

Amended**Water Appropriation Permit**

Pursuant to Minnesota Statutes, Chapter 103G, and on the basis of statements and information contained in the permit application, letters, maps, and plans submitted by the applicant and other supporting data, all of which are made part hereof by reference, **PERMISSION IS HEREBY GRANTED** to the applicant to perform actions as authorized below. This permit supersedes the original permit and all previous amendments.

Project Name: Poly Met Mining, Inc.	County: St. Louis	Watershed: St. Louis River	Resource: Quarry/Mine: Central Pit
Purpose of Permit: Mine Dewatering		Authorized Action: Withdrawal of up to 700.0 million gallons of water per year for mine dewatering. Authorized use includes Mine Dewatering and all associated activities. Exact points of taking and number of installations will be variable over time. Prior to pumping Permittee shall notify DNR of exact location and number of installations. Maximum authorized pumping rate shall not be exceeded by the addition of installations. Discharge locations shall be in accordance with those noted in Attachment A.	
Permittee: POLY MET MINING, INC. CONTACT: KEARNEY, CHRISTIE, (218) 471-2163 6500 CO RD 666 PO BOX 475 HOYT LAKES, MN 55750 (218) 471-2150		Authorized Agent: N/A	
To Appropriate From: Quarry/Mine: Central Pit : by means of a portable pump at a rate not to exceed 1300 gpm Point(s) of Taking UTM zone 15N, 577274m east, 5274545m north NESE of Section 3, T59N, R13W			
Issued Date: 07/11/2019	Effective Date: 07/11/2019	Expiration Date: Long-Term Appropriation	
Authorized Issuer: Michael Liljegren	Title: Mine Permitting and Coordination Supervisor	Email Address: michael.liljegren@state.mn.us	Phone Number: 651-259-5689

This permit is granted **subject to** the following **CONDITIONS**:

LIMITATIONS: (a) Any violation of the terms and provisions of this permit and any appropriation of the waters of the state

CONDITIONS *(Continued from previous page)*

in excess of that authorized hereon shall constitute a violation of Minnesota Statutes, Chapter 103G. (b) This permit shall not be construed as establishing any priority of appropriation of waters of the state. (c) This permit is permissive only. No liability shall be imposed upon or incurred by the State of Minnesota or any of its employees, on account of the granting hereof or on account of any damage to any person or property resulting from any act or omission of the Permittee relating to any matter hereunder. This permit shall not be construed as estopping or limiting any legal claims or right of action of any person other than the state against the Permittee, for any damage or injury resulting from any such act or omission, or as estopping or limiting any legal claim or right of action of the state against the Permittee, for violation of or failure to comply with the provisions of the permit or applicable provisions of law. (d) In all cases where the doing by the Permittee of anything authorized by this permit shall involve the taking, using, or damaging of any property, rights or interests of any other person or persons, or of any publicly owned lands or improvements thereon or interests therein, the Permittee, before proceeding therewith, shall obtain the written consent of all persons, agencies, or authorities concerned, and shall acquire all property, rights, and interests necessary therefore. (e) This permit shall not release the Permittee from any other permit requirements or liability or obligation imposed by Minnesota Statutes, Federal Law, or local ordinances relating thereto and shall remain in force subject to all conditions and limitations now or hereafter imposed by law. (f) Unless explicitly specified, this permit does not authorize any alterations of the beds or banks of any public (protected) waters or wetlands. A separate permit must be obtained from the Department of Natural Resources prior to any such alteration.

FLOW METER: The Permittee shall equip each installation for appropriating or using water with a flow meter, unless another method of measuring the quantity of water appropriated to within ten (10) percent of actual amount withdrawn is approved by the Department.

WATER USE REPORTING: Monthly records of the amount of water appropriated or used shall be recorded for each installation. Such readings and the total amount of water appropriated or used shall be reported annually to the Director of DNR Ecological and Water Resources, on or before February 15 of the following year, via the MNDNR Permitting and Reporting System (MPARS) at www.mndnr.gov/mpars/signin. Any processing fee required by law or rule shall be submitted with the records whether or not any water was appropriated during the year. Failure to report shall be sufficient cause for terminating the permit 30 days following written notice.

MODIFICATION: The Permittee must notify the Commissioner in writing of any proposed changes to the existing permit. This permit shall not be modified without first obtaining the written permission from the Commissioner.

TRANSFER OR ASSIGNMENT: Any transfer or assignment of rights, or sale of property involved hereunder shall be reported within 90 days thereafter to the Director of DNR Ecological and Water Resources. Such notice shall be made by the transferee (i.e., new owner) and shall state the intention to continue the appropriation as stated in the permit. This permit shall not be transferred or assigned except with the written consent of the Commissioner.

COMMISSIONER'S AUTHORITY: (a) The Commissioner may inspect any installation utilized for the appropriation or use of water. The Permittee shall grant access to the site at all reasonable times and shall supply such information concerning such installation as the Commissioner may require. (b) The Commissioner may, as he/she deems necessary, require the Permittee to install gages and/or observation wells to monitor the impact of the Permittee's appropriation on the water resource and require the Permittee to pay necessary costs of installation and maintenance. (c) The Commissioner may restrict, suspend, amend, or cancel this permit in accordance with applicable laws and rules for any cause for the protection of public interests, or for violation of the provisions of this permit.

