RS 10 – Hydrogeological – Drill Hole Monitoring and Data Collection – Phase 2

Hydrogeologic Investigation – Phase II
PolyMet NorthMet Mine Site
RS-10

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Executive Summary

A second hydrogeologic investigation was conducted at the PolyMet mine site. The objective of this investigation was to determine the hydraulic properties and water quality of the Virginia Formation. Four 6-inch diameter pumping wells and five 2-inch diameter observation wells were installed near the contact between the Virginia Formation and the Duluth Complex, near the northern boundary of the proposed PolyMet mine pits. A pumping test was conducted at each pumping well, three 36 hour tests and one 96 hour test. During and following the test, water levels in the pumping well and observation wells were recorded. This data was analyzed using conventional analytical methods to determine hydraulic properties of the Virginia Formation. Hydraulic conductivities calculated from the measured water level data ranged from .0024 to 1.0 ft/day. The geometric mean was 0.17 ft/day.

Following at least 12 hours of pumping, a groundwater sample was collected from each of the pumping tests wells. Groundwater samples were analyzed for total metals, dissolved metals, and general chemistry parameters. This data is needed to help predict the water quality in the mine pits during operation and during closure. Since the discharge or treatment of the mine pit water in not yet determined, analytical results were compared to the Minnesota Surface Water Quality Class 2B Chronic and the Lake Superior Basin Water Quality Class 2B Chronic criteria for comparison. The only water quality exceedences were for nitrogen (ammonia as N) from wells P-2 and P-4. The presence of ammonia nitrogen in the samples likely indicates that there is a hydraulic connection between the bedrock aquifer and th3e surficial aquifer. A third hydrogeologic investigation at the mine site is planned to further investigate this possible connection.

1.0 Introduction

This report has been prepared for PolyMet Mining Corporation (PolyMet) by Barr Engineering Company (Barr) to document the results of the Phase II Hydrogeologic Investigation that was conducted at the PolyMet NorthMet mine site (the Mine Site) (Figure 1). This work was done, in part, to fulfill the requirements of the October 25, 2005, NorthMet Mine and Ore Processing Facilities Project Final Scoping Decision. The objectives of this study were to provide information on the hydrogeologic characteristics of the Virginia Formation at the Mine Site and the chemical characteristics of the groundwater within this unit.

1.1 Background

A scoping Environmental Assessment Worksheet (EAW) was submitted in June 2005 for PolyMet's proposed NorthMet Mine and Ore Processing Facilities located near Hoyt Lakes, Minnesota. PolyMet plans to excavate and process the low-grade polymetallic, disseminated, magmatic sulfide NorthMet deposit in northeastern Minnesota, approximately 6 miles south of the town of Babbitt and about 2 miles south of the operating Northshore Mining Company taconite open pit. Project plans call for the excavation of up to 32,000 tons of ore per day, using open-pit mining methods. Overburden and waste rock will be stripped and stockpiled. Processing of the ore will take place at the existing Cliffs Erie processing plant.

On October 25, 2005, the Minnesota Department of Natural Resources (DNR), in co-operation with the United States Army Corps of Engineer (USACE) and the United States Forest Service (USFS), published the final scoping decision for the project. Section 3.3.4 of that report discussed the need for the Phase I and Phase II hydrogeologic studies. The Phase I Hydrogeologic Investigation accessed the ability of the Duluth Complex and the surficial sediments at the Mine Site to transmit water into the proposed NorthMet pit. Water-quality samples were also collected to assist in the evaluation and estimation of mine-pit dewatering water quality. The results of this investigation were presented in the Hydrogeologic Investigation- PolyMet NorthMet Mine Site report (RS-02) (Barr, 2006).

1.2 Mine Site Setting

The NorthMet deposit is located in the Duluth Complex, a large mafic intrusion that was emplaced into flood basalts along a portion of the Middle Proterozoic Midcontinent Rift System. The NorthMet

deposit is situated along the western edge of the Complex within the Partridge River intrusion, which has been subdivided into a least seven igneous stratigraphic units on the basis of drill core evaluations. All of these igneous layers exhibit a shallow dip (10º-25º) to the south-southeast. Underlying the Complex at NorthMet is the sedimentary Lower Proterozoic (1.8 million year old) Virginia Formation, which, in turn, is underlain by the Biwabik Iron Formation (BIF). The BIF will not be intersected in mining operations. The Virginia Formation may be intersected along the northern footwall of the pit. The investigation presented in this report focused on the aquifer properties of the Virginia Formation. The Duluth Complex, along with the surficial sediment, was the focus of the Phase I Hydrogeologic Investigation (RS-02) (Barr, 2006).

1.3 Scope of Work

The hydrogeologic investigation presented in this report was designed to aid in the characterization of the Virginia Formation at the Mine Site. Four pumping test wells and five observation wells were advanced into the Virginia Formation along the northern boundary of the Mine Site. Three 36-hour and one 96-hour pumping tests were conducted. In addition, a groundwater sample was collected from each pumping well to assist in the evaluation and estimation of mine pit dewatering water quality. All work presented here was done in accordance with the *Hydrogeologic Investigation Work Plan for the PolyMet NorthMet Mine Site – Phase II* (Work Plan) (Barr, 2005), except where noted.

1.4 Report Organization

This report is organized into four sections, including this introduction. Section 2 summarized the field activities and data collection; Section 3 presents the field investigation observations and results, including the results of the groundwater sampling; and Section 4 provides the investigation summary.

2.0 Field Activities and Data Collection

Understanding the ability of the Virginia Formation to transmit water into the proposed mine pit (or pits) and the chemical characteristics of that water is critical to understanding both the overall quality and quantity of water that can be expected to flow into the pit(s). The information collected as part of this investigation will be used in conjunction with data collected during the Phase I Investigation (RS-02) and data collected during future investigations to help predict the total volume of water the mine pit will collect. The results of this work will be presented in *Hydrology – Mine Water Model and Balance* (RS-21).

2.1 Well Installation

2.1.1 Pumping Wells

Four pumping wells (P-1 through P-4) were installed by WDC Exploration and Wells using a combination of STRATEX® and air rotary techniques. Wells were installed near the proposed locations provided in the Work Plan (Figure 2), with the exception of P-4 which was moved to the northeast in order to ensure placement in the Virginia Formation and outside of the proposed mine pit footprint. Well construction information is shown in Table 1 and well logs are included in Appendix A. The remaining three wells were placed as far north towards the Virginia Formation as site conditions (i.e. roads and wetlands) would permit. However, it was not possible to locate all of the wells in areas where the Virginia Formation is the uppermost bedrock unit. Well construction information is shown in Table 1 and well logs are included in Appendix A.

At each well location, a 12-inch diameter borehole was drilled at least ten feet into bedrock using the STRATEX® drilling method. This method consists of a non-rotating casing (12-inch diameter) that is driven into the ground by a pneumatic down-hole hammer in conjunction with a retractable, under-reaming carbide drill bit. A six-inch diameter black steel casing was placed in the hole and the annulus was grouted with neat cement. After the grout had set (a minimum of 24 hours), the 6-inch diameter borehole was completed using the air rotary method. Wells P-1, P-2 and P-3 were completed to a depth of 610 feet. Well P-4 was terminated at 485 feet, where soft formation conditions (from 462-485 feet) prohibited further borehole advancement. Wells were developed by airlifting.

2.1.2 Observation Wells

Five observation wells (Ob-1 through Ob-5) were installed by WDC Exploration and Wells using air rotary techniques. In addition, an unsuccessful boring (the seal between unconsolidated sediments and open interval was lost) at the Ob-3 location was converted to an observation well (Ob-3a). This observation well is discussed in further detail below. Wells were installed near the proposed locations provided in the Work Plan, with the exception of Ob-5 which was moved along with pumping well P-4. Similar to the pumping wells, the observation wells were placed as far north towards the Virginia Formation as site conditions (i.e. roads and wetlands) would permit. However, it was not possible to locate all of the wells in areas where the Virginia Formation is the uppermost bedrock unit. Well construction information is shown in Table 1 and well logs are included in Appendix A.

At each observation well location, a 4-inch diameter black steel casing was driven at least ten feet into bedrock, with the exception of well Ob-4. The work plan specified that the casing was to be set one foot into bedrock, as was done at well Ob-4. Following the completion of Ob-4, it was determined that the casing needed to be set at least ten feet into bedrock in order to help avoid setting the casing into a large boulder. After driving the casing, the 4-inch diameter borehole was completed using the air-rotary method. All wells were completed to a depth of 100 feet. Wells were developed by airlifting.

When attempting to drill well Ob-3, the casing seal was broken during drilling. It was determined that rather than try and regain a seal, the boring would be "abandoned" and re-drilled several feet away. However, rather than abandoning the borehole, it was left open and permitted as an additional observation well, called Ob-3a. This well was completed to a depth of 50 feet.

2.2 Aquifer Performance Testing

Aquifer performance tests were conducted in each of the four pumping wells. Rather than performing a separate step-drawdown test to determine an appropriate pumping rate, the step-drawdown test was conducted at the beginning of the 36- or 96-hour test. The pumping phase of three tests, one each in wells P-1, P-2, and P-4, were run for 36 hours. The pumping phase of the test in P-3 was run for 96 hours. Originally, the 96 hour test was planned for well P-1 due to the presence of a nearby wetland piezometer. However, because the pumping tests were conducted in the winter rather than during the summer as originally planned, the wetland piezometer was frozen

and was not useable. In addition, information gathered during drilling suggested that the yield from well P-1 would be low and the 96-hour test would be better suited for a higher yielding well.

Water levels from pumping and observation wells were measured automatically using miniTroll data logging probes (miniTrolls) manufactured by In Situ, Inc. The miniTrolls automatically record and correct water levels for changes in barometric pressure.

2.2.1 P-1 Test

A 36-hour pumping test was conducted in well P-1. MiniTrolls were installed in P-1 and Ob-1 prior to the beginning of the test. The miniTrolls collected water level and temperature data every five minutes throughout the pumping and recovery portions of the test.

A temporary pump was placed in the well at a depth of 400 feet below ground surface. An inline flow meter was used to measure pumping rates. Discharge was routed via hoses 500 feet to a down-slope upland (i.e. non-wetland) area.

At the beginning of the test, the pumping rate (6-9 gallons per minute [gpm]) was much higher than the well yield, and the rate was quickly scaled back to 4.2 gpm. After pumping at this rate for roughly 30 minutes, the pumping rate was scaled back to approximately 2 gpm. Six and a half hours into the test, it was determined that the well would not be able to sustain this rate and the rate was set at 1.2 gpm, where it remained for the duration of the test. The pumping schedule is summarized below:

Time since Pumping Began (minutes)	Pumping Rate (gpm)
0-24	6-9
24-77	4.2
77-385	2.2
385-2195	1.2
2195	0

Thirty-six hours after pumping began, the pump was turned off and water levels were allowed to recover for 36 hours, after which time the pump and miniTrolls were removed. Water level data from the miniTrolls is included as supplemental electronic data.

2.2.2 P-2 Test

A 36-hour pumping test was conducted in well P-2. MiniTrolls were installed in P-2 and Ob-2 prior to the beginning of the test. Water-level data were collected every two minutes throughout the pumping and recovery portions of the test. A temporary pump was placed in P-2 at a depth of 400 feet below ground surface. Discharge, measured using a five-gallon bucket and stopwatch, was routed 500 feet to a down-slope upland area. Discharge distance was decreased from the distance specified in the work plan due to frozen ground conditions that prohibited the infiltration of the discharge water.

