	(8) NF Concentrate	(9) NF/RO Concentrate w/CO2	Percent VSEP Rejection	(10) VSEP A Permeate	(11) VSEP A Concentrate	(14) VSEP B Permeate	(15) VSEP B Concentrate	(16)Chem Precip Influent	(17) HDS Effluent	(18) Sulfate Effluent
Flow Rate, gpm		**2534**	**2469**	**1481**		**1111**	**370**	**1779**		**1423**	**356**	**726**		**617**	**109**	**174**	**43**	**217**	**217**	**217**
[Ag] [mg/L]	**0.001**	9.02E-05	9.25E-05	9.25E-05	98.90%	1.60E-06	3.67E-04	5.53E-05	39.20%	4.48E-05	9.78E-05	2.35E-04	95.96%	1.12E-05	1.53E-03	7.20E-07	1.53E-03	7.79E-04	7.24E-05	1.44E-05
[Al] [mg/L]	**0.125**	1.37E-02	1.28E-02	1.28E-02	99.20%	1.54E-04	5.10E-02	7.23E-03	94.40%	6.23E-04	3.38E-02	4.26E-02	99.36%	3.20E-04	2.88E-01	1.13E-06	2.88E-01	1.44E-01	1.44E-01	1.43E-01
[As] [mg/L]	**0.01**	3.83E-03	3.08E-05	3.08E-05	98.70%	2.95E-06	1.15E-04	5.63E-05	98.90%	1.12E-06	2.78E-04	1.95E-04	50.60%	1.13E-04	6.71E-04	1.64E-09	6.71E-04	3.34E-04	2.70E-09	2.68E-09
[B] [mg/L]	**0.5**	2.77E-01	2.61E-01	2.61E-01	61.40%	1.50E-01	5.95E-01	3.32E-01	29.20%	3.35E-01	3.18E-01	4.60E-01	15.00%	4.59E-01	4.69E-01	2.88E-01	4.69E-01	2.75E-01	2.75E-01	2.73E-01
[Ba] [mg/L]	**2**	2.48E-02	2.42E-02	2.42E-02	100.00%	0.00E+00	9.72E-02	1.54E-02	90.30%	6.15E-03	5.25E-02	7.53E-02	93.75%	5.53E-03	4.80E-01	3.74E-04	4.80E-01	2.44E-01	4.86E-03	4.82E-03
[Be] [mg/L]	**0.004**	3.41E-04	3.35E-04	3.35E-04	99.30%	3.56E-06	1.33E-03	2.46E-03	94.50%	2.11E-04	1.14E-02	6.28E-03	15.00%	6.27E-03	6.41E-03	1.03E-03	6.41E-03	3.34E-03	9.88E-04	9.81E-04
[C] [mg/L]		4.84E+02	4.67E+02	4.67E+02	98.70%	4.48E+01	1.74E+03	8.96E+02	48.80%	5.67E+02	2.22E+03	2.15E+03	40.00%	1.63E+03	6.29E+03	7.31E+02	6.29E+03	3.53E+03	8.29E-01	4.05E-01
[Ca] [mg/L]		6.10E+01	5.82E+01	5.82E+01	99.20%	6.20E-01	2.32E+02	4.63E+01	88.60%	6.13E+00	2.08E+02	2.20E+02	89.33%	2.76E+01	1.34E+03	4.51E+01	1.34E+03	9.73E+02	5.62E+02	1.46E+03
[Cd] [mg/L]	**0.0025**	1.50E-04	2.18E-04	2.18E-04	99.10%	2.61E-06	8.68E-04	1.29E-04	94.40%	1.11E-05	6.03E-04	7.38E-04	97.41%	2.25E-05	4.89E-03	4.31E-07	4.89E-03	2.45E-03	1.35E-05	1.34E-05
[Cl] [mg/L]	**230.00**	1.38E+01	1.37E+01	1.37E+01	99.00%	1.64E-01	5.45E+01	5.24E+01	9.40%	2.36E+01	1.68E+02	1.10E+02	13.33%	1.12E+02	9.98E+01	6.10E+01	9.98E+01	4.50E+02	5.74E+01	5.69E+01
[Co] [mg/L]	**0.005**	3.79E-03	7.90E-05	7.90E-05	99.20%	9.47E-07	3.14E-04	4.94E-05	97.20%	4.25E-06	2.31E-04	2.73E-04	95.10%	1.57E-05	1.77E-03	1.30E-12	1.77E-03	8.82E-04	9.02E-08	2.15E-11
[Cr] [mg/L]	**0.011**	7.01E-04	7.37E-04	7.37E-04	99.20%	8.83E-06	2.93E-03	6.70E-04	94.50%	5.84E-05	3.12E-03	3.02E-03	89.33%	3.79E-04	1.84E-02	1.33E-03	1.84E-02	1.81E-02	1.01E-02	1.00E-02
[Cu] [mg/L]	**0.0093**	4.14E-02	3.85E-03	3.85E-03	99.00%	4.61E-05	1.53E-02	2.34E-03	93.80%	1.81E-04	1.10E-02	1.32E-02	96.60%	5.27E-04	8.67E-02	1.86E-04	8.67E-02	4.75E-02	4.46E-03	4.42E-03
[F] [mg/L]	**2**	3.10E-01	3.15E-01	3.15E-01	98.90%	0.00E+00	1.26E+00	5.67E-01	38.60%	4.78E-01	9.28E-01	1.10E+00	40.00%	7.75E-01	2.99E+00	1.27E+00	2.99E+00	2.18E+00	2.18E+00	1.70E+00
[Fe] [mg/L]	**0.3**	2.89E+00	2.84E-02	2.84E-02	100.00%	4.92E-04	1.13E-01	1.72E-02	100.00%	5.38E-03	6.49E-02	8.92E-02	96.00%	4.19E-03	5.83E-01	5.98E-05	5.83E-01	2.07E+02	1.22E-03	1.21E-03
[K] [mg/L]		7.48E+00	7.53E+00	7.53E+00	99.00%	1.30E-01	2.98E+01	1.62E+01	59.00%	1.30E+01	2.93E+01	2.96E+01	62.67%	1.30E+01	1.26E+02	7.74E+01	1.26E+02	1.69E+02	1.69E+02	1.67E+02
[Mg] [mg/L]		9.28E+01	8.71E+01	8.71E+01	99.40%	8.12E-01	3.47E+02	8.47E+01	94.60%	7.30E+00	3.96E+02	3.71E+02	76.00%	1.05E+02	1.92E+03	1.11E-01	1.92E+03	9.57E+02	4.19E+02	3.74E-01
[Mn] [mg/L]	**0.05**	8.26E-01	1.22E-01	1.22E-01	100.00%	2.12E-03	4.85E-01	1.16E-01	91.10%	3.60E-02	4.39E-01	4.63E-01	74.53%	1.38E-01	2.35E+00	3.69E-03	2.35E+00	1.18E+00	1.18E+00	1.17E-02
[Na] [mg/L]		3.63E+01	3.65E+01	3.65E+01	99.00%	6.32E-01	1.45E+02	7.78E+01	48.58%	6.27E+01	1.38E+02	1.41E+02	66.67%	5.53E+01	6.41E+02	3.92E+02	6.41E+02	9.56E+02	9.57E+02	9.50E+02
[Ni] [mg/L]	**0.052**	3.12E-02	6.08E-03	6.08E-03	99.20%	7.29E-05	2.42E-02	3.74E-03	97.10%	3.23E-04	1.75E-02	2.09E-02	95.70%	1.06E-03	1.36E-01	2.86E-10	1.36E-01	6.79E-02	3.44E-06	5.36E-09
[Pb] [mg/L]	**0.0032**	2.13E-03	2.30E-04	2.30E-04	99.10%	2.75E-06	9.13E-04	1.36E-04	96.90%	1.17E-05	6.35E-04	7.77E-04	97.33%	2.44E-05	5.15E-03	2.13E-08	5.15E-03	2.57E-03	6.49E-07	6.44E-07
[Sb] [mg/L]	**0.031**	1.03E-03	1.39E-03	1.39E-03	99.20%	1.67E-05	5.54E-03	8.83E-04	94.50%	7.61E-05	4.13E-03	4.85E-03	94.67%	3.03E-04	3.12E-02	5.36E-05	3.12E-02	1.63E-02	1.63E-02	1.62E-02
[Se] [mg/L]	**0.005**	5.00E-04	5.46E-04	5.46E-04	99.50%	5.09E-06	2.18E-03	3.30E-04	96.80%	2.80E-05	1.54E-03	1.87E-03	97.70%	5.04E-05	1.24E-02	9.31E-05	1.24E-02	9.40E-03	9.40E-03	6.53E-03
[SiO2] [mg/L]		3.48E+01	3.47E+01	3.47E+01	99.40%	3.70E-01	1.38E+02	5.17E+01	24.10%	5.07E+01	5.14E+01	9.58E+01	90.67%	1.05E+01	5.91E+02	2.95E+02	5.91E+02	2.56E+03	2.56E+03	2.55E+03
[S] [mg/L]	**10.00**	214.41	204.55	204.55	99.50%	1.91	815.63	190.70	86.70%	1.62E+01	8.92E+02	8.53E+02	8.53E-01	1.47E+02	4.95E+03	2.67E+02	4.95E+03	3.73E+03	3.68E+03	1.47E+03
[Tl] [mg/L]	**0.00056**	6.01E-05	6.03E-05	6.03E-05	99.20%	5.62E-07	2.41E-04	1.12E-04	94.70%	9.42E-06	5.05E-04	3.70E-04	94.68%	2.31E-05	2.38E-03	7.21E-04	2.38E-03	1.11E-02	1.11E-02	1.09E-02
[V] [mg/L]		1.52E-03	1.84E-03	1.84E-03	99.20%	1.96E-05	7.35E-03	1.40E-03	94.50%	1.23E-04	6.54E-03	6.95E-03	86.67%	1.09E-03	4.10E-02	8.39E-09	4.10E-02	2.04E-02	5.12E-08	5.08E-08
[Zn] [mg/L]	**0.12**	8.62E-03	3.34E-04	3.34E-04	99.10%	3.11E-06	1.33E-03	2.22E-04	98.40%	1.91E-05	1.04E-03	1.19E-03	94.67%	7.43E-05	7.64E-03	1.06E-04	7.64E-03	5.34E-03	1.62E-03	1.61E-03
[Alkalinity] [mg/L] as HCO3-*	**250**	4.60E+02	4.34E+02	4.34E+02	97.80%	5.78E+00	1.73E+03	4.50E+02	70.00%	1.56E+02	1.62E+03	1.67E+03	60.00%	3.93E+02	9.10E+03	7.48E+02	9.10E+03	5.85E+03	2.42E+03	5.83E+03
Hardness [mg/L]**	**100**	534.5	504.2	504.2	0.0	4.9	2009.8	464.4	0.0	45.4	2148.5	2077.8	0.0	499.6	11244.5	113.2	11244.5	6370.3	3129.9	3640.1
[Ionic_Strength] [M]		0.017	0.017	0.017	0.00	0.00020	0.05867	0.01744	0.00	0.00434	0.1	0.1	0.00	0.06286	0.21130	0.02317	0.21130	0.16791	0.13158	0.15043
[Charge_pct_err]		0.608	0.397	0.397	0.00	-3.80232	0.47947	0.93392	0.00	5.03932	-0.21273	0.12932	0.00	0.11402	0.22913	4.30079	0.22913	-4.25356	-5.46812	-4.49437
[pH] [std units]	**6.5-8.5**	7.4	7.3	7.3	0.0	5.5	7.6	6.3	0.0	5.9	6.6	6.7	0.0	6.6	9.1	8.1	9.1	9.1	10.6	12.4
mEQ-Na^+/mEQ-∑Cations	**60%**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lime, mg/L				0%	0.00			0%	0.00		0%	0%	0.00						3376.0	2532.0
Lime, kg/day				0%	0.00			0%	0.00		0%	0%	0.00						4000.0	3000.0
Sulfuric Acid [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfuric Acid [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO2 [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO2 [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	500.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CaCO3 [mg/L]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CaCO3 [kg/day]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

***Converted from as CaCO3 to as HCO3-**

****Calculated as the sum of Ca and Mg as CaCO3**

Mine Site WWTF - Year 2
CRE Mine Year 1 Closure Scenario
09/2016

Chem Precip Concentrations	Water Quality Targets (mg/L)	West EQ (12)	From Plant Site to HDS (2)	Media Filtration Backwash Solids	From VSEP A (4)	From VSEP B (5)	Combined HDS Influent (13)	HDS Effluent (14)	Sulfate Effluent (15)	pH Adjustment Effluent 1 (16)	pH Adjustment Effluent 2 (17)	Combined Discharge (18)	Effluent Target Met?
Flow Rate, GPM		82	81	5	7	31	206	206	206	206	206	350	
[Ag] [mg/L]	0.001	5.76E-03	2.72E-03	2.52E-06	2.51E-05	1.30E-02	5.32E-03	2.63E-03	2.63E-03	2.65E-03	2.64E-03	4.12E-04	Target Met
[Al] [mg/L]	0.125	7.33E+01	3.06E-01	1.30E-03	3.21E-02	1.48E-01	2.96E+01	2.91E+01	2.91E-02	2.93E-02	2.92E-02	4.24E-03	Target Met
[As] [mg/L]	0.01	1.10E-01	7.36E-04	1.18E+00	1.69E-01	8.56E-06	7.80E-02	3.32E-06	3.32E-06	3.35E-06	3.34E-06	3.36E-03	Target Met
[B] [mg/L]	0.5	2.53E-01	7.93E-01	8.90E-02	1.37E-01	4.93E-01	4.91E-01	4.83E-01	4.83E-01	4.87E-01	4.86E-01	2.86E-01	Target Met
[Ba] [mg/L]	2	3.38E-02	4.35E+00	2.11E-02	4.77E-01	2.14E-02	1.72E+00	4.42E-03	4.42E-03	4.46E-03	4.45E-03	2.30E-03	Target Met
[Be] [mg/L]	0.004	3.67E-03	4.48E-03	2.60E-04	2.33E-03	2.14E-03	3.63E-03	1.16E-03	1.16E-03	1.17E-03	1.17E-03	5.91E-04	Target Met
[C] [mg/L]		3.56E+03	8.29E+03	1.34E+03	1.59E+04	7.38E+02	5.34E+03	9.08E-01	4.00E-01	5.40E-01	4.85E+02	1.31E+03	NA
[Ca] [mg/L]		4.03E+02	1.01E+03	3.11E+02	6.84E+03	2.01E+03	1.08E+03	5.29E+02	1.39E+03	4.21E+02	4.20E+02	9.64E+01	NA
[Cd] [mg/L]	0.0051	3.32E-02	3.15E-03	6.77E-02	5.20E-03	1.20E-03	1.65E-02	2.40E-04	2.40E-04	2.42E-04	2.42E-04	4.48E-05	Target Met
[Cl] [mg/L]	230	1.39E+00	7.18E+01	9.94E-01	3.19E-01	1.78E+02	1.03E+02	5.45E+01	2.69E+02	2.71E+02	2.70E+02	1.44E+02	Target Met
[Co] [mg/L]	0.005	2.67E+00	9.89E-04	4.58E+00	4.61E-02	2.13E-07	1.18E+00	2.28E-04	4.39E-08	4.43E-08	4.42E-08	7.49E-05	Target Met
[Cr] [mg/L]	0.011	9.24E-03	1.32E-02	8.30E-03	1.89E-01	7.26E-02	2.66E-02	1.56E-02	1.56E-02	1.57E-02	1.57E-02	3.40E-03	Target Met
[Cu] [mg/L]	0.03	4.76E+00	7.95E-03	9.94E+00	4.05E-01	2.03E-02	2.17E+00	4.14E-03	4.13E-03	4.16E-03	4.15E-03	1.00E-03	Target Met
[F] [mg/L]	2	1.70E+00	7.54E+01	1.90E+00	1.00E+01	4.47E+00	3.11E+01	3.05E+01	1.69E+00	1.70E+00	1.70E+00	1.40E+00	Target Met
[Fe] [mg/L]	0.3	5.34E+01	5.61E-01	2.06E+00	1.44E-02	5.32E-03	4.65E+01	1.08E-03	1.08E-03	1.09E-03	1.08E-03	1.78E-04	Target Met
[K] [mg/L]		3.58E+01	1.82E+02	3.69E+01	3.90E+02	7.02E+02	2.05E+02	2.02E+02	2.02E+02	2.04E+02	2.03E+02	6.91E+01	NA
[Mg] [mg/L]		1.76E+02	1.76E+03	6.47E+01	1.30E+03	3.69E-01	8.01E+02	5.21E+02	3.39E-01	9.03E-02	9.01E-02	7.98E+00	NA
[Mn] [mg/L]	0.05	5.59E+00	1.10E+00	7.81E+00	2.17E-01	1.15E-01	2.88E+00	2.83E-02	2.83E-02	2.86E-02	2.85E-02	8.25E-03	Target Met
[Na] [mg/L]		9.05E+01	1.32E+03	8.23E+01	5.83E+02	2.75E+03	9.90E+02	9.72E+02	9.72E+02	9.81E+02	9.78E+02	3.65E+02	NA
[Ni] [mg/L]	0.113	1.34E+01	5.02E-02	6.34E+01	6.69E+00	4.10E-06	7.15E+00	6.56E-04	8.39E-07	8.47E-07	8.44E-07	1.00E-02	Target Met
[Pb] [mg/L]	0.0102	8.68E-02	3.15E-03	5.52E-02	4.37E-03	6.23E-05	3.75E-02	1.24E-05	1.24E-05	1.26E-05	1.25E-05	6.29E-06	Target Met
[Sb] [mg/L]	0.031	2.05E-01	1.46E-02	3.53E-02	8.41E-01	2.93E-02	1.22E-01	1.20E-01	6.00E-03	6.05E-03	6.03E-03	2.73E-03	Target Met
[Se] [mg/L]	0.005	4.16E-02	1.33E-02	9.93E-04	2.40E-02	5.07E-02	3.04E-02	2.09E-02	1.04E-02	1.05E-02	1.05E-02	1.76E-03	Target Met
[SiO2] [mg/L]		5.44E+01	7.40E+02	5.40E+01	3.17E+02	4.79E+03	1.03E+03	1.02E+03	1.01E+03	1.02E+03	1.02E+03	2.00E+02	NA
[SO4] [mg/L]	250	2.25E+03	5.25E+03	3.07E+02	6.85E+03	7.22E+03	4.29E+03	3.97E+03	1.44E+03	1.46E+03	1.45E+03	2.43E+02	Target Met
[Tl] [mg/L]	0.056	4.49E-04	3.62E-03	1.86E-05	4.43E-04	2.64E-02	5.51E-03	5.41E-03	5.40E-03	5.45E-03	5.43E-03	8.71E-04	Target Met
[V] [mg/L]		1.05E-02	9.75E-02	8.91E-03	1.98E-01	3.14E-06	4.91E-02	6.88E-07	6.88E-07	6.95E-07	6.93E-07	7.27E-04	NA
[Zn] [mg/L]	0.26	2.98E+00	6.16E-03	3.86E+00	5.82E-02	2.76E+00	1.71E+00	5.71E-01	5.71E-01	5.76E-01	5.74E-01	9.44E-02	Target Met
[Alkalinity] [mg/L as HCO3-]		2.06E+02	8.21E+03	1.14E+03	1.92E+04	7.95E+02	4,025	1,264	4,222	1,311	1.31E+03	913	NA
[Ionic_Strength] [mg/L]		0.06	0.25	0.00	0.35	0.21	0.18	0.13	0.13	0.08	0.07	0.03	NA
[Charge_pct_err] [mg/L]		**0.07**	**2.20**	**0.00**	**5.58**	**23.89**	**5.78**	**8.26**	**7.22**	**8.27**	**8.96**	**-2.26**	NA
[pH] [mg/L]		4.99	7.49	7.00	8.44	7.67	6.58	10.57	12.45	11.48	9.74	6.61	NA
Hardness	250.00	1728.0	9764.4	1042.4	22406.4	5012.1	6004.6	3463.0	3478.1	1051.4	1048.4	273.5	Target not Met
Sodium Ratio	60%	7.71%	22.34%	13.14%	5.24%	50.26%	24.66%	35.25%	36.13%	61.91%	61.91%	68.68%	Target not Met
Ferrihydrite [mg/L]		0						2666					
Lime [mg/L]		0						4443	3110				
Lime [kg/d]		0						5000	3500				
Sulfuric Acid [mg/L]		0											
Sulfuric Acid [kg/d]		0											
CO2 [mg/L]		0								1066	355		
CO2 [kg/d]		0								1200	400		
Ferric Sulfate [mg/L]								178	0				
Ferric Sulfage [kg/day]								200	0				
FeRT/HRT		0											