PUBLIC RECORD: All data, facts, plans, maps, applications, annual water use reports, and any additional information submitted as part of this permit, and this permit itself are part of the public record and are available for public inspection at the offices of DNR Ecological and Water Resources. The information contained therein may be used by the Division as it deems necessary. The submission of false data, statements, reports, or any such additional information, at any time shall be deemed as just grounds for revocation of this permit.

MONITORING REQUIREMENTS: Minnesota Statutes 103G.282 authorizes the Department of Natural Resources to require permittees to install and maintain monitoring equipment to evaluate water resource impacts from permitted appropriations. You may be required to modify or install automated measuring devices and keep records for each installation. The frequency of measurements and other requirements will be based on quantity of water appropriated, source of water, potential connections to other water resources, nature of concern, and other relevant factors.

DROUGHT PLANNING: In accordance with M.S. 103G.293, all permits must be consistent with the drought response plan detailed in the Statewide Drought Plan at http://files.dnr.state.mn.us/natural_resources/climate/drought/drought_plan_matrix.pdf.

CONDITIONS *(Continued from previous page)*

WATER USE CONFLICT: If notified by the DNR that a water use conflict is suspected and probable from your appropriation, based on confirmation of a formal well interference complaint or a preliminary hydrologic assessment, all appropriation authorized by this permit must cease immediately until the interference is resolved. The permittee may be required to obtain additional data to support the technical analysis, such as domestic well information within a radius of one and one-half miles of the production well. The permittee and impacted party may engage in a negotiated settlement process and there may be modifications made to this permit in support of conflict resolution.

SUSPENSION: The Department may require the suspension of appropriation during periods of low water in order to maintain minimum water levels within the basin/watercourse/watershed.

CONTINGENCY: If directed by DNR Ecological and Water Resources to cease pumping, the permittee agrees to withstand the results of no appropriation as stated in the contingency statement submitted with the application.

INTAKE: All pump intakes must be screened to prevent fish from being drawn into the system.

INVASIVE SPECIES - EQUIPMENT DECONTAMINATION: All equipment intended for use at a project site must be free of prohibited invasive species and aquatic plants prior to being transported into or within the state and placed into state waters. All equipment used in designated infested waters, shall be inspected by the Permittee or their authorized agent and adequately decontaminated prior to being transported from the worksite. The DNR is available to train inspectors and/or assist in these inspections. For more information refer to the "Best Practices for Preventing the Spread of Aquatic Invasive Species" at http://files.dnr.state.mn.us/publications/ewr/invasives/ais/best_practices_for_prevention_ais.pdf. Contact your regional Invasive Species Specialist for assistance at www.mndnr.gov/invasives/contacts.html. A list of designated infested waters is available at www.mndnr.gov/invasives/ais/infested.html. A list of prohibited invasive species is available at www.mndnr.gov/invasives/laws.html#prohibited.

INFESTED WATERS - WATER TREATMENT REQUIREMENTS: Surface water appropriation from waters listed as containing invasive species (see <http://www.mndnr.gov/invasives/ais/infested.html>) are required to contact 651-259-5100 or 1-888-MINN-DNR to obtain information from the DNR Division of Ecological and Water Resources on specific invasive species water treatment requirements.

WATER CONSERVATION: All practical and feasible water conservation methods and practices must be employed to promote sound water management and use the least amount of water necessary, such as reuse and recycling water, water-saving devices, and water storage.

DISCHARGE AUTHORIZATION: This permit is valid only in conjunction with all required discharge authorizations from local, state, or federal government units.

MONITORING PLAN: Monitoring shall be done in accordance with the attached Monitoring Plan dated June 6, 2019. All data shall be reviewed annually in cooperation with the DNR and adjustments made to the monitoring requirements as appropriate. Changes to the Monitoring Plan shall be made through an amendment to this permit.

QUALITY ASSURANCE PROJECT PLAN: Monitoring procedures and reporting requirements shall be conducted in accordance with the attached Quality Assurance Project Plan (QAPP) dated June 6, 2019, or as subsequently amended.

WATER MOVEMENT REPORTING: Flow rates and total monthly volumes shall be reported for all water movement on-site or discharged off-site as listed in the attached Monitoring Plan. Instantaneous rates, when relevant, shall be recorded when the total monthly volumes (totalizer readings) are collected. This information will allow for the development of a comprehensive water balance, provide further data about past and current water uses and inform future water management decisions.

PROCESS FLOW DIAGRAM - TEMPORARY IDLE : Prior to initiation of a temporary idle that may last longer than six (6) months, Permittee shall submit an updated process flow diagram showing water movement on-site and off-site during the temporary idle. Permittee shall work with the DNR to evaluate the process flow diagram and water balance model and determine additional data needs. Additional data collected shall be reported to the DNR. This Condition applies once a temporary idle lasts six months even if a shorter time frame was originally anticipated. All Conditions of this permit apply in the event of a temporary idle.