The pumping rate was initially set at 4 gpm. After 22 minutes, water levels had stabilized and the pumping rate was increased to 15gpm. The pumping rate was again increased after 72 total minutes of pumping to 32 gpm. At 194 minutes of pumping, the rate was decreased to 28 gpm to assure that the well would not pump dry before 36 hours of pumping. The pumping schedule is summarized below:

Time since Pumping Began (minutes)	Pumping Rate (gpm)
0-22	4
22-72	15
72-194	32
194-2155	28
2155	0

After thirty-six hours of pumping, the pump was turned off and water levels were allowed to recover. The pump and miniTrolls were removed after nine hours of recovery when water levels had recovered at least 90% of the final drawdown. Water level data from the miniTrolls is included as supplemental electronic data.

2.2.3 P-3 Test

A 96 hour pumping test was conducted in well P-3. MiniTrolls were installed in wells P-3, Ob-3, Ob-3a, and a preexisting water supply well, #717971, prior to the beginning of the test. Water-level data were collected every five minutes throughout the pumping and recovery portions of the test. A temporary pump was placed in well P-3 at a depth of 400 feet. Discharge, measured using an in-line flow meter, was routed 700 feet to a down-slope upland area. The discharge distance was decreased

from the distance specified in the work plan due to frozen ground conditions that prohibited the infiltration of the discharge water. The pumping schedule for the test is summarized below:

Time since Pumping Began (minutes)	Pumping Rate (gpm)
0-55	0-4*
55-105	23
105-160	37
160-5800	41
5800	0

*Problems with the pump resulted in the pump cycling on and off at approximately 4 gpm for the first 40 minutes of the test.

After 96 hours of pumping, the pump was turned off and water levels were allowed to recover. The pump and miniTrolls were removed after twenty hours. Water level data from the miniTrolls is included as supplemental electronic data.

2.2.4 P-4 Test

A 35-hour pumping test was conducted in well P-4. The test was originally supposed to last for thirty-six hours, however the pump was accidentally turned off one hour early. MiniTrolls were installed in P-4, Ob-4 and Ob-5 prior to the beginning of the test. Water-level data were collected every five minutes throughout the pumping and recovery portions of the test. A temporary pump was placed in P-4 at a depth of 400 feet below ground surface. Discharge, measured using a five-gallon bucket and stopwatch, was routed 1000 feet to a down-slope upland area.

The pumping rate was initially set at 5 gpm. After 22 minutes, the pumping rate was increased to 20 gpm. After 120 minutes of pumping at lower rates, the pump was set at 40 gpm, where it stayed for the reminder of the test. The pumping schedule is summarized below:

Time since Pumping Began (minutes)	Pumping Rate (gpm)
0-22	5
22-82	20
82-120	27
120-2115	40
2115	0

After 35 hours of pumping, the pump was turned off and water levels were allowed to recover. The pump and miniTrolls were removed after eleven hours of recovery when water levels had recovered at least 90% of final drawdown. Water level data from the miniTrolls is included as supplemental electronic data.

2.3 Groundwater Sampling

Following at least 12 hours of pumping, groundwater samples were collected from each of the pumping test wells. Samples were collected from a sampling port located on the discharge line, near where it came out of the well. Prior to collecting the sample, water was allowed to flow out of the sampling port for several minutes. Samples were collected by the Barr geologist on site, with assistance from a WDC representative. Groundwater samples were collected and placed into laboratory-supplied containers and submitted to Northeast Technical Services (Virginia, Minnesota) for laboratory analysis for total metals, dissolved metals, and general chemistry parameters. Groundwater laboratory parameters and analysis methods are provided in Table 2.

Due to the delayed start of this investigation in relationship to the mineral exploration drilling at the Site, it was not possible to collect groundwater samples from exploratory boreholes in the Duluth Complex, as originally proposed in the Work Plan.

3.0 Field Investigation Observations and Results

3.1 Aquifer Test Results

The aquifer test data were analyzed using conventional analytic methods. These methods are used to obtain estimates of the hydrostratigraphic unit's transmissivity/hydraulic conductivity and storage properties. All of these methods have assumptions, such as the assumptions of a hydrostratigraphic unit of infinite areal extent, homogeneity, and isotropy. Some methods have additional or modifying assumptions. For some tests data, multiple analytic methods were used to estimate transmissivity/hydraulic conductivity and storage – different estimates may result from the application of different methods. All analyses were done using the computer code AQTESOLV for Windows (Duffield, 2003).

The pumping test data were analyzed using the Moench method (1984) for drawdown in an unconfined, fractured aquifer with slab shaped blocks (Appendix B). The Moench method is an analytical solution for predicting water-level displacements in response to pumping in a fractured aquifer assuming a double-porosity model with slab-shaped matrix blocks with fracture skin and wellbore skin. The Moench method assumes the aquifer has infinite areal extent, uniform thickness, and consists of a double porosity system with low-permeability, primary porosity blocks and high-permeability, secondary porosity fissures. The skin parameter allows for modeling of additional (or less) resistance to flow between the blocks and fractures and between the wellbore and fractures. The effects of wellbore storage, partial penetration and variable pumping rates are included in the analysis. For each test, an aquifer thickness equal to the depth of the pumping well was assumed. The Moench method solves for the hydraulic conductivity and storage for both the fractures and the rock matrix and provides information on the wellbore skin and fracture skin.

There was no measurable drawdown observed at Ob-4 during the P-3 or P-4 pumping tests and, as such, there was no analysis for this well. Measured drawdowns in observation wells Ob-1 and Ob-5 were very small (less than 0.2 feet). There is uncertainty in analyzing such small drawdowns because small changes in water levels from outside influences (i.e. diurnal effects, regional water level changes, transducer slip, barometric pressure changes, etc.) may have substantial effects on predicted aquifer properties if these outside influences cannot be adequately filtered from the data. Because of this, these data were not analyzed. Following the completion of drilling and the pumping tests, it was

determined that Ob-2 is located entirely within the Duluth Complex. As such, data from this test were not analyzed.

Recovery period data from many of the wells were also analyzed separately using the Theis (1935) recovery method (Appendix B). The Theis recovery method estimates transmissivity and the apparent ratio of storage coefficient following pumping to storage coefficient during pumping from residual displacement data collected during the recovery phase of a pumping test. The Theis recovery method can be used for unconfined confined aquifers and partially penetrating wells as long as late time data is used for the analysis (Kruseman and deRidder, 2000). Recovery data from wells P-2, P-3, Ob-3, Ob-3a, #717971, and P-4 were analyzed using this method. Recovery data in wells P-1, P-2, Ob-1 and Ob-5 did not meet the criteria of the method and were not analyzed. Transmissivities were converted to hydraulic conductivities using the thickness of the Virginia Formation in the pumping well as the assumed aquifer thickness.

As indicated in Table 3, the hydraulic conductivities determined using both the Moench method and the Theis method range over several orders of magnitude, from 0.0024 to 1.0 ft/day. In general, hydraulic conductivities determined from the recovery data for each well were slightly higher (by a factor of 1 to 5) than the hydraulic conductivities determined using the Moench method. The geometric mean of all hydraulic conductivity values is 0.17 ft/day. Drawdown data from all four pumping wells indicated that bilinear flow conditions (i.e. fracture flow conditions) likely exist, however bilinear flow was not observed at any of the observation wells.

The 96-hour pumping test conducted at P-3 had some unexpected results. Figure 3 shows the drawdown curves for all wells monitored during this test. As stated previously, while drilling Ob-3a, the seal between the open interval of the well and the unconsolidated material was broken. During the initial periods of the pumping test, water was observed seeping into the well from the base of the casing. However, after several hours, this seepage was no longer observed. Because of the observed change in seepage into the well, the early drawdown data from Ob-3a were not used. There was significantly more drawdown in Ob-3a (total well depth of 50 feet) than at Ob-3 (total well depth of 100 feet) which is less than 20 feet away (see Figure 4). In addition, there was more drawdown in #717971 (total well depth of 260 feet) than at Ob-3 which is more than 200 feet closer to the pumping well than #717971. Despite these differences in drawdown, analysis of the data from all of the wells resulted in similar aquifer properties (see Table 3). However, no single set of aquifer properties could match all of the data.

3.2 Analytical Results

3.2.1 Analytical Data

Groundwater samples were collected from the four pumping wells (P-1, P-2, P-3 and P-4) in December 2005 and January 2006. The analytical results are presented in Table 4. Since the discharge or treatment of the mine pit water is not yet determined, analytical results are compared to the Minnesota Surface Water Quality Class 2B Chronic and the Lake Superior Basin Water Quality Class 2B Chronic criteria for comparison. The Minnesota Surface Water Quality Class 2B Chronic standards are designed to be protective of surface water used for recreation and support cool or warm water sport or commercial fish and associated aquatic life. Class 2B surface water is not protected as a drinking water source. The Lake Superior Basin water quality standards protect Class 2B waters within the Lake Superior watershed. Because a receiving water has not been identified at this time, a hardness of 50 mg/l was used to derive the criteria.

The water samples from wells P-2 and P-4 exceeded the nitrogen (ammonia as N) criteria (270 ug/L and 110 ug/L respectively). The presence of ammonia nitrogen in the samples likely indicates that there is a hydraulic connection between the bedrock aquifer and the surficial aquifer; however, the nature of this connection can not be determined at this time. There were no other exceedences. The sample collected from P-1 has an elevated level of sulfate (1,200 mg/L) compared to the other samples. Only the sample from P-4 had measurable amounts of mercury (0.0007 ug/L), which are below the criteria of 0.0013 ug/L.

3.2.2 Quality Assurance

A quality assurance and quality control review was performed on the analytical results from the sampling event. This review was performed in accordance with the Barr Engineering Standard Operating Procedure for data validation, which is based on *The National Functional Guidelines for Organic and Inorganic Data Review* (EPA 1999/2004). All methyl mercury analysis was performed by Frontier Geosciences, Inc. located in Seattle, Washington and all other analysis was performed by Northeast Technical Services located in Virginia, Minnesota.

Only data for methyl mercury were evaluated for the samples collected on December 22, 2005 and January 5, 2006; no additional quality assurance data were provided for any other analyses from these samples.

Field, trip and method blank data showed multiple detections of methyl mercury for both sampling events. Only one of the samples had a detection of methyl mercury above the detection limit (P-2). Since this detection was within 5 times the blank value, the detection was qualified and should be considered a potential false positive value. No other qualifiers were applied based on blank data.

Technical holding times were evaluated for each sample and target parameter, based on the EPA recommendations listed in *40 CFR SW8-46 Test Methods for Evaluating Hazardous Waste*. All holding times were met for the all samples in submitted to both laboratories. Northeast Technical Services did not indicate any issues with their QA/QC parameters in the reports provided for the analyzed samples.

All of the data met the data project requirements and is deemed acceptable for the purposes of this project with the above mentioned qualifications.

4.0 Summary

The purpose of the Phase II Hydrogeologic Investigation was to gather information on the ability of the Virginia Formation to transmit water to the proposed NorthMet pit, to characterize the quality of the water found in this formation.

To help determine the aquifer characteristics of the Virginia Formation, four pumping tests were conducted in wells open primarily to this formation. These wells were spaced along the contact of the Virginia Formation and the Duluth Complex at the mine site, focusing primarily on the eastern portion of the site. Hydraulic conductivity values determined from these tests had a range of three orders of magnitude, from 0.0024 ft/day – 1.0 ft/day. The geometric mean of the values is 0.17 ft/day.

Water quality from the pumping test wells was relatively uniform across the site. Two wells (P-2 and P-4) exceeded the 2B chronic criteria for ammonia nitrogen; there were no other exceedences of 2B chronic criteria. The sample at P-1 showed elevated sulfate concentrations relative to the other wells. All wells had low level mercury levels below the 2B chronic criteria.