Filtration Concentrations	Water Quality Targets (mg/L)	East EQ Influent (1)	Media Filtration Permeate (2)	Media Filtration Aggregate Backwash (3)	Media Filtration Backwash Decant	NF Permeate (4)	NFConcentrate (5)	NF_Conc w Acid (6)	VSEP A Permeate (7)	VSEP A Concentrate (9)	VSEP B Permeate (10)	VSEP B Concentrate (11)	
Flow Rate, GPM		191.8	182.2	9.6	4.8	145.8	36.4	36.4	29.2	7.3	125.5	31.4	193.4
[Ag] [mg/L]	0.001	2.53E-06	2.53E-06	2.52E-06	2.52E-06	1.92E-06	5.00E-06	5.01E-06	2.00E-07	2.51E-05	1.05E-04	1.30E-02	
[Al] [mg/L]	0.125	1.31E-03	1.31E-03	1.30E-03	1.30E-03	9.12E-05	6.21E-03	6.22E-03	3.88E-05	3.21E-02	1.82E-04	1.48E-01	
[As] [mg/L]	10	4.28E-02	1.29E-02	6.96E-01	2.16E-01	1.77E-04	6.43E-02	6.45E-02	3.97E-02	1.69E-01	2.06E-06	8.56E-06	
[B] [mg/L]	0.5	8.93E-02	8.93E-02	8.90E-02	8.90E-02	7.89E-02	1.31E-01	1.32E-01	1.31E-01	1.37E-01	4.85E-01	4.93E-01	
[Ba] [mg/L]	2	2.12E-02	2.12E-02	2.11E-02	2.11E-02	2.57E-03	9.65E-02	9.67E-02	6.03E-03	4.77E-01	2.77E-04	2.14E-02	
[Be] [mg/L]	0.004	2.61E-04	2.61E-04	2.60E-04	2.60E-04	1.79E-05	1.24E-03	1.25E-03	9.94E-04	2.33E-03	9.35E-04	2.14E-03	
[C] [mg/L]		1.34E+03	1.34E+03	1.34E+03	1.34E+03	8.57E+02	3.30E+03	1.02E+04	8.89E+03	1.59E+04	4.24E+02	7.38E+02	
[Ca] [mg/L]		3.12E+02	3.12E+02	3.11E+02	3.11E+02	4.44E+01	1.39E+03	1.40E+03	9.93E+01	6.84E+03	2.98E+01	2.01E+03	
[Cd] [mg/L]	0.0051	1.95E-03	2.15E-04	3.66E-02	5.49E-03	1.50E-05	1.02E-03	1.02E-03	2.68E-05	5.20E-03	6.32E-06	1.20E-03	
[Cl] [mg/L]	230	9.97E-01	9.97E-01	9.94E-01	9.94E-01	1.13E+00	4.72E-01	4.73E-01	5.13E-01	3.19E-01	2.93E+02	1.78E+02	
[Co] [mg/L]	0.005	1.20E-01	1.90E-03	2.37E+00	1.54E-01	6.64E-05	9.32E-03	9.34E-03	5.71E-04	4.61E-02	2.70E-09	2.13E-07	
[Cr] [mg/L]	0.011	8.33E-03	8.33E-03	8.30E-03	8.30E-03	5.71E-04	3.97E-02	3.97E-02	4.21E-03	1.89E-01	1.66E-03	7.26E-02	
[Cu] [mg/L]	0.02	2.72E-01	1.71E-02	5.25E+00	5.68E-01	1.32E-03	8.08E-02	8.09E-02	3.43E-03	4.05E-01	1.76E-04	2.03E-02	
[F] [mg/L]	2	1.90E+00	1.90E+00	1.90E+00	1.90E+00	1.46E+00	3.70E+00	3.71E+00	2.22E+00	1.00E+01	1.02E+00	4.47E+00	
[Fe] [mg/L]	0.3	5.36E-02	5.67E-04	1.06E+00	6.37E-02	1.09E-19	2.86E-03	2.86E-03	1.14E-04	1.44E-02	4.33E-05	5.32E-03	
[K] [mg/L]		3.70E+01	3.70E+01	3.69E+01	3.69E+01	1.89E+01	1.10E+02	1.10E+02	4.37E+01	3.90E+02	8.05E+01	7.02E+02	
[Mg] [mg/L]		6.49E+01	6.49E+01	6.47E+01	6.47E+01	4.37E+00	3.09E+02	3.10E+02	7.42E+01	1.30E+03	2.15E-02	3.69E-01	
[Mn] [mg/L]	0.05	2.12E-01	1.14E-02	4.11E+00	4.11E-01	1.27E-03	5.24E-02	5.25E-02	1.34E-02	2.17E-01	7.21E-03	1.15E-01	
[Na] [mg/L]		8.26E+01	8.26E+01	8.23E+01	8.23E+01	5.30E+01	2.02E+02	2.03E+02	1.13E+02	5.83E+02	5.44E+02	2.75E+03	
[Ni] [mg/L]	0.113	1.90E+00	2.75E-01	3.48E+01	6.27E+00	9.94E-03	1.35E+00	1.35E+00	7.23E-02	6.69E+00	4.53E-08	4.10E-06	
[Pb] [mg/L]	0.0102	1.59E-03	1.75E-04	2.99E-02	4.48E-03	6.77E-06	8.55E-04	8.57E-04	1.92E-05	4.37E-03	2.81E-07	6.23E-05	
[Sb] [mg/L]	0.031	3.55E-02	3.55E-02	3.53E-02	3.53E-02	2.43E-03	1.69E-01	1.69E-01	9.07E-03	8.41E-01	3.24E-04	2.93E-02	
[Se] [mg/L]		9.96E-04	9.96E-04	9.93E-04	9.93E-04	3.98E-05	4.86E-03	4.87E-03	2.98E-04	2.40E-02	6.42E-04	5.07E-02	
[SiO2] [mg/L]		5.42E+01	5.42E+01	5.40E+01	5.40E+01	5.13E+01	6.58E+01	6.59E+01	6.13E+00	3.17E+02	9.49E+01	4.79E+03	
[SO4] [mg/L]	250	3.08E+02	3.08E+02	3.07E+02	3.07E+02	5.10E+01	1.34E+03	1.35E+03	3.36E+01	6.85E+03	3.62E+01	7.22E+03	
[Tl] [mg/L]	0.056	1.87E-05	1.87E-05	1.86E-05	1.86E-05	1.23E-06	8.91E-05	8.93E-05	4.79E-06	4.43E-04	2.91E-04	2.64E-02	
[V] [mg/L]		8.94E-03	8.94E-03	8.91E-03	8.91E-03	6.13E-04	4.26E-02	4.26E-02	5.69E-03	1.98E-01	9.25E-08	3.14E-06	
[Zn] [mg/L]	0.26	1.02E-01	2.38E-03	2.00E+00	1.44E-01	4.75E-05	1.18E-02	1.18E-02	7.51E-04	5.82E-02	3.65E-02	2.76E+00	
[Alkalinity] [mg/L as HCO3-]		1.14E+03	1.14E+03	1.14E+03	1.14E+03	2.85E+02	4.60E+03	4.61E+03	1.15E+03	1.92E+04	1.43E+03	7.95E+02	
[Ionic_Strength] [mg/L]		3.24E-02	3.24E-02	0.00E+00	0.00E+00	7.04E-03	9.05E-02	1.19E-01	2.25E-02	3.53E-01	3.37E-02	2.13E-01	
[Charge_pct_err] [mg/L]		**0.67**	**0.50**	**0.00**	**0.00**	**-4.40**	**2.66**	**1.86**	**-7.44**	**5.58**	**-9.64**	**23.89**	
[pH] [mg/L]		6.96	6.96	7.00	7.00	5.99	9.11	6.08	5.44	8.44	11.81	7.67	
Hardness	250 mg/L as CaCO3	1045.8	1045.8	1042.4	1042.4	128.8	4750.7	4760.5	553.1	22406.4	74.4	5012.1	
Sodium Ratio	60% of Cations	14.08%	14.11%	13.57%	14.03%	42.97%	8.25%	8.25%	28.69%	5.24%	86.96%	50.26%	
Ferrihydrite [mg/L]													
Lime [mg/L]		0	0	0		0	0	0	0	0	0	0	
Lime [kg/d]		0	0	0		0	0	0	0	0	0	0	
Sulfuric Acid [mg/L]		0	0	0		0	0	0	0	0	0	0	
Sulfuric Acid [kg/d]		0	0	0		0	0	0	0	0	0	0	
CO2 [mg/L]		0	0	0		0	0	5034.238209	0	0	0	0	
CO2 [kg/d]		0	0	0		0	0	1000	0	0	0	0	

Mine Site WWTF - Year 4
CRE MY1 Closure Scenario
09/2016

Qualities and Quantities	Preliminary Water Quality Targets	(1) Influent	(2) Green Sand Effluent	(3) RO Feed	Percent RO Rejection	(5) RO Permeate	(7) RO Concentrate	(4) NF Feed	Percent NF Rejection	(6) NF Permeate	(8) NF Concentrate	(9) NF/RO Concentrate w/CO2	Percent VSEP Rejection	(10) VSEP A Permeate	(11) VSEP A Concentrate	(14) VSEP B Permeate	(15) VSEP B Concentrate	(16)Chem Precip Influent	(17) HDS Effluent	(18) Sulfate Effluent	(19) CO2-1 Effluent	(20) CO2-2 Effluent	(12) Stabilization Influent	(13) Stabilized Effluent	Target Met?
Flow Rate, gpm		886	863	0		0	0	1107		886	221	221		188	33	56	14	70	70	70	70	0	886	886	
[Ag] [mg/L]	0.001	1.63E-04	1.59E-04	0.00E+00	98.90%	0.00E+00	0.00E+00	2.34E-04	39.20%	9.93E-05	2.34E-04	2.34E-04	95.96%	1.11E-05	1.55E-03	8.95E-06	1.55E-03	9.16E-04	9.16E-04	1.82E-04	1.82E-04	1.82E-04	9.93E-05	9.93E-05	Target Met
[Al] [mg/L]	0.125	5.59E-04	5.45E-04	0.00E+00	99.20%	0.00E+00	0.00E+00	2.03E-03	94.40%	3.04E-05	2.03E-03	2.03E-03	99.36%	1.52E-05	1.39E-02	5.14E-08	1.39E-02	6.64E-03	6.65E-03	6.59E-03	6.59E-06	6.59E-06	3.04E-05	3.04E-05	Target Met
[As] [mg/L]	0.01	7.56E-02	5.43E-04	0.00E+00	98.70%	0.00E+00	0.00E+00	5.61E-03	98.90%	1.40E-05	5.61E-03	5.61E-03	50.60%	3.24E-03	1.96E-02	4.18E-03	1.96E-02	1.24E-02	7.00E-03	6.93E-03	6.93E-03	6.94E-03	1.40E-05	1.40E-05	Target Met
[B] [mg/L]	0.5	9.17E-02	8.94E-02	0.00E+00	61.40%	0.00E+00	0.00E+00	1.43E-01	29.20%	8.70E-02	1.43E-01	1.43E-01	15.00%	1.42E-01	1.48E-01	8.52E-02	1.48E-01	8.29E-02	8.29E-02	8.22E-02	8.22E-02	8.23E-02	8.70E-02	8.70E-02	Target Met
[Ba] [mg/L]	2	1.74E-02	1.70E-02	0.00E+00	100.00%	0.00E+00	0.00E+00	6.33E-02	90.30%	1.86E-03	6.33E-02	6.33E-02	93.75%	4.63E-03	4.10E-01	1.88E-04	4.10E-01	1.98E-01	2.49E-03	2.47E-03	2.47E-03	2.47E-03	1.86E-03	1.86E-03	Target Met
[Be] [mg/L]	0.004	3.65E-04	3.55E-04	0.00E+00	99.30%	0.00E+00	0.00E+00	5.89E-03	94.50%	8.80E-05	5.89E-03	5.89E-03	15.00%	5.86E-03	6.10E-03	2.66E-05	6.10E-03	2.91E-03	2.59E-05	2.56E-05	2.56E-05	2.56E-05	8.80E-05	8.80E-05	Target Met
[C] [mg/L]		1.73E+03	1.68E+03	0.00E+00	98.70%	0.00E+00	0.00E+00	5.15E+03	48.80%	1.42E+03	5.15E+03	5.20E+03	40.00%	3.65E+03	1.44E+04	4.67E+03	1.44E+04	9.38E+03	6.26E+03	6.21E+03	6.38E+03	6.39E+03	1.42E+03	1.42E+03	NA
[Ca] [mg/L]		1.41E+02	1.37E+02	0.00E+00	99.20%	0.00E+00	0.00E+00	5.50E+02	88.60%	1.53E+01	5.50E+02	5.50E+02	89.33%	6.87E+01	3.39E+03	5.45E+01	3.39E+03	2.01E+03	4.23E+02	4.19E+02	4.19E+02	4.19E+02	1.53E+01	1.53E+01	NA
[Cd] [mg/L]	0.0025	7.01E-03	6.83E-03	0.00E+00	99.10%	0.00E+00	0.00E+00	3.08E-02	94.40%	4.60E-04	3.08E-02	3.08E-02	97.41%	9.33E-04	2.07E-01	2.23E-02	2.07E-01	7.17E-01	7.17E-01	7.07E-01	7.07E-01	7.08E-01	4.60E-04	4.60E-04	Target Met
[Cl] [mg/L]	230.00	5.98E+01	5.83E+01	0.00E+00	99.00%	0.00E+00	0.00E+00	2.38E+01	9.40%	5.67E+01	2.38E+01	2.38E+01	13.33%	2.41E+01	2.19E+01	1.26E+01	2.19E+01	4.69E+01	1.20E+01	1.19E+01	1.19E+01	1.19E+01	5.67E+01	5.67E+01	Target Met
[Co] [mg/L]	0.005	2.91E-01	4.40E-03	0.00E+00	99.20%	0.00E+00	0.00E+00	2.41E-02	97.20%	1.78E-04	2.41E-02	2.41E-02	95.10%	1.38E-03	1.58E-01	2.86E-02	1.58E-01	4.83E-01	4.83E-01	4.79E-01	4.79E-01	4.79E-01	1.78E-04	1.78E-04	Target Met
[Cr] [mg/L]	0.011	6.00E-03	5.84E-03	0.00E+00	99.20%	0.00E+00	0.00E+00	2.68E-02	94.50%	4.02E-04	2.68E-02	2.68E-02	89.33%	3.35E-03	1.66E-01	1.06E-02	1.66E-01	1.52E-01	1.45E-01	8.11E-02	8.11E-02	8.11E-02	4.02E-04	4.02E-04	NA
[Cu] [mg/L]	0.0093	4.10E+00	2.45E-01	0.00E+00	99.00%	0.00E+00	0.00E+00	9.55E-01	93.80%	1.56E-02	9.55E-01	9.55E-01	96.60%	3.79E-02	6.36E+00	9.45E-02	6.36E+00	5.25E+00	2.31E+00	2.29E+00	2.29E+00	2.28E+00	1.56E-02	1.56E-02	Target not Met
[F] [mg/L]	2	2.16E+00	2.10E+00	0.00E+00	98.90%	0.00E+00	0.00E+00	4.59E+00	38.60%	2.04E+00	4.59E+00	4.59E+00	40.00%	3.23E+00	1.27E+01	7.28E+00	1.27E+01	1.00E+01	1.00E+01	9.95E+00	9.95E+00	9.96E+00	2.04E+00	2.04E+00	Target not Met
[Fe] [mg/L]	0.3	8.57E-02	8.80E-04	0.00E+00	100.00%	0.00E+00	0.00E+00	3.62E-03	100.00%	0.00E+00	3.62E-03	3.62E-03	96.00%	1.70E-04	2.40E-02	8.25E-05	2.40E-02	1.83E+01	1.71E-03	1.69E-03	1.69E-03	1.69E-03	0.00E+00	0.00E+00	Target Met
[K] [mg/L]		4.14E+01	4.04E+01	0.00E+00	99.00%	0.00E+00	0.00E+00	1.92E+02	59.00%	3.55E+01	1.92E+02	1.92E+02	62.67%	8.38E+01	8.31E+02	4.45E+02	8.31E+02	9.86E+02	9.86E+02	9.78E+02	9.78E+02	9.78E+02	3.55E+01	3.55E+01	NA
[Mg] [mg/L]		5.40E+01	5.26E+01	0.00E+00	99.40%	0.00E+00	0.00E+00	6.19E+02	94.60%	8.72E+00	6.19E+02	6.19E+02	76.00%	1.74E+02	3.25E+03	1.38E+03	3.25E+03	4.78E+03	4.78E+03	4.72E+03	4.73E+03	4.73E+03	8.72E+00	8.72E+00	NA
[Mn] [mg/L]	0.05	5.80E-01	4.63E-01	0.00E+00	100.00%	0.00E+00	0.00E+00	2.38E+00	91.10%	1.33E-02	2.38E+00	2.38E+00	74.53%	7.09E-01	1.22E+01	1.81E-02	1.22E+01	5.87E+00	5.88E+00	5.82E-02	5.82E-02	5.83E-02	1.33E-02	1.33E-02	Target Met
[Na] [mg/L]		1.90E+02	1.85E+02	0.00E+00	99.00%	0.00E+00	0.00E+00	6.13E+02	48.58%	1.68E+02	6.13E+02	6.13E+02	66.67%	2.39E+02	2.83E+03	1.50E+03	2.83E+03	3.73E+03	3.73E+03	3.69E+03	3.69E+03	3.70E+03	1.68E+02	1.68E+02	NA
[Ni] [mg/L]	0.052	2.92E+00	3.93E-01	0.00E+00	99.20%	0.00E+00	0.00E+00	2.07E+00	97.10%	1.53E-02	2.07E+00	2.07E+00	95.70%	1.04E-01	1.37E+01	2.23E+00	1.37E+01	4.30E+01	4.29E+01	4.25E+01	4.26E+01	4.26E+01	1.53E-02	1.53E-02	Target Met
[Pb] [mg/L]	0.0032	2.12E-03	2.26E-04	0.00E+00	99.10%	0.00E+00	0.00E+00	9.31E-04	96.90%	7.37E-06	9.31E-04	9.31E-04	97.33%	2.91E-05	6.26E-03	2.03E-04	6.26E-03	8.62E-03	6.31E-03	6.25E-03	6.25E-03	6.25E-03	7.37E-06	7.37E-06	Target Met
[Sb] [mg/L]	0.031	3.93E-02	3.84E-02	0.00E+00	99.20%	0.00E+00	0.00E+00	1.50E-01	94.50%	2.25E-03	1.50E-01	1.50E-01	94.67%	9.36E-03	9.81E-01	1.58E-03	9.81E-01	4.91E-01	4.91E-01	4.86E-01	2.43E-02	2.43E-02	2.25E-03	2.25E-03	Target Met
[Se] [mg/L]	0.005	6.04E-03	5.89E-03	0.00E+00	99.50%	0.00E+00	0.00E+00	2.32E-02	96.80%	1.90E-04	2.32E-02	2.32E-02	97.70%	6.24E-04	1.57E-01	1.10E-03	1.57E-01	1.13E-01	1.13E-01	7.86E-02	3.93E-02	3.93E-02	1.90E-04	1.90E-04	Target Met
[SiO2] [mg/L]		5.42E+01	5.28E+01	0.00E+00	99.40%	0.00E+00	0.00E+00	5.77E+01	24.10%	4.50E+01	5.77E+01	5.77E+01	90.67%	6.30E+00	3.61E+02	1.14E+02	3.61E+02	1.01E+03	1.02E+03	1.01E+03	1.01E+03	1.01E+03	4.50E+01	4.50E+01	NA
[S] [mg/L]	10.00	440.48	429.36	0.00	99.50%	0.00	0.00	2783.77	86.70%	23.49	2783.77	2783.82	0.85	477.89	16410.31	3523.11	16410.31	23071.59	19873.31	19693.56	19694.60	19709.00	2.35E+01	2.35E+01	Target not Met
[Ti] [mg/L]	0.000556	1.55E-04	1.51E-04	0.00E+00	99.20%	0.00E+00	0.00E+00	8.07E-04	94.70%	1.21E-05	8.07E-04	8.07E-04	94.68%	5.02E-05	5.28E-03	9.89E-04	5.28E-03	1.54E-02	1.55E-02	1.52E-02	1.52E-02	1.53E-02	1.21E-05	1.21E-05	Target Met
[V] [mg/L]		9.17E-03	8.94E-03	0.00E+00	99.20%	0.00E+00	0.00E+00	6.52E-02	94.50%	9.74E-04	6.52E-02	6.52E-02	86.67%	1.02E-02	3.91E-01	1.14E-01	3.91E-01	7.37E-01	7.06E-01	7.00E-01	7.00E-01	7.00E-01	9.74E-04	9.74E-04	NA
[Zn] [mg/L]	0.12	7.58E-01	1.70E-02	0.00E+00	99.10%	0.00E+00	0.00E+00	9.67E-02	98.40%	3.89E-04	9.67E-02	9.67E-02	94.67%	6.03E-03	6.32E-01	1.18E-01	6.32E-01	1.84E+00	1.83E+00	1.82E+00	1.82E+00	1.82E+00	3.89E-04	3.89E-04	Target Met
[Alkalinity] [mg/L] as HCO3-*	250	6.07E+02	4.36E+02	4.23E-05	97.80%	4.23E-05	4.23E-05	1.42E+03	70.00%	3.53E+02	1.42E+03	1.42E+03	60.00%	6.67E+02	5.90E+03	2.38E+03	5.90E+03	4.66E+03	3.94E+03	3.91E+03	3.91E+03	3.91E+03	3.53E+02	3.53E+02	Target not Met
Hardness** [mg/L]	100	573.5	559.1	0.0	0.0	0.0	0.0	3924.6	0.0	74.2	3924.6	3924.6	0.0	887.9	21870.7	5831.2	21870.7	24706.0	20757.6	20505.5	20506.5	20521.5	74.2	74.2	Target Met
[Ionic_Strength] [M]		0.027	0.025	0.000	0.00	0.00000	0.00000	0.11270	0.00	0.00965	0.1	0.1	0.00	0.11270	0.43506	0.17493	0.43506	0.49493	0.45911	0.45571	0.45573	0.45596	0.00965	0.00965	NA
[Charge_pct_err]		0.440	7.361	-0.345	0.00	-0.34539	-0.34539	19.93058	0.00	9.80315	19.93058	19.93055	0.00	18.81572	25.74750	34.48433	25.74750	19.93019	21.37090	21.08753	21.08775	21.09321	9.80315	9.80315	NA
[pH] [std units]	6.5-8.5	6.0	5.8	7.0	0.0	7.0	7.0	5.8	0.0	5.8	5.8	5.8	0.0	5.8	5.9	6.2	5.9	6.0	6.3	6.3	6.2	6.2	5.8	5.8	Target Met
meQ-Na^+/meQ-$\sum$Cations	60%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Target Met
Lime, mg/L				0%	0.00			0%	0.00		0%	0%	0.00						2623.4	0.0					
Lime, kg/day				0%	0.00			0%	0.00		0%	0%	0.00						1000.0	0.0					
Sulfuric Acid [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sulfuric Acid [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CO2 [mg/L]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	131.2	0.0	0.0	0.0	
CO2 [kg/d]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	
CaCO3 [mg/L]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CaCO3 [kg/day]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

*Converted from as CaCO3 to as HCO3-
**Calculated as the sum of Ca and Mg as CaCO3

Appendix D

Water Treatment Cost Support

Water Treatment Operations Cost Support

April 2016

Contents

Attachment N:

40 gpm Chemical Precipitation Train Cost Estimate, 6/10/16, WesTech, Jaron Stanley

NorthMet Waste Water Treatment Cost Support

April 2016

File	Sheet	Date	Item	Detail	Unit Cost	Unit	Unit Cost Response	Support Document	Quantity Response	Support Document
[3]	blue tabs	2016	NF Membrane Replacement	NF Membrane Replacement		LS	Based on 5/1/13 vendor cost estimate spreadsheet from GE - $550 per 4.4 gpm module every 3 years, and 3/31/16 e-mail from Paul Dillalo	Attachment A, Attachment J	Based on 5/1/13 vendor cost estimate spreadsheet from GE - module replacement every 3 years	Attachment A
[3]	blue tabs	2016	VSEP Module Replacement	VSEP Module Replacement		LS	Based on 5/9/13 vendor cost estimate spreadsheet from NLR - $78,000 per 40 gpm module	Attachment B	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Attachment B
[3]	blue tabs	2016	Limestone (Granular Calcite)	Limestone (Granular Calcite)	$ 47.00	$/ton	From Graymont via Jim Tieberg e-mail 3/29/16	Attachment I	Based on process model to stabilize effluent LSI	
[3]	blue tabs	2016	CO2 (VSEP)	CO2 (VSEP)	$ 120.00	$/ton	From Praxair via Jim Tieberg e-mail 3/29/16	Attachment I	Based on procss model to adjust pH (VSEP influent <6.2, recarbonation 1 ~10.5, recarbonation 2 ~ 7-9)	
[3]	blue tabs	2016	Sodium Permanganate	Sodium Permanganate	$ 14.50	$/lb	From Hawkins quote e-mail 4/1/16	Attachment K	2.5 ppm in GSF feed based on SD033 (Area 5) Pilot	Attachment G
[3]	blue tabs	2016	Sodium Bisulfite	Sodium Bisulfite	$ 1.50	$/lb	From Hawkins quote e-mail 4/1/16	Attachment K	1 ppm in primary and secondary membrane feeds based on 5/1/13 vendor cost estimate spreadsheet from GE	Attachment B
[3]	blue tabs	2016	Anionic Polymer (Standby)	Anionic Polymer (Standby)	$ 1.49	$/lb	From Nalco via Jim Tieberg e-mail 3/29/16	Attachment I	2 ppm, based on typical polymer feed rates	
[3]	blue tabs	2016	GE Hypersperse	GE Hypersperse	$ 3.22	$/lb	Based on 11/19/15 e-mail from Paul Dillalo at GE	Attachment C	2.2 ppm in Primary feed based on 5/1/13 vendor cost estimate spreadsheet from GE	Attachment B
[3]	blue tabs	2016	Membrane Cleaner 1	Membrane Cleaner 1	$ 5.35	$/lb	Based on 11/19/15 e-mail from Paul Dillalo at GE	Attachment C	Based on GE vendor estimates 3/26/15 e-mail	Attachment D
[3]	blue tabs	2016	Membrane Cleaner 4	Membrane Cleaner 4	$ 3.07	$/lb	Based on 11/19/15 e-mail from Paul Dillalo at GE	Attachment C	Based on GE vendor estimates 3/26/15 e-mail	Attachment D
[3]	blue tabs	2016	Hydrated Lime (Chem Precip)	Hydrated Lime (Chem Precip)	$ 153.00	$/lb	From Graymont via Jim Tieberg e-mail 3/29/16	Attachment I	Based on water quality modeling to meet metals and sulfate targets	