WATER BALANCE MODEL - PLANNED COMPLETION OF MINING: Two (2) years prior to planned completion of mining, Permittee shall update existing or, with DNR approval, develop new Mine Site and Plant Site water balance models to predict hydrologic equilibrium conditions after closure for submittal to the DNR. Permittee shall work with the DNR to evaluate the water balance models and determine if additional data is needed. If after this evaluation the DNR identifies

CONDITIONS *(Continued from previous page)*

additional data needs related to water balance modeling, Permittee must provide the additional data prior to closure.

REQUIRED REPORTING: The monitoring and reporting required by conditions of this permit are necessary to protect public health, safety and welfare pursuant to Minnesota Statutes 103G.297 and shall continue during periods of temporary idle, shutdown and/or bankruptcy unless otherwise specified by the DNR.

WELL SEALING: The Permittee shall notify the Minnesota Department of Health prior to sealing, removing, covering, plugging or filling the well(s). The well(s) must be sealed by a licensed well driller and in accordance with the procedures required under Minnesota Statutes 103I and Minnesota Rules 4725 as administered by the Minnesota Department of Health. Prior to sealing any wells used solely for NPDES/SDS monitoring, Permittee and DNR shall determine if any of the wells shall be left unsealed and used for groundwater level monitoring.

NEW WELL INSTALLATION: Permittee shall provide the MN Unique Well Numbers, well logs, and any additional data collected during the installation process, for each new well that is installed for monitoring required by this permit. All data and information shall be provided to DNR within 30 days of well installation and/or data collection.

ADAPTIVE MANAGEMENT: Should monitoring data and/or modeling results show unacceptable impacts to public health, to public safety, or to the public interests in lands and waters are being, or could potentially be, caused by the appropriation or use of water authorized under this permit, Permittee shall work with the DNR to develop an approved plan for implementing appropriate adaptive management or mitigation strategies. If the DNR concludes that adaptive management or other mitigation strategies are insufficient to remedy the unacceptable impacts, the DNR may cancel or suspend the permit in accordance with Minnesota Statutes 103G.297.

MINE PIT ELEVATIONS AND VOLUMES: Permittee shall develop one-foot contour elevation data and maps for each pit and provide stage-area relationship data based on either mine survey information or aerial photography every other year. This data shall be reported to the DNR in the Permittee's annual report in accordance with the QAPP dated June 6, 2019, or as subsequently amended.

RIGHT TO APPROPRIATE: This permit is valid only as long as the Permittee has ownership, control of, or a license to use the land overlying the groundwater source or abutting the surface water source from which the water will be appropriated.

BEDROCK WELL DATA COLLECTION: As described in the Monitoring Wells North of the Mine Site: Installation and Hydrogeologic Monitoring Plan document, dated October 2016, at each of the twelve (12) new bedrock wells installed in the area between the Project Mine Site and the Peter Mitchell Pit, downhole geophysical data must be collected. Such data must include but is not limited to: caliper; borehole fluid temperature and resistivity; single-point resistance; spontaneous potential; short and long normal resistivity; acoustic and/or optical borehole imaging. Flow logging and aquifer testing shall also be performed at each well. All bedrock well data must be provided to the DNR within 30 days of collection.

MAINTAIN PARTRIDGE RIVER STREAMFLOW: Mean annual streamflow in Partridge River shall be maintained within $\pm 20\%$ of the existing conditions hydrograph. Adaptive management, which may include stream augmentation, shall be required if monitoring results show that streamflow cannot be maintained within $\pm 20\%$ of average annual streamflow hydrograph. Discharge from the Waste Water Treatment System (WWTS) for stream augmentation shall not exceed the new source performance standard (NSPS) defined by the NPDES/SDS permit, under authority of the MPCA, for the WWTS.

MODEL UPDATES AND ASSESSMENTS: Permittee shall develop a modeling work plan that details how monitoring data will be used to update and/or create new models and the plan must be approved by the DNR. Permittee shall conduct ongoing modeling in accordance with the work plan and incorporate ongoing surface water and groundwater monitoring results obtained through monitoring required by this permit. Permittee shall submit model reports according to schedules established in the work plan.

GREAT LAKES WATER BASIN: Appropriations authorized by this permit must comply with Minnesota Statutes 103G.265, subd. 4. Diversion or consumption of water from the Lake Superior basin of more than 5 million gallons per day average in a 30-day period is not authorized.

TERM OF PERMIT: The term of permit shall end in the event that the Permittee fails to appropriate and use water under this permit for a continuous period of ten (10) years. In such event, the Permittee shall be deemed to have abandoned any right to use and appropriate water under this permit and the permit shall be terminated, unless the DNR extends the term of the permit in writing upon good cause shown by the Permittee.