References

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Tables

Table 1
Well Construction Information
PolyMet Mining, Inc.

Location	Well Construction			Geology		
	Well Diameter (inches)	Casing Depth (ft)	Total Depth (ft)	Depth to Bedrock (ft BGS)	Duluth Complex Interval (ft BGS)[2]	Virginia Formation Interval (ft BGS)[2]
P-1	12	27	610	11	11-105	105-610
P-2	12	27	610	12	12-170	170-610
P-3	12	27	610	17	--	17-610
P-4	12	46	485	7	--	7-485
Ob-1	4	21	100	8	8-100	--
Ob-2	4	18	100	6	6-100	--
Ob-3	4	21	100	7	--	7-100
Ob-3a	4	17	50	7	--	7-100
Water Well[1]	6	19	260	8	8-160	160-260
Ob-4	4	7	100	6	--	6-100
Ob-5	4	18	100	7	--	7-100

Notes:

BGS = Below ground surface

[1] Not installed as part of Phase II Hydrogeologic Investiation, Unique Well #717972

[2] Stratigraphy based on 3D geologic model of the site and not drill cuttings.

Table 2
Groundwater Analytical
Parameters with Analysis Method
PolyMet Mining, Inc.

Description	Method
Alkalinity, Total as CaCO3	EPA 310.1
Carbon, Total Organic	EPA 415.1
Chemical Oxygen Demand	STD METH 5220D, 18TH ED
Chloride	EPA 325.2
Cyanide Total	EPA 335.2
Fluoride	EPA 340.1
Hardness, Total (calculated)	EPA 200.7
Nitrogen, Ammonia	EPA 350.1
Nitrogen, Nitrate + Nitrite	EPA 353.2
pH	EPA 150.1
Phosphorus, Total	EPA 365.2
Sulfate	EPA 375.4
Aluminum, Total	EPA 200.7
Aluminum, Dissolved	EPA 200.7
Antimony, Total	EPA 204.2
Arsenic, Total	EPA 200.8
Barium, Total	EPA 200.7
Beryllium, Total	EPA 210.2
Boron, Total	EPA 200.7
Cadmium, Total	EPA 213.2
Cadmium, Dissolved	EPA 213.2
Calcium, Total	EPA 200.7
Chromium, Total	EPA 218.2
Chromium, Dissolved	EPA 218.2
Cobalt, Total	EPA 219.2

Description	Method
Copper, Total	EPA 220.2
Copper, Dissolved	EPA 220.2
Iron, Total	EPA 200.7
Lead, Total	EPA 7421
Magnesium, Total	EPA 200.7
Manganese, Total	EPA 200.7
Mercury, Low Level Total	EPA 1631E
Methyl Mercury, Total	EPA 1631E
Molybdenum, Total	EPA 246.2
Molybdenum, Dissolved	EPA 246.2
Nickel, Total	EPA 249.2
Nickel, Dissolved	EPA 249.2
Palladium, Total	EPA 200.7
Platinum, Total	EPA 200.7
Potassium, Total	EPA 200.7
Selenium, Total	EPA 270.2
Selenium, Dissolved	EPA 270.2
Silver, Total	EPA 272.2
Silver, Dissolved	EPA 272.2
Sodium, Total	EPA 200.7
Strontium, Total	EPA 200.7
Thallium, Total	EPA 279.2
Titanium, Total	EPA 283.2
Zinc, Total	EPA 200.7
Zinc, Dissolved	EPA 200.7

Table 3
Aquifer Test Results
PolyMet Mining, Inc.

Pumping Well	Observation Well	Pumping Data (Moench Method)	Recovery Data (Theis Method)		All Data
		Hydraulic Conductivity of Fractures (ft/day)	Transmissivity (ft^2/day)	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity Geometric Mean (ft/day)
P-1	P-1	0.0024	--	--	0.0024
P-2	P-2	0.072	--	--	0.072
P-3	P-3	0.40	489	0.82	0.57
P-3	Ob-3	0.46	627	1.0	0.68
P-3	Ob-3a	0.27	530	0.88	0.49
P-3	Water Well	0.16	483	0.81	0.36
P-4	P-4	0.33	154	0.32	0.33
				Maximum	0.68
				Minimum	0.0024
				Geo. Mean	0.17

Table 4
Analytical Data Summary
Polymet Mining, Inc.
(concentrations in ug/L, unless noted otherwise)

Location Date Dup	MN Surface Water Class 2B Chronic (1)	P-1 1/5/2006	P-2 12/22/2005	P-3 1/5/2006	P-4 12/22/2005
Exceedance Key	**Bold**				
General Parameters					
Alkalinity, total, mg/L	--	<10	98.5	97.2	69.2
Chemical Oxygen Demand, mg/L	--	<10	<10	485	17
Chloride, mg/L	230	6.6	1.8	2.1	<0.5
Cyanide	--	<20	<20	<20 *	<20
Fluoride, mg/L	--	1.1	0.53	0.64	0.35
Hardness, total, mg/L	--	15	56.5	113	76.2
Nitrate + Nitrite	--	<100	<100	<100	<100
Nitrogen, ammonia as N	40	<100	**270**	<100	**110**
Phosphorus total	--	<100	110	<100	<100
Sulfate, mg/L	--	1200	10.5	32.9	14.1
pH, standard units	6.5-9.0 PH	8.5	7.8	6.6	8.1
Carbon, total organic, mg/L	--	2.3	2.4	7.6	2.2
Total Metals					
Aluminum	125	59.1	<25	<25	57.2
Antimony	31	<3	<3	<3	<3
Arsenic	53	2.2	<2	<2	5.7
Barium	--	<10	<10	<10	<10
Beryllium	--	<0.2	<0.2	<0.2	<0.2
Boron	--	518	170	76.3	55
Cadmium	0.66 HD	<0.2	<0.2	<0.2	<0.2
Calcium	--	6200	11600	20400	17700
Chromium	11 CR6	1.9	<1	1.2	<1
Cobalt	5.0	<1	<1	<1	<1
Copper	5.2 HD	<2	<2	<2	<2
Iron	--	100	140	4370	190
Lead	1.3 HD	<1	<1	<1	<1
Magnesium	--	<2000	6700	15000	7800
Manganese	--	10	20	140	60
Mercury	0.0013	<0.0005	<0.0005	<0.0005	0.0007
Mercury methyl	--	<0.000025	0.000059 b	<0.000025	<0.000025
Molybdenum	--	<5	<5	<5	34.5
Nickel	29 HD	<2	<2	<2	<2
Palladium	--	<0.1	<0.1	0.3	<0.1
Platinum	--	<0.02	<0.02	<0.02	<0.02
Potassium	--	1200	1100	2100	1700
Selenium	5.0	<2	<2	<2	<2
Silver	1.0 HD	<1	<1	<1	<1
Sodium	--	43900	24300	7500	4400
Strontium	--	33.4	37.9	75.2	45.5
Thallium	0.56	<2	<2	<2	<2
Titanium	--	<10	<10	<10	<10
Zinc	59 HD	17.9	<10	11.3	<10
Dissolved Metals					
Aluminum, dissolved	--	<25	<25	<25	<25
Cadmium, dissolved	--	<0.2	<0.2	<0.2	<0.2
Chromium, dissolved	--	<1	<1	<1	<1
Copper, dissolved	--	<2	<2	<2	<2
Molybdenum dissolved	--	<5	<5	<5	28.9
Nickel, dissolved	--	<2	<2	<2	<2
Selenium, dissolved	--	<2	<2	<2	<2
Silver, dissolved	--	<1	<1	<1	<1
Zinc, dissolved	--	<25	<10	<25	<10

Table 4
Analytical Data Summary
Polymet Mining, Inc.
(concentrations in ug/L, unless noted otherwise)

--	No criteria.
(1)	Criteria represents most conservative value as noted in Minnesota Rules Chapter 7050.0222 and 7052.0100.
*	Estimated value, QA/QC criteria not met.
b	Potential false positive value based on blank data validation procedure.
CR6	Value represents the criteria for Chromium, hexavalent.
HD	Hardness dependent. The specific analyte should be referenced in Minnesota Rules Chapter 7050.0222 and 7052.0100 for specific exp. calculations. The values reported are assuming a hardness of 50 mg/L.
PH	Not less than 6.5 nor greater than 9.0.