NorthMet Waste Water Treatment Cost Support

April 2016

File	Sheet	Date	Item	Detail	Unit Cost	Unit	Unit Cost Response	Support Document	Quantity Response	Support Document
[3]	blue tabs	2016	Hydrochloric Acid (standby)	Hydrochloric Acid (standby)	$0.80	$/lb	From Hawkins quote e-mail 4/1/16	Attachment K	Based on water quality modeling to meet sulfate targets	
[3]	blue tabs	2016	Ferric Sulfate	Ferric Sulfate	$0.26	$/lb	From Hawkins quote e-mail 4/1/16	Attachment K	Based on water quality modeling to achieve HDS recycle flow of <25% HDS influent	
[3]	blue tabs	2016	MetClear MR2405 (Standby)	MetClear MR2405 (Standby)	$4.94	$/lb	Based on 3/31/16 e-mail from Paul Dillalo at GE	Attachment J	2 ppm in HDS influent, in range of manufacturer recommendations	
[3]	blue tabs	2016	Anionic Polymer (Standby)	Anionic Polymer (Standby)	$1.49	$/lb	From Nalco via Jim Tieberg e-mail 3/29/16	Attachment I	2 ppm in HDS influent, based on typical polymer feed rates	
[3]	blue tabs	2016	NLR 759	NLR 759	$ 44.00	$/gal	Based on 5/9/13 vendor cost estimate spreadsheet from NLR	Attachment B	10 ppm in secondary feed based on 11/11/13 specs from NLR	Attachment F
[3]	blue tabs	2016	NLR 404	NLR 404	$ 16.00	$/gal	Based on 3/31/16 e-mail update from NLR	Attachment H	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	Attachment F
[3]	blue tabs	2016	NLR 505	NLR 505	$ 16.00	$/gal	Based on 3/31/16 e-mail update from NLR	Attachment H	4 gal/cleaning per 40 gpm module, 1 cleaning/day based on 11/11/13 specs from NLR	Attachment F
[3]	blue tabs	2016	Transport concentrate to WWTF	Transport concentrate to WWTF	$ 1,400.00	$/day	Conversation with local hauler	Attachment M	Based on process model estimate of WWTP VSEP concentrate production rate	
[3]	blue tabs	2016	Sludge hauling and disposal	Sludge hauling and disposal	$ 36.00	$/ton	Quote from waste management 4/5/16, assuming 18-24 tons/load	Attachment L	Based on process model total sludge production, assuming pressed to 50% solids	

Attachment A:

GE Cost Spreadsheet, 5/1/2013, GE, Paul Dillallo

792240 PolyMet Mining - Estimated OPEX Summary @ Average Operating Conditions

	Year 1 (450 gpm)		Year 5 (900 gpm)		Year 10 (1,100 gpm)		Year 14 (1,350 gpm)		Year 15 (1,350 gpm)		Year 20 (650 gpm)	
	Coldest	Warmest	Coldest	Warmest	Coldest	Warmest	Coldest	Warmest	Coldest	Warmest	Coldest	Warmest
Power Cost (US$/Year)	$ 53,319	$ 36,617	$ 102,813	$ 69,438	$ 129,560	$ 86,578	$ 152,891	$ 102,842	$ 152,891	$ 102,842	$ 80,066	$ 53,757
Chemical Costs (US$/Year)	$ 45,251	$ 45,251	$ 160,460	$ 153,603	$ 179,194	$ 181,964	$ 418,880	$ 405,765	$ 453,201	$ 442,398	$ 134,848	$ 130,853
Consumables Cost (US$/Year)	$ 71,460	$ 71,460	$ 106,635	$ 106,635	$ 175,455	$ 175,455	$ 175,455	$ 175,455	$ 175,455	$ 175,455	$ 175,455	$ 175,455
Total Annual Cost (US$/Year)	$ 170,031	$ 153,328	$ 369,908	$ 329,676	$ 484,209	$ 443,997	$ 747,226	$ 684,062	$ 781,547	$ 720,696	$ 390,369	$ 360,065

Note: Consumables based on full system replacement

792240 PolyMet Mining

Preliminary Estimates at Average Flow Conditions Producing 450 GPM, YEAR 1, COLDEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 35ºF)	1826	kwh/day	$ 0.08	**$ 53,319**	
Chemicals					
Potassium Permanganate **(100%)**	5.3	lbs/day	$ 2.25	$ 4,353	Continuous
Antiscalant **(100% MDC706)**	0	lbs/day	$ 5.76	$ -	Continuous
Antiscalant **(100% MSI410)**	13.2	lbs/day	$ 3.55	$ 17,104	Continuous
Sodium Bisulfite **(38%, DCL30)**	17.5	lbs/day	$ 0.79	$ 5,046	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 6,523	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 12,226	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 45,251**	
Consumables					
Greensand Media	116	#/year	$ 225.00	$ 26,100	Replacement every 5 years
Cartridge filter element replacement	336	#/year	$ 10.00	$ 3,360	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	36	#/year	$ 500.00	$ 18,000	Replacement every 3 years
Sub-Total				**$ 71,460**	

Preliminary Estimates at Average Flow Conditions Producing 450 GPM, YEAR 1, WARMEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 75ºF)	1254	kwh/day	$ 0.08	**$ 36,617**	
Chemicals					
Potassium Permanganate **(100%)**	5.3	lbs/day	$ 2.25	$ 4,353	Continuous
Antiscalant **(100% MDC706)**	0	lbs/day	$ 5.76	$ -	Continuous
Antiscalant **(100% MSI410)**	13.2	lbs/day	$ 3.55	$ 17,104	Continuous
Sodium Bisulfite **(38%, DCL30)**	17.5	lbs/day	$ 0.79	$ 5,046	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 6,523	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 12,226	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 45,251**	
Consumables					
Greensand Media	116	#/year	$ 225.00	$ 26,100	Replacement every 5 years
Cartridge filter element replacement	336	#/year	$ 10.00	$ 3,360	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	36	#/year	$ 500.00	$ 18,000	Replacement every 3 years
Sub-Total				**$ 71,460**	

792240 PolyMet Mining

Preliminary Estimates at Average Flow Conditions Producing 900 GPM, YEAR 5, COLDEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 35ºF)	3521	kwh/day	$ 0.08	**$ 102,813**	
Chemicals					
Potassium Permanganate **(100%)**	12.9	lbs/day	$ 2.25	$ 10,594	Continuous
Antiscalant **(100% MDC706)**	31.3	lbs/day	$ 5.76	$ 65,805	Continuous
Antiscalant **(100% MSI410)**	26.5	lbs/day	$ 3.55	$ 34,337	Continuous
Sodium Bisulfite **(38%, DCL30)**	42.4	lbs/day	$ 0.79	$ 12,226	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 13,046	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 24,451	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 160,460**	
Consumables					
Greensand Media	155	#/year	$ 225.00	$ 34,875	Replacement every 5 years
Cartridge filter element replacement	1176	#/year	$ 10.00	$ 11,760	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	72	#/year	$ 500.00	$ 36,000	Replacement every 3 years
Sub-Total				**$ 106,635**	

Preliminary Estimates at Average Flow Conditions Producing 900 GPM, YEAR 5, WARMEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 75ºF)	2378	kwh/day	$ 0.08	**$ 69,438**	
Chemicals					
Potassium Permanganate **(100%)**	12.9	lbs/day	$ 2.25	$ 10,594	Continuous
Antiscalant **(100% MDC706)**	28.1	lbs/day	$ 5.76	$ 59,077	Continuous
Antiscalant **(100% MSI410)**	26.4	lbs/day	$ 3.55	$ 34,208	Continuous
Sodium Bisulfite **(38%, DCL30)**	42.4	lbs/day	$ 0.79	$ 12,226	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 13,046	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 24,451	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 153,603**	
Consumables					
Greensand Media	155	#/year	$ 225.00	$ 34,875	Replacement every 5 years
Cartridge filter element replacement	1176	#/year	$ 10.00	$ 11,760	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	72	#/year	$ 500.00	$ 36,000	Replacement every 3 years
Sub-Total				**$ 106,635**	

792240 PolyMet Mining

Preliminary Estimates at Average Flow Conditions Producing 1,100 GPM, YEAR 10, COLDEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 35ºF)	4437	kwh/day	$ 0.08	**$ 129,560**	
Chemicals					
Potassium Permanganate **(100%)**	16.5	lbs/day	$ 2.25	$ 13,551	Continuous
Antiscalant **(100% MDC706)**	32.4	lbs/day	$ 5.76	$ 68,118	Continuous
Antiscalant **(100% MSI410)**	27	lbs/day	$ 3.55	$ 34,985	Continuous
Sodium Bisulfite **(38%, DCL30)**	43.5	lbs/day	$ 0.79	$ 12,543	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270 + 180	lbs/cleaning	$ 3.02	$ 17,395	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270 + 180	lbs/cleaning	$ 5.66	$ 32,602	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 179,194**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

Preliminary Estimates at Average Flow Conditions Producing 1,100 GPM, YEAR 10, WARMEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 75ºF)	2965	kwh/day	$ 0.08	**$ 86,578**	
Chemicals					
Potassium Permanganate **(100%)**	16.5	lbs/day	$ 2.25	$ 13,551	Continuous
Antiscalant **(100% MDC706)**	32.3	lbs/day	$ 5.76	$ 67,908	Continuous
Antiscalant **(100% MSI410)**	29.3	lbs/day	$ 3.55	$ 37,965	Continuous
Sodium Bisulfite **(38%, DCL30)**	43.5	lbs/day	$ 0.79	$ 12,543	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270 + 180	lbs/cleaning	$ 3.02	$ 17,395	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270 + 180	lbs/cleaning	$ 5.66	$ 32,602	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 181,964**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

792240 PolyMet Mining

Preliminary Estimates at Average Flow Conditions Producing 1,350 GPM, YEAR 14, COLDEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 35ºF)	5236	kwh/day	$ 0.08	**$ 152,891**	
Chemicals					
Potassium Permanganate **(100%)**	52	lbs/day	$ 2.25	$ 42,705	Continuous
Antiscalant **(100% MDC706)**	104.3	lbs/day	$ 5.76	$ 219,280	Continuous
Antiscalant **(100% MSI410)**	39.6	lbs/day	$ 3.55	$ 51,312	Continuous
Sodium Bisulfite **(38%, DCL30)**	171.1	lbs/day	$ 0.79	$ 49,337	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 19,570	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 36,677	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 418,880**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

Preliminary Estimates at Average Flow Conditions Producing 1,350 GPM, YEAR 14, WARMEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 75ºF)	3522	kwh/day	$ 0.08	**$ 102,842**	
Chemicals					
Potassium Permanganate **(100%)**	52	lbs/day	$ 2.25	$ 42,705	Continuous
Antiscalant **(100% MDC706)**	98	lbs/day	$ 5.76	$ 206,035	Continuous
Antiscalant **(100% MSI410)**	39.7	lbs/day	$ 3.55	$ 51,441	Continuous
Sodium Bisulfite **(38%, DCL30)**	171.1	lbs/day	$ 0.79	$ 49,337	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 19,570	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 36,677	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 405,765**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

792240 PolyMet Mining

Preliminary Estimates at Average Flow Conditions Producing 1,350 GPM, YEAR 15, COLDEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 35ºF)	5236	kwh/day	$ 0.08	**$ 152,891**	
Chemicals					
Potassium Permanganate **(100%)**	55.6	lbs/day	$ 2.25	$ 45,662	Continuous
Antiscalant **(100% MDC706)**	117.6	lbs/day	$ 5.76	$ 247,242	Continuous
Antiscalant **(100% MSI410)**	39.6	lbs/day	$ 3.55	$ 51,312	Continuous
Sodium Bisulfite **(38%, DCL30)**	182.9	lbs/day	$ 0.79	$ 52,739	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 19,570	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 36,677	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 453,201**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

Preliminary Estimates at Average Flow Conditions Producing 1,350 GPM, YEAR 15, WARMEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 75ºF)	3522	kwh/day	$ 0.08	**$ 102,842**	
Chemicals					
Potassium Permanganate **(100%)**	55.6	lbs/day	$ 2.25	$ 45,662	Continuous
Antiscalant **(100% MDC706)**	112.4	lbs/day	$ 5.76	$ 236,310	Continuous
Antiscalant **(100% MSI410)**	39.7	lbs/day	$ 3.55	$ 51,441	Continuous
Sodium Bisulfite **(38%, DCL30)**	182.9	lbs/day	$ 0.79	$ 52,739	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 19,570	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 36,677	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 442,398**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

792240 PolyMet Mining

Preliminary Estimates at Average Flow Conditions Producing 650 GPM, YEAR 20, COLDEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 35ºF)	2742	kwh/day	$ 0.08	**$ 80,066**	
Chemicals					
Potassium Permanganate **(100%)**	6.8	lbs/day	$ 2.25	$ 5,585	Continuous
Antiscalant **(100% MDC706)**	19.9	lbs/day	$ 5.76	$ 41,838	Continuous
Antiscalant **(100% MSI410)**	19.1	lbs/day	$ 3.55	$ 24,749	Continuous
Sodium Bisulfite **(38%, DCL30)**	22.3	lbs/day	$ 0.79	$ 6,430	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 19,570	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 36,677	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 134,848**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

Preliminary Estimates at Average Flow Conditions Producing 650 GPM, YEAR 20, WARMEST TEMP

DESCRIPTION	CONSUMPTION UF+RO+EDI	UNIT	UNIT COST US$	TOTAL COST US$/yr	Comments
Utilities					
Power (at coldest temp, 75ºF)	1841	kwh/day	$ 0.08	**$ 53,757**	
Chemicals					
Potassium Permanganate **(100%)**	6.8	lbs/day	$ 2.25	$ 5,585	Continuous
Antiscalant **(100% MDC706)**	18	lbs/day	$ 5.76	$ 37,843	Continuous
Antiscalant **(100% MSI410)**	19.1	lbs/day	$ 3.55	$ 24,749	Continuous
Sodium Bisulfite **(38%, DCL30)**	22.3	lbs/day	$ 0.79	$ 6,430	Continuous
RO Cleaning Chemicals **- MCT 103 (100%)**	270	lbs/cleaning	$ 3.02	$ 19,570	8 cleans per year per RO (every 45 days)
RO Cleaning Chemicals **- MCT 511 (100%)**	270	lbs/cleaning	$ 5.66	$ 36,677	8 cleans per year per RO (every 45 days)
Sub-Total				**$ 130,853**	
Consumables					
Greensand Media	271	#/year	$ 225.00	$ 60,975	Replacement every 5 years
Cartridge filter element replacement	1848	#/year	$ 10.00	$ 18,480	Replacement every month
RO Membrane Replacement (Muni-NF-300)	48	#/year	$ 500.00	$ 24,000	Replacement every 3 years
RO Membrane Replacement (Muni-NF-450)	144	#/year	$ 500.00	$ 72,000	Replacement every 3 years
Sub-Total				**$ 175,455**	

Attachment B:

VESP Cost Spreadsheet, 5/9/2013, VSEP, Mark Galimberti

VSEP Economic Analysis - Quote Version				
	70ºC, pH 11.5, 200 ml EDTA & 100 ml ABS/tote			
Alter Values in Blue to manipulate	US Standard Units		SI Units	
Total System Cost per 1000 gallons (Feed):	**$6.50**	$/1000 gal	**$2.29**	US$/m3
VSEP Cost per 1000 gallons (Permeate):	$7.65	$/1000 gal	$2.02	US$/m3
Variable Entered Values				
Feed Flow Rate	178	gpm	40	m3/hr
Average Testing Flux	25	gfd	From current Testing	
Amount of Pre-treatment chemical used	10	ml/250 gal	Actual data from first two runs	
Pretreatment Chemical Specific Gravity	1.00	g/ml	According to MSDS	
Cost for Pretreatment Chemical	$5.25	$/lb	Price we currently pay for small volumes	
Amount of Acid used	2,000	ml/1000 gal	Estimated, see pH Worksheet	
Specific Gravity	1.20	g/ml	According to MSDS	
Cost for Acid	$0.50	$/lb	Price we currently pay for small volumes	
Time between cleanings	1440	minutes	From actaul testing data	
Cleaning Solution Volume per module	100	gal	Estimated	
# of cleanings/cycle	1	each	Currently being used	
Concentrated Cleaner use	2%		Currently being used	
Power Cost	$0.05	$/kw-hr	Estimated, need to confirm	
Membrane Life	2.5	Years	Estimated from Historical data	
% Recovery	85%		Average of current testing	
Pressure	400	psi	From actual data	
Pump Efficiency	85%		Estimated	
Module Size	1400	SF		
Safety Factor	10%			
Calculated Values				
Design Flux	22.73	gfd	22.73	gfd
Number of Modules	7	modules	7	modules
Filtrate Rate	151	gpm	34	m3/hr
Feed Gallons/day	256,320	gpd	970	m3/day
Permeate Gallons/day	217,872	gpd	825	m3/day
Energy Cost (During Filtration Mode)				
Vibration Power Consumption	82	hp (@ 3/4")	82	hp (@ 3/4")
Pump Power Consumption	49	hp	49	hp
Total Energy Consumption	131	hp	131	hp
Rate of Kilowatt Usage	97.7	kW	97.7	kW
Daily Energy Cost (kw x 22hrs x .04$/kw)	$107	$/Day	$107	$/Day
Daily Cost ÷ Daily Capacity ÷ 1000	$0.42	$/1000 gal	$0.11	US$/m3
Membrane Replacement Cost				
Module Replacement Cost (ea module)	$78,000	$/ea	$78,000	$/ea
Total Membrane Repacement Cost	$534,098		$534,098	
Annual Membrane Cost	$213,639	$/yr	$213,639	$/yr
Daily Membrane Cost (365 day year)	$585	$/day	$585	$/day
Daily Cost ÷ Daily Capcity ÷ 1000	$2.28	$/1000 gal	$0.60	US$/m3
Pretreatment Chemical Cost				
Amount of Pretreatment Chemical used	0.04	kg/1000 gal	0.04	kg/1000 gal
Cost of Pretreatment Chemical	$11.55	$/kg USD	$11.55	$/kg USD
Daily Dispersant Cost	$118	$/day	$118	$/day
Daily Cost ÷ Daily Capacity ÷ 1000	$0.46	$/1000 gal	$0.12	$/m3
pH Adjusting Cost				
Amount of 50/50 Caustic used	2.40	kg/1000 gal	2.40	kg/1000 gal
Cost of 50/50 Caustic	$1.10	$/kg USD	1.1000	$/kg USD
Daily Caustic Cost	$677	$/day	$677	$/day
Daily Cost ÷ Daily Capacity ÷ 1000	$2.64	$/1000 gal	$0.70	$/m3
Chemical Cleaner Cost				
Concentrated Cleaner Consumption/Cycle/module	2.00	gal/cycle/module	2.00	gal/cycle/module
Daily Cleaner Consumption	2.00	gallons/day/module	2.00	gallons/day/module
Cost of Chemical Cleaner	$13.00	$/gallon	$13.00	$/gallon
Daily Cleaner Cost	$178	$/day	$178	$/day
Daily Cost ÷ Daily Capacity ÷ 1000	$0.69	$/1000 gal	$0.18	$/m3
Total Cost - Ct	$6.50	$/1000 gallons	$2.29	US$/m3
	$1,666	$/day	$1,666	US $/day
Annual Operating Costs	**608,067**	USD/year	**608,067**	USD/year

Attachment C:

GE Membrane Cleaning e-mail, 11/19/15, GE, Paul Dillallo

Teresa Kes

From: Dilallo, Paul M (GE Power & Water) <Paul.Dilallo@ge.com>
Sent: Thursday, November 19, 2015 8:53 AM
To: Alison L. Ling
Cc: Bryan T. Oakley
Subject: RE: PolyMet Chemical Info: Costs

Alison,
Budget pricing for the referenced chemicals are as follows.

Kleen MCT103 (low pH cleaner) – Totes - $5.35/lb
Kleen MCT515 (high pH cleaner) – Totes - $3.07/lb
Hypersperse MSI410 (antiscalant) – Totes - $3.22/lb

Please let me know whether you have any questions or require additional information.

Thanks,

Paul DiLallo
GE Water & Process Technologies

M 414 403 1897
E paul.dilallo@ge.com

From: Alison L. Ling [mailto:ALing@barr.com]
Sent: Tuesday, November 17, 2015 10:46 AM
To: Dilallo, Paul M (GE Power & Water)
Cc: Bryan T. Oakley
Subject: PolyMet Chemical Info: Costs

Paul,

In July, you provided us with guidelines for CIP chemical usage and concentrations. We are currently working on O&M cost estimates for the project. Can you send estimated costs for the following chemicals ($/ton)?

- GE Hypersperse
- MC1
- MC4

Are these items GE would provide, or would we have to source them elsewhere?

Thanks,

Alison L. Ling, PhD

Environmental Specialist
Minneapolis, MN office: 952.842.3568
ALing@barr.com

www.barr.com

Attachment D:

GE Membrane Cleaning e-mail, 3/26/15
GE, Paul Dillallo

Teresa Kes

From: Dilallo, Paul M (GE Power & Water) <Paul.Dilallo@ge.com>
Sent: Thursday, March 26, 2015 6:59 AM
To: Jeff Ubl; Don E. Richard; Todd D. DeJournett
Cc: Hansen, Peter C (GE Power & Water)
Subject: PolyMet CIP Info

Gentlemen,
Thanks for taking the time to meet last week. As discussed, I am providing preliminary CIP volume/frequency information for the RO/NF Systems for PolyMet.

Mine Site
MUNI-300 – 72 membrane elements
~1,300 gallons cleaning solution per clean

MUNI-450 – 108 membrane elements
~1,950 gallons cleaning solution per clean

Plant Site
MUNI-1MGD - 180 membrane elements
~3,250 gallons cleaning solution per clean

Note that the volume per clean is based on each cleaning solution. i.e. a low-pH clean requires that volume and a high-pH clean requires that volume.

Based on feed water quality, we anticipate 4 cleanings per year (of both low-pH and high-pH) will be required per year per system. Note that this frequency could be higher or lower depending on actual feed water quality and operation.

Please let me know whether you have any questions or require additional information.

Thanks,

Paul DiLallo
GE Power & Water
Water & Process Technologies

T 262 200 2111
M 414 403 1897
E paul.dilallo@ge.com

Attachment E:

VSEP Pretreatment Requirements, 5/9/2013, VSEP, Mark Galimberti

Pre-treatment Requirements:

Polymet Mining
Membrane: ESPA
Estimated Recovery: 75%

VSEP does not have set concentration limits for individual constituents and the feed is evaluated as a whole for performance and economic feasibility. There are known problematic substances that will negatively impact the membrane such as polymers, solvents, and chlorine to name a few and is not recommended these substances be introduced in the system. Changes in water quality can affect the system performance and recovery in addition to membrane condition and maintenance.

Testing is required to determine the optimum pre-treatment needed. Based on the provided estimated feed water quality, the performance can probably benefit from pre-treatment. Anti-scalant can inhibit mineral scaling and increase flux stability. Adjusting the pH of the feed can increase solubility limits of common foulants and increase flux stability beyond the limits of anti-scalant.

Anti-scalant:

NLR-759 liquid membrane anti-scalant is designed to target scaling foulants, silica, fluoride magnesium, and calcium sulfate as well as scaling metal complexes including iron. This pretreatment chemical will inhibit fouling to maintain the membrane performance and extend the frequency of cleaning. The NLR-759 anti-scalant contains a unique blend of multiple prepackaged proprietary formula chemical ingredients and is a concentrated pretreatment chemical and is typically dosed at 10-20ppm.

Sulfuric Acid:

Decreasing the pH can increase the solubility limits of minerals that cause scaling t beyond the capability of a scale inhibitor. Adjusting the pH between 6-7 may possible improve flux and recovery performance. The amount of acid required will depend on the concentration of acid and can vary based on the feed quality. Testing would be required for an estimated acid dosage rate and the improvement in performance with pH adjusting.

mgalimberti@vsep.com

Attachment F:

VSEP Pretreatment Requirements, 11/11/2013, VSEP, Mark Galimberti

Clean In Place Requirements:

Polymet Mining
Membrane: ESPA
Recovery: 85%
Cleaning Chemicals: NLR 404, NLR 505, (pH adjust to 11 NaOH)

a. Cycle Details: Steps, time per step, flow per step:

Cleaner Description	Volume		Temperature	Time
	GPM	Total Gallons	(°C)	(Mins)
STEPS				
1. Rinsing/flush with water prior to cleaning (feed directly into the VSEP).	60	300	50-60	5
2. NLR 404 clean (Fill up CIP tank and make an acidic cleaning solution. Mix solution. Drain first 15% of concentrate and recirculate the rest). Record pH and temperature of cleaning solution.	60	200	50-60	30-45
3. CIP Tank Rinse.	60	50	50-60	5
4. Rinsing/flushing with water between caustic and acidic cleaning. (Feed directly into the VSEP).	60	600	50-60	10
5. NLR 505 clean (Fill up CIP tank and make an acidic cleaning solution. NaOH addition to reach desired 11.5 pH during mixing step. Drain first 15% of concentrate and recirculate the rest). Record pH and temperature of cleaning solution.	60	200	50-60	45-60
6. CIP Tank Rinse.	60	50	50-60	5
7. Final Flush (feed directly into the VSEP).	60	300	50-60	5
Miscellaneous steps inc prep time and mixing time				*20*
Totals		**1700**		**125-155**

b. Frequency

Typically a full cleaning cycle occurs once per day, but this may vary considering the system operation time. Regular cleaning schedules will depend on the performance of each VSEP on an individual basis. The frequency of cleaning is programmable and may vary from once per day to once per month depending on actual performance to be determined during startup. The cleaning frequency will also vary due to feed materials, operating conditions, and membrane life.

c. Water Volume per Cycle

To complete one standard cleaning cycle, 1700 gallons of water will be needed. For specific volumes utilized per cleaning step, please refer to the chart provided above.

d. Chemical Use.