CONDITIONS *(Continued from previous page)*

cc: Anna Hess, EWR District Manager
Erika Herr, DNR LAM
Anthony Bermel, Conservation Officers, Babbitt
Jennifer Engstrom, Mineland Reclamation, Statewide
Margi Coyle, DNR Regional Environmental Assessment Ecologist, Region 2
Tom Rusch, DNR Wildlife, Tower
Edie Evarts, DNR Fisheries, Tower Area
Mark Lindhorst, County, St. Louis
Phil Norvitch, SWCD, St. Louis SWCD - North
Debbie Marinaro, City, Babbitt

Attachment A
Initial Discharge Location for Individual Installations
DNR Water Appropriation Permit 2016-1364

Installation	Initial Discharge Location
Pre-operation construction	Construction Mine Water Basin or similar temporary basin at the Mine Site or, if construction stormwater, offsite through the stormwater system (Partridge River Tributaries)
During operation	Equalization Basins
Treated water may be discharged off-site to the following sites for augmentation:	<ul style="list-style-type: none"> ◦Second Creek UTMs X=565896 Y=5271955 ◦Trimble Creek #1 UTMs X=563983 Y=5275733 ◦Trimble Creek #2 UTMs X=564471 Y=5275791 ◦Trimble Creek #3 UTMs X=564857 Y=5276079 ◦Trimble Creek #4 UTMs X=565381 Y=5276076 ◦Trimble Creek #5 UTMs X=565918 Y=5276075 ◦Trimble Creek #6 UTMs X=566331 Y=5276044 ◦Trimble Creek #7 UTMs X=566818 Y=5276024 ◦Unnamed Creek #1 UTMs X=563404 Y=5274175 ◦Unnamed Creek #2 UTMs X=563388 Y=5275138

Poly Met Mining, Inc.
Monitoring Plan for Compliance with DNR Water Appropriation Permit 2016-1364
June 6, 2019

Appropriations under Water Appropriation Permit 2016-1364 are conditioned upon Poly Met Mining, Inc. (PolyMet) fulfilling the following monitoring requirements in accordance with this Monitoring Plan.

Changes to the Monitoring Plan shall be made through an amendment to Water Appropriation Permit 2016-1364.

All monitoring requirements under this Monitoring Plan go into effect following issuance of Water Appropriation Permit 2016-1364, or as otherwise specified below.

Monitoring locations are shown in Figure 1 and process flow shown in Figure 3.

Rates and Monthly Water Volumes – PolyMet shall equip the following location with a flow meter and totalizer to accurately record instantaneous rates and total monthly volumes, within 10% of actual. Rates and monthly volumes shall be reported after dewatering is initiated, according to the following schedule:

- WS404, Central Pit (continuous, year-round)

Pit Water Levels – PolyMet shall monitor water levels after dewatering is initiated at the following location, according to the schedule below:

- WS404, Central Pit (monthly, year-round)

Installation of a continuous recording data logger is recommended. Should pit dewatering result in the separation into individual water bodies or multiple water bodies join to form a single body, PolyMet will meet with the DNR to discuss potential changes to monitoring requirements.

Groundwater Well Monitoring – PolyMet shall monitor groundwater levels at the following locations according to the schedule below. These wells shall be installed as soon as reasonably practicable after PolyMet obtains all necessary rights to access the land at the Mine Site. Well installation must be completed no later than six months from the date PolyMet obtains all necessary approvals for site access and well installation.

- GW407, MDH Unique Well No. 786726 (monthly, year-round)
- GW419, MDH Unique Well No. 837781 (monthly, year-round)
- GW525, MDH Unique Well No. 762038 (monthly, year-round)

Installation of a continuous recording data logger is recommended.

Streamflow Monitoring – PolyMet shall validate stage-discharge relationships with a manual discharge and stage measurement every 4 to 6 weeks year-round. In addition, streamflow monitoring shall occur during season(s) of interest or as needed during high and low flows. Stage measurements shall be recorded at 15 minute intervals. PolyMet shall measure streamflows at the following locations:

- Partridge River (H03155002)
- SW430, Partridge River near Babbitt, 0.5 mi DS PM Pit Rd (H03155005)
- SW431, Partridge River
- SW432, South Branch of Partridge River near Skibo, 1.4 mi US of FR113 (H03145003)
- SW433, Unnamed Creek (West Pit Outfall) – 2 years of monitoring required with location to be determined with DNR. Based upon the monitoring results the DNR will determine if monitoring at this location may cease or whether monitoring needs to be continued.