Figures

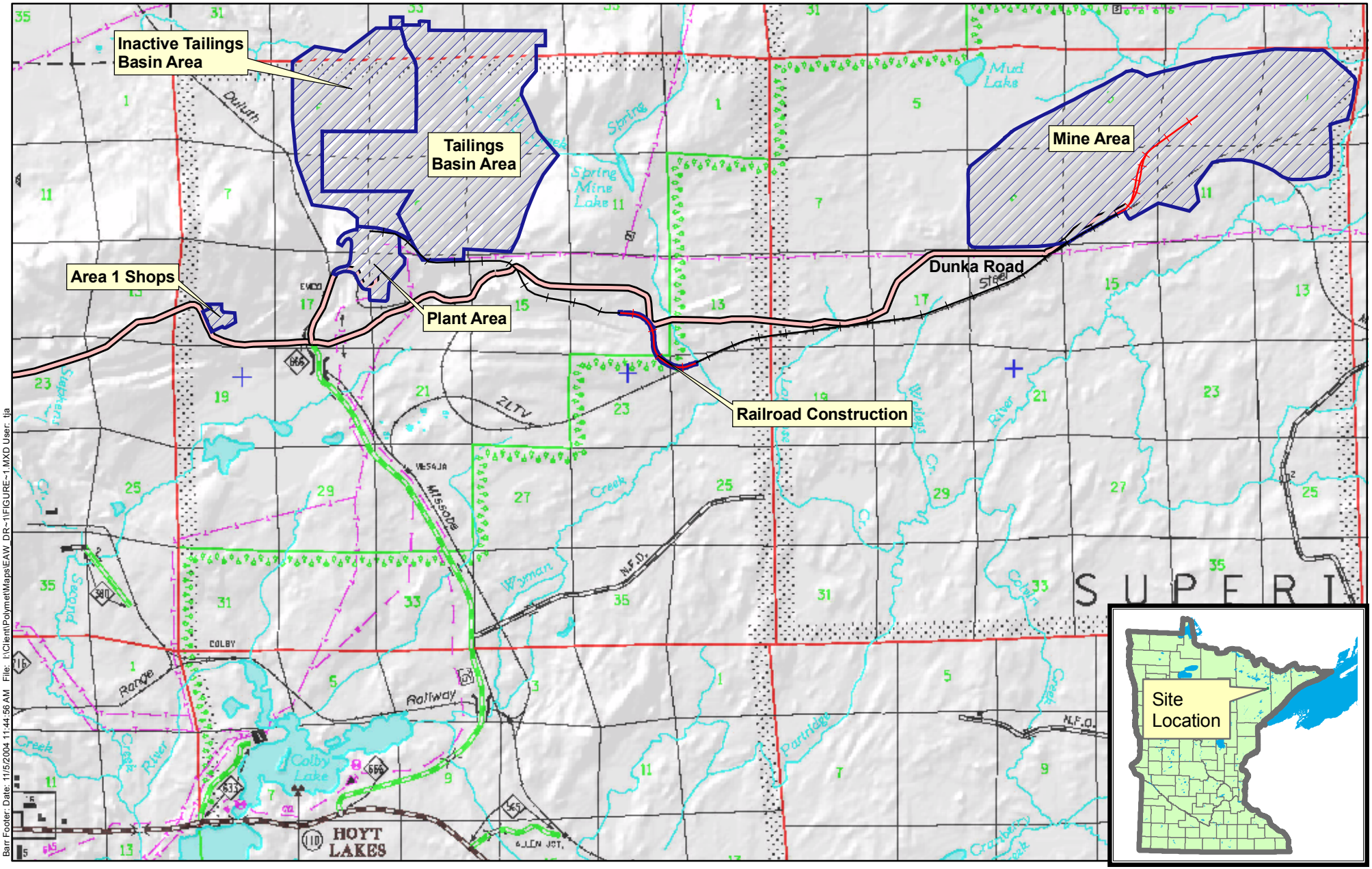
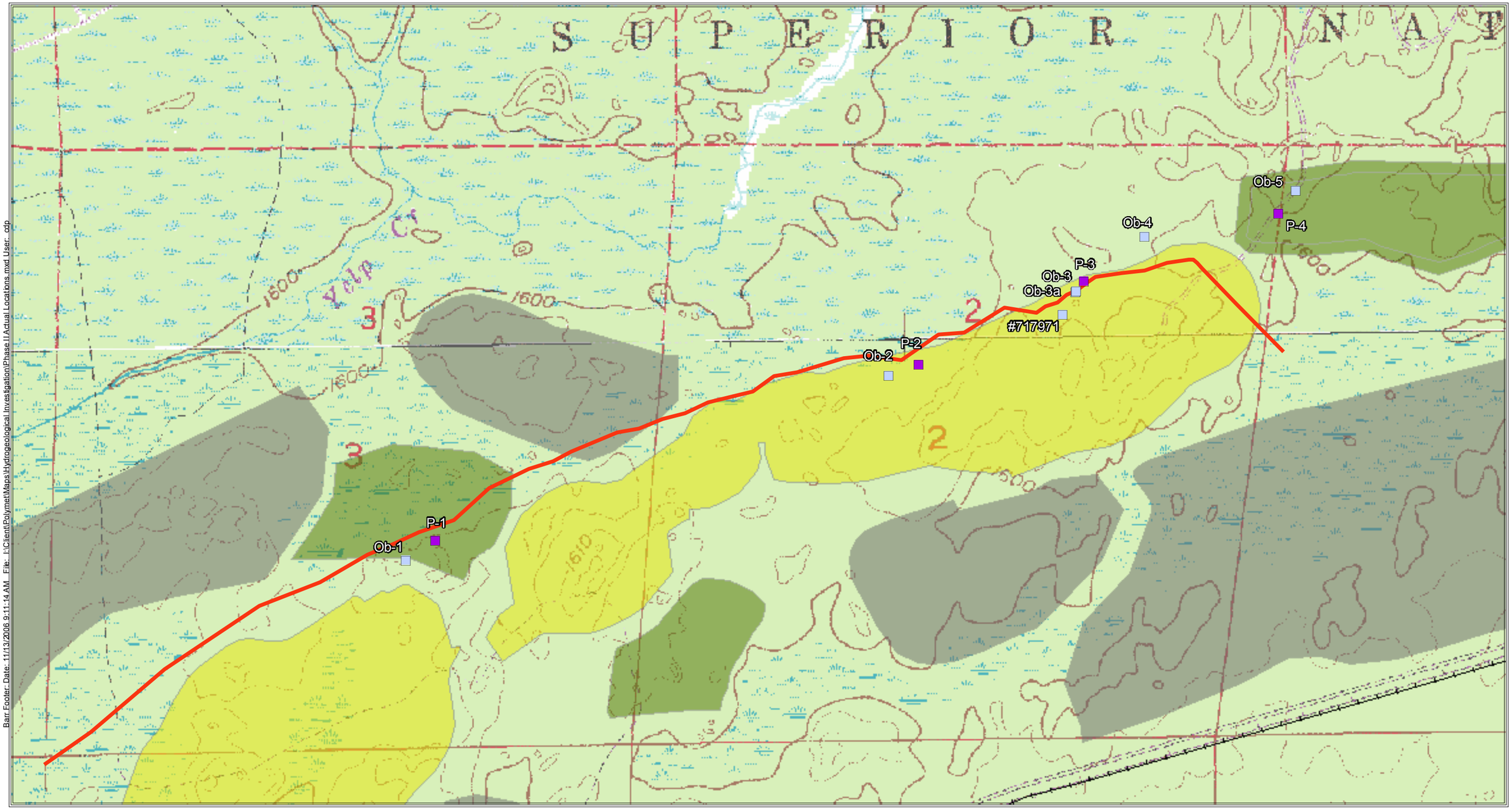


Figure 1

SITE LOCATION MAP
PolyMet Mining, Inc.
Hoyt Lakes, Minnesota



Mine Features

- Loadout Pocket
- Overburden Stockpiles
- Mine Pits
- Rock Stockpiles

- Approximate contact between Duluth Complex and Virginia Formation
- Observation Wells
- Pumping Wells

Allen, Babbitt, Babbitt SW, and Isaac Lake
7.5 Minute USGS Quadrangles

(Mine features based on August 2006 design)

0 250 500 1,000 Feet

0 125 250 500 Meters

Figure 2

PUMPING AND OBSERVATION
WELL LOCATIONS
PolyMet Mining, Inc.
Hoyt Lakes, Minnesota

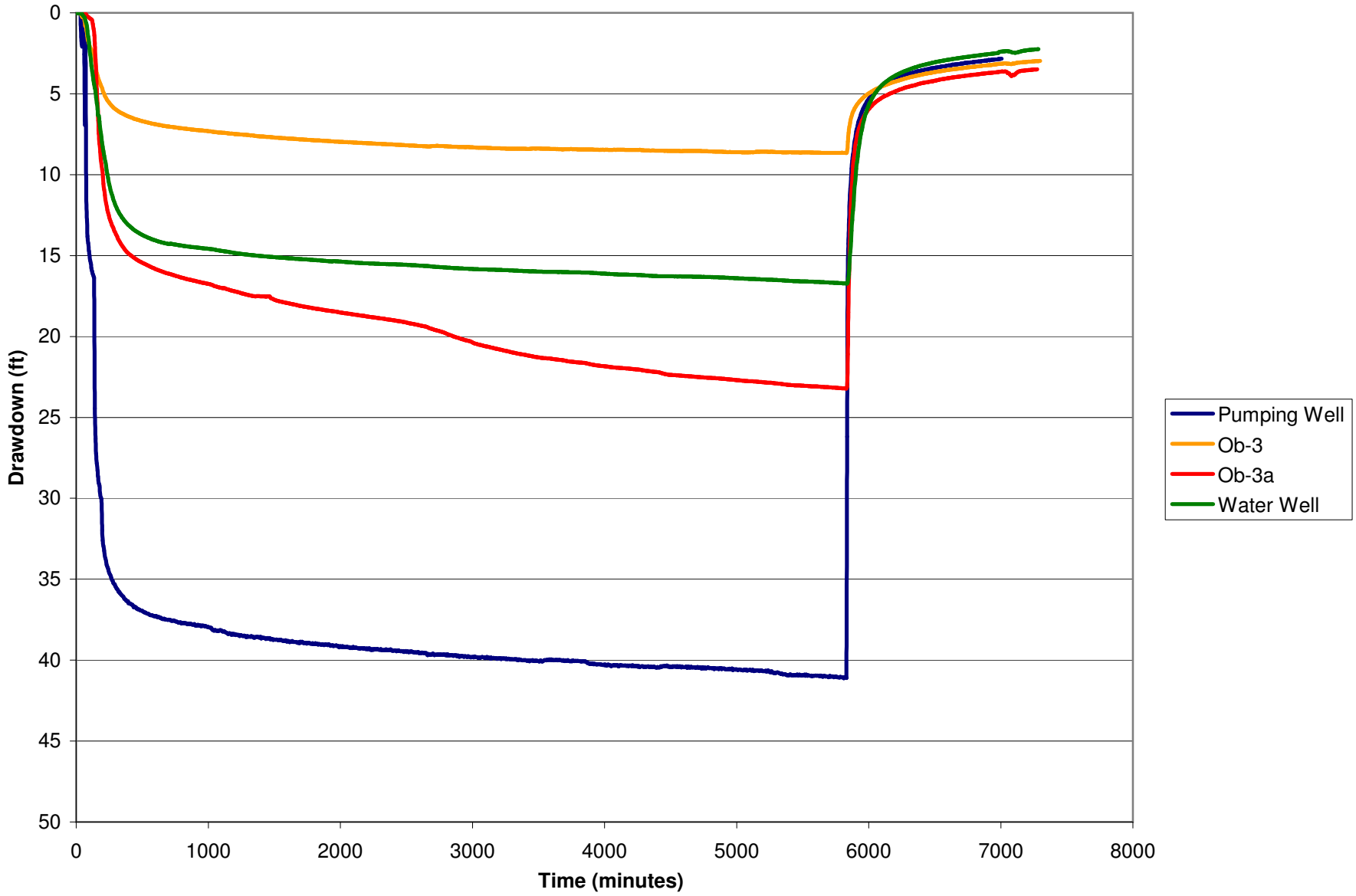


Figure 3
Measured Drawdowns
During P-3 Pumping Test
PolyMet Mining, Inc.

P:23\69\862\Figures_Graphics\Cross Section thru P_3 Wells.CDR RLG 03-22-06

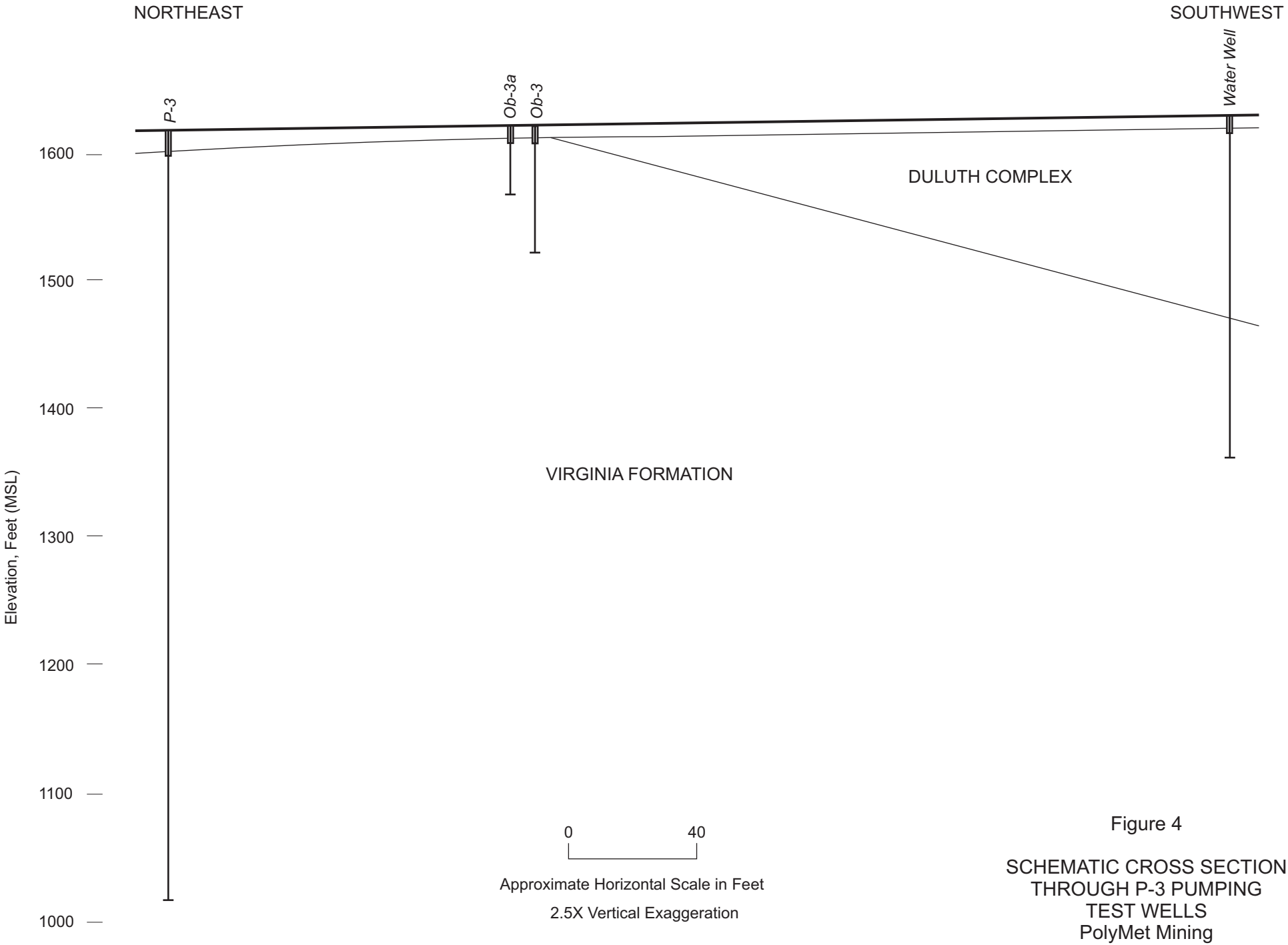


Figure 4

SCHEMATIC CROSS SECTION
THROUGH P-3 PUMPING
TEST WELLS
PolyMet Mining
Hoyt Lakes, MN