Typically the best chemical cleaning procedure for this application is the use of NLR 404 and NLR 505 cleaners on an as needed basis. NLR 505 is a caustic cleaner containing mostly chelating agents and surfactants. Use of this cleaner will dissolve those foulants which are soluble in medium to high pH such as organics and silica. 404 is an acidic based cleaner and can be used to remove those things soluble in acid such as mineral scale. Warm water and pH adjusting are critical to the success of the cleaning.

Each cleaning cycle consumes between 4-6 gallons (2-3% solution) of the respective cleaning during each wash.

For alkaline washes, NaOH dosing to the cleaning solution is sometimes needed, based on pH level. The dosing occurs during tank preparation and the alkaline recirculation wash.

e. Temperature Requirements

For optimal results, the VSEP system requires cleaning water temperature to be at a minimum of 50°C, and a maximum of 60°C (temperature tolerance of membrane).

Pre-treatment Requirements:

Polymet Mining
Membrane: ESPA
Recovery: 85%
Pre-treatment: NLR 759 and pH 6.0

Piloting testing the TB WWTP determined pre-treatment is required for optimum flux and recovery. The addition of an anti-scalant and pH adjustment provided the desired performance. Chemical pre-treatment can reduce the amount of mineral scaling which affects membrane performance. VSEP does not have set concentration limits for individual constituents and the feed is evaluated as a whole for performance and economic feasibility. There are known problematic substances that will negatively impact the membrane such as polymers, solvents, and chlorine to name a few and is not recommended these substances be introduced in the system. These recommendations are based on the water quality and operating conditions tested during the field pilot. Changes in water quality can affect the system performance and recovery.

Anti-scalant:

NLR-759 liquid membrane anti-scalant is designed to target scaling foulants, silica, fluoride magnesium, and calcium sulfate as well as scaling metal complexes including iron. This pretreatment chemical will inhibit fouling to maintain the membrane performance and extend the frequency of cleaning. The NLR-759 anti-scalant contains a unique blend of multiple prepackaged proprietary formula chemical ingredients and is a concentrated pretreatment chemical and is estimated to be dosed at 10ppm based on pilot test data.

Sulfuric Acid:

The pH was adjusted to 6.0 to improve flux stability and increase recovery. Decreasing the pH can increase the solubility limits of minerals that cause scaling t beyond the capability of a scale inhibitor. Sulfuric acid was initially dosed on average at 2,672ppm of a 40% solution during pilot testing. The actual amount of acid required will depend on the concentration of acid and can vary based on the feed quality.

Attachment G:

SD033 (Area 5) WWTF Pilot Test Report, September 2013, Barr Engineering Co.

Reverse Osmosis Pilot Test Report

SD033 Active Treatment Evaluation

Prepared for
Cliffs Erie LLC and PolyMet Mining Inc.

September 2013

BARR

Reverse Osmosis Pilot Test Report

SD033 Active Treatment Evaluation

September 2013

Table of Contents

4.0 Reverse Osmosis Pilot Test Results

4.1 Pretreatment

4.1.1 Greensand Filtration

The greensand filter pilot unit for the pilot test was a pressure filter (see Figure 3). This filter is a 30-inch diameter unit filled with coarse gravel (5 inches), greensand filter media (30 inches), and anthracite (12 inches). The greensand media is silica sand coated with manganese oxide. Technical information on the greensand used during the pilot test and information on the pilot unit systems can be found in Appendix A.

For the pilot test, the influent was dosed continuously with potassium permanganate in order to (1) oxidize iron and manganese for removal by filtration and (2) regenerate the greensand media.

4.1.1.1 Filter Loading

Over the duration of the testing program, the influent flow rate ranged from around 15 to 22 gpm. The resultant range of hydraulic loading to the filter was 3.1 to 4.5 gpm per square foot (gpm/ft^2) of filter bed area.

4.1.1.2 Filter Removal Rates

The greensand filter removal rates for total suspended solids (TSS), iron, and manganese are presented in Table 3. During the complete period of testing (including startup and optimization phases), the TSS removal across the filter averaged > 41.9%. However, 15 of the 21 sampling events had TSS concentrations in both the influent and effluent from the greensand filter below the method reporting limit. Similarly, the removal of TSS was > 45% on average during Phase 3, but again the low observed removal may be related to the frequent influent concentrations below method reporting limits. Iron removal through the filter averaged > 73.1% over the course of the entire testing period. The concentration of iron in the filter effluent was never detected above the method reporting limit.

Greensand filter manganese removal averaged 86.0% over the course of the entire test. The greensand filter demonstrated the lowest manganese removal when the influent concentration dropped significantly during the three-week snow melt period. If those data points are removed from the average, manganese removal performance increases to 89.9% for the remainder of the testing period. Breakthrough of manganese to levels that could be problematic for operation of the RO membrane was not observed during the pilot test. Some variability in the effluent manganese was apparent, but effluent concentrations never exceeded 58 micrograms per liter (ug/L), a value similar

to the alert level of 50 ug/L recommended by some membrane system vendors (Hydranautics, 2006). The variability in effluent manganese observed during the test can likely be attributed to varied uptake of the potassium permanganate across different regions of the filter media. Potassium permanganate dosing was held constant at 2.5 mg/L for the duration of the pilot test. Concentrations of manganese, iron, TSS, and all other parameters measured in the greensand filter effluent are displayed in Table 4.

4.1.1.3 Residuals

Periodically, accumulated solids must be removed from the greensand filter bed to maintain hydraulic capacity and performance. A filter backwash can be triggered based on filter run time, or more commonly, an increase in pressure drop across the filter. For the pilot unit, pressure drop was used to trigger backwash events. When the pressure drop across the unit reached approximately 10 psi, feed water was pumped up through the filter bed at a rate of 60 to 70 gpm (12 gpm/ft^2) to remove solids from the bed. During Phase 3 operations, the filter backwash frequency was approximately once every two days. Samples of the spent backwash water were collected and analyzed periodically. Greensand filter backwash water quality results are summarized in Table 5. In addition to containing elevated concentrations of TSS, iron, and manganese (the targeted constituents), the spent backwash water also contained elevated concentrations of organic material (as chemical oxygen demand), silica, and a few other trace metals.

4.1.1.4 Discussion

The primary purpose of the greensand filter was to protect the RO membranes by removing particulate matter, iron, and manganese upstream. The filter generally removed TSS and iron to concentrations below the method reporting limits and significantly reduced manganese concentrations. Although the RO membranes did exhibit signs of fouling during the seven-month pilot test, the reasons for this observed fouling were not likely due to the concentrations of iron, manganese, or other potential scalants or foulants in the RO feed water. The minimal fouling observed was due to the presence of microorganisms that result in biofouling, as discussed in more detail in Section 4.2. The greensand filter was a simple-to-operate, effective means of pretreatment for the feed water from Area 5NW.

In a full-scale application, one of the primary design criteria for greensand filters is the hydraulic loading rate. The loading rate for greensand filters has the potential to affect the manganese removal efficiency, the backwash frequency, and the number of filters required for filtration. For this pilot testing unit, the hydraulic loading rate was fixed by the unit supplier and was higher than typical

hydraulic loadings for this type of filter (up to 4.5 gpm/ft^2 for the pilot compared to 3 gpm/ft^2 as a typical value). Influent concentrations of TSS, iron, and manganese for the Area 5 NW pit water were generally low compared to other greensand filter applications. Higher-than-typical loading rates can also be acceptable if demonstration testing shows acceptable treatment performance and backwash frequency, as was case during this pilot testing program.

4.1.2 Chemical Pretreatment

At the recommendation of the unit supplier, 3.9 ppm of Hypersperse MDC150, a scale inhibitor, was added to the process upstream of the RO membranes. As can be seen in Figure 2, the water at SD033 has generally contained slightly higher concentrations of bicarbonate alkalinity than was observed in the feed water from Area 5NW during the pilot testing program. For implementation of RO for the treatment of water from SD033, additional pretreatment of the water with a mineral acid may be required to mitigate scaling from calcium carbonate.

4.2 Reverse Osmosis

The RO pilot unit, as installed for this pilot testing application, is shown in the photograph on Figure 4. Manufacturer's information on the pilot unit can be found in Appendix A. The pilot used 18, 4-inch-diameter RO modules housed in six vessels, with the vessels oriented in a 4-stage (2-2-1-1) array. The 2-2-1-1 pattern provides treatment with two housings in parallel, two more housings in parallel, and the final two housings in series. Membranes employed in the pilot test were low-pressure RO membranes (GE model AG90). The pilot unit was operated continuously for approximately 8 hours per day, typically 5 days per week. At the end of each 8-hour shift, the RO system was flushed with permeate and shut down.

4.2.1 Flux and Recovery

Key operating variables for membrane treatment are recovery, the percentage of feed water volume that becomes permeate, and flux, or the flow rate through the system per unit area of membrane in service. In general, the higher the membrane flux, the lower the membrane area required for a given treatment capacity. However, operation at higher flux rates has the potential to increases the fouling rate of the membranes. For this application, the pilot flux and recovery targets were chosen during the initial period of testing and not changed during Phase 2 of testing. However, a substantial period of time during Phase 2 was dedicated to installing new mechanical components to allow the system to reach the target recovery and flux. Components changed included the pilot RO unit's flowmeter and concentrate orifice valve, which helps regulate concentrate flow and therefore recovery.

Attachment H:

VSEP Cost E-mail Update, 3/31/2016, VSEP, Mark Galimberti

Teresa Kes

From: Mark Galimberti <mgalimberti@vsep.com>
Sent: Friday, March 25, 2016 3:16 PM
To: Jeff Ubl
Cc: Don E. Richard; Bryan T. Oakley; Alison L. Ling
Subject: RE: PolyMet OPEX Update
Attachments: Polymet_RO_Reject_Op_Costs.pdf

Hi Jeff, the only thing we see is the cleaners (404 & 505), which are $16 now. Everything else is the same. What is your feeling on the latest timeline on the project, or even the initial engineering work? Thanks for the question and review, Mark, tel 814 861 1506

From: Jeff Ubl [mailto:JUbl@barr.com]
Sent: Friday, March 25, 2016 2:44 PM
To: 'Mark Galimberti' <mgalimberti@vsep.com>
Cc: Don E. Richard <DRichard@barr.com>; Jeff Ubl <JUbl@barr.com>; Bryan T. Oakley <BOakley@barr.com>; Alison L. Ling <ALing@barr.com>
Subject: PolyMet OPEX Update

Hi Mark;

We are looking to get an update of unit costs for the items attached in red. These were from 5/9/13.

Can you provide within the next week?

Jeff Ubl, PE

Senior Environmental Engineer
Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
---
office: 952.832.2647
toll-free: 800.632.2277
---
jubl@barr.com
www.barr.com

VSEP Economic Analysis - Quote Version				
	70ºC, pH 11.5, 200 ml EDTA & 100 ml ABS/tote			
Alter Values in Blue to manipulate	US Standard Units		SI Units	
Total System Cost per 1000 gallons (Feed):	**$6.50**	$/1000 gal	**$2.29**	US$/m3
VSEP Cost per 1000 gallons (Permeate):	$7.65	$/1000 gal	$2.02	US$/m3
Variable Entered Values				
Feed Flow Rate	178	gpm	40	m3/hr
Average Testing Flux	25	gfd	From current Testing	
Amount of Pre-treatment chemical used	10	ml/250 gal	Actual data from first two runs	
Pretreatment Chemical Specific Gravity	1.00	g/ml	According to MSDS	
Cost for Pretreatment Chemical	$5.25	$/lb	Price we currently pay for small volumes	
Amount of Acid used	2,000	ml/1000 gal	Estimated, see pH Worksheet	
Specific Gravity	1.20	g/ml	According to MSDS	
Cost for Acid	$0.50	$/lb	Price we currently pay for small volumes	
Time between cleanings	1440	minutes	From actaul testing data	
Cleaning Solution Volume per module	100	gal	Estimated	
# of cleanings/cycle	1	each	Currently being used	
Concentrated Cleaner use	2%		Currently being used	
Power Cost	$0.05	$/kw-hr	Estimated, need to confirm	
Membrane Life	2.5	Years	Estimated from Historical data	
% Recovery	85%		Average of current testing	
Pressure	400	psi	From actual data	
Pump Efficiency	85%		Estimated	
Module Size	1400	SF		
Safety Factor	10%			
Calculated Values				
Design Flux	22.73	gfd	22.73	gfd
Number of Modules	7	modules	7	modules
Filtrate Rate	151	gpm	34	m3/hr
Feed Gallons/day	256,320	gpd	970	m3/day
Permeate Gallons/day	217,872	gpd	825	m3/day
Energy Cost (During Filtration Mode)				
Vibration Power Consumption	82	hp (@3/4")	82	hp (@3/4")
Pump Power Consumption	49	hp	49	hp
Total Energy Consumption	131	hp	131	hp
Rate of Kilowatt Usage	97.7	kW	97.7	kW
Daily Energy Cost (kw x 22hrs x .04$/kw)	$107	$/Day	$107	$/Day
Daily Cost ÷ Daily Capacity ÷ 1000	$0.42	$/1000 gal	$0.11	US$/m3
Membrane Replacement Cost				
Module Replacement Cost (ea module)	$78,000	$/ea	$78,000	$/ea
Total Membrane Repacement Cost	$534,098		$534,098	
Annual Membrane Cost	$213,639	$/yr	$213,639	$/yr
Daily Membrane Cost (365 day year)	$585	$/day	$585	$/day
Daily Cost ÷ Daily Capcity ÷ 1000	$2.28	$/1000 gal	$0.60	US$/m3
Pretreatment Chemical Cost				
Amount of Pretreatment Chemical used	0.04	kg/1000 gal	0.04	kg/1000 gal
Cost of Pretreatment Chemical	$11.55	$/kg USD	$11.55	$/kg USD
Daily Dispersant Cost	$118	$/day	$118	$/day
Daily Cost ÷ Daily Capacity ÷ 1000	$0.46	$/1000 gal	$0.12	$/m3
pH Adjusting Cost				
Amount of 50/50 Caustic used	2.40	kg/1000 gal	2.40	kg/1000 gal
Cost of 50/50 Caustic	$1.10	$/kg USD	1.1000	$/kg USD
Daily Caustic Cost	$677	$/day	$677	$/day
Daily Cost ÷ Daily Capacity ÷ 1000	$2.64	$/1000 gal	$0.70	$/m3
Chemical Cleaner Cost				
Concentrated Cleaner Consumption/Cycle/module	2.00	gal/cycle/module	2.00	gal/cycle/module
Daily Cleaner Consumption	2.00	gallons/day/module	2.00	gallons/day/module
Cost of Chemical Cleaner	$13.00	$/gallon	$13.00	$/gallon
Daily Cleaner Cost	$178	$/day	$178	$/day
Daily Cost ÷ Daily Capacity ÷ 1000	$0.69	$/1000 gal	$0.18	$/m3
Total Cost - Ct	$6.50	$/1000 gallons	$2.29	US$/m3
	$1,666	$/day	$1,666	US $/day
Annual Operating Costs	**608,067**	USD/year	**608,067**	USD/year

NLR 759. Converts to approximately $44/gallon.

Hydrochloric Acid

VSEP Module Replacement

NLR 404 and NLR 505 cleaner

Attachment I:

PolyMet Chemical Cost Update, 3/29/2016, PolyMet, Jim Tieberg

Teresa Kes

From: Don E. Richard
Sent: Monday, March 28, 2016 4:28 PM
To: Jeff Ubl; Bryan T. Oakley; Alison L. Ling; Abby Morrisette
Subject: FW: Reagents & other items
Attachments: image001.png; ATT00001.htm; 2013 REAGENT UPDATE.xlsx; ATT00002.htm; Nalco Reagent pricing.pdf; ATT00003.htm; limestome products.pdf; ATT00004.htm; Hawkins reagent pricing.pdf; ATT00005.htm; liquid carbon dioxide.pdf; ATT00006.htm; Neosolutions antiscalant.pdf; ATT00007.htm; SIPX - Charles Tenant Co..pdf; ATT00008.htm; Quadra ca reagent pricing update.pdf; ATT00009.htm; grinding media.pdf; ATT00010.htm; Lubrication pricing update.pdf; ATT00011.htm; Diesel Fuel.pdf; ATT00012.htm; Ames Construction geotech liner update.pdf; ATT00013.htm; Mine Site power distribution update.pdf; ATT00014.htm

Some updated costs from PolyMet via Jim Tieberg.

From: Jim Tieberg [mailto:jtieberg@polymetmining.com]
Sent: Monday, March 28, 2016 12:46 PM
To: Don E. Richard
Cc: Jim Scott; Jennifer Saran
Subject: Fwd: Reagents & other items

Jim Tieberg
Mining Division Manager
Mobile: 218-248-0952 | Office: 218-471-2150 | Direct: 218-471-2165 | Fax: 218-471-2159
jtieberg@polymetmining.com | **www.polymetmining.com**

Begin forwarded message:

> **From:** Jim Tieberg <jtieberg@polymetmining.com>
> **Date:** January 29, 2016 at 7:43:35 AM CST
> **To:** Jon Cherry <jcherry@polymetmining.com>, Douglas Newby <dnewby@polymetmining.com>
> **Subject: FW: Reagents & other items**
>
> Good morning,
>
> Steve DeVaney has received all of the information he requested from vendors for use in updating the opex model. Please see the attachments for Steve's summary and back up.
>
> Jim

JAN 2016 PRICING

REAGENT	USEAGE (STPY)		2015 PRICE/UNIT	2016 PRICE/UNIT	2015 EXTENDED PRICE	2016 EXTENDED PRICE	COMMENTS
FLOTATION CIRCUIT							
SIPX (SODIUM ISOPROPYL XANTHATE)	1,170	DRY	$1,250.00	$1,327.27	$1,462,500.00	$1,552,905.90	+ DELIVERY (DULUTH)
MIBC (METHYL ISOBUTYL CARBINOL)	1,007	100% SOLUTION	$2,180.00	$2,180.00	$2,195,260.00	$2,195,260.00	+ DELIVERY (GARYVILLE, LA)
COPPER SULPHATE ($CUSO_4$)	592	DRY	$2,358.70	$1,817.00	$1,396,350.40	$1,075,664.00	DELIVERED
MAGNAFLOC 10/455	6	DRY	$3,300.00	$2,980.00	$19,800.00	$17,880.00	+ DELIVERY (HOUSTON, TX)
CMC (CARBOXYL METHYL CELLULOSE)	1,072	DRY	$4,535.97	$4,535.97	$4,862,559.84	$4,862,559.84	+ DELIVERY (MONTREAL, CANADA)
LIME SLURRY	10,274	DRY	$151.48	$153.36	$1,556,305.52	$1,575,620.64	DELIVERED
WASTE WATER TREATMENT							
MINE SITE							
SODIUM METASILICATE @ 5%	25,000	GALLONS/YR	$1.00	$1.00	$25,000.00	$25,000.00	DELIVERED
FERRIC CHLORIDE @ 35%	14,400	GALLONS/YR	$1.65	$1.69	$23,760.00	$24,336.00	DELIVERED
SODIUM HYDROXIDE @ 50%	41,000	GALLONS/YR	$2.35	$2.10	$96,350.00	$86,100.00	DELIVERED
POLYMER FLOCULANT (LIQUID)	600	GALLONS/YR	$10.59	$10.59	$6,354.00	$6,354.00	DELIVERED
HYDRATED LIME	1,100	S/TONS/YR	$151.48	$153.36	$166,628.00	$168,696.00	DELIVERED
CARBON DIOXIDE LIQUID	1,000	S/TONS/YR	$144.00	$129.00	$144,000.00	$129,000.00	+ $900/MO IF WE NEED A TANK
CITRIC ACID	120	GALLONS/YR	$9.96	$9.96	$1,195.20	$1,195.20	DELIVERED
SODIUM HYPOCHLORITE	120	GALLONS/YR	$1.75	$1.70	$210.00	$204.00	DELIVERED
TAILINGS BASIN							
POTASSIUM PERMANGANATE	16,000	POUNDS/YR	$3.50	$4.00	$56,000.00	$64,000.00	DELIVERED
ANTISCALANT	4,000	GALLONS/YR	$7.50	$6.49	$30,000.00	$25,960.00	DELIVERED
CARBON DIOXIDE LIQUID	250	S/TONS/YR	$144.00	$129.00	$36,000.00	$32,250.00	+ $900/MO IF WE NEED A TANK
HYDRATED LIME	220	S/TONS/YR	$151.48	$153.36	$33,325.60	$33,739.20	DELIVERED
MISC							
					SAVINGS		
GRINDING BALLS (125MM or 5-1/2")	FORGED	/ST	$1,250.00	$901.00	$349.00		DELIVERED
GRINDING BALLS (50mm)	FORGED	/ST	$1,060.00	$770.00	$290.00		DELIVERED
	20% CHROME	/ST	$1,435.00	$1,292.00	$143.00		DELIVERED
GRINDING BALLS (38mm)	FORGED	/ST	NOT BID B4	$810.00			DELIVERED
	% CHROME	/ST	NOT BID B4	$1,292.00			DELIVERED
CERAMIC GRINDING MEDIA		/ST	$3,260.00	$3,100.00	$160.00		

LUBRICANTS — BASKET OF ITEMS SHOWS SAVINGS FROM 0.1% (SYNTHETICS AND HI PERFORMANCE LUBES) TO 19.6% (MINERAL OILS)
SEE ATTACHED FOR INFORMATION (INCLUDES 2013 & 2016 PRICING WITH EXAMPLES OF HIGHER USAGE OILS)

FUEL OIL — EDWARDS OIL - BASED ON FUTURES - ALL COSTS ADDED IN, LESS SALES TAX - SEE ATTACHED EXPLANATION
FEB - $1.7906 MAR - $1.7057 APR - $1.5073 MAY - $1.5224 JUN - $1.5446 JUL - $1.5646
AUG - $1.5851 SEP - $1.6143 OCT - $1.6380 NOV - $1.9733 DEC - $1.9805

GEOTECH FABRIC FOR MINE DUMPS AND TAILINGS — LITTLE CHANGE IN PRICE DUE TO: 1) LABOR INCREASES; 2) HIGH DEMANDS FOR LINER PROJECTS HAS INCREASED PRICING

MINE POWER DISTRIBUTION — ANY SAVINGS IN MATERIALS/EQUIPMENT IS OFFSET BY INCREASED LABOR COSTS

Steve DeVaney

From: Martin Husnik <MartinHusnik@amesco.com>
Sent: Thursday, January 21, 2016 10:45 AM
To: Steve DeVaney
Cc: Jim Tieberg; Butch Trebesch
Subject: RE: Liners

Steve,

I spoke with the liner subcontractor we had from fall of 2013 and they told me that there is not much change from then to now due to a couple reasons:

- Labor has increased.
- Currently there are a lot of liner projects for this year and demand/price is up offsetting the low cost of oil.

He will contact the manufactures and said he would have some updated pricing next week so we can compare.

Let us know if you need anything else.

Marty

Ames Construction
2000 Ames Drive
Burnsville, MN 55306
Midwest: 952-435-7106

Martin Husnik, P. E.
Chief Estimator
MartinHusnik@amesco.com
Mobile: 612-919-3405

From: Steve DeVaney [mailto:sdevaney@polymetmining.com]
Sent: Wednesday, January 13, 2016 11:38 AM
To: Martin Husnik <MartinHusnik@amesco.com>
Subject: Liners

Martin,

I have been asked to find out from you if the pricing for the geotech liners for PolyMet's project has changed (hopefully less) due to the decrease in price for petroleum products.

Thank you,
Steve DeVaney
Procurement Manager
PolyMet Mining, Inc.