Annual Report, Re-evaluation of Monitoring Plan, Closure and Temporary Idle

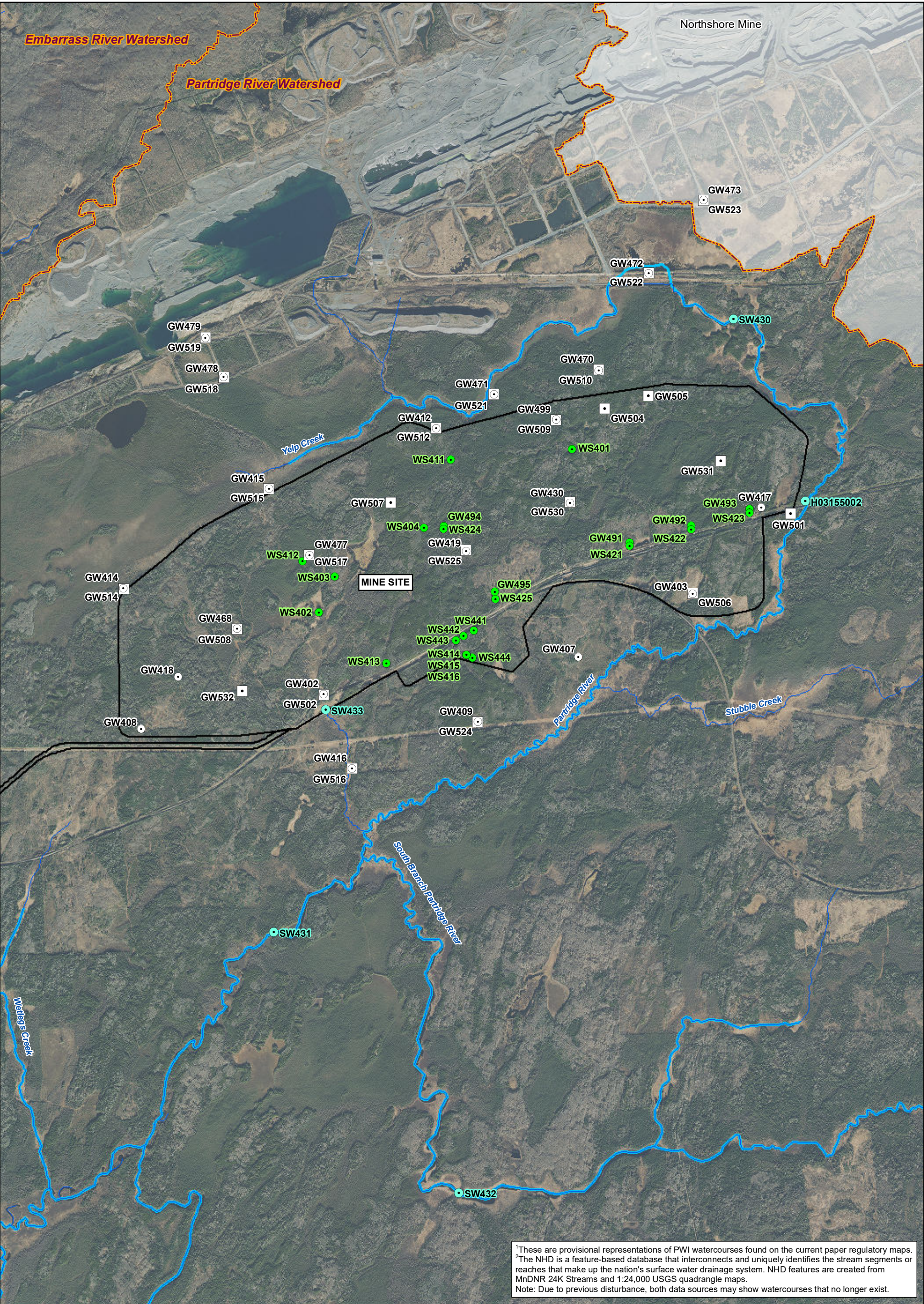
- Data shall be collected and reported in accordance with requirements outlined in the Quality Assurance Project Plan (QAPP) dated June 1, 2019, or as subsequently amended.
- If the DNR determines that monitoring data and/or modeling results show unacceptable impacts to public health, to public safety, or to the public interests in land and waters, that could potentially be caused by the appropriation or use of water authorized under Water Appropriation Permit 2016-1364, then the DNR may revise the requirements of this Monitoring Plan.
- PolyMet shall discuss with the DNR plans for temporary idle beyond six (6) months or cessation of pumping. This Monitoring Plan shall remain in effect during a temporary idle or after cessation of pumping unless otherwise approved by the DNR.

 6/6/19

Michael Liljegren
Mine Permitting and Coordination Section Supervisor
Minnesota Department of Natural Resources

 6/6/2019

Christie Kearney
Environmental Site Director
Poly Met Mining, Inc.



¹These are provisional representations of PWI watercourses found on the current paper regulatory maps.
²The NHD is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD features are created from MnDNR 24K Streams and 1:24,000 USGS quadrangle maps.
Note: Due to previous disturbance, both data sources may show watercourses that no longer exist.