Appendices

Appendix A

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736114

WELL LOCATION

County Name: St. Louis

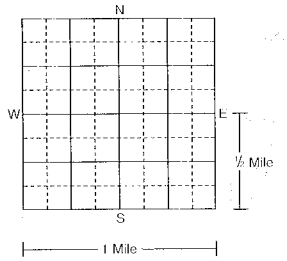
Township Name	Township No	Range No	Section No	Fraction
Babbitt	59	13	3	NW¼ SE¼ NW¼ SE¼

GPS LOCATION: Latitude ___ degrees ___ minutes ___ seconds ___ Longitude ___ degrees ___ minutes ___ seconds ___

House Number, Street Name, City, and Zip Code of Well Location: Superior National Forest

or Fire Number:

Show exact location of well in section grid with "X".



Sketch map of well location. Showing property lines, roads and buildings

SEE ATTACHED

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:

318 Forestry Rd.
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above:

PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Overburden	Brown	Soft	0	7
Rocky Clay	Brown	Hard/Soft	7	11
Bedrock	Red/Gray/Bk	Hard	11	27
Bedrock	Black	Hard	27	440
Bedrock	Wht/Blk	Hard	440	610

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

P1

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY

736114

WELL DEPTH (completed): 610 ft. Date Work Completed: 12/17/05

DRILLING METHOD: [ ] Cable Tool [ ] Driven [ ] Dug [ ] Auger [x] Rotary [ ] Jetted [x] stratex

DRILLING FLUID: None

WELL HYDROFRACTURED? [ ] Yes [x] No FROM ___ ft. TO ___ ft

USE: [x] Monitoring [ ] Heating/Cooling [ ] Domestic [ ] Environ. Bore Hole [ ] Industry/Commercial [ ] Noncommunity PWS [ ] Irrigation [ ] Remedial [ ] Community PWS [ ] Dewatering [ ] ___

CASING: [x] Steel [ ] Threaded [x] Welded [ ] Plastic [ ] ___ Drive Shoe? [ ] Yes [x] No

HOLE DIAM

CASING DIAMETER / WEIGHT

CASING DIAMETER	WEIGHT	HOLE DIAM
6 in. to 27 ft	19 lbs./ft.	12 in. to 27 ft
___ in. to ___ ft.	___ lbs./ft.	6 in. to 610 ft
___ in. to ___ ft.	___ lbs./ft.	___ in. to ___ ft.

SCREEN: None
Make ___ Type ___ Diam. ___
Slot/Gauze ___ Length ___
Set between ___ ft. and ___ ft. FITTINGS ___

OPEN HOLE: FROM 27 ft. TO 610 ft.

STATIC WATER LEVEL: 8 ft [x] below [ ] above land surface Date measured 12/17/05

PUMPING LEVEL (below land surface): 500 ft. after 36 hrs. pumping 1.2 g.p.m.

WELL HEAD COMPLETION
[ ] Pitless adapter manufacturer ___ Model ___
[ ] Casing Protection ___ [x] 12 in. above grade
[ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION
Well grouted [x] Yes [ ] No
Grout material [x] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite

from 0 ft.	to 27 ft.	19	[ ] yds	[x] bags
from ___ ft.	to ___ ft.	___	[ ] yds	[ ] bags
from ___ ft.	to ___ ft.	___	[ ] yds	[ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None feet ___ direction ___ type ___
Well disinfected upon completion [ ] Yes [x] No

PUMP
[x] Not installed Date installed ___
Manufacturer's name ___
Model number ___ HP ___ Volts ___
Length of drop pipe ___ ft. Capacity ___ g.p.m.
Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] ___

ABANDONED WELLS
Does property have any not in use and not sealed well(s) [ ] Yes [x] No

VARIANCE
Was a variance granted from the MDH for this well? [ ] Yes [x] No TN# ___

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

WDC Exploration & Wells — 49653
Licensee Business Name — *Lic. or Reg. No.*

Authorized Representative Signature — 1-31-06 *Date*

Mark Green/Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736115

WELL LOCATION

County Name: St. Louis

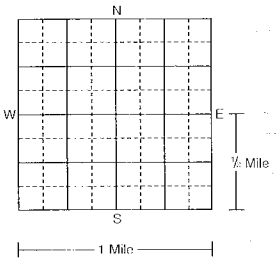
Township Name	Township No.	Range No.	Section No.	Fraction
Babbitt	59	13	2	SE SE NW

GPS LOCATION: Latitude ____ degrees ____ minutes ____ seconds ____ Longitude ____ degrees ____ minutes ____ seconds ____

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X".



Sketch map of well location. Showing property lines, roads and buildings

SEE ATTACHED

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:
318 Forestry Rd.
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above:
PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Clay/Rock	Blk/Brn	Sft/H	0	12
Bedrock	Red/Blk	Hard	12	27
Bedrock	Black	Hard	27	540
Bedrock	Reddish	Hard	540	610

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.: P2

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY 736115

WELL DEPTH (completed): 610 ft. Date Work Completed: 12/13/05

DRILLING METHOD: [ ] Cable Tool [ ] Driven [ ] Dug [ ] Auger [x] Rotary [ ] Jetted
x Stratex

DRILLING FLUID:

WELL HYDROFRACTURED? [ ] Yes [x] No FROM ____ ft. TO ____ ft.

USE: [x] Monitoring [ ] Heating/Cooling [ ] Domestic [ ] Environ. Bore Hole [ ] Industry/Commercial [ ] Noncommunity PWS [ ] Irrigation [ ] Remedial [ ] Community PWS [ ] Dewatering [ ] ____

CASING: [x] Steel [ ] Plastic; Drive Shoe? [ ] Yes [x] No; [ ] Threaded [x] Welded

HOLE DIAM

CASING DIAMETER / WEIGHT

CASING DIAMETER	WEIGHT	HOLE DIAM
6 in. to 27 ft.	19 lbs./ft	12 in. to 27 ft.
____ in. to ____ ft.	____ lbs./ft	6 in. to 610 ft.
____ in. to ____ ft.	____ lbs./ft.	____ in. to ____ ft.

SCREEN: None
Make ____ Type ____ Diam ____ Slot/Gauze ____ Length ____ Set between ____ ft. and ____ ft. FITTINGS ____

OPEN HOLE: FROM 27 ft. TO 610 ft.

STATIC WATER LEVEL: 11 ft. [x] below [ ] above land surface. Date measured 12/13/05

PUMPING LEVEL (below land surface): 500 ft. after 36 hrs. pumping 28 g.p.m.

WELL HEAD COMPLETION: [ ] Pitless adapter manufacturer ____ Model ____ [ ] Casing Protection ____ [x] 12 in. above grade [ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION: Well grouted [x] Yes [ ] No
Grout material [x] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite

from 0 ft.	to 27 ft.	23	[ ] yds.	[x] bags
from ____ ft.	to ____ ft.	____	[ ] yds.	[ ] bags
from ____ ft.	to ____ ft.	____	[ ] yds.	[ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None ____ feet ____ direction ____ type
Well disinfected upon completion [ ] Yes [x] No

PUMP: [x] Not installed Date installed ____
Manufacturer's name ____ Model number ____ HP ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ g.p.m.
Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] ____

ABANDONED WELLS: Does property have any not in use and not sealed well(s) [ ] Yes [x] No

VARIANCE: Was a variance granted from the MDH for this well? [ ] Yes [x] No TN# ____

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

WDC Explortion & Wells — 49653
Licensee Business Name — *Lic. or Reg. No.*

Authorized Representative Signature — 1-31-06 *Date*

Mark Green/Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736116

WELL LOCATION

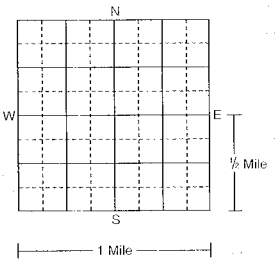
County Name: St. Louis

Township Name	Township No	Range No	Section No	Fraction
Babbitt	59	13	NE2SW NE SW NE	

GPS LOCATION: Latitude ___ degrees ___ minutes ___ seconds ___ Longitude ___ degrees ___ minutes ___ seconds ___

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705 | or Fire Number

Show exact location of well in section grid with "X".



Sketch map of well location Showing property lines, roads and buildings: Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above: 318 Forestry Road, Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above: PO Box 475, Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Sand	Brown	Soft	0	3
Rock	Red	Hard	3	5
Sand/Gravel	Brown	Soft	5	10
Sand	Brown	Medium	10	17
Bedrock	Black	Hard	17	27
Bedrock	Black	Hard	27	49
Bedrock	Black	Medium	49	130
Bedrock	Black	Hard	130	610

Use a second sheet if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc: P3

IMPORTANT - FILE WITH PROPERTY PAPERS WELL OWNER COPY 736116

WELL DEPTH (completed): 610 ft. | Date Work Completed: 12/10/05

DRILLING METHOD: [ ] Cable Tool [ ] Driven [ ] Dug [ ] Auger [X] Rotary [ ] Jetted [X] Stratex

DRILLING FLUID | WELL HYDROFRACTURED? [ ] Yes [X] No FROM ___ ft. TO ___ ft.

USE: [ ] Domestic [X] Monitoring [ ] Heating/Cooling [ ] Noncommunity PWS [ ] Environ. Bore Hole [ ] Industry/Commercial [ ] Community PWS [ ] Irrigation [ ] Remedial [ ] Dewatering [ ] ___

CASING: [X] Steel [ ] Plastic | Drive Shoe? [ ] Yes [X] No | [ ] Threaded [X] Welded

HOLE DIAM.

CASING DIAMETER / WEIGHT

CASING DIAMETER	WEIGHT	HOLE DIAM.
6 in. to 27 ft	19 lbs/ft	12 in. to 27 ft
___ in. to ___ ft	___ lbs./ft.	6 in. to 610 ft
___ in. to ___ ft	___ lbs./ft.	___ in. to ___ ft

SCREEN None | OPEN HOLE FROM 27 ft. TO 610 ft.

Make ___ Type ___ Diam ___ Slot/Gauze ___ Length ___ Set between ___ ft and ___ ft FITTINGS ___

STATIC WATER LEVEL: 10 ft [X] below [ ] above land surface Date measured 12/10/05

PUMPING LEVEL (below land surface): 700 ft after 96 hrs. pumping 41 g.p.m.