Steve DeVaney

From: Bob Skalko <rskalko@eoctrimark.com>
Sent: Wednesday, January 20, 2016 4:22 PM
To: Steve DeVaney
Cc: Scott Skalko
Subject: Fuel projections 2016
Attachments: Book1.xlsx

Hi Steve:

Attached are the fuel projections for 2016. Historically, this is the time of year for the seasonal low for diesel fuel. Prices for gas and diesel will most like go up from here. The risk is much greater to the upside than the downside. I could lock in these numbers for you today if you were able to commit. I added competitive rates for transport from Duluth/Superior to the Range, a fee for unit fill, MN taxes. I did not include sales tax as most likely Polymet will have an exemption.

Since you aren't able to commit today, I have added a standard deviation which represents what I think is reasonable upside potential. I looked at the 2-standard deviation calculation from a few months ago (which would provide a 95% confidence level) and divided it in half since we are only talking twelve months out vs 3 years in my previous work. If I remember my stats class, one standard deviation is about a 64% confindence level. You can double the amount that I show if you wanted to get back to 2 standard deviations and a higher degree of confidence.

For the months of Feb, Nov, Dec I added 24 cents per gallon to the #2 price to estimate a value for #1. I also used half the standard deviation amount for #1 that was calculated a few months ago. It differed slightly from #2.

I hope this works. If not let me know and I'll try to give you the information that you want for your projections.

Thx.

Bob Skalko
Edwards Oil Inc.

		Futures	Frt+Insp Fee	Unit Fill	MN Cleanu	1 Std Dev	Total
Feb	#1	1.2186	0.042	0.21	0.02	0.3	1.7906
Mar	#2	1.2337	0.042	0.21	0.02	0.2	1.7057
Apr	#2	1.0353	0.042	0.21	0.02	0.2	1.5073
May	#2	1.0504	0.042	0.21	0.02	0.2	1.5224
June	#2	1.0726	0.042	0.21	0.02	0.2	1.5446
July	#2	1.0926	0.042	0.21	0.02	0.2	1.5646
Aug	#2	1.1131	0.042	0.21	0.02	0.2	1.5851
Sept	#2	1.1423	0.042	0.21	0.02	0.2	1.6143
Oct	#2	1.166	0.042	0.21	0.02	0.2	1.638
Nov	#1	1.4013	0.042	0.21	0.02	0.3	1.9733
Dec	#1	1.4085	0.042	0.21	0.02	0.3	1.9805
	Avg	1.175855				Avg	1.675127

Steve DeVaney

From: Dave Pierson <David.Pierson@gerdau.com>
Sent: Monday, January 18, 2016 1:43 PM
To: Steve DeVaney
Subject: RE: Pricing

Hi Steve, sorry for late reply. Please see current budgetary pricing for FORGED Grinding Balls delivered to Hoyt Lakes, MN.
We manf in Duluth, MN.
Advise if questions or comments.
Thanks
Dave

David Pierson

Regional Sales SBQ/Grinding Media

david.pierson@gerdau.com
763.772.8491

From: Steve DeVaney [mailto:sdevaney@polymetmining.com]
Sent: Thursday, January 14, 2016 8:30 AM
To: Dave Pierson <David.Pierson@gerdau.com>
Subject: Pricing

Happy New Year Dave,

I have been asked by the banks looking into providing PolyMet with construction financing , to check into pricing for some of the commodities that may have changed, due to market forces.

Could you please provide me with pricing (delivered) for:

125mm forged balls (Sag Mill) - Do not produce at Duluth but can source and deliver at $985/ short ton.
50mm forged and chrome balls (ball mills) $770 / short ton
38mm forged and chrome balls (regrind mills) $810 / short ton.

Thank you,
Steve DeVaney
Procurement Manager
PolyMet Mining, Inc.
6500 County Road 666
Hoyt Lakes MN 55750

Monday, January 18, 2016

Mr. Steve Devaney
Manager- Purchasing
Polymet Mining
P.O. Box 475
Hoyt Lakes, MN 55750

Ref: Budget Ball Pricing

Dear Steve,

I am quoting Forged balls & chrome balls delivered to Polymet Mining in Hoyt Lakes. Our pricing includes the surcharges for Steel Scrap and Ferro-Chrome. Currently, we are reviewing the raw materials costs on a quarterly basis.

Budget Chrome Ball pricing: 38mm & 50 mm 20% Cr balls @ $1,292/ST delivered.

This reflects current Raw materials and freight costs.
We believe that the 20% chrome ball will be very beneficial to Polymet in their downstream process (flotation).

Foged balls:

125mm - $901/st delivered

38mm & 50mm - $883/st delivered

Ceramic Beads: 2-3 mm $3,492/st delivered

Delivery:

Chrome balls- in 90 ton railcars

Forged balls in 1 metric ton or 1 short ton bags by truck or rail car

Beads- in 1 metric ton or 1 short ton bags by truck

Sincerely,

Doug G. Halverson
Sales Engineer
Magotteaux

Steve DeVaney

From: Phil Eason <Phil.Eason@HawkinsInc.com>
Sent: Friday, January 15, 2016 3:46 PM
To: Steve DeVaney
Subject: RE: Reagents

Here are some current costs based on the volumes you provided earlier. We are checking with BASF on the Magnafloc items and also waiting on a copper sulfate price. What is the volume on the copper sulfate? Copper is down right now as you probably know.

Thanks, Phil

Magnafloc 10/455	$
Copper Sulphate	$
Sodium Metasilicate @ 5%	$1.00/gallon
Ferric Chloride @ 35%	$1.69/gallon
Sodium Hydroxide @ 50%	$2.10/gallon
Polymer Floculant	$14.86/gallon
Citric Acid 50%	$9.96/gallon
Sodium Hypochlorite	$1.70/gallon
Potassium Permanganate	$4.00/lb.

Phil Eason
Account Manager
Hawkins, Inc.
Direct 612-617-8534
Mobile 612-750-2221

From: Steve DeVaney [mailto:sdevaney@polymetmining.com]
Sent: Wednesday, January 13, 2016 1:11 PM
To: Phil Eason
Subject: Reagents

Happy New Year Phil,

I have been asked by the banks interested in providing construction financing to get updated pricing on our reagents.

Could you please provide me with delivered pricing for the following products that you have quoted in the past?
Magnafloc 10/455
Copper Sulphate
Sodium Metasilicate @ 5%
Ferric Chloride @ 35%
Sodium Hydroxide @ 50%
Polymer Floculant
Citric Acid
Sodium Hypochlorite

Steve DeVaney

From: Terry Spooner <tspooner@graymont.com>
Sent: Thursday, January 14, 2016 12:46 PM
To: Steve DeVaney
Subject: RE: Lime

Happy New Year to you as well, Steve. Here's the budget numbers for 2016.

High Calcium Hydrated Lime: $125.00
High Calcium Quicklime (1/4" minus sizing): $105.00
Pulverized High Calcium Limestone, 270 Mesh: $28.00
ADD Pneumatic Truck Freight, delivered to Polymet silos: $18.62 for PLS (Pulverized Limestone)
$23.00 for Quicklime
$28.36 for Hydrate

All prices are per short ton. If you need anything else, just let me know.

Terry

Terry Spooner
Account Manager
GRAYMONT

T +1 715-394-1714 M +1 218-348-4598
800 Hill Avenue
Superior, WI 54880

From: Steve DeVaney [mailto:sdevaney@polymetmining.com]
Sent: Wednesday, January 13, 2016 12:56 PM
To: Terry Spooner <tspooner@graymont.com>
Subject: Lime

Happy New Year Terry,

The banks that are interested in supplying construction financing to PolyMet have asked that I get current pricing on the lime/limestone products that you have quoted in the past.

Please provide a current pricing for: 1) High Calcium Hydrated Lime 2) High Calcium Quicklime and 3) pulverized High Calcium Limestone.

Thank you,

Steve DeVaney
Procurement Manager
PolyMet Mining, Inc.

Steve DeVaney

From: David_Stanaway@praxair.com
Sent: Friday, January 15, 2016 11:32 AM
To: Steve DeVaney
Subject: RE: Pricing

You would be around $129.00/ton. Hope this helps you out. Let us know if you need anything else. Thanks

David Stanaway
Praxair Distribution Inc
Branch Manager II
112 S. 15th Ave W
Virginia, MN 55792
218 749-4293
David_Stanaway@Praxair.com

From: Steve DeVaney <sdevaney@polymetmining.com>
To: "David_Stanaway@praxair.com" <David_Stanaway@praxair.com>
Date: 01/15/2016 10:02 AM
Subject: RE: Pricing

About 1,000 short tons/year

From: David_Stanaway@praxair.com [mailto:David_Stanaway@praxair.com]
Sent: Friday, January 15, 2016 9:26 AM
To: Steve DeVaney <sdevaney@polymetmining.com>
Subject: Re: Pricing

Happy New Year to you!!!

Can you refresh our memory as to the anticipated usage?

David Stanaway
Praxair Distribution Inc
Branch Manager II
112 S. 15th Ave W
Virginia, MN 55792
218 749-4293
David_Stanaway@Praxair.com

Steve DeVaney

From: Steve King <sking@petrochoice.com>
Sent: Friday, January 15, 2016 4:23 PM
To: Steve DeVaney
Cc: Mark Giese; Erik Modeen
Subject: Lubrication Budget and Outlook
Attachments: Polymet Budget numbers 2016.xlsx

Steve-

Mark mentioned you were looking for an update on the market. I attached a sampling of budgetary pricing based on today's market. For the most part, mineral oil pricing has dropped substantially while synthetics and high performance products have only dropped a little. We see today's pricing to hold firm for at least a year if not longer. I do not believe it will drop much more than it already has. Let me know if you need anything else.

Thanks

Steve King, CLS
Executive Vice-President West Zone
PetroChoice Lubrication Solutions
Cell: 218-348-4194
sking@petrochoice.com

PRICING IS LOWER
0.1% TO 19.6%
SEE FOLLOWING PAGE

'13

SHORT_DESC	Vendor	Feb-16		
Cummins Fleetcool EX 50/50: Bulk	Cummins	6.57		
Mobil Delvac MX 15w-40: Bulk	ExxonMobil	6.50		$13,30
Mobil DTE 10 Excel 32: Bulk	ExxonMobil	13.18 ✓	-$0.12 = -0.9%	
Mobil DTE Extra Heavy: Drum	ExxonMobil	459.25		
Mobil DTE Heavy Medium: Drum	ExxonMobil	447.70		$519
Mobil DTE Light: Drum	ExxonMobil	507.65 ✓	-$11.35 = -2.2%	
Mobil Gear 600 XP 68: Bulk	ExxonMobil	5.76		
Mobil Grease XHP 221: Drum	ExxonMobil	722.18 ✓	-$30.82 = -4.1%	$753
Mobil Grease XHP 321: Bulk	ExxonMobil	2.27		
Mobil Nuto H 68: Bulk	ExxonMobil	5.05 ✓	$1.23 = -19.6%	$6.28
Mobil SHC 626: Drum	ExxonMobil	2,230.80		
Mobil SHC 629: Drum	ExxonMobil	1,922.94 ✓	-$2.06 = -0.1%	$1925
Mobil SHC 630: Drum	ExxonMobil	1,961.44		
Mobil Spartan EP 150: Bulk	ExxonMobil	5.38 ✓	-$1.03 = -16%	$6.41
Mobil Spartan EP 220: Bulk	ExxonMobil	5.38		
Mobil Spartan EP 320: Bulk	ExxonMobil	5.65		
Mobil Spartan EP 460: Bulk	ExxonMobil	6.68 ✓	-$0.73 = -9.9%	$7.41
Mobil Trans HD 10W: Bulk	ExxonMobil	6.06		
Mobil Trans HD 30: Bulk	ExxonMobil	6.27		
Mobil Trans HD 50: Bulk	ExxonMobil	6.74		
Mobil Univis N 32: Bulk	ExxonMobil	5.15		

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Polymet Pricing for Budgetary Purposes **11/5/2013**

Product Description	Bulk	Drum
Mobil ATF D/M	6.75	400.00
✓ Mobil DTE 10 Excel 32	13.30	748.00
Mobil DTE 10 Excel 68		960.00
✓ Mobil DTE Light		519.00
Mobil Mobilgrease XHP Mine 320		988.00
Mobilith SHC 220-Drum		2,486.00
Mobilith SHC 221-Drum		2,486.00
✓ Mobil Nuto 68	6.28	362.00
Petron Gearshield NC	2.13	984.00
Petron PK 140		860.00
✓ Mobil SHC 629		1,925.00
Mobil SHC 634		2,020.00
✓ Mobil Spartan EP 150	6.41	382.00
✓ Mobil Spartan EP 460	7.41	438.00
✓ Mobil XHP 221 Grease		753.00
Mobil XHP 222 Grease		753.00
	Keg	**Pail**
Mobil Grease XTC	604.00	187.00

*** Budgetary numbers only. Actual products and final costs to be determined.

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Lubrication Solutions

3/26/14 (2013 LUBE PRICING)

PolyMet Coarse Crusher

		Upgraded System			*Lubrication Costs*					
Project #	**Project**	**Description**	**Est. Cost**	**Ref. Doc**	**Description**	**Est.Cost**	**Ref. Doc**		**Est.Cost**	**Ref. Doc**
PMCC101	Coarse Crusher Car Dump Hydraulic Systems	Clean modify end plates, replace suction strainers, utilize existing high pressure filters, and existing kidney loop filtration system. Add soft shift to directional control valves, hydraulic jumper hoses between pump and DCV, rubber motor mount inserts. reseal hydraulic cylinders.	$101,824.70	PMCC101B	Product- Mobil Nuto H 68 1770 gallons ✓	$11,115.60 8938.50 → '16	PMCC101BL			
PMCC102	Coarse Crusher Lube Oil System	Replace the existing crusher lube oil system with individual day tanks. Day tanks will be equipped with heaters, coolers, and filtration. Install a 1500 gallon storage tank, install a new distribution pipe and plumbing.	$857,700.00	PMCC102A	Fill Crusher Oil System Product- Mobil Spartan EP150 - 4800 gallons	$30,768.00 25824 → '16	PMCC102AL			
PMCC103	60" and 36" Crusher Drive Motors	Remove drive couplings, clean and grease with Mobil Grease XTC. Drain, and flush electric drive motors; fill as required(AW68).	$3,200.00	PMCC103B	(1) 5-Gallon Pail Mobil Grease XTC (24) Gallons Mobil Nuto H68	$337.72	PMCC103BL		150.72 → '13 121.20 → '16	
PMCC104	60" Spyder Lube Systems	Replace grease pumps, install bulk grease tanks, replace Trabon blocks and replace existing lubricant supply lines to crusher. Purge lines, connect and purge spyder bushings.	$40,670.13	PMCC104A	Mobil Grease XHP 320 (400 lbs.)	$988.00	PMCC104AL			
PMCC105	36 " Spyder Lube Systems	Replace grease pumps, install bulk grease tanks, replace lube blocks and replace existing lubricant supply lines to crusher. Purge lines, connect and purge spyder bushings.	$91,493.13	PMCC105A	Mobil Grease XHP 320 (400 lbs.)	$988.00	PMCC105AL			
PMCC106	60" Hydrosets	Replace existing tanks (old tanks were cut open), install new breathers on tanks. Replace electric motor/pump assembly.Replace high pressure filter housings (2 each system, 4 total) with upgrades.	$24,227.48	PMCC106A	(500 gallons) Mobil Spartan EP 150	$3,205.00 2525 → '16	PMCC106AL			

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Lubrication Solutions

PMCC107	36" Hydrosets	Replace existing tanks (8) total, install new breathers on tanks. Install new electric motor/pump assembly. Replace high pressure filter housings (8 total-2 each system,) with upgrades.	$75,124.80	PMCC107A	(800) gallons Mobil Spartan EP 150	$5,128.00 4040 → 16	PMCC107AL			
PMCC108	Pan Feeders	Rescope								
PMCC109	1A & 1B Conveyors (Tail Pulleys)	Plumb out grease fittings for manually greasing the tail pulley bearings.	$337.00	PMCC109B	Grease (14 lbs.) Bulk Mobil Grease XHP 221	$24.50	PMCC109BL			
PMCC110	60" Lifting Cylinders	Replace existing pump with a rermanufactured pump. Drain oil, install sample tube, new breather and refill with new oil. Rebuild existing cylinder.	$17,521.86	PMCC110A	(60) Gallons Mobil Nuto H 68	$376.80	PMCC110AL			
PMCC111	30" Lifting Cylinders	Replace existing pump with a rermanufactured pump. Drain oil, install sample tube, new breather and refill with new oil. Rebuild existing cylinder.	$7,238.08	PMCC111A	(30) Gallons Mobil Nuto H 68	$188.40	PMCC111A			
PMCC112	Miscellaneous				(4) Kegs Mobil XTC Coupling Grease $604.00 Each	$2,416.00				
			$1,219,337.18			$55,536.02			$0.00	

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PolyMet Concentrator

		Upgraded System			*Lubrication Costs*					
Project #	**Project**	**Description**	**Est. Cost**	**Ref. Doc**	**Description**	**Est.Cost**	**Ref. Doc**		**Est.Cost**	Ref. Doc
PMC501	4A & 4 B Conveyor Head Pulley Lubrication	Install a Centromatic for conveyor pulleys and shaft bearings.	$23,904.32	PMC501A	Mobil Grease XHP 221 (400 lbs.)	$753.00	PMC501AL			
PMC502	5 N Primary and Secondary Drive Gear Boxes	Install sample valves, 3/8" sight glasses. Flush with portable filter cart, service couplings. Install an automatic lubrication system to supply grease to lube points. USE The 4A & 4B system	$23,480.70	PMC502A	Mobil Grease XHP 221 (400 lbs.) Mobil Spartan EP 150 85 gallons Mobil Nuto H 68 2 gallons	$1,310.41	PMC502AL			
PMC503	5 N Tripper Car	Replace breathers and sight glasses, flush with portable filter cart, service drive coupling. Install a QLS for carriage wheel, conveyor pulley and shaft bearings. Drain secondary drive gear reservoir, flush and refill with 460 gear oil.	$8,708.49	PMC503A	(5) Gallons Mobil Spartan EP 150 (2) Gallons Mobil Spartan EP 460 Grease (14 lbs.) Bulk Mobil Grease XHP 221	$71.37	PMC503AL			
PMC504	5N Head Pulley Lubrication	Install a (1) quick systems on the 5N conveyor head pulley.	$5,845.97	PMC504A	Mobil Grease XHP 221 (400 lbs.)	$753.00	PMC504AL			
PMC505	Feeder Belts	Install sample valves, install a new breathersand 3/8" sight glasses, flush with portable filter cart, service couplings. Install an automatic Lube system to grease lube points.	$40,467.61	PMC505A	IMobil Grease XHP 221 (400 lbs.) (82) Gallons Mobil Spartan EP 150	$1,278.62	PMC505AL			
PMC506	Mill Oil Systems	Install a new bulk storagepumping system. Install new day tank oil skids on the 440 deck at each mill. Install new supply lines from each day tanks to the rod and ball mills. Install new flow meters on each mill. Install new supply hoses,return hoses on the mills. Service drive couplings,.	$1,100,908.40	PMC506A	IMobil Spartan EP 150 3200 gallons (8) Mobil grease XTC Keg	$25,344.00 17,216 → '16 +	PMC506AL			
PMC507	Mill Drive Gear & Pinion Lubrication Systems	Install a new bulk storage system. Replace current storage tanks,install new grease pumps, replace lube blocks and supply hoses. Rebuild lube panels. Service mill and pinon gear lubricant.	$236,025.80	PMC507A	Petron Gearshield NC 9300 lbs.	$19,809.00	PMC507AL			

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PMC508	Regrind Mill Oil Systems	Install a new bulk storage system. Install new day tank oil skids under the regrind deck at each mill. Install new supply lines from each day tanks to the ball mills. Install new flow meters on each mill. Install new supply hoses,return hoses on the mills. Service drive couplings,.	$92,801.40	PMC508A	Mobil Spartan EP 320 1100 gallons (1) Mobil grease XTC Keg	$7,655.00	PMC508AL			
PMC509	Regrind Mill Drive Gear & Pinion Lubrication Systems	Install a new bulk storage system. Replace current storage tanks,install new grease pumps, replace lube blocks and supply hoses. Rebuild lube panels. Service mill and pinon gear lubricant.	$50,303.58	PMC509A	Petron Gearshield NC 2000	$4,260.00	PMC509AL			
TOTAL			$1,582,446.27			$61,234.40			$0.00	

Steve DeVaney

From: Shevich, George <George.Shevich@ParsonsCorp.com>
Sent: Wednesday, January 20, 2016 1:41 PM
To: Steve DeVaney
Cc: Zdon, Roger; Johnson, Denny
Subject: RE: Estimate

Steve, we have reviewed our proposal for the Mine site Power Distribution. The major materials/equipment was to be furnished by others. The balance of the material/equipment pricing did not change a great deal. Some went up and some went down. Any savings here would be offset be a labor rate increase. The next rate increase is May 31, 2016.

We would be more than happy to take another look at our proposal if there were any new information or drawings available.

Please let us know if there is anything else we can do for you. Thank you very much for the opportunity.

George Shevich | Project Manager
PARSONS ELECTRIC
(218) 725-3405 Direct
(218) 591-0282 Mobile
www.parsonscorp.com

From: Steve DeVaney [mailto:sdevaney@polymetmining.com]
Sent: Friday, January 15, 2016 9:10 AM
To: Shevich, George
Subject: Estimate

Happy New Year George,

I have been asked to contact you concerning the proposal (PR-0039) that you submitted in October, 2013. We are working with bankers interested in providing PolyMet with construction financing and they have asked us to provide them with updated estimates of various projects. They are inquiring if any of the estimates may have increased (or decreased) due to the decrease in metals and petroleum costs in the current marketplace. Could you please update the proposal (specifically for SOW 13 : Mine Site Power Distribution System : Year – 1)? The banks (and PolyMet) seem to be in a hurry for this information and are requesting that you return an updated estimate as soon as possible.

Thank you,
Steve DeVaney
Procurement Manager
PolyMet Mining, Inc.
218-471-2155

Steve DeVaney

From: Leingang, David <dleingang@nalco.com>
Sent: Wednesday, January 20, 2016 10:51 AM
To: Steve DeVaney
Subject: FW: Reagents

Steve,

For the sake of accuracy, I received an update on the MIBC density this morning, apparently my marketer gave me the standard MIBC density, not the FP 509 product in the table below. The FP 509 is slightly heavier and does change the cost per gallon slightly.

SPEC PRODUCT	NALCO PRODUCT	FORM	PRICE/LBS	#/gal	$/gal
SIPX	SIPX	Dry-Bulk Bag	$1.42		
MIBC	FP 509	Bulk Liquid	$1.09	7.3	$7.96
Antiscalant	DVS4O012	Bulk Liquid	$1.12	9.6	$10.75
Liquid Flocculant	83904	Bulk Liquid	$1.19	8.9	$10.59
Dry Flocculant	83949	Dry-Bulk Bag	$1.49		

MALNAFLOC. 10/455

Hope this all make sense to you, if not let me know and I will do my best to clarify.

Thanks.

David Leingang
District Account Manager
Grand Rapids, MN

NALCO | an Ecolab Company
Cell: 218 259 6450
Dist Office: 304-965-7461
E: dleingang@nalco.com

From: Leingang, David
Sent: Tuesday, January 19, 2016 11:30 AM
To: 'Steve DeVaney'
Subject: FW: Reagents

Steve,

As per our discussion, the densities of the liquid products and the price per gallon were updated in the table below. Let me know if you have further questions.

SPEC PRODUCT	NALCO PRODUCT	FORM	PRICE/LBS	#/gal	$/gal
SIPX	SIPX	Dry-Bulk Bag	$1.42		
MIBC	FP 509	Bulk Liquid	$1.09	6.9	$7.52
Antiscalant	DVS4O012	Bulk Liquid	$1.12	9.6	$10.75

Steve DeVaney

From: DKarkoska Neo Solutions <dkarkoska@neosolutionsinc.com>
Sent: Tuesday, January 19, 2016 5:07 PM
To: Steve DeVaney; KHovland Neo Solutions
Subject: RE: Antiscalant

Steve, I assumed (maybe incorrectly) that the product was to be delivered in bulk. I got the updated product costings in freight and came up with $6.49 a gallon the only thing that would change that would be product in totes compared to product in bulk.