- EIS Project Areas

Watershed Divide

Public Waters Inventory (PWI) Watercourses¹

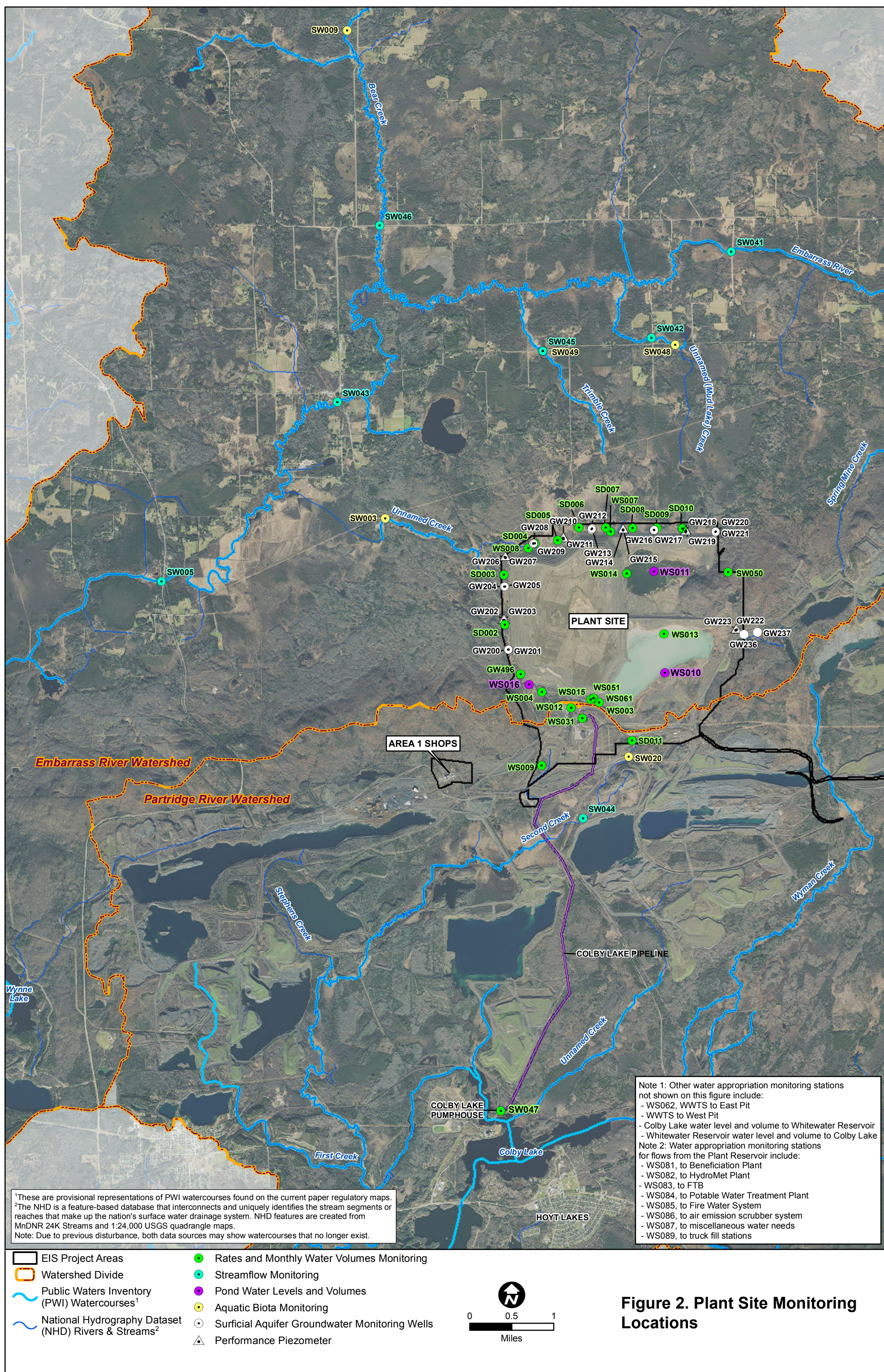
National Hydrography Dataset (NHD) Rivers & Streams²

Rates and Monthly Water Volumes Monitoring

Streamflow Monitoring

Surficial Aquifer Groundwater Well Monitoring

Bedrock Aquifer Groundwater Well Monitoring
- Note: Water appropriation monitoring stations not shown on this figure include the following:
- WS900, East Pit outfall
- SD401, West Pit outfall
-
- Figure 1. Mine Site Monitoring Locations**



Poly Met Mining, Inc.
Quality Assurance Project Plan (QAPP) for Water Appropriation Permit Monitoring Procedures
2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, 2017-0260
June 6, 2019

Background

This QAPP applies to the monitoring and reporting requirements imposed under Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260 issued to Poly Met Mining, Inc. (PolyMet) and details the methods for data collection. The permits require data collection and reporting under the Department of Natural Resources (DNR) approved Monitoring Plans in order to monitor for potential impacts from water appropriations under these permits. Any changes to the Monitoring Plan(s) shall occur through an amendment to the Water Appropriation Permit(s).

Reporting Requirements

An annual report displaying and analyzing all monitoring data shall be prepared by PolyMet and submitted electronically (and in hard copy, if requested), along with associated data in a Microsoft Excel compatible format, no later than March 31st of the following year. Data shall be submitted in template(s), should they be provided by the DNR. The annual report shall include a narrative analyzing monitoring data for short-term and long-term trends, comparison of data trends to short-term and long-term predictions, effects of dewatering or pumping activities, effectiveness of the Monitoring Plan, and provide recommendations for any monitoring changes. The DNR shall provide guidance on development of this report and submittal of data as needed.

PolyMet shall also provide with the annual report: 1) an updated process flow diagram depicting all water movement on-site and off-site and 2) documentation showing the current configuration of all points of taking, points of discharge, pipe alignments, truck-fill stations, flow meters, and monitoring locations. Locational data shall be reported as points, lines, or polygon features in an ArcGIS compatible file or as otherwise approved by the DNR.

Data may be requested at any time by the DNR between reporting periods.