WELL HEAD COMPLETION: [ ] Pitless adapter manufacturer ___ Model ___ [ ] Casing Protection ___ [X] 12 in. above grade [ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION: Well grouted [X] Yes [ ] No; Grout material [X] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite

from 0 to 27 ft	23	[ ] yds.	[X] bags
from ___ to ___ ft	___	[ ] yds.	[ ] bags
from ___ to ___ ft	___	[ ] yds.	[ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None ___ feet ___ direction ___ type

Well disinfected upon completion [ ] Yes [X] No

PUMP: [X] Not installed Date installed ___

Manufacturer's name ___ Model number ___ HP ___ Volts ___ Length of drop pipe ___ ft Capacity ___ g.p.m.

Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] ___

ABANDONED WELLS: Does property have any not in use and not sealed well(s) [ ] Yes [X] No

VARIANCE: Was a variance granted from the MDH for this well? [ ] Yes [X] No TN# ___

WELL CONTRACTOR CERTIFICATION

This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

WDC Exploration & Wells — Licensee Business Name | 49653 — Lic. or Reg. No.

Authorized Representative Signature | 1-31-06 — Date

Chris Fuhs — Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736117

WELL LOCATION

County Name: St. Louis

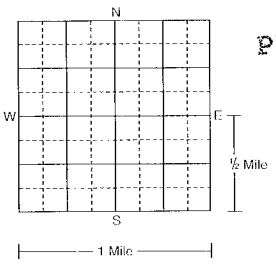
Township Name	Township No.	Range No.	Section No.	Fraction
Babbitt	59	13	2	SE NE NE

GPS LOCATION: Latitude ____ degrees ____ minutes ____ seconds ____ Longitude ____ degrees ____ minutes ____ seconds ____

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X"



Sketch map of well location. Showing property lines, roads and buildings: Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:
318 Forestry Road
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above:
PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Sand	Red/Blk	Soft	0	5
Rock Boulders	Blk/Gry	Hard	5	7
Boulder Bedrock	Gray	Hard	7	16
Boulder Bedrk	Red/Gry	Hard	16	19
Boulder Bedrk	Gray	Hard	19	25
Boulder Bedrk	Red/Gry	Med/Hard	25	26
Bedrock	Gray	Hard	26	462
Graphite	Soft	Black	462	485

Use a second sheet if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc: P4

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY 736117

WELL DEPTH (completed): 485 ft. Date Work Completed: 12/18/05

DRILLING METHOD: [ ] Cable Tool [ ] Driven [ ] Dug [ ] Auger [X] Rotary [ ] Jetted [X] Stratex

DRILLING FLUID: None

WELL HYDROFRACTURED? [ ] Yes [X] No FROM ____ ft. TO ____ ft.

USE: [X] Monitoring [ ] Heating/Cooling [ ] Domestic [ ] Environ. Bore Hole [ ] Industry/Commercial [ ] Noncommunity PWS [ ] Irrigation [ ] Remedial [ ] Community PWS [ ] Dewatering [ ] ____

CASING: [X] Steel [ ] Plastic; Drive Shoe? [X] Yes [ ] No; [ ] Threaded [X] Welded [ ] ____

CASING DIAMETER	WEIGHT	HOLE DIAM
6 in. to 46 ft.	19 lbs./ft.	12 in. to 46 ft.
____ in. to ____ ft.	____ lbs./ft.	6 in. to 485 ft.
____ in. to ____ ft.	____ lbs./ft.	____ in. to ____ ft.

SCREEN: None
Make ____ Type ____ Diam. ____ Slot/Gauze ____ Length ____ Set between ____ ft. and ____ ft. FITTINGS ____

OPEN HOLE: FROM 46 ft. TO 485 ft.

STATIC WATER LEVEL: 9 ft. [X] below [ ] above land surface. Date measured 12/18/05

PUMPING LEVEL (below land surface): 400 ft. after 36 hrs. pumping 40 g.p.m.

WELL HEAD COMPLETION: [ ] Pitless adapter manufacturer ____ Model ____ [ ] Casing Protection ____ [X] 12 in. above grade [ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION: Well grouted [X] Yes [ ] No
Grout material [X] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite

from 0 ft. to 46 ft.	21	[ ] yds.	[X] bags
from ____ ft. to ____ ft.	____	[ ] yds.	[ ] bags
from ____ ft. to ____ ft.	____	[ ] yds.	[ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None ____ feet ____ direction ____ type

Well disinfected upon completion [ ] Yes [X] No

PUMP: [X] Not installed Date installed ____
Manufacturer's name ____ Model number ____ HP ____ Volts ____
Length of drop pipe ____ ft. Capacity ____ g.p.m.
Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] ____

ABANDONED WELLS: Does property have any not in use and not sealed well(s) [ ] Yes [X] No

VARIANCE: Was a variance granted from the MDH for this well? [ ] Yes [X] No TN# ____

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge

WDC Exploration & Wells — 49653
Licensee Business Name — *Lic. or Reg. No.*

Mark Green — 1-31-06
Authorized Representative Signature — *Date*

Mark Green/Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736121

WELL LOCATION

County Name: St. Louis

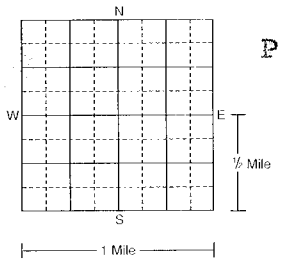
Township Name	Township No.	Range No.	Section No.	Fraction
Babbitt	59	13	3	¼ ¼ ¼

GPS LOCATION: Latitude N degrees 47 minutes 37 seconds 187; Longitude W degrees 91 minutes 58 seconds 567

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X"



Sketch map of well location. Showing property lines, roads and buildings

Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:
318 Forestry Road
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above:
PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Rock/Sand	Brown	Hard	0	8
Rock	Gray	Hard	8	100

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc: OB1

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY 736121

WELL DEPTH (completed): 100 ft. Date Work Completed: 12/5/05

DRILLING METHOD: [ ] Cable Tool [X] Driven [ ] Dug [ ] Auger [X] Rotary [ ] Jetted [ ] _____

DRILLING FLUID: None

WELL HYDROFRACTURED? [ ] Yes [X] No FROM _____ ft. TO _____ ft.

USE: [ ] Domestic [ ] Noncommunity PWS [ ] Community PWS [ ] Monitoring [ ] Environ. Bore Hole [ ] Irrigation [ ] Dewatering [ ] Heating/Cooling [ ] Industry/Commercial [X] Remedial OB [ ] _____

CASING: [X] Steel [ ] Plastic [ ] _____ Drive Shoe? [ ] Yes [X] No [ ] Threaded [X] Welded

HOLE DIAM.

CASING DIAMETER		WEIGHT		HOLE DIAM.	
4 in. to 21 ft.		11 lbs./ft.		4 in. to 100 ft.	
_____ in. to _____ ft.		_____ lbs./ft.		_____ in. to _____ ft.	
_____ in. to _____ ft.		_____ lbs./ft.		_____ in. to _____ ft.	

SCREEN None
Make _____
Type _____ Diam _____
Slot/Gauze _____ Length _____
Set between _____ ft. and _____ ft. FITTINGS _____

OPEN HOLE FROM 21 ft. TO 100 ft.

STATIC WATER LEVEL: 10 ft. [X] below [ ] above land surface Date measured 12/5/05

PUMPING LEVEL (below land surface): 100 ft. after .5 hrs. pumping 1 g.p.m.

WELL HEAD COMPLETION
[ ] Pitless adapter manufacturer _____ Model _____
[ ] Casing Protection _____ [X] 12 in. above grade
[ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION
Well grouted [X] Yes [ ] No
Grout material [ ] Neat cement [ ] Bentonite [X] Concrete [ ] High Solids Bentonite

from 0 to 21 ft.	12	[ ] yds.	[X] bags
from _____ to _____ ft.	_____	[ ] yds.	[ ] bags
from _____ to _____ ft.	_____	[ ] yds.	[ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None _____ feet _____ direction _____ type

Well disinfected upon completion [ ] Yes [X] No

PUMP
[X] Not installed Date installed _____
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] _____

ABANDONED WELLS
Does property have any not in use and not sealed well(s) [ ] Yes [X] No

VARIANCE
Was a variance granted from the MDH for this well? [ ] Yes [X] No TN# _____

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

WDC Exploration & Wells 49653
Licensee Business Name *Lic. or Reg. No.*

Authorized Representative Signature 1-31-06 *Date*

Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736120

WELL LOCATION

County Name: St. Louis

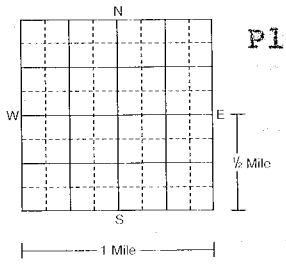
Township Name	Township No.	Range No.	Section No.	Fraction
Babbitt	59	13	2	¼ ¼ ¼

GPS LOCATION: Latitude N degrees 47 minutes 37 seconds 443; Longitude W degrees 91 minutes 57 seconds 538

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X".



Sketch map of well location. Showing property lines, roads and buildings

Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:

318 Forestry Road
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above:

PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Rock/Sand	Brown	Hard	0	6
Rock	Gray	Hard	6	100

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

OB2

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY

736120

WELL DEPTH (completed): 100 ft. Date Work Completed: 12/2/05

DRILLING METHOD: [ ] Cable Tool [ ] Auger [ ] ____ [X] Driven [X] Rotary [ ] Dug [ ] Jetted

DRILLING FLUID: None

WELL HYDROFRACTURED? [ ] Yes [X] No FROM ____ ft TO ____ ft

USE: [ ] Domestic [ ] Noncommunity PWS [ ] Community PWS [ ] Monitoring [ ] Environ. Bore Hole [ ] Irrigation [ ] Dewatering [ ] Heating/Cooling [ ] Industry/Commercial [ ] Remedial [X] OB

CASING: [X] Steel [ ] Plastic [ ] Threaded [X] Welded; Drive Shoe? [ ] Yes [X] No

CASING DIAMETER	WEIGHT	HOLE DIAM.
4 in. to 18 ft.	11 lbs./ft	4 in. to 100
____ in. to ____ ft.	____ lbs./ft	____ in. to ____ ft
____ in. to ____ ft.	____ lbs./ft.	____ in. to ____ ft.

SCREEN None

Make ____ Type ____ Slot/Gauze ____ Set between ____ ft. and ____ ft

Diam ____ Length ____ FITTINGS ____

OPEN HOLE FROM 18 ft. TO 100 ft.