Dave Karkoska
Neo Solutions Inc.
218.780.3283

-------- Original message --------
From: Steve DeVaney <sdevaney@polymetmining.com>
Date: 1/19/2016 9:50 AM (GMT-06:00)
To: DKarkoska Neo Solutions <dkarkoska@neosolutionsinc.com>, KHovland Neo Solutions <khovland@neosolutionsinc.com>
Subject: Antiscalant

I have been asked to update the price of antiscalant (part of our construction financing). The last price from you was $7.50/gl in 2013.

Thanks,
Steve DeVaney
PolyMet Mining, Inc.

Steve DeVaney

From: Catherine_Gagnon@quadra.ca
Sent: Tuesday, January 26, 2016 4:08 PM
To: Steve DeVaney
Cc: Catherine_Gagnon@quadra.ca
Subject: Re: FW: Considering Quadra Chemicals Regents & Technical Services
Attachments: REAGENT UPDATE QUOTE SHEET (Jan 2016).xlsx

Steve,

Pleas find revisions on the reagents. There are some products where prices have not yet decreased. Please note that these are budgetary figures and prices are subject to change. As we get closer to the opening of the mine, then Quadra will be in a better position to provide true figures during that time.

If you need more information, please do not hesitate to contact me.

Regards,

Catherine Gagnon
Directrice des Comptes Stratégiques
Strategic Account Manager
Cellulaire/Cellular (613) 360-0016
Télécopieur / Fax: (450) 424-9458
Courriel / Email: Catherine_Gagnon@quadra.ca
http://www.quadrachemicals.com

From: Steve DeVaney <sdevaney@polymetmining.com>
To: '"catherine_gagnon@quadra.ca"' <catherine_gagnon@quadra.ca>
Date: 01/13/2016 02:24 PM
Subject: FW: Considering Quadra Chemicals Regents & Technical Services

---

Happy New Year Catherine,

I have been asked by the banks that are considering providing construction financing to PolyMet to update my reagent pricing.

Could you please look at the attached list (which you supplied to me last summer) and provide me with current pricing?

Thank you,
Steve DeVaney
Procurement Manager
PolyMet Mining, Inc.

From: Catherine_Gagnon@quadra.ca [mailto:Catherine_Gagnon@quadra.ca]
Sent: Thursday, June 11, 2015 9:17 PM

QUADRA PRICING 1/26/16

REAGENT PRICING

REAGENT	USEAGE (STPY)		PRICE/UNIT	EXTENDED PRICE	COMMENTS
HYDROMET CIRCUIT					
HYDROCHOLIC ACID	1,485	32% SOLUTION	$199.60	$296,406.00	ex-Toronto, Canada (for now. May quote out of Wisconcin).
SULFUR DIOXIDE (LIQUID)	1,254	100% LIQUID	$0.00	$0.00	no quote
SODIUM HYDROSULFIDE	334		$905.00	$302,270.00	1984 lb/bag of dry flakes delivered to mine & dissolved on-site.
LIMESTONE (LUMP)	87,341	DRY	$0.00	$0.00	
LIMESTONE (GROUND)	87,341	DRY	$0.00	$0.00	
LIME - DRY	5,181	DRY	$0.00	$0.00	May quote through support from our supplier
Mg HYDROXIDE	3,674	60% SOLUTION	$598.75	$2,199,807.50	bulk deliveried to site
CAUSTIC SODA (NaOH)	64	50% SOLUTION	$0.00	$0.00	
MAGNAFLOC 342 (NOW 155)	26	DRY/TANKER	$2,991.00	$77,766.00	POLYCLEAR A350L. 1653 lb/bags. Combined with other Polyclear for full truckload deliveries to site.
MAGNAFLOC 351	179	DRY/TANKER	$3,320.00	$594,280.00	Polyclear N103.
SULPHURIC ACID	138	93% SOLUTION	$390.10	$53,833.80	bulk delivered to site
FLOTATION CIRCUIT					
SIPX (SODIUM ISOPROPYL XANTHATE)	1,170	DRY	$1,770.00	$2,070,900.00	1873 lb/bag in wooden crates delivered in full truckloads
MIBC (METHYL ISOBUTYL CARBINOL)	1,007	100% SOLUTION	$2,140.00	$2,154,980.00	45,000 lb bulk delivered to site
COPPER SULPHATE ($CUSO_4$)	592	DRY	$1,817.00	$1,075,664.00	2755.75 lb/bag delivered to mine site. Price is based on an LME Cu price
MAGNAFLOC 10/455	6	DRY	$3,014.00	$18,084.00	Polyclear A2501.
CMC (CARBOXYL METHYL CELLULOSE)	1,072	DRY	$4,535.97	$4,862,559.84	2204 lb/bag ex-Montreal Warehouse
LIME SLURRY	10,274	DRY	$0.00	$0.00	May quote through support from our supplier.
WASTE WATER TREATMENT					
MINE SITE					
SODIUM METASILICATE @ 5%	25,000	GALLONS/YR	$0.27	$6,812.50	Assuming a density of 1.8. Need to add dissolving + freight rate.
FERRIC CHLORIDE @ 35%	14,400	GALLONS/YR	$5.67	$81,648.00	2676 lb non-returnable tote shipments del'd to site
SODIUM HYDROXIDE @ 50%	41,000	GALLONS/YR	$5.79	$237,431.00	IHS index
POLYMER FLOCULANT (LIQUID)	600	GALLONS/YR	$0.00	$0.00	may quote following better understanding of application
HYDRATED LIME	1,100	S/TONS/YR	$0.00	$0.00	recommended to install a slaking system
CARBON DIOXIDE LIQUID	1,000	S/TONS/YR	$0.00	$0.00	no quote
CITRIC ACID	120	GALLONS/YR	$0.00	$0.00	
SODIUM HYPOCHLORITE	120	GALLONS/YR	$5.98	$717.60	210 liter drums delivered. Drum deposit applicable.
TAILINGS BASIN					
POTASSIUM PERMANGANATE	16,000	POUNDS/YR	$3.86	$61,760.00	55 lb bag packaging
ANTISCALANT	4,000	GALLONS/YR	$12.17	$48,680.00	3000 lb tote shipments, delivered to site.
CARBON DIOXIDE LIQUID	250	S/TONS/YR	$0.00	$0.00	
HYDRATED LIME	220	S/TONS/YR	$0.00	$0.00	recommened to install a slaking system
GRINDING MEDIA					
CERAMIC MEDIA 3.0mm	UNDETERMINED		$1.55 $/lb	$0.00	Bulk bags. Product: Microbit Leonardo 2.5-3.5mm

Steve DeVaney

From: shuynh@ctc.ca
Sent: Thursday, January 28, 2016 11:30 AM
To: Steve DeVaney
Subject: Re: FW: Reagents
Attachments: SIPX PolyMet Quote Jan 28.pdf

Hey Steve,

I have a quote here for Chinese SIPX, similar to last time. The other products I've been chasing for freight and still waiting for response. I didn't want you to wait any longer without receiving anything. So, here is the quote for the SIPX at least to Duluth.

Hopefully, I'll have other numbers later in the day.

regards,

Steven
Steven Huynh
Project Engineer
Charles Tennant & Company (Canada) Ltd.
Tel: +1 647 962 1600
E-mail: shuynh@ctc.ca

Steve DeVaney <sdevaney@polymetmining.com>

01/26/16 10:23 AM

To '"shuynh@ctc.ca"' <shuynh@ctc.ca>
cc
Subject FW: Reagents

Steve,
Anything Yet?
Steve

-----Original Message-----
From: Steve DeVaney
Sent: Wednesday, January 20, 2016 11:40 AM
To: 'shuynh@ctc.ca' <shuynh@ctc.ca>
Subject: RE: Reagents

Yes

Steve

-----Original Message-----
From: shuynh@ctc.ca [mailto:shuynh@ctc.ca]
Sent: Wednesday, January 20, 2016 11:34 AM
To: Steve DeVaney <sdevaney@polymetmining.com>
Subject: Reagents

Hello Steve,

Eric Johnson forwarded me your message about the getting current pricing for some products. I can provide you current pricing, let me work on getting this for you.

Will I be quoting for the same volumes you requested before?

Regards,

Steven

Steven Huynh
Project Engineer
Charles Tennant & Company Ltd.
34 Clayson Road
Toronto, On. M9M 2G8
Tel: +16479621600
Email: shuynh@ctc.ca

CHARLES TENNANT
& Company/Compagnie

34 Clayson Road, Toronto, Ontario. M9M 2G8
Tel : (416) 741-9264. Fax: (416) 741-6475
www.ctcminechem.com

Att:
Steve DeVaney – Procurement Manager
PolyMet Mining, Inc.
6500 County Road 666
Hoyt Lakes, MN 55750
Tel: 218-471-2155
Email:sdevaney@polymetmining.com

28 January 2016

On behalf of Charles Tennant and Company, it is my pleasure to provide you with the following product pricing;

PRODUCT:	**Sodium Isopropyl Xanthate 85% Technical Grade**
PACKAGING:	850kg FIBC Bag-Box Combination
STOWAGE	20 Units of 850 kg box full container
TOTAL DELIVERY	**17.0 MT**
PRODUCT COST:	CIF Duluth, Minnesota **USD $1455.90/MT** USD $1.46/kg $0.664/LB
TERMS:	CIF. 100% T/T or Wire Transfer in advance payment prior to shipment of products.
ORIGIN	Charles Tennant and Company – TC China
PRODUCT ORIGIN	Weifang, China
PRODUCTION TIME	4 weeks from receipt of purchase order.
LEAD TIME	2-3 weeks
Notes	Quote for SIPX is valid for one month. PO should be submitted before February 28th, 2016.

PAYMENT TERMS: NET 30 DAYS

CHARLES TENNANT
& Company/Compagnie

34 Clayson Road, Toronto, Ontario. M9M 2G8
Tel : (416) 741-9264. Fax: (416) 741-6475
www.ctcminechem.com

QUOTE VALIDITY This quote is deemed valid up to the 28th of February, 2016 and is subject to confirmation thereafter.

Should you require any further information, assistance or would like to discuss this quote, please contact me at your convenience.

Best regards,

Steven Huynh
Charles Tennant & Company Ltd.
Tel: 647 962 1600
Email: shuynh@ctc.ca

Attachment J:

GE OpEx Cost Update, 3/31/2016, GE, Paul Dillalo

From:	Dilallo, Paul M (GE Power)
To:	Jeff Ubl
Cc:	Don E. Richard; Bryan T. Oakley; Alison L. Ling
Subject:	RE: PolyMet GE OPEX Update
Date:	Thursday, March 31, 2016 5:33:06 PM
Attachments:	image001.png

Jeff,

Please use $550 per NF element as an updated cost. Let me know if you have any questions or require additional information.

Thanks,

Paul DiLallo
Regional Sales Manager
GE Water & Process Technologies

M 414 403 1897
E paul.dilallo@ge.com

From: Jeff Ubl [mailto:JUbl@barr.com]
Sent: Friday, March 25, 2016 1:53 PM
To: Dilallo, Paul M (GE Power)
Cc: Don E. Richard; Jeff Ubl; Bryan T. Oakley; Alison L. Ling
Subject: PolyMet GE OPEX Update

Hi Paul;

We are looking to get an update of unit costs for the items attached in red. These were from 4/30/13.

Can you provide within the next week?

Jeff Ubl, PE

Senior Environmental Engineer
Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
---
office: 952.832.2647
toll-free: 800.632.2277
---
jubl@barr.com
www.barr.com

From:	Dilallo, Paul M (GE Power)
To:	Alison L. Ling; Jeff Ubl
Cc:	Don E. Richard; Bryan T. Oakley
Subject:	RE: PolyMet GE OPEX Update
Date:	Thursday, March 31, 2016 5:35:29 PM
Attachments:	image001.png

Alison,
Unit cost for the MetClear MR2405 is $4.94/lb based on delivery in totes. Please let me know whether you have any questions or require additional information.

Thanks,

Paul DiLallo
Regional Sales Manager
GE Water & Process Technologies

M 414 403 1897
E paul.dilallo@ge.com

From: Alison L. Ling [mailto:ALing@barr.com]
Sent: Tuesday, March 29, 2016 2:34 PM
To: Dilallo, Paul M (GE Power); Jeff Ubl
Cc: Don E. Richard; Bryan T. Oakley
Subject: RE: PolyMet GE OPEX Update

Paul,

Can you also provide a unit cost for MetClear MR2405? This chemical will be on standby for addition to the metals removal process.

Thanks,

Alison L. Ling, PhD

Environmental Specialist
Minneapolis, MN office: 952.842.3568
ALing@barr.com
www.barr.com

From: Dilallo, Paul M (GE Power) [mailto:Paul.Dilallo@ge.com]
Sent: Monday, March 28, 2016 5:27 PM
To: Jeff Ubl <JUbl@barr.com>
Cc: Don E. Richard <DRichard@barr.com>; Bryan T. Oakley <BOakley@barr.com>; Alison L. Ling

<ALing@barr.com>
Subject: RE: PolyMet GE OPEX Update

Hi Jeff,
I will review and get back to you this week.

Thanks,

Paul DiLallo
Regional Sales Manager
GE Water & Process Technologies

M 414 403 1897
E paul.dilallo@ge.com

From: Jeff Ubl [mailto:JUbl@barr.com]
Sent: Friday, March 25, 2016 1:53 PM
To: Dilallo, Paul M (GE Power)
Cc: Don E. Richard; Jeff Ubl; Bryan T. Oakley; Alison L. Ling
Subject: PolyMet GE OPEX Update

Hi Paul;

We are looking to get an update of unit costs for the items attached in red. These were from 4/30/13.

Can you provide within the next week?

Jeff Ubl, PE

Senior Environmental Engineer
Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
---
office: 952.832.2647
toll-free: 800.632.2277
---
jubl@barr.com
www.barr.com

Attachment K:

Hawkins Chemical Unit Costs, 4/1/2016, Hawkins Chemical, Phil Eason

From: Phil Eason
To: Alison L. Ling
Subject: RE: Chemical unit costs for PolyMet
Date: Friday, April 01, 2016 3:01:33 PM
Attachments: image001.png

Alison, here you go. Prices are good for 90 days.

Ferric sulfate (up to 50,000 tons/year) – $.26/lb.

Sodium permanganate 20% (approximately 1 ton/year) – $2.80/lb. (product weighs 9.67 lbs./gallon) packaged in 536 lb. drums. We cannot supply the higher concentration.

Hydrochloric acid (up to 100 tons/year) – HCL 20 Baume, delivered as 48,000 bulk loads. $.16/lb.

Sodium bisulfite (approximately 1 ton/year) – $1.50/lb. in 50 lb. bags

Phil Eason
Account Manager
Hawkins, Inc.
Direct 612-617-8534
Mobile 612-750-2221

From: Alison L. Ling [mailto:ALing@barr.com]
Sent: Friday, April 01, 2016 2:05 PM
To: Phil Eason
Cc: Jeff Ubl
Subject: RE: Chemical unit costs for PolyMet

Phil,

See below. Thanks.

Alison L. Ling, PhD

Environmental Specialist
Minneapolis, MN office: 952.842.3568
ALing@barr.com
www.barr.com

From: Phil Eason [mailto:Phil.Eason@HawkinsInc.com]
Sent: Friday, April 01, 2016 12:03 PM
To: Alison L. Ling <ALing@barr.com>
Cc: Jeff Ubl <JUbl@barr.com>
Subject: RE: Chemical unit costs for PolyMet

Alison, do you have specifications on what you need for these products?

Ferric sulfate (up to 50,000 tons/year) – we offer dry bags or a 12% iron solution? Dry

Sodium permanganate (approximately 1 ton/year) – this is sold as either a 20% or 40% solution? 40%

Hydrochloric acid (up to 100 tons/year) – I will quote our HCL 20' solution – which is very common. Ok

Sodium bisulfite (approximately 1 ton/year) – we offer sodium bisulfite in bags or in a 40% solution? Dry

Phil Eason
Account Manager
Hawkins, Inc.
Direct 612-617-8534
Mobile 612-750-2221

From: Alison L. Ling [mailto:ALing@barr.com]
Sent: Wednesday, March 30, 2016 4:01 PM
To: Phil Eason
Cc: Jeff Ubl
Subject: Chemical unit costs for PolyMet

Phil,

We are helping PolyMet with chemical use cost estimates for water treatment at the NorthMet project. Can you provide unit cost estimates for the following chemicals? Can you also provide an estimate of how much it would cost per unit to deliver to the mine in Hoyt Lakes?

- Ferric sulfate (up to 50,000 tons/year)
- Sodium permanganate (approximately 1 ton/year)
- Hydrochloric acid (up to 100 tons/year)
- Sodium bisulfite (approximately 1 ton/year)

Thanks, and don't hesitate to call with questions.

Alison L. Ling, PhD

Environmental Specialist
Minneapolis, MN office: 952.842.3568
ALing@barr.com
www.barr.com

This email has been scanned by the Symantec Email Security.cloud service.
For more information please visit http://www.symanteccloud.com

Attachment L:

Sludge Hauling and Disposal Estimate, 4/5/2016, Waste Management, Trevor Long

April 5, 2016

Jeff Ubl
Barr Engineering Co.
4300 MarketPointe Dr
Suite 200
Minneapolis, MN 55435
952-832-2647
jubl@barr.com

Project: Hoyt Lakes Water Treatment Plant Filter Press Sludge

Dear Jeff:

Waste Management of Minnesota is pleased to provide you with pricing for disposal per your request. Based upon the information provided, the following summarizes our quotation.

DISPOSAL FACILITY:

Voyageur Landfill
6830 Hwy 53
Canyon, MN 55717

WASTE STREAMS

Waste Description	WTP Filter Cake
Disposal Method	Direct Burial
Estimated Volume	15,000 – 100,000 tons annually
Disposal Price	$13.00 per ton (4 ton minimum per load)
Transportation Charge	$20.00 per ton
Environmental Charge	$20.00 per load
Fuel Charge	4.01% week of 4/4/16

ANALYTICAL TESTING REQUIREMENTS:
Go to www.wmsolutions.com to complete profile, attach analytical reports when submitting profile.

SPECIAL CONDITIONS:
Waste must meet acceptability criteria at the site and comply with local, state and federal regulations, as well as the sites permit requirements. *Pricing is contingent upon site and/or sample evaluation and approval*. Customers must have a current Waste Management Industrial Service Agreement.

Pricing is open for consideration for a period of 30 days. Upon acceptance, pricing remains in effect up to and including 60 days from the date of the quote. Pricing based solely on the information available at this time. Additional information may be required prior to approval.

Payment terms are net 30-days from receipt of invoice. Late fees apply on payments received after thirty days at an accrual interest rate of 1.5% per month. Customers that do not have approved credit with Waste Management must submit an up to date credit application.

Waste Management of Minnesota wishes to thank you for allowing us to quote on your disposal needs.

Please do not hesitate to contact me at the phone number below with any questions you may have or if you require any further assistance.

Sincerely,

Trevor Long
Industrial Account Manager
Manufacturing & Industrial
tlong@wm.com
952-807-8913

Waste Management
Technical Service Center
W132 N10487 Grant Drive, Germantown, WI 53022
tscmidwest@wm.com
TSC 800-963-4776
FAX 866-800-2591

Attachment M:

Concentrate Hauling Estimate, 4/11/2016, Wayne Transports, Jeff Hill

From: Jeff Hill
To: Jeff Ubl
Cc: Alison L. Ling
Subject: brine hauling
Date: Monday, April 11, 2016 7:40:48 AM

Morning Jeff,

Sorry I didn't get back to you on Friday, we had safety meetings all day and it was pretty hectic,
It is very hard to figure step up in rates without knowing what the flow would be, meaning if it would change through out the day, so I think the best we could do right now would be to do daily rates and gallons per truck,

I think one truck could handle up to 120,000 gals for $1400.00 per day
2 trucks up to 230,000 gallons per day for $2300.00
3 trucks up to 330,000 gals per day for $3600.00
I hope this helps you,
Any more questions please contact me,

Have a good day,
Jeff

Attachment N:

40 gpm Chemical Precipitation Train Cost Estimate, 6/10/16, WesTech, Jaron Stanley

From: Bryan T. Oakley
To: Jeff Ubl
Cc: Alison L. Ling
Subject: Re: PolyMet - HDS process 1310362
Date: Saturday, June 11, 2016 7:31:29 AM
Attachments: image001.png

---

40 is about as small as they go. The cost would be the same for 20

Sent from my iPhone

On Jun 11, 2016, at 07:29, Jeff Ubl <JUbl@barr.com> wrote:

> Bryan;
>
> I thought we were talking about a 20 gpm flow or were you thinking about redundancy?
>
> Jeff Ubl, PE
>
> Senior Environmental Engineer
> Barr Engineering Co.
> 4300 MarketPointe Drive, Suite 200
> Minneapolis, MN 55435
> ---
> office: 952.832.2647
> toll-free: 800.632.2277
> ---
> jubl@barr.com
> www.barr.com
>
> <image001.png>
>
> ---
>
> **From:** Bryan T. Oakley
> **Sent:** Friday, June 10, 2016 7:29 PM
> **To:** Jaron STANLEY
> **Cc:** Jeff Ubl; Rick SZILAGYI; Pete Svebakken; Layfe ANTHONY; Kirsten SIMS; Industrial Sales
> **Subject:** Re: PolyMet - HDS process 1310362
>
> Thanks for the quick response Jaron. This is what we needed.
>
> Sent from my iPhone
>
> On Jun 10, 2016, at 18:03, Jaron STANLEY <JSTANLEY@westech-inc.com> wrote:
>
> > Bryan,
> >
> > Based on our conversation this afternoon I have put together a rough price for a new system to treat 40 gpm. The equipment sizes and the pricing is based on what I could get from previous estimates. At this size it

may be more economical to price use grade plastic tanks with mixers for the mix tanks and use the grade at the site to produce the hydraulic profile. I think you had a good idea of reusing some of the mix tanks from the 810 gpm plant for the thickeners in the 40 gpm plant.

One other thought to consider. The HDS process does a great job of making solids that settle faster and dewater better. If you reused the 810 gpm equipment for the 40 gpm flow but you turned off the HDS recycle you would produce a more dilute underflow. It would dewater slower but you would have far more filter capacity to deal with the more dilute and hard to dewater solids. Your cake wouldn't be as good but at this size it may not matter.

BUDGET +/- 30% PRICING

ITEM	EQUIPMENT	PRICE (US $)
High Density Metals Precipitation		
A	**THICKENER MECHANISM** One 15'-0 diameter	**$75,000.00**
B	**ELEVATED TANK (KNOCK-DOWN)** One 15' diameter x 12' side shell depth	**$100,000.00**
C	**LIME SLURRY DENSIFICATION ELEVATED TANK (SHOP BUILT)** One 2' diameter x 4' total height	**$20,000.00**
D	**NEUTRALIZATION ELEVATED TANKS (SHOP BUILT)** Two (2) 6' diameter x 8' side depth	**$50,000.00**
Gypsum Precipitation		
E	**THICKENER MECHANISM** One 15'-0 diameter	**$75,000.00**
F	**ELEVATED TANK (KNOCK-DOWN)** One 15' diameter x 12' side shell depth	**$100,000.00**
G	**LIME SLURRY DENSIFICATION ELEVATED TANK (SHOP BUILT)** One 2' diameter x 4' total height	**$25,000.00**
H	**NEUTRALIZATION ELEVATED TANKS (SHOP BUILT)** Two (2) 6' diameter x 8' side depth	**$50,000.00**
Recarbonation/Calcite Preciptiation		
I	**SOLIDS CONTACT CLARIFIER MECHANISMS** One 12' diameter	**$120,000.00**
J	**STEEL BOTTOM TANK (SHOP**	**$30,000.00**

	BUILT) One 12' diameter x 16' side shell depth	
K	**RAPID MIX FLAT BOTTOM TANK (SHOP BUILT)** One 4' diameter x 6’ side shell depth	**$20,000.00**

Please let me know how I can help.

Thanks,

Jaron Stanley

Applications Engineer
T: 801.290.1507
M: 801.598.2106
3665 West Temple
Salt Lake City, UT 84115
jstanley@westech-inc.com
www.westech-inc.com

From: Bryan T. Oakley [mailto:BOakley@barr.com]
Sent: Friday, June 10, 2016 1:54 PM
To: Jaron STANLEY
Cc: Jeff Ubl
Subject: PolyMet - HDS process

Jaron,

Thanks for taking time to review the PolyMet project with me. As we discussed, please provide information on modifications to the HDS system to treat a design flow of 40 gpm during reclamation. We would like to keep the same process we are planning to use to treat 810 gpm during operation. The modification can be either a completely new system, or could be modifications of the initial tanks to treat the lower flow during reclamation.