Survey Requirements

The survey method used to collect elevation data for Monitoring Plan(s) shall be capable of reporting elevations within 0.05 foot accuracy and calibrated to an approved Minnesota Department of Transportation (MnDOT) GSID benchmark (NGVD 1929) or a temporary benchmark approved by the DNR. If an approved temporary benchmark is used, PolyMet shall provide information on the MnDOT GSID benchmark used to establish that temporary benchmark. PolyMet is responsible for choosing the appropriate survey methodology based on the monitoring requirements and DNR recommendations. However, any method that is chosen must meet the 0.05 foot accuracy requirement. Survey grade GPS should be considered when choosing an appropriate survey method because of its ability to meet the 0.05 foot accuracy requirement.

All survey data shall be reported with the date and time of survey, surveyed elevation (NGVD 1929), site name and number of the MnDOT GSID benchmark or temporary benchmark, survey method used, and survey accuracy.

Monitoring Data Collection

Data shall be presented in the annual report and submitted in electronic format according to the Reporting Requirements. All surveyed water level elevations shall be reported according to the Survey Requirements for survey method and survey accuracy. Should PolyMet be unable to collect scheduled data in accordance with the Monitoring Plan(s), PolyMet shall notify the DNR of the issue and develop a plan to correct the issue.

1. On-site Weather Station

All equipment and procedures used for instrument siting and data collection shall conform to procedures set forth in the National Weather Service Instruction 10-1302 (Requirements and Standards for NWS Climate Observations). PolyMet shall collect hourly, on-site precipitation and air temperature data at a site approved by the DNR in accordance with the Monitoring Plan(s). Air temperature data shall be collected year-round. Precipitation data shall be collected during non-freezing months unless a heated gage is used. Should PolyMet's data collection system fail, PolyMet shall inform the DNR of the failure and develop a plan to correct the issue. In this event, the DNR may allow the use of precipitation data from the nearest approved weather station until PolyMet's data collection system is operational.

Precipitation totals (inches) and air temperature (degrees Fahrenheit) shall be reported in hourly time increments with the date and time of measurement.

2. Rates and Monthly Water Volumes

Unless otherwise noted in the Monitoring Plan(s), all installations shall be equipped with flow meters and totalizers to record instantaneous rates and total monthly volumes of water appropriated and/or discharged. Flow meters shall be accurate to within 10% of the total volume. This information shall be used to complete the annual Water Use Report in the MN DNR Permitting and Reporting System (MPARS). An alternative method may be approved by the DNR if PolyMet is unable to use flow meters and totalizers to record instantaneous rates and total monthly volumes. PolyMet shall follow standards set forth in the USGS Techniques and Methods 3-A7 and 3-A8, or the latest updated USGS standards, for rate and volume monitoring associated with a weir structure.

Flow rates and total monthly volumes shall be reported for all water movement on site or discharged off site as listed in the Monitoring Plan. Instantaneous rates, when relevant, shall be recorded when the total monthly volumes (totalizer readings) are collected. This information will allow for the development of a comprehensive water balance, provide further data about past and current water uses and inform future water management decisions.

Data shall be submitted in a template, should one be provided by the DNR.

3. Pit Elevations and Volumes

All Digital Elevation Model(s) (DEM) and/or pit contour data must meet American Society for Photogrammetry and Remote Sensing (ASPRS) standards unless otherwise approved by the DNR.

4. Pit and Lake Water Levels

Pit and lake water levels shall be monitored in accordance with requirements set forth in the Monitoring Plan(s). Water level elevations may be surveyed or measured using a data logger, staff gage, or other DNR approved method(s).

Data Logger

Following installation of a continuous recording data logger, PolyMet shall submit monthly logger and calibration data for six (6) months or unless otherwise approved by the DNR. Data will be assessed for data logger and calibration accuracy. Once the DNR concludes after this initial reporting period that the data loggers are accurate and appropriately calibrated, PolyMet may begin collection and calibration of data at the frequency set forth in the Monitoring Plan(s).

If a data logger is used to monitor water level elevation, the frequency at which the logger is calibrated and data are recorded must be done in accordance with requirements set forth in the Monitoring Plan(s). If no calibration requirements are included in the Monitoring Plan(s) then the data logger shall be calibrated, at minimum, quarterly unless otherwise approved by the DNR. The data logger shall be calibrated with a surveyed manual water level elevation measurement taken immediately before and after data are downloaded or calibrated with a staff gage measurement unless otherwise approved by the DNR. Data logger

calibration shall be conducted by resetting the water level elevation to the surveyed manual water level elevation or staff gage measurement. At a minimum, data should be downloaded during each calibration and data logger corrected, if needed, in a timely manner. Any problems with the data logger shall be reported to the DNR as soon as possible.

All calibration corrections and data logger data shall be submitted with the date and time of correction and measurement. Any difference in the manual and data logger water level measurements at the time of calibration shall be reported to the nearest hundredth of a foot (0.01'). If drift corrections are retroactively applied to the logger data, PolyMet shall include a narrative explaining the correction applied and submit both the raw and corrected data files.