STATIC WATER LEVEL: 11 ft [X] below [ ] above land surface Date measured 12/2/05

PUMPING LEVEL (below land surface): 100 ft after .5 hrs. pumping 1 g.p.m

WELL HEAD COMPLETION: [ ] Pitless adapter manufacturer ____ Model ____ [ ] Casing Protection ____ [X] 12 in. above grade [ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION: Well grouted [ ] Yes [X] No

Grout material [ ] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite

from ____ to ____ ft ____ [ ] yds [ ] bags

from ____ to ____ ft ____ [ ] yds [ ] bags

from ____ to ____ ft ____ [ ] yds [ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None feet ____ direction ____ type

Well disinfected upon completion [ ] Yes [X] No

PUMP: [X] Not installed Date installed ____

Manufacturer's name ____

Model number ____ HP ____ Volts ____

Length of drop pipe ____ ft Capacity ____ g.p.m

Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] ____

ABANDONED WELLS: Does property have any not in use and not sealed well(s) [ ] Yes [X] No

VARIANCE: Was a variance granted from the MDH for this well? [ ] Yes [X] No TN# ____

WELL CONTRACTOR CERTIFICATION

This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge

WDC Exploration & Wells 49653

Licensee Business Name *Lic. or Reg. No.*

Mark Fuchs 1-31-06

Authorized Representative Signature *Date*

Chris Fuhs

Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736123

WELL LOCATION

County Name: St. Louis

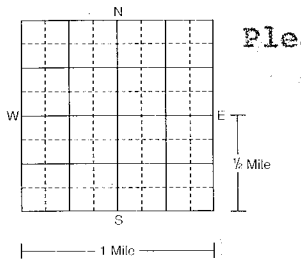
Township Name	Township No	Range No.	Section No.	Fraction
Babbitt	59	13	2	¼ ¼ ¼

GPS LOCATION 6 — Latitude N degrees 47 minutes 37 seconds 557 — Longitude W degrees 91 minutes 58 seconds 140

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X". Sketch map of well location Showing property lines, roads and buildings



Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:
318 Forestry Road
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above.
PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Rock/Sand	Brown	Hard	0	7
Rock	Gray	Hard	7	100

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.
OB3

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY 736123

WELL DEPTH (completed): 100 ft. Date Work Completed: 12/1/05

DRILLING METHOD: [ ] Cable Tool [x] Driven [ ] Dug [ ] Auger [x] Rotary [ ] Jetted [ ]

DRILLING FLUID: None

WELL HYDROFRACTURED? [ ] Yes [x] No FROM ____ ft TO ____ ft

USE: [ ] Domestic [ ] Monitoring [ ] Heating/Cooling [ ] Noncommunity PWS [ ] Environ. Bore Hole [ ] Industry/Commercial [ ] Community PWS [ ] Irrigation [ ] Remedial [ ] Dewatering [x] OB

CASING: [x] Steel [ ] Threaded [ ] Plastic — Drive Shoe? [x] Yes [ ] No [x] Welded

CASING DIAMETER / WEIGHT / HOLE DIAM.

4 in. to 21 ft.	11 lbs./ft.	4 in. to 100 ft.
____ in. to ____ ft.	____ lbs./ft.	____ in. to ____ ft.
____ in. to ____ ft.	____ lbs./ft.	____ in. to ____ ft.

SCREEN: None — Make ____ Type ____ Slot/Gauze ____ Set between ____ ft. and ____ ft

OPEN HOLE: FROM 21 ft. TO 100 ft.

Diam. ____ Length ____ FITTINGS ____

STATIC WATER LEVEL: 9 ft. [x] below [ ] above land surface Date measured 12/1/05

PUMPING LEVEL (below land surface): 100 ft. after .5 hrs. pumping 1 g.p.m.

WELL HEAD COMPLETION
[ ] Pitless adapter manufacturer ____ Model ____
[ ] Casing Protection ____ [x] 12 in. above grade
[ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION
Well grouted [ ] Yes [x] No
Grout material [ ] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite
from ____ to ____ ft. ____ [ ] yds. [ ] bags
from ____ to ____ ft. ____ [ ] yds. [ ] bags
from ____ to ____ ft. ____ [ ] yds. [ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None feet ____ direction ____ type ____
Well disinfected upon completion [ ] Yes [x] No

PUMP
[x] Not installed Date installed ____
Manufacturer's name ____
Model number ____ HP ____ Volts ____
Length of drop pipe ____ ft. Capacity ____ g.p.m.
Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] ____

ABANDONED WELLS
Does property have any not in use and not sealed well(s) [ ] Yes [x] No

VARIANCE
Was a variance granted from the MDH for this well? [ ] Yes [x] No TN# ____

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

WDC Exploration & Wells — 49653
Licensee Business Name — *Lic. or Reg. No.*

Mark [signature] — 1-31-06
Authorized Representative Signature — *Date*

Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736122

WELL LOCATION

County Name: St. Louis

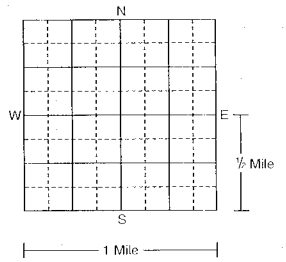
Township Name	Township No	Range No	Section No	Fraction
Babbitt	59	13	2	¼ ¼ ¼

GPS LOCATION: Latitude N degrees 47 minutes 37 seconds 559; Longitude W degrees 91 minutes 57 seconds 139

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X".



Sketch map of well location Showing property lines, roads and buildings: Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:
318 Forestry Road
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet MIning, Inc.

Well owner's mailing address if different than property owners address indicated above:
PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Rock/Sand	Brown	Med/H	0	7
Rock	Gray	Hard	7	50

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.: OB3A

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY 736122

IC 140-0020

WELL DEPTH (completed): 50 ft. Date Work Completed: 12/6/05

DRILLING METHOD: [ ] Cable Tool [x] Driven [ ] Dug [ ] Auger [x] Rotary [ ] Jetted [ ]

DRILLING FLUID: None

WELL HYDROFRACTURED? [ ] Yes [x] No FROM ft TO ft

USE: [ ] Domestic [ ] Monitoring [ ] Heating/Cooling [ ] Noncommunity PWS [ ] Environ. Bore Hole [ ] Industry/Commercial [ ] Community PWS [ ] Irrigation [x] Remedial OB [ ] Dewatering [ ]

CASING: [x] Steel [ ] Plastic [ ] Drive Shoe? [x] Yes [ ] No [ ] Threaded [x] Welded [ ]

CASING DIAMETER	WEIGHT	HOLE DIAM.
4 in. to 17 ft	11 lbs./ft.	4 in. to 50 ft.
in. to ft.	lbs./ft.	in. to ft.
in. to ft.	lbs./ft.	in. to ft.

SCREEN None

Make

Type Diam.

Slot/Gauze Length

Set between ft. and ft FITTINGS

OPEN HOLE FROM 17 ft. TO 50 ft.

STATIC WATER LEVEL: 9 ft [x] below [ ] above land surface Date measured 12/6/05

PUMPING LEVEL (below land surface): 50 ft. after .5 hrs. pumping .5 g.p.m.

WELL HEAD COMPLETION
[ ] Pitless adapter manufacturer Model
[ ] Casing Protection [x] 12 in. above grade
[ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION
Well grouted [ ] Yes [x] No
Grout material [ ] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite
from to ft yds bags
from to ft yds bags
from to ft yds bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None feet direction type
Well disinfected upon completion [ ] Yes [x] No

PUMP
[x] Not installed Date installed
Manufacturer's name
Model number HP Volts
Length of drop pipe ft Capacity g.p.m.
Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ]

ABANDONED WELLS
Does property have any not in use and not sealed well(s) [ ] Yes [x] No

VARIANCE
Was a variance granted from the MDH for this well? [ ] Yes [x] No TN#

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

WDC Exploration & Wells 49653
Licensee Business Name *Lic. or Reg. No.*

Authorized Representative Signature 1-31-06 *Date*

Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736118

WELL LOCATION

County Name: St. Louis

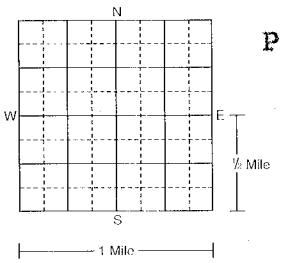
Township Name	Township No.	Range No.	Section No.	Fraction
Babbitt	59	13	2	¼ ¼ ¼

GPS LOCATION: Latitude N degrees 47 minutes 37 seconds 633; Longitude W degrees 91 minutes 56 seconds 998

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X"



Sketch map of well location. Showing property lines, roads and buildings

Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:

318 Forestry Road
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above:

PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Topsoil	Black	Soft	0	2
Clay/Sand	Brown	Medium	2	6
Rock	Gray	Hard	6	100

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

OB4

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY

736118

WELL DEPTH (completed): 100 ft. Date Work Completed: 11/19/05

DRILLING METHOD: [ ] Cable Tool [X] Driven [ ] Dug [ ] Auger [X] Rotary [ ] Jetted [ ]

DRILLING FLUID: None

WELL HYDROFRACTURED? [ ] Yes [X] No FROM ____ ft. TO ____ ft.

USE: [ ] Domestic [ ] Monitoring [ ] Heating/Cooling [ ] Noncommunity PWS [ ] Environ. Bore Hole [ ] Industry/Commercial [ ] Community PWS [ ] Irrigation [ ] Remedial [ ] Dewatering [X] OB

CASING: [X] Steel [ ] Plastic [ ] Drive Shoe? [X] Yes [ ] No [ ] Threaded [X] Welded [ ]

HOLE DIAM.

CASING DIAMETER		WEIGHT		HOLE DIAM.	
4 in. to 7 ft.		11 lbs./ft.		4 in. to 100 ft.	
____ in. to ____ ft.		____ lbs./ft.		____ in. to ____ ft.	
____ in. to ____ ft.		____ lbs./ft.		____ in. to ____ ft.	

SCREEN: None
Make: ____ Type: ____ Diam: ____
Slot/Gauze: ____ Length: ____
Set between ____ ft. and ____ ft. FITTINGS: ____

OPEN HOLE: FROM 7 ft. TO 100 ft.

STATIC WATER LEVEL: 12 ft. [X] below [ ] above land surface. Date measured 11/19/05

PUMPING LEVEL (below land surface): 100 ft. after .5 hrs. pumping 1 g.p.m.

WELL HEAD COMPLETION
[ ] Pitless adapter manufacturer ____ Model ____
[ ] Casing Protection ____ [X] 12 in. above grade
[ ] At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION
Well grouted [ ] Yes [X] No
Grout material [ ] Neat cement [ ] Bentonite [ ] Concrete [ ] High Solids Bentonite
from ____ to ____ ft. ____ [ ] yds. [ ] bags
from ____ to ____ ft. ____ [ ] yds. [ ] bags
from ____ to ____ ft. ____ [ ] yds. [ ] bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None ____ feet ____ direction ____ type
Well disinfected upon completion [ ] Yes [X] No

PUMP
[X] Not installed Date installed ____
Manufacturer's name ____
Model number ____ HP ____ Volts ____
Length of drop pipe ____ ft. Capacity ____ g.p.m.
Type: [ ] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ] ____

ABANDONED WELLS
Does property have any not in use and not sealed well(s) [ ] Yes [X] No

VARIANCE
Was a variance granted from the MDH for this well? [ ] Yes [X] No TN# ____

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

WDC Exploration & Wells — 49653
Licensee Business Name — *Lic. or Reg. No.*

Authorized Representative Signature — 1-31-06 *Date*

Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL NO. 736119

WELL LOCATION

County Name: St. Louis

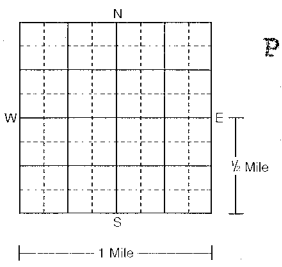
Township Name	Township No.	Range No.	Section No.	Fraction
Babbitt	59	13	2	¼ ¼ ¼

GPS LOCATION: Latitude N degrees 47 minutes 37 seconds 703; Longitude W degrees 91 minutes 56 seconds 677

House Number, Street Name, City, and Zip Code of Well Location: Hoyt Lakes, MN 55705

or Fire Number:

Show exact location of well in section grid with "X"



Sketch map of well location. Showing property lines, roads and buildings

Please see attached

PROPERTY OWNER'S NAME/COMPANY NAME: Superior National Forest

Property owner's mailing address if different than well location address indicated above:

318 Forestry Road
Aurora, MN 55705

WELL OWNER'S NAME/COMPANY NAME: PolyMet Mining, Inc.