I’m hoping to get an email response by 6/14.

Thanks for your help!

Bryan T. Oakley, PE

Senior Civil Engineer
Minneapolis, MN office: 952.842.3679
cell: 763.242.6092
BOakley@barr.com

resourceful. naturally.
engineering and environmental consultants

BARR

Technical Memorandum

To: Jennifer Saran
From: Don E. Richard
Subject: Summary of Non-Mechanical Treatment Plans for PolyMet
Date: May 18, 2016
Project: 23/69-0862.00
c: Jim Scott

1.0 Introduction

At PolyMet, Non-Mechanical Treatment (NMT) is planned to address legacy issues associated with drainage from the former LTVSMC lands acquired from Cliffs Erie. In addition, the ultimate water treatment objective for the NorthMet Project (NorthMet) is to transition from mechanical water treatment systems to NMT during Long Term Closure.

Costs for NMT Legacy systems are used to develop the PolyMet Asset Retirement Obligation (ARO) and, for the Tailings Basin during the construction/development period (Mine Year 0) only, the Contingency Reclamation Estimate (CRE). Costs for NorthMet NMT systems are used in the Planned Reclamation Estimate (PRE) and NorthMet NMT development costs are used in the CRE. Table 1 summarizes the Legacy and NorthMet NMT system costs and their planned applications.

All costs are based on current best information and could change as a result of regulatory changes,

Table 1 PolyMet NMT Summary

Location	Design				Capital		Annual O&M			Usage
	Type	Flow (gpm)	HRT (days)	Location	Development	Construction	Establishment (First 5 Years)	Maintenance	Media Replacement	
	Legacy									
Area 5N	PRB	20	6	Stockpile 5021 Toe Seep	$481,000	$1,510,000	$0	$10,000	$51,855	ARO
Area 5S	Natural Wetland	400	NA	Pit Overflow	$0	$0	$0	$0	$0	ARO
Tailings Basin	CW	1,800	5	Toe – Multiple Locations	$1,595,000	$13,235,000	$20,000	$1,419	$0	ARO and CRE Mine Year 0
	NorthMet									
Cat 1 Stockpile Containment	PRB	4	5	2	$409,000	$146,475	$0	$10,000	$7,200	PRE and CRE Development Only
West Pit Overflow	CW + PSB	1,920	2	1: Seasonal Discharge	$935,300	$5,673,150	$10,000	$4,977	$9,600	
FTB Containment System	CW + PSB	1,800	5	FTB Toe – Multiple Locations	$1,081,100	$7,204,050	$20,000	$1,419	$7,200	
FTB Pond Overflow	CW	500	2	FTB Toe	$521,000	$1,323,000	$2,500	$0	$0	

The following paragraphs outline the conceptual plans for design, development, construction, and operation of the NMT systems that have been incorporated into the ARO, CRE and PRE.

2.0 Basis of NMT Design:

Two general designs for NMT are being considered – Permeable Reactive Barrier (PRB) and Constructed Wetland (CW). Descriptions of these two designs with the conceptual designs for their planned applications are provided below.

2.1 Permeable Reactive Barrier (PRB)

Section 6.1.2.1 of the Adaptive Water Management Plan (Reference (1)) contains a detailed description of PRB conceptual design, Section 6.1.3.1 describes the basis of treatment and Section 6.1.4.1 identifies current applications. The following paragraph provides a high level summary of conceptual design.

A PRB consists of a below-grade chamber that is filled with a uniformly-distributed treatment media. The primary component of the media is a stored energy source for microbiological activity, such as a blend of wood-chips, hay, manure, or other organic matter. The organic matter is mixed with sand and gravel to provide structure. The media may also include a small amount of zero valent iron (ZVI) to maintain pH, consume alkalinity, and to reduce secondary effects from sulfide. Because the PRB is constructed below-ground and uses stored energy, the media has a finite useful life. For this reason, the PRB is designed so that the media can be replaced. The volume of the PRB is driven by the hydraulic retention time (HRT) required to meet treatment objectives as groundwater flows through the media passively, by gravity.

PRBs are planned for high-concentration, low-flow applications including the legacy Area 5N Stockpile 5021 Toe Seep and the NorthMet Category 1 Stockpile Containment System. The conceptual designs of these two systems are described below.

2.1.1 Legacy Area 5N

The driving treatment objective for NMT at Area 5N is to reduce sulfate at SD033 by 50% or to 500 mg/l, which also reduces TDS and conductivity. A strategy of water diversion, stockpile cover, and NMT has been developed to achieve that objective. This strategy satisfies the current regulatory requirement to meet the wild rice sulfate standard at the rice in the Embarrass River as well as the potential new wildlife sulfate standard.

The NMT portion of this strategy consists of a PRB applied at the 20 gpm, 3,500 mg/L sulfate flow at the 5021 stockpile toe seep. Case studies, bench testing, and pilot testing indicate that an organic/ZVI design with 6-day total HRT (5 days for organic media followed by one day in ZVI/sand media) will meet these treatment objectives. A conceptual design for NMT treatment of water at the toe seep is presented in Appendix C of the SD033 Upstream Strategies Report (Reference (2)).

If the wild rice sulfate rules are modified as proposed by the MPCA, the wildlife sulfate standard would apply and the treatment strategy for Legacy Area 5N would likely stay the same.

2.1.2 NorthMet Category 1 Stockpile Containment System

The driving treatment objectives at the Category 1 Stockpile Containment System are to reduce sulfate and heavy metals. Modeling indicates that capping of the stockpile will reduce the total flow and increase sulfate and metal concentrations, but will not significantly reduce the amount of sulfate and metals. Thus, treatment is recommended to remove sulfate and metals from the remaining flow during Long-Term Closure of the NorthMet Project, before this flow enters the West Pit. The planned NorthMet WWTF will treat the flow from the Category 1 Stockpile Containment System when the WWTF is operating (during the Operations and Reclamation phases of the Project). This will allow time to better understand the actual flow and water chemistry and finalize the design for this location.

The Category 1 Stockpile Containment System NMT consists of a PRB applied at the modeled 4 gpm flow with concentrations for the primary constituents of approximately 2,800 mg/L sulfate, 0.4 mg/L copper, 2.2 mg/L nickel, and 0.12 mg/L cobalt. Case studies indicate that an organic/ZVI design with a 5-day HRT will meet treatment objectives. Section 6.2 of Reference (1) contains details on the conceptual design for the Category 1 Stockpile Containment System NMT.

If the wild rice sulfate rules are modified as proposed by the MPCA, the treatment strategy for the Category 1 Stockpile Containment System would likely stay the same because modeling indicates that the Category 1 Waste Rock Stockpile is a major source of sulfate and heavy metals to the West Pit lake.

2.2 Constructed Wetland (CW)

Section 6.1.2.2 of Reference (1) contains a detailed description of CW conceptual design, Section 6.1.3.1 describes the basis of treatment and Section 6.1.4.2 identifies current applications. The following paragraph provides a high level summary of conceptual design.

A CW consists of an upper layer of wetland soils and vegetation above a subsurface layer that helps to provide a uniformly distributed, upward flow through the wetland soils. The energy to support microbiological activity in a CW is provided by the sun and is transformed into organic matter by the activity of the wetland plants. Because the energy to support a CW is provided continuously, they are considered to be self-sustaining and the media does not need to be replaced. For the design of a CW, the volume is determined by the HRT required to meet treatment objectives, while the area requirement is determined by the amount of total solar energy input needed to maintain long-term performance. Depending on the influent concentrations and the desired treatment, either the volume or the area could control the design of a CW.

CWs are planned for low concentration high flow applications including the legacy Area 5S Pit Overflow, the legacy Tailings Basin Seepage, the NorthMet West Pit Overflow, and the NorthMet Flotation Tailings Basin Seepage/Pond Overflow.

2.2.1 Legacy Area 5S

Discussions with regulators are ongoing and it is not yet clear where the discharge monitoring point will be in the next permit. The current monitoring point is the pit lake (SD3030). Water leaves the pit lake as a diffuse flow which does not become channelized until some distance from the pit. No wild rice in present in the receiving water (Wyman Creek). However, wild rice is present in downstream locations of the Partridge River, below the confluence of Wyman Creek and the Partridge River.

Based on the above, it is assumed that the driving treatment objectives for NMT at Area 5S are to reduce sulfate from the pit lake discharge, which also reduces TDS and conductivity, and to reduce the concentration of arsenic to meet the in stream standard. This strategy is expected to satisfy the current regulatory requirement to meet the wild rice sulfate standard at the rice in the Partridge River and the trout stream arsenic standard.

The goal of any CW is to function, to the extent practical, like a naturally occurring wetland. At Area 5S, the discharge from the pit lake enters a large, natural wetland. The flow and water quality through this wetland was studied from April 2013 through April 2014, and the results of this work were reported in a technical memorandum (Reference (3)). For an average annual flow of approximately 400 gpm flow containing approximately 100 mg/L sulfate and 0.004 mg/L arsenic, when measured in the Area 5SW pit lake, the concentrations in the first channelized portion of Wyman Creek were shown to be reduced by over 50% for sulfate and to be consistently below the arsenic water quality standard of 0.002 mg/L. NMT would consist of monitoring and enhancing, if necessary, the performance of the existing wetlands upstream of the first channelized flow.

If the wild rice sulfate rules are modified as proposed by the MPCA, enhancement of the wetlands upstream of the channelized flow would not be required.

2.2.2 Legacy Tailings Basin

The driving treatment objective for NMT at the Tailings Basin is to reduce sulfate by 50%, which also reduces TDS and conductivity. This strategy is expected to satisfy the current regulatory requirement to meet the wild rice sulfate standard at the rice in the Embarrass River.

The NMT for legacy tailings basin seepage would consist of a CW to treat the approximately 1,800 gpm flow containing approximately 200 mg/L sulfate, as measured in existing monitoring wells and surface water discharge locations. Case studies and bench testing indicate that a CW design with 5-day HRT will meet treatment objectives. Pilot testing of a CW at the toe of the existing tailings basin is planned for the summer of 2016. The overall concept for this wetland would look similar to the CW for the FTB seepage Containment Systems, described below. Section 6.4 of Reference (1) contains details on the conceptual design for the FTB Containment Systems NMT.

Surface seepage on the south side of the Tailings Basin forms the headwaters of Second Creek (SD026). The existing sulfate concentration downstream of this discharge where wild rice is present is such that

even a concentration of 0 mg/l sulfate at SD026 would not result in compliance at the existing wild rice standard for surface water quality. Because NMT cannot currently achieve the permittable 10 mg/l sulfate concentration in seepage discharged at SD026, the seepage at this location is currently being collected and returned to the Tailings Basin. The long term plan for this location is for the seepage to continue to be returned to the Tailings Basin.

If the wild rice sulfate rules are modified as proposed by the MPCA, it is possible that no additional treatment would be required for the existing (legacy) discharges from the Tailings Basin in the absence of the NorthMet Project.

2.2.3 NorthMet West Pit Overflow

The treatment objectives at the West Pit Overflow are to reduce the concentrations of sulfate and heavy metals.

The NMT for the West Pit Overflow consists of a CW applied at the modeled flow of 1,920 gpm containing approximately 60 mg/L sulfate, 0.24 mg/L copper, 0.49 mg/L nickel, 0.03 mg/L cobalt flow from the West Pit. The elevated flow at this location is based on a seasonal discharge of 2 months per year, which will occur in the late summer when vegetation in the CW is fully established and ground temperatures will be at their highest point on an annual basis. Case studies indicate that a design with 2-day HRT will meet treatment objectives. Section 6.3 of Reference (1) contains details on the conceptual design for the West Pit Overflow NMT.

The time needed for the West Pit to flood will allow for further development of this design. Post treatment of the CW effluent will likely be needed and may consist of consist of aeration or additional metals removal through sorption to a fixed organic media. These items are described further in NMT Development (Section 3.0).

If the wild rice sulfate rules are modified as proposed by the MPCA, seasonal discharge would not be required resulting in a smaller NMT system.

2.2.4 NorthMet Flotation Tailings Basin (FTB) Seepage Containment Systems

The treatment objectives at the NorthMet FTB Seepage Containment Systems are to reduce the concentrations of sulfate and heavy metals.

The NMT for the FTB Seepage Containment Systems consists of a CW applied at the modeled flow of approximately 1,800 gpm, containing approximately 200 mg/L sulfate, 0.14 mg/L copper, 0.17 mg/L nickel, and 0.013 mg/L cobalt. Case studies indicate that a design with 5-day HRT will meet treatment objectives. Section 6.4 of Reference (1) contains details on the conceptual design for the FTB Containment Systems NMT. Surface seepage on the south side of the Tailings Basin forms the headwaters of Second Creek (SD026). The existing sulfate concentration downstream of this discharge where wild rice is present is such that even a concentration of 0 mg/l sulfate at SD026 would not result in compliance at the existing wild rice standard for surface water quality. Because NMT cannot currently achieve the permittable 10

mg/l sulfate concentration in seepage discharged at SD026, the seepage at this location will be collected and pumped to NMT on the north side of the Tailings Basin.

The planned NorthMet WWTP will treat the flow from the containment systems when the WWTP is operating. This will allow time to better understand the actual flow and water chemistry and finalize design. Post treatment of the CW effluent will likely be needed and may consist of consist of aeration or additional metals removal through sorption to a fixed organic media. These items are described further in NMT Development (Section 3.0).

If the wild rice sulfate rules are modified as proposed by the MPCA, seepage to the south could be discharged at SD026. This would eliminate pumping to the north, reduce the size of the north NMT system and require an NMT at SD026.

2.2.5 NorthMet Flotation Tailings Basin (FTB) Pond Overflow

The treatment objectives at the NorthMet FTB Pond Overflow are to reduce residual dissolved copper

The NMT for the FTB Pond Overflow consists of a CW applied at the modeled annual average flow of approximately 500 gpm, containing approximately 25 mg/L sulfate, 0.03 mg/L copper, 0.05 mg/L nickel, and 0.004 mg/L cobalt. Case studies indicate that a design with 2-day HRT, similar to the West Pit Overflow CW, will meet treatment objectives. Section 6.3 of Reference (1) contains details on the conceptual design for a CW for the West Pit Overflow, which would be the same fundamental design used for the FTB Pond Overflow CW.

The planned NorthMet WWTP will treat excess FTB Pond water while the WWTP is operating (during Reclamation). This will allow time to better understand the actual flow and water chemistry and finalize design. Post treatment of the CW effluent will likely be needed and may consist of consist of aeration or additional metals removal through sorption to a fixed organic media. These items are described further in NMT Development (Section 3.0).

If the wild rice sulfate rules are modified as proposed by the MPCA, this NMT system stays the same.

3.0 NMT Development

Development of the NMT systems will build upon existing case studies and bench testing that has been conducted to evaluate NMT systems. Examples of the bench-scale testing that has already been completed to support NMT for legacy sites are provided in References (4), (5), (6). The objective of site-specific pilot testing will be to demonstrate effectiveness and to refine any design assumptions related to proposed HRTs, media composition, and post treatment requirements. In addition, some pilot testing has already been completed to support legacy NMT operations to provide a basis for development of NorthMet Project NMT systems. Reporting on pilot system operations at Area 5 is currently being completed.

These additional development steps are required because NMT designs are very site specific and the amount of treatment required has a direct influence on the size of the system. In addition, site terrain and other constraints associated with maintaining gravity flow through these systems need to be considered in designing the physical layout and dimensions of NMT systems. For media systems, the treatment requirements and site water chemistry will also drive media selection and effect the media useful life and replacement frequency requirements.

Effluents from PRBs or CWs may be directly discharged or flow by gravity through post treatment systems. Post treatment could be used to condition the water prior to discharge, for example by equilibrating the treated water with the atmosphere to increase the concentration of dissolved oxygen or a Permeable Sorptive Barrier (PSB) could be used as a final polishing step. A PSB is a treatment unit containing a media with an affinity for sorption of metals. Because PSB media is part of a chemical/physical removal process, it has a finite useful life and PSBs are designed so that the media can be replaced. Section 6.1.2.3 of Reference (1)) contains a detailed description of PSB conceptual design, Section 6.1.3.2 describes the basis of treatment and Section 6.1.4.3 identifies current applications.

4.0 Construction:

Construction of the either PRB or CW systems for either legacy sites or for the NorthMet Project would use similar methods.

4.1 PRB Construction

Construction of PRB systems will require excavation below the water table for installation of media. This may include the construction of tied-back walls that will allow for the periodic replacement of media, or could include plans for progressive movement of the PRB location – upgradient or downgradient relative to the groundwater flow – as the media is replaced over time. The upper portion of the PRB will be buried beneath the ground surface a sufficient depth to prevent freezing within the PRB. The depth will be dependent on the type of cover used – and can be minimized with placement of insulating layers of foam or other materials. The inlet and outlet sections of the PRBs will be constructed using coarse granular media and may include some perforated and solid wall piping to help maintain distribution of the influent flow throughout the available treatment volume. Effluent discharge from the subsurface PRB will be into the surrounding groundwater.

4.2 CW Construction

Construction of CW systems will also require excavation below the existing surface water or groundwater elevations. To provide uniform flow through the CW systems, multiple layers will be installed to allow distribution of the flow in the subsurface and uniform upward flow through the wetland materials. This may include the construction of multiple 'cells' that can be used to distribute the flow. Where CWs are installed in the location of existing wetlands, the existing wetland soils (and plants to the extent practical) will be harvested and reused in the seeding/establishment of the reconfigured CW.

On the north and west sides of the Tailings Basin/FTB groundwater seepage emerges close to the toe of the dams. Hydraulic barriers will be installed to contain the seepage and CWs will be constructed between the barriers and toe in areas where the seepage converges. Known surface seeps (SD004 and SD006) would be upstream of the barriers. The cost for the hydraulic barrier is included in the estimate for legacy CW at the Tailings Basin. Because the hydraulic barrier is included in the NorthMet Project, it is not included in the CW cost for the NorthMet FTB.

5.0 Maintenance:

Maintenance of NMT systems varies by design. Maintenance requirements for PRB and CW systems are described below. If the NMT system includes post treatment, maintenance consists of monitoring for proper hydraulic flow and removing any blockages and replacing PSB media at the end of its useful life.

5.1 PRB Maintenance

PRB maintenance consists of monitoring for proper hydraulic flow and removing any blockages, providing insulating cover for proper winter operation and replacing media at the end of its useful life. The ZVI is assumed to have a 20-year life and the organic material is assumed to have a 10-year life. Replacement of media will require either removing the old material (for disposal) and replacement of new media within an engineered containment system, sometimes referred to as a cassette, or installing new media parallel to the existing materials. The maintenance methods used will be determined during the design process.

5.2 CW Maintenance

CW maintenance consists of monitoring for proper hydraulic flow and removing any blockages. An initial 5-year period of enhanced maintenance is assumed to establish the wetland as self-sustaining. During this period wetland plants could be added and channels revised. Once wetland plants are established the CW is considered self-sustaining, provided water levels are adequately controlled to prevent ingress of trees or other upland plant species.

6.0 Cost Development

Cost estimates to support the values presented in Table 1 are included in Attachment 1. Each of these cost estimates was developed using a similar assumption that each NMT system would require site-specific testing to verify materials of construction, sizing requirements, and anticipated performance. Then, based on likely design parameters for flow and hydraulic retention time at each location, the approximate dimensions and material requirements for each NMT were established. Conceptual costs were also included to allow for hydraulic control into and out of the NMT systems. Costs for media and other materials were based on similar costs for these items from recently bid projects as well as engineering judgement. No formal bids were obtained.

The Capital Costs in Table 1 are distributed between Development and Construction. Development includes the costs to conduct pilot testing, including development of a pilot test work plan, conducting the testing, analysis, and reporting of the results. Development costs also include preliminary estimate for

the design of the full-scale system based on a fixed percentage of the full-scale construction costs and an allowance for legal fees. The Construction costs include the materials, equipment, labor, supervision, and other services required to furnish and install all of the components of the NMT systems. These costs have been estimated based on recent experience with similar construction projects and similar materials. No formal bids were obtained for any of this potential work.

The annual Operation and Maintenance (O&M) Costs presented in Table 1 are divided between routine annual maintenance activities and media replacement costs. Annual maintenance activities include removing invasive species (weeding) the wetland systems, maintaining the designed hydraulic performance – for example by removing beaver dams or other obstructions, or other routine activities. Media replacement, which is included for PRB (and PSB) systems only, is an annualized costs for periodic replacement that is assumed to be needed at the end of the useful life of the media. The annualized replacement costs were calculated as a percentage of the initial media installation cost.

7.0 References

1. **Poly Met Mining Inc.** NorthMet Project Adaptive Water Management Plan (v10). April 2015.

2. **Barr Engineering Co.** SD033 Upstream Strategies: Hydrology Modification, Stockpile 5020 Soil Cover, Stockpile 5021 Seepage Treatment - NPDES/SDS Permit No. MN 0042536. Prepared for Cliffs Erie LLC and PolyMet Mining Inc. June 2015.

3. —. Wyman Creek Field Study – 2013-2014 Data Summary and Evaluation. Project file Technical Memorandum. October 9, 2014.

4. —. Floating Wetland Bench Test Report-SD033, NPDES/SDS Permit No. MN 0042536, Prepared for Cliffs Erie L.L.C. and PolyMet Mining Inc. September 2011.

5. —. Permeable Reactive Barrier Bench Test Report – SD033 - NPDES/SDS Permit No. MN 0042536. Prepared for Cliffs Erie L.L.C. and PolyMet Mining, Inc.

6. —. Permeable Reactive Barrier Bench Test Report-Tailing Basin, NPDES/SDS Permit No. MN 0054089, Prepared for Cliffs Erie L.L.C. and PolyMet Mining, Inc. September 2011.