Staff Gage

Staff gages shall be surveyed upon installation and measured during ice-free periods in accordance with requirements set forth in the Monitoring Plan(s). Should the staff gage need to be reset, PolyMet shall report the new staff gage location and survey information. Staff gage water level elevations shall be reported with the date and time of measurement, gage zero elevation, and gage plate reading.

Other Method

The DNR may approve an alternative method for pit or lake water level elevation collection. In order to request DNR approval of alternative methods, PolyMet shall submit a report detailing the proposed method for data collection, proposed equipment accuracy, and a feasibility review of using data loggers and staff gages.

5. Groundwater Levels

Well water levels shall be monitored in accordance with requirements set forth in Monitoring Plan(s). The ground level elevation and measuring point elevation on the well casing shall be surveyed and reported. Groundwater levels may be measured using an electronic tape, steel tape, or data logger.

Manual Water Level

Manual groundwater level measurements using an electronic tape or steel tape shall be taken by measuring the depth to water (feet) from a designated measuring point on the well casing. Data shall be reported with the date, time, depth to water measurement, and calculated water level elevation.

Data Logger

Following installation of a continuous recording data logger, PolyMet shall submit monthly logger and calibration data for six (6) months or unless otherwise approved by the DNR. Data will be assessed for data logger and calibration accuracy. Once the DNR concludes after this initial reporting period that the data loggers are accurate and appropriately calibrated, PolyMet may begin collection and calibration of data at the frequency set forth in the Monitoring Plan(s).

If a data logger is used to monitor water level elevation, the frequency at which the logger is calibrated and data are recorded must be done in accordance with requirements set forth in the Monitoring Plan(s). If no calibration requirements are included in the Monitoring Plan(s) then the data logger shall be calibrated, at minimum, quarterly unless otherwise approved by the DNR. The logger shall be calibrated with a manual water level elevation measurement taken immediately before and after data are downloaded unless otherwise approved by the DNR. Calibration of the data logger shall be conducted by resetting the water level elevation to the measured manual water level elevation. At a minimum, data should be downloaded during each calibration and data logger corrected, if needed, in a timely manner. Any problems with the data logger shall be reported to the DNR as soon as possible.

All calibration corrections and data logger data, including barometric pressure corrected data for non-vented pressure transducers, shall be submitted with the date and time, manual water level measurement, data logger water level reading, and applied calibration. Any difference in the manual and data logger water level measurements at the time of calibration shall be reported to the nearest hundredth of a foot (0.01'). If data are retroactively corrected for instrument drift or barometric pressure, PolyMet shall include a narrative explaining the correction applied and shall submit both the raw and corrected data files.

6. Streamflow Monitoring

All equipment and procedures used to collect streamflow and stage measurements and compute stream discharges shall conform to procedures set forth in the USGS Techniques and Methods 3-A7 and 3-A8 or the latest updated USGS procedures. The DNR shall approve proposed gage sites prior to establishment.

Discharge Measurements

Wading discharge measurements made using hand-held velocity meters must have a minimum of 25 – 30 velocity, depth, and cross-sectional distance measurements within a transect. Other methods for measuring stream discharge, such as acoustic doppler current profilers (ADCP), shall be approved by the DNR prior to measurement and methodologies shall be described in detail in the annual report.

Stage Measurements

Continuous stage recording equipment shall be accurate to +/- 0.005 feet over the expected stage range for each gage site.

Rating Curve / Stage-Discharge Relation

Flow and stage measurements, required to develop an initial stage-discharge relationship, shall be collected according to standard USGS procedures.

Computation of Continuous Stage Measurements

Discharge computed using continuous stage measurements shall follow standard USGS procedures including the use of datum corrections and shift adjustments throughout the year. During winter ice conditions, flow measurements, weather data, and gage height record shall be used to estimate discharge for periods when the stage-discharge relation is affected by ice backwater; and flow adjusted accordingly.

Reference Points

All continuous gaging stations shall be surveyed annually and a reference staff gage installed and maintained at gage datum.

All continuous and manual stage and discharge measurements and daily average discharges shall be included in the annual report. Estimated discharge values shall be noted in the dataset. A detailed summary of collected data and data processing shall also be included in the annual report.

7. Macroinvertebrate Monitoring

Macroinvertebrate surveys shall be conducted in accordance with the Minnesota Pollution Control Agency (MPCA) standards at the locations and frequencies specified in the Monitoring Plan(s).

8. Fish Community Monitoring

Fish community surveys shall be conducted in accordance with the Minnesota Pollution Control Agency (MPCA) standards at the locations and frequencies specified in the Monitoring Plan(s).

9. *Bedrock Well Data Collection*

- Geophysical Testing: The standards and procedures used to collect geophysical data from the open-hole section of each bedrock well shall be provided to and approved by DNR prior to the start of any data collection.
- Flow Logging: The standards and procedures used for flow-logging from the open-hole section of each bedrock well shall be provided to and approved by DNR prior to the start of any data collection.
- Aquifer Testing: Details for aquifer testing of each bedrock well shall be developed in consultation with DNR Lands and Minerals following completion of the geophysical testing and flow logging. The standards and procedures used to perform aquifer testing of each bedrock well shall be provided to and approved by DNR prior to the start of any testing.