Well owner's mailing address if different than property owners address indicated above:

PO Box 475
Hoyt Lakes, MN 55705

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Topsoil	Black	Soft	0	1
Clay/Sand	Brown	Medium	1	7
Rock	Gray	Hard	7	100

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

OB5

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY

736119

WELL DEPTH (completed): 100 ft

Date Work Completed: 11/20/05

DRILLING METHOD: ☐ Cable Tool ☒ Driven ☐ Dug ☐ Auger ☒ Rotary ☐ Jetted ☐ _____

DRILLING FLUID: None

WELL HYDROFRACTURED? ☐ Yes ☒ No FROM _____ ft TO _____ ft

USE: ☐ Domestic ☐ Monitoring ☐ Heating/Cooling ☐ Noncommunity PWS ☐ Environ. Bore Hole ☐ Industry/Commercial ☐ Community PWS ☐ Irrigation ☐ Remedial ☐ Dewatering ☒ OB

CASING: ☒ Steel ☐ Plastic

Drive Shoe? ☒ Yes ☐ No ☐ Threaded ☒ Welded ☐ _____

HOLE DIAM.

CASING DIAMETER	WEIGHT	HOLE DIAM.
4 in. to 18 ft	11 lbs./ft.	4 in. to 100 ft
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.

SCREEN None
Make _____
Type _____ Diam _____
Slot/Gauze _____ Length _____
Set between _____ ft. and _____ ft. FITTINGS _____

OPEN HOLE FROM 18 ft. TO 100 ft.

STATIC WATER LEVEL: 13 ft ☒ below ☐ above land surface Date measured 11/20/05

PUMPING LEVEL (below land surface): 100 ft. after .5 hrs. pumping 1.5 g.p.m.

WELL HEAD COMPLETION
☐ Pitless adapter manufacturer _____ Model _____
☐ Casing Protection _____ ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Boring ONLY)

GROUTING INFORMATION
Well grouted ☐ Yes ☒ No
Grout material ☐ Neat cement ☐ Bentonite ☐ Concrete ☐ High Solids Bentonite
from _____ to _____ ft. _____ ☐ yds. ☐ bags
from _____ to _____ ft. _____ ☐ yds. ☐ bags
from _____ to _____ ft. _____ ☐ yds. ☐ bags

NEAREST KNOWN SOURCE OF CONTAMINATION: None feet _____ direction _____ type

Well disinfected upon completion ☐ Yes ☒ No

PUMP
☒ Not installed Date installed _____
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ _____

ABANDONED WELLS
Does property have any not in use and not sealed well(s) ☐ Yes ☒ No

VARIANCE
Was a variance granted from the MDH for this well? ☐ Yes ☒ No TN#

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge

WDC Exploration & Wells — 49653
Licensee Business Name — *Lic. or Reg. No.*

Mark Druckrey — 1-31-06
Authorized Representative Signature — *Date*

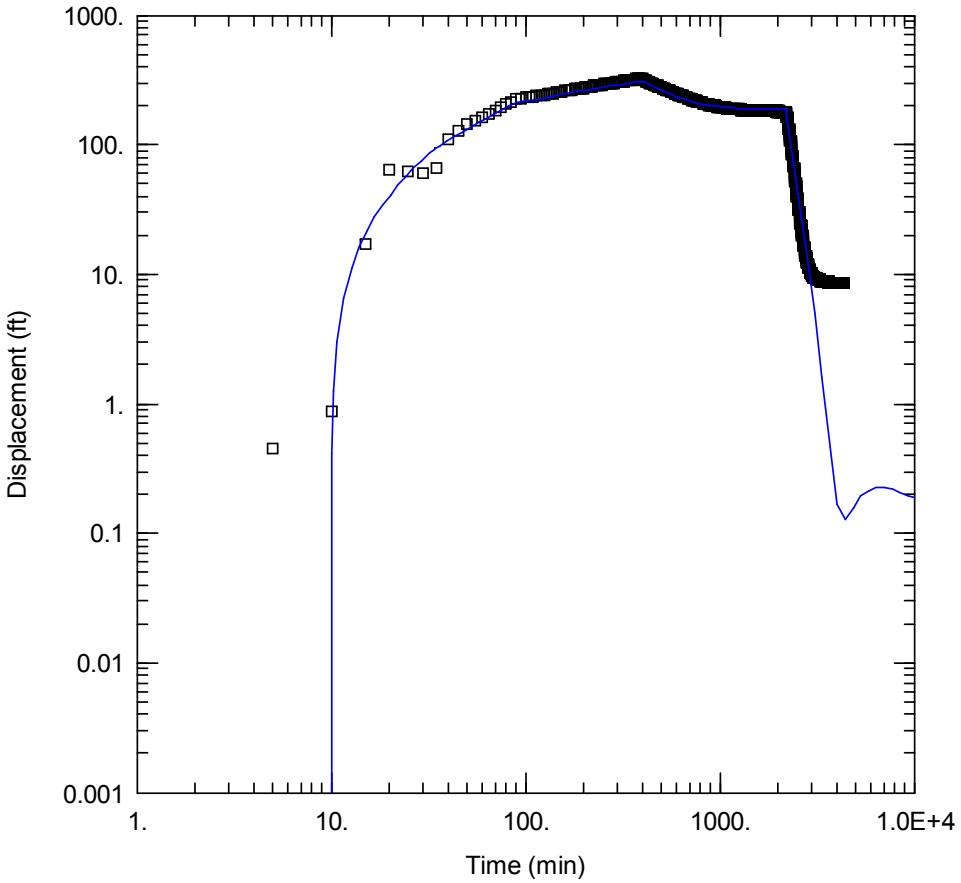
Chris Fuhs
Name of Driller

HE-01205-08 (Rev. 5/02)

IC 140-0020

Appendix B

Aquifer Test Analysis Plots

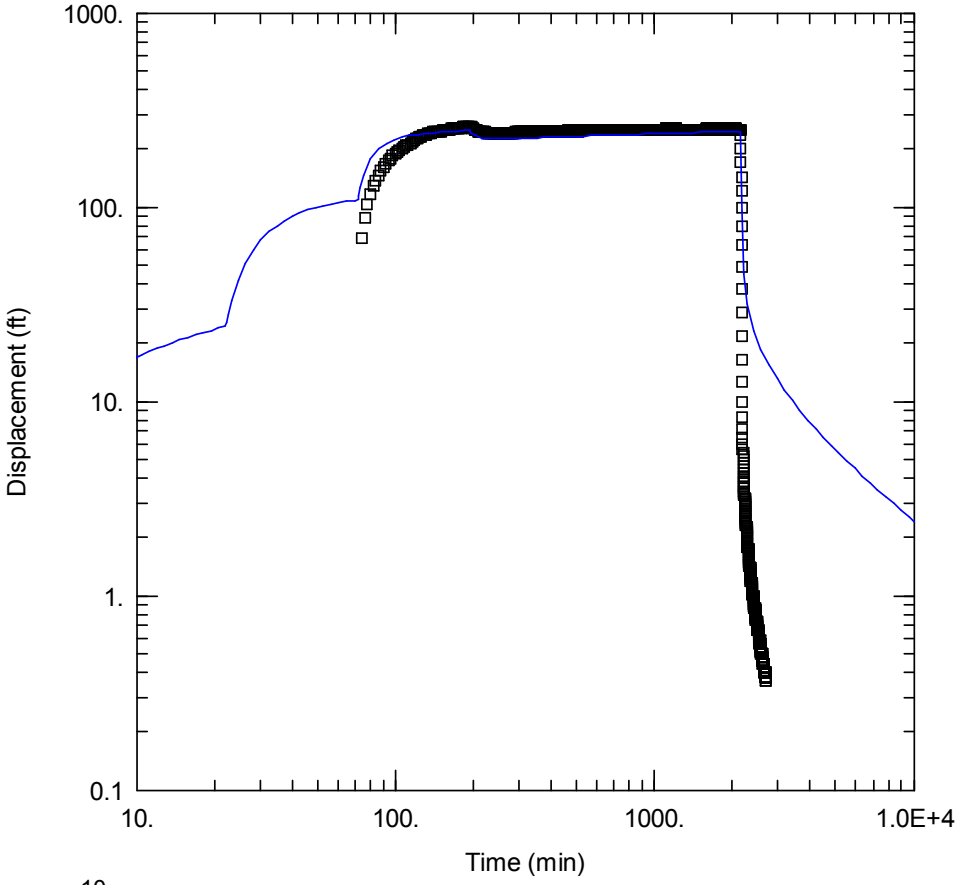


Obs. Wells
- P-1

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.002351 ft/day
Ss = 2.512E-10 ft^{-1}
K' = 1.0E-6 ft/day
Ss' = 1.736E-5 ft^{-1}
Sw = 0.05
Sf = 1.391
r(w) = 0.25 ft
r(c) = 0.25 ft

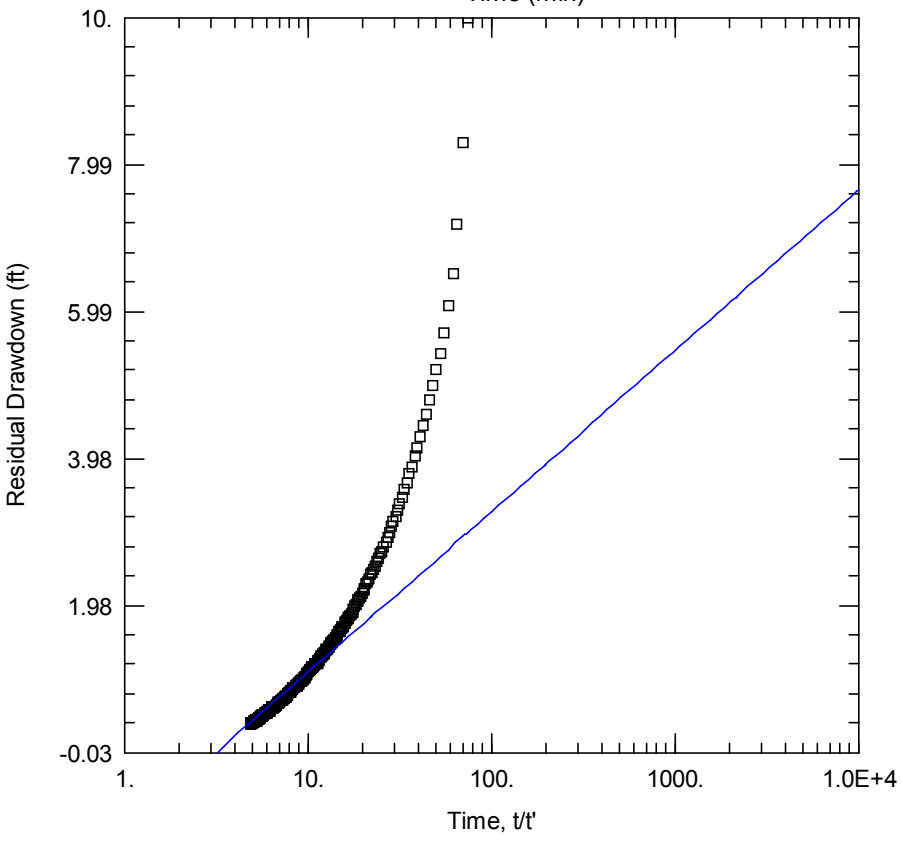


Obs. Wells
□ P-2

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.07172 ft/day
Ss = 1.667E-12 ft^{-1}
K' = 1.019 ft/day
Ss' = 1.0E-10 ft^{-1}
Sw = 0.
Sf = 0.
r(w) = 0.25 ft
r(c) = 0.25 ft