8.0 Attachments

Attachment 1 Non-Mechanical Treatment Cost Estimate Summary

Attachment 1 Non-Mechanical Treatment Cost Estimate Summary

Area 5 North - Non-Mechanical Treatment Summary
Permeable Reactive Barrier at Stockpile 5021 Toe Seep: 20 gpm, 6-day HRT

Estimated Development Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Pilot Testing				**$287,700**	
Planning	LS	1	$35,000	$35,000	
Installation				$67,672	
Mobilization & Demobilization	LS	1	$4,000	$4,000	
PRB Tank (3000 Gallon)	ea	1	$2,000	$2,000	
ZVI Tank	ea	1	$2,000	$2,000	
Sand Filter Tank	ea	1	$500	$500	
Sand for Sand Filter	ton	4	$500	$2,000	
Pea Gravel	ton	2	$100	$200	Assume 8 inches of Pea Gravel top and bottom of PRB and ZVI cells
Piping and Valves between Cells	LS	1	$5,000	$5,000	4-inch solid piping and associated valves
Collection piping	LS	1	$1,000	$1,000	
PRB/BCR Media (From Cell 2)	CY	15	$100	$1,500	
ZVI	lbs	56,000	$1	$29,120	
Sand, mix with ZVI and place	Ton	16	$400	$6,400	
Insulation	LS	1	$5,000	$5,000	
Solar Panel	Ea	1	$2,000	$2,000	
Monitoring points	EA	8	$100	$800	
Contractor Overhead & Profit	%	10	$6,152	$6,152	10% of Installation costs less ZVI
Analysis	LS	1	$150,000	$150,000	
Reporting	LS	1	$35,000	$35,000	
Professional Services				**$193,300**	
Design and procurement	10%	1	$143,238	$143,238	10% of Construction costs
Legal	LS	1	$50,000	$50,000	Fixed fee
		Estimated Total Cost:		**$481,000**	

Estimated Full Scale Construction Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Construction and Equipment Costs				**$1,432,380**	
Mobilization & Demobilization	LS	1	$39,340	$39,340	
Erosion Control				$4,700	
Silt Fence	LF	900	$5	$4,500	
Seeding, Mulching, and Fertilizing	AC	0.1	$2,000	$200	
Construct Treatment Cells				$1,258,800	
Clearing and Grubbing	ac	1	$3,000	$3,000	
Site grading and excavation	CY	4,000	$7	$27,000	Excavate as necessary to site treatment system. Excavated material is placed with 1/2 mile of excavation location
PRB/BCR Clay Liner (1-foot Thick)	CY	550.0	$6	$3,300	Compact till to 95% standard proctor; assume a 4 mi. round trip haul from owner borrow source; assume rock segregation from borrow source is required
ZVI cell Clay liner (1-footh Thick)	CY	150	$6	$900	Compact till to 95% standard proctor; assume a 4 mi. round trip haul from owner borrow source; assume rock segregation from borrow source is required
Sand Filter - Concrete Formwork and Concrete	CY	60	$510	$30,600	
Sand for Sand Filter	ton	300	$18	$5,400	
Perforated Distribution Piping	LF	3,250	$12	$39,000	4-inch perforated PVC piping
Pea Gravel for Distribution piping	ton	1,400	$28	$38,500	Assume 8 inches of Pea Gravel top and bottom of PRB and ZVI cells
Piping and Valves between Cells	LF	150	$12	$1,800	4-inch solid piping and associated valves
Weir Manhole (Agridrain)	EA	3	$2,000	$6,000	
Toe Seep Weir	EA	1	$2,500	$2,500	
Overflow Piping (3-inch) installed	LF	900	$12	$10,800	
PRB/BCR Media procuement and placement	CY	2,800	$30	$84,000	use to calculate PBR media replacement allowance
ZVI	Ton	900	$1,050	$945,000	use to calculate ZVI media replacement allowance
Sand, mix with ZVI and place	Ton	450	$18	$8,100	use to calculate ZVI media replacement allowance
Thermal Cover	CY	5,000	$4	$17,500	
Rip-Rap	Ton	20	$45	$900	
Flowmeter	EA	3	$2,000	$6,000	
Solar Panel	Ea	3	$2,000	$6,000	
Monitoring points	EA	15	$1,500	$22,500	
Piping to SD033				$74,900	
Clearing and Grubbing	LF	3,200.0	$5	$16,000	
3" HDPE Pipe at Grade	LF	3,600	$7	$25,200	
Siphon/ valve setup (3")	EA	1	$6,000	$6,000	
Pump	EA	1	$700	$700	
Flowmeter	EA	1	$2,000	$2,000	
Siphon Intake	EA	1	$10,000	$10,000	
Siphon outfall	EA	1	$15,000	$15,000	
Wetland Mitigation and Permitting	ac	1	$20,000	$20,000	
Contractor Overhead & Profit	%	10	$39,340	$39,340	Construction costs less ZVI
Construction Oversight	5%	1	$71,619	**$71,619**	5% of Construction costs
		Estimated Total Cost:		**$1,510,000**	

Estimated Annual Operation Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Annual Operation and Maintenance				**$61,855**	
Winterization	LS	1	$10,000	$10,000	material replacement costs
PRB Media Replacement (5% per year)	CY	140	$370	$51,855	
Analysis and Reporting	LS	0	$100,000	$0	in project water monitoring
Labor	FTE	0	$60,000	$0	in project staffing

Area 5 South - Non-Mechanical Treatment Summary
Natural Wetland: 400 gpm

Estimated Annual Operation Costs					
Pay Item	**Unit**	**Estimated Quantity**	**Unit Cost ($)**	**Total Cost ($)**	**Comments**
Annual Operation and Maintenance				**$0**	
Wetland Establishment	Acre	0	$500	$0	already established
Wetland Maintenance	FTE	0	$60,000	$0	in project staffing
Analysis and Reporting	LS	0	$100,000	$0	in project water monitoring

Tailings Basin -- Non Mechanical Treatment Summary
Constructed Wetland: 1,800 gpm, 5-day HRT

Estimated Development Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Pilot Testing				**$345,000**	
Planning	LS	1	$35,000	$35,000	
Installation	LS	1	$125,000	$125,000	
Analysis	LS	1	$150,000	$150,000	
Reporting	LS	1	$35,000	$35,000	
Professional Services				**$1,250,000**	
Design and procurement	10%	1	$1,200,000	$1,200,000	10% of Construction costs
Legal	5%	LS	1	$50,000	Fixed fee
		Estimated Total Cost:		**$1,595,000**	

Estimated Full Scale Construction Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Construction and Equipment Costs				**$11,985,000**	
Grading/Earthwork	Acre	40	$25,000	$1,000,000	Costs from AWMP
Import, Mix and Place Wetland Soils	CY	192,000	$25	$4,800,000	Costs from AWMP
Wetland Plantings	Acre	40	$5,000	$200,000	Costs from AWMP
Containment Barrier Installation	SF	25,800	$200	$5,160,000	Install containment wall
Outlet/Flow Control Structures	Ea	25	$25,000	$625,000	Costs from AWMP
Pumps and Controls (for South Seepage)	LS	1	$100,000	$100,000	Costs from AWMP
Site Restoration	LS	1	$100,000	$100,000	Costs from AWMP
Construction Oversight	5%	1	$600,000	**$600,000**	5% of Construction costs
		Estimated Total Cost:		**$13,235,000**	

Estimated Annual Operation Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Annual Operation and Maintenance				**$21,419**	
Wetland Establishment (5 Years Only)	Acre	40	$500	$20,000	inspections, remove invasives, maintain water flow
Wetland Maintenance	FTE	0	$60,000	$0	in project staffing
Pump South Seepage to North	1,000 gal	47,304	$0.03	$1,419	
Analysis and Reporting	LS	0	$100,000	$0	in project water monitoring

Category 1 Waste Rock Stockpile Containment System - Non-Mechanical Treatment Summary
Permeable Reactive Barrier: 4 gpm, 5-day HRT

Estimated Development Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Pilot Testing				**$345,000**	
Planning	LS	1	$35,000	$35,000	
Installation	LS	1	$125,000	$125,000	
Analysis	LS	1	$150,000	$150,000	
Reporting	LS	1	$35,000	$35,000	
Professional Services				**$64,000**	
Design and procurement	10%	1	$13,950	$13,950	10% of Construction costs
Legal	LS	1	$50,000	$50,000	Fixed fee
		Estimated Total Cost:		**$409,000**	

Estimated Full Scale Construction Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Construction Costs				**$139,500**	
Grading/Earthwork	Acre	0.1	$25,000	$2,500	function of GPM
Import, Mix and Place PRB Media	CY	480	$75	$36,000	function of GPM
Winterization/Cover Soil	Acre	0.1	$10,000	$1,000	function of GPM
Inlet and Outlet Flow Control Structures	Ea	2	$25,000	$50,000	
Site Restoration	LS	1	$50,000	$50,000	
Construction Oversight	5%	1	$6,975	**$6,975**	5% of Construction costs
		Estimated Total Cost:		**$146,475**	

Estimated Annual Operation Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Annual Operation and Maintenance				**$7,200**	
Winterization	LS	1	$10,000	$10,000	material replacement costs
PRB Media Replacement (20% per year)	CY	96	$75	$7,200	
Analysis and Reporting	LS	0	$100,000	$0	in project water monitoring
Labor	FTE	0	$60,000	$0	in project staffing

West Pit Overflow Non - Mechanical Treatment Summary
Constructed Wetland: 1,920 gpm, 2-day HRT

Estimated Development Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Pilot Testing				**$345,000**	
Planning	LS	1	$35,000	$35,000	
Installation	LS	1	$125,000	$125,000	
Analysis	LS	1	$150,000	$150,000	
Reporting	LS	1	$35,000	$35,000	
Professional Services				**$590,300**	
Design and procurement	10%	1	$540,300	$540,300	10% of Construction costs
Legal	LS	1	$50,000	$50,000	Fixed fee
		Estimated Total Cost:		**$935,300**	

Estimated Full Scale Construction Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Construction Costs				**$5,403,000**	
Grading/Earthwork	Acre	20	$100,000	$2,000,000	function of GPM
Import, Mix and Place Wetland Soils	CY	96,000	$25	$2,400,000	function of GPM
Wetland Plantings	Acre	20	$5,000	$100,000	function of GPM
PSB Media	CF	16,000	$3	$48,000	function of GPM
Aeration Basin	Acre	3	$10,000	$30,000	function of GPM
Outlet/Flow Control Structures	Ea	25	$25,000	$625,000	
Pumps and Controls (for Seasonal Discharge)	LS	1	$100,000	$100,000	
Site Restoration	LS	1	$100,000	$100,000	
Construction Oversight	5%	1	$270,150	**$270,150**	5% of Construction costs
		Estimated Total Cost:		**$5,673,150**	

Estimated Annual Operation Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Annual Operation and Maintenance				**$24,577**	
Wetland Establishment (5 Years Only)	Acre	20	$500	$10,000	inspections, remove invasives, maintain water flow
Wetland Maintenance	FTE	0	$60,000	$0	in project staffing
Pumping	1,000 gal	165,888	$0.03	$4,977	for seasonal discharge
PSB Media (20% per year)	CF	3,200	$3	$9,600	
Analysis and Reporting	LS	0	$100,000	$0	in project water monitoring

FTB Containment Systems - Non-Mechanical Treatment Summary
Constructed Wetland: 1,800 gpm, 5-day HRT

Estimated Development Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Pilot Testing				**$345,000**	
Planning	LS	1	$35,000	$35,000	
Installation	LS	1	$125,000	$125,000	
Analysis	LS	1	$150,000	$150,000	
Reporting	LS	1	$35,000	$35,000	
Professional Services				**$736,100**	
Design and procurement	10%	1	$686,100	$686,100	10% of Construction costs
Legal	LS	1	$50,000	$50,000	Fixed fee
		Estimated Total Cost:		**$1,081,100**	

Estimated Full Scale Construction Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Construction Costs				**$6,861,000**	
Grading/Earthwork	Acre	40	$25,000	$1,000,000	function of GPM
Import, Mix and Place Wetland Soils	CY	192,000	$25	$4,800,000	function of GPM
Wetland Plantings	Acre	40	$5,000	$200,000	function of GPM
PSB Media	CF	12,000	$3	$36,000	function of GPM
Outlet/Flow Control Structures	Ea	25	$25,000	$625,000	
Pumps and Controls (for South Seepage)	LS	1	$100,000	$100,000	
Site Restoration	LS	1	$100,000	$100,000	
Construction Oversight	5%	1	$343,050	**$343,050**	5% of Construction costs
		Estimated Total Cost:		**$7,204,050**	

Estimated Annual Operation Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Annual Operation and Maintenance				**$28,619**	
Wetland Establishment (5 Years Only)	Acre	40	$500	$20,000	inspections, remove invasives, maintain water flow
Wetland Maintenance	FTE	0	$60,000	$0	in project staffing
Pumping S to NW	1,000 gal	47,304	$0	$1,419	
PSB Media (20% per year)	CF	2,400	$3.00	$7,200	
Analysis and Reporting	LS	0	$100,000	$0	in project water monitoring

FTB Pond Overflow - Non-Mechanical Treatment Summary
Constructed Wetland: 500 gpm, 2-day HRT

Estimated Development Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Pilot Testing				**$345,000**	
Planning	LS	1	$35,000	$35,000	
Installation	LS	1	$125,000	$125,000	
Analysis	LS	1	$150,000	$150,000	
Reporting	LS	1	$35,000	$35,000	
Professional Services				**$176,000**	
Design and procurement	10%	1	$126,000	$126,000	10% of Construction costs
Legal	LS	1	$50,000	$50,000	Fixed fee
		Estimated Total Cost:		**$521,000**	

Estimated Full Scale Construction Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Construction Costs				**$1,260,000**	
Grading/Earthwork	Acre	5	$100,000	$500,000	function of GPM
Import, Mix and Place Wetland Soils	CY	24,000	$25	$600,000	function of GPM
Wetland Plantings	Acre	5	$5,000	$25,000	function of GPM
Aeration Basin	Acre	1	$10,000	$10,000	function of GPM
Outlet/Flow Control Structures	Ea	1	$25,000	$25,000	
Site Restoration	LS	1	$100,000	$100,000	
Construction Oversight	5%	1	$63,000	**$63,000**	5% of Construction costs
		Estimated Total Cost:		**$1,323,000**	

Estimated Annual Operation Costs

Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)	Comments
Annual Operation and Maintenance				**$2,500**	
Wetland Establishment (5 Years Only)	Acre	5	$500	$2,500	inspections, remove invasives, maintain water flow
Wetland Maintenance	FTE	0	$60,000	$0	in project staffing
Analysis and Reporting	LS	0	$100,000	$0	in project water monitoring

Appendix 15.5 Estimating Methodology for NorthMet Closure in Mine Years Beyond Mine Year 1

Estimating Methodology for NorthMet Closure in Mine Years Beyond Mine Year 1
November 1, 2016

Closure costs for the NorthMet Project for closure in Mine Years beyond Mine Year 1 have been estimated by determining a unit cost from the cost and units from SRCE for Mine Year 1 (Reference 1) and applying those unit costs to the units for major project features for selected Mine Years from Table 1 of Reference 2.

Several Mine Years were selected for analysis:

1. Mine Year 3 to capture the addition of Phase 2 liabilities
2. Mine Year 11 because it is the stockpiles are at their maximum extent.
3. Mine Year 15 as a typical year between maximum stockpile and Life of Mine
4. Mine Year 20 for Life of Mine

The major mine features that change over time are:

1. The amount of rock in the temporary Category 2/3 and Category 4 Waste Rock Stockpiles which drive the cost of relocating that rock from the stockpiles to the pit for subaqueous disposal (tons x $/ton) and reclaiming the stockpile footprint (acres x $/acre).
2. The size of the permanent Category 1 Waste Rock Stockpile which drives the cost of the cover system (acres x $/acre) on that stockpile and extending the stockpile containment system (feet x $/foot).
3. The size of the pit which drives the cost of sloping and reclaiming the pit walls (acres x $/acre).
4. The size of the Flotation Tailings Basin beach and pond which drive the cost of the cover system on the Flotation Tailings Basin (acres x $/acre).
5. The amount of water to be treated which drives the cost of water treatment (gallons x $/gallon). Note that cost of water treatment facility replacement is considered constant.
6. Phase 2 features
    a. Additional buildings to demolish
    b. Hydrometallurgical Residue Facility Cover System

The analysis is shown in Table 1. For Mine Year 1, Amount, Units and $ were obtained from the SRCE locations noted and the Unit $ calculated. For Water Treatment the Average GPM and Years of operation were used to calculate the total gallons treated and $/gallon calculated. The costs for the major mine features that change over time listed above were subtotaled as Variable Direct Cost and the Indirect Costs added to get Subtotal Variable Direct + Indirect. Subtotal Fixed Direct + Indirect Cost was calculated as the difference between Mine Year 1 Grand Total Cost and Mine Year 1 Subtotal Variable Direct + Indirect Cost.

For Mine Years 3, 11, 15 and 20, the unit costs determined above were applied to the units from Reference 2 for the appropriate Mine Year to develop an estimated Subtotal Variable Direct Cost for that Mine Year and the Variable Indirect Costs added to get Subtotal Variable Direct + Indirect. which was added to Subtotal Fixed Direct + Indirect Cost determined above to get the Grand Total Cost for that Mine Year.

In Table 2, NPV was calculated based on amounts from Reference 1. It was assumed that the major change in NPV would be due to the change in water treatment. Water treatment cost NPV was determined for each of the selected Mine Years. For each selected Mine Year, the water treatment NPV for the previous selected Mine Year was subtracted from the previous Estimated NPV and the water treatment NPV for the Mine Year being calculated added. To account for any non water treatment changes, the difference in Total Cost less Water Treatment between the previous Mine Year and the Mine Year being calculated was added to get the Estimated NPV.

Closure cost as of Mine Year 25 (5 years after planned mine closure) was also estimated as shown in Table 3. The estimated cost of work done in Mine Years 21 to 25 was subtracted from the Mine Year 20 Total Direct Cost to determine the Remaining Total Direct Cost. Using the same assumption as above (NPV change mostly due to water treatment), the NPV as of Mine Year 25 was developed by deducting the cost of work done (less water treatment) and the NPV of Mine Year 20 water treatment and adding the NPV of water treatment from Mine Year 26 on.

References (can be found as part of Appendix 15.4)

1 SRK SRCE for Mine Year 1 October 31, 2016
2 Barr Engineering NorthMet Project Features Changes Over Time October 7, 2016

Table 1 - Estimates Based on Major Project Feature Changes Over Time - 11/01/16

	Phase 1 Mine Year 1					Phase 2 Mine Year 3		Peak Mine Year 11		Mine Year 15		LOM Mine Year 20	
	Amount [1]	Units	$[2]	SRCE Location	Unit $	Amount [1]	$	Amount [1]	$	Amount [1]	$	Amount [1]	$
Category 2/3 Waste Rock Stockpile													
- Liner Acres to be Removed and Footprint Restored	63	Acres	$181,819	Haul Material R84+R97	$2,886	119	$343,436	181	$522,369	150	$432,902	0	$0
- Tons to Relocate	5,238,800	Tons	$7,251,791	Haul Material R69	$1.38	13,968,800	$19,336,264	44,021,400	$60,936,473	26,802,537	$37,101,321	0	$0
Category 4 Waste Rock Stockpile													
- Liner Acres to be Removed and Footprint Restored	29	Acres	$75,572	Haul Material R85+R98	$2,606	57	$148,538	57	$148,538	0	$0	0	$0
- Tons to Relocate	1,489,201	Tons	$1,849,122	Haul Material R70	$1.24	3,379,412	$4,196,173	6,206,813	$7,706,921	0	$0	0	$0
Category 1 Waste Rock Stockpile													
- Acres to Cover	205	Acres	$14,697,257		$71,694	369	$26,455,063	526	$37,711,011	394	$28,247,411	64	$4,588,412
- Haul and Place Cover Material			$3,116,054	Waste Rock Dumps R17									
- Haul and Place Cover Material			$893,346	Haul Material R88									
- geomembrane and geotextile			$10,687,857	Other User R29									
- Containment System Feet to Extend	2,800	LF	$2,341,414	Other User R32	$836	2,800	$2,341,414	0	$0			0	$0
Pits													
East Pit Wall Acres to Reclaim	10.1	Acres	$50,035	Quarrys and Borrow R20	$4,954	10.1	$50,035	9.2	$45,576	9.2	$45,576	9.2	$45,576
West Pit Wall Acres to Reclaim	0	Acres			$4,954	8.7	$43,099	13.5	$66,878	13.5	$66,878	13.5	$66,878
Central Pit Wall Acres to Reclaim	0	Acres			$4,954	0	$0	8.9	$44,090	8.9	$44,090	8.9	$44,090
Flotation Tailings Basin (FTB)													
- Beach Acres to Amend	95	Acres	$5,640,523	User 11 BD126-BD125	$59,374	93	$5,521,775	212	$12,587,272	219	$13,002,890	428	$25,412,040
- Pond Acres to Amend	421	Acres	$9,832,200	User 11 BD125	$23,354	427	$9,972,326	1,124	$26,250,339	1,136	$26,530,592	905	$21,135,727
Water Treatment (OPEX only)													
- WWTF Pit Flushing Avg GPM	642	GPM				899		1925		1925		1925	
- WWTF Pit Flushing Years	4	Years				6		14		14		14	
- WWTF Pit Flushing Gallons Treated	1,349,740,800	Gallons	$7,204,978	User 7	$0.00534	2,835,086,400	$15,133,821	14,164,920,000	$75,612,990	14,164,920,000	$75,612,990	14,164,920,000	$75,612,990
- Years to Pit Overflow	9	Years				14		32		32		32	
- Pit Overflow to WWTP	note 3	GPM				150		321		321		321	
- WWTP Pit Overflow Gallons Treated	0	Gallons				2,838,240,000		3,036,916,800		3,036,916,800		3,036,916,800	
- WWTP Avg GPM - Reclamation	2,957	GPM				3,066		3,500		3,500		3,500	
- WWTP Years - Reclamation	8	Years				13		35		35		35	
- WWTP Gallons Treated - Reclamation	12,433,593,600	Gallons				20,949,364,800		64,386,000,000		64,386,000,000		64,386,000,000	
- WWTP Avg GPM - Long Term	2534	GPM				2450		2450		2450		2450	
- WWTP Years - Long Term	42	Years				37		15		15		15	
- WWTP Gallons Treated - Long Term	55,938,556,800	Gallons				47,645,640,000		19,315,800,000		19,315,800,000		19,315,800,000	
- WWTP Gallons Treated	68,372,150,400	Gallons	$266,519,630	User 7	$0.00390	71,433,244,800	$278,451,999	86,738,716,800	$338,113,846	86,738,716,800	$338,113,846	86,738,716,800	$338,113,846
Phase 2													
- Demo		lot	$0	User 2 R103-111			$12,438,475		$12,438,475		$12,438,475		$12,438,475
- HRF Cover System	0	Acres	$0	note 4	$220,409	49	$10,800,024	49	$10,800,024	71	$15,649,015	98	$21,600,048
Subtotal Variable Direct			$330,341,598				$385,232,442		$582,984,802		$547,285,986		$499,058,083
Variable Indirect			$16,517,080				$19,261,622		$29,149,240		$27,364,299		$24,952,904
Subtotal Variable Total Direct + Indirect			$346,858,678				$404,494,064		$612,134,042		$574,650,285		$524,010,987
Subtotal Fixed Direct + Indirect		Calculated	$230,323,432	→			$230,323,432	→	$230,323,432	→	$230,323,432	→	$230,323,432
Grand Total (Direct + Indirect)		SRCE Grand Total	$577,182,110			Calculated	$634,817,496	Calculated	$842,457,474	Calculated	$804,973,717	Calculated	$754,334,419
Estimated NPV based on change in Water Treatment OPEX Only (see Table 2 for development)		SRCE Grand Total NPV	$197,390,336				$241,699,858		$365,544,990		$329,846,174		$281,618,271

Notes
1 From NorthMet Project Feature Changes Over Time v 1.9 Table 1
2 From SRCE MY 1 10/31/16
3 Mine Year 1 Included in WWTP Flow - other years assumed to go to WWTP
4 Includes Temporary Cover, Permanent Cover and Treatment of drainage water at WWTP - Mine Year 20 cost ratioed to acres

Table 2 - Development of NPV - 11/01/16

	Phase 1 Mine Year 1					Phase 2 Mine Year 3		Peak Mine Year 11		Mine Year 15		LOM Mine Year 20	
			$				$		$		$		$
Grand Total Cash (from Table 1)			$577,182,110				$634,817,496		$842,457,474		$804,973,717		$754,334,419
Water Treatment Cash (from NPV tab)			$287,410,838				$308,265,111		$434,413,177		$434,413,177		$434,413,177
Total Cash less Water Treatment			$289,771,272				$326,552,386		$408,044,297		$370,560,540		$319,921,242
NPV Water Treatment (from NPV tab)			$65,659,113				$73,187,521						
Previous Estimated NPV							$197,390,336		$241,699,858		$365,544,990		$328,061,233
Delete Previous NPV Water Treatment							-$65,659,113		-$73,187,521		-$115,540,742		-$115,540,742
Add NPV Water Treatment							$73,187,521		$115,540,742		$115,540,742		$115,540,742
Add Change in Cash Less Water Treatment							$36,781,114		$81,491,912		-$37,483,757		-$50,639,298
Estimated NPV (to Table 1 except MY 1)			$197,390,336	From Table 1			$241,699,858		$365,544,990		$328,061,233		$277,421,935

Table 3 - Development of Mine Year 25 - 11/01/16

												LOM Mine Year 20	
Estimated Total for Mine Year 20 Closure													$754,334,419
Work Done in Mine Years 21 to 25													
- Cat 1 Stockpile Cover (from Table 1)												$4,588,412	
- Pit Wall (from Table 1)												$156,545	
- FTB Beach (from Table 1)												$25,412,040	
- Demo and Site Restoration (from Table 1 for Phase 2 and NPV section D)												$57,535,566	
- HRF Cover System (from Table 1 - assume 50% for temporary cover and 5 years of draining)												$10,800,024	
- First 5 Years of Monitoring, Staff and Support (from NPV sections E, F and G)												$9,901,601	
- Indirect Costs	5%											$5,419,709	
SubTotal Work Done													$113,813,898
Remaining Total at end of Mine Year 25 after Planned Closure in Mine Year 20													$640,520,521
Estimated NPV for Mine Year 20 Closure (from Table 2)													$277,421,935
Deduct Work Done in First 5 Years (from above)													-$113,813,898
Deduct NPV of Water Treatment for Mine Year 20 Closure (from NPV)													-$115,540,742
Add NPV of Water Treatment at Mine Year 25 for Mine Year 20 Closure (from NPV)													$75,123,238
Estimated NPV at end of Mine Year 25 for Mine Year 20 Closure (from Table 2)													$123,190,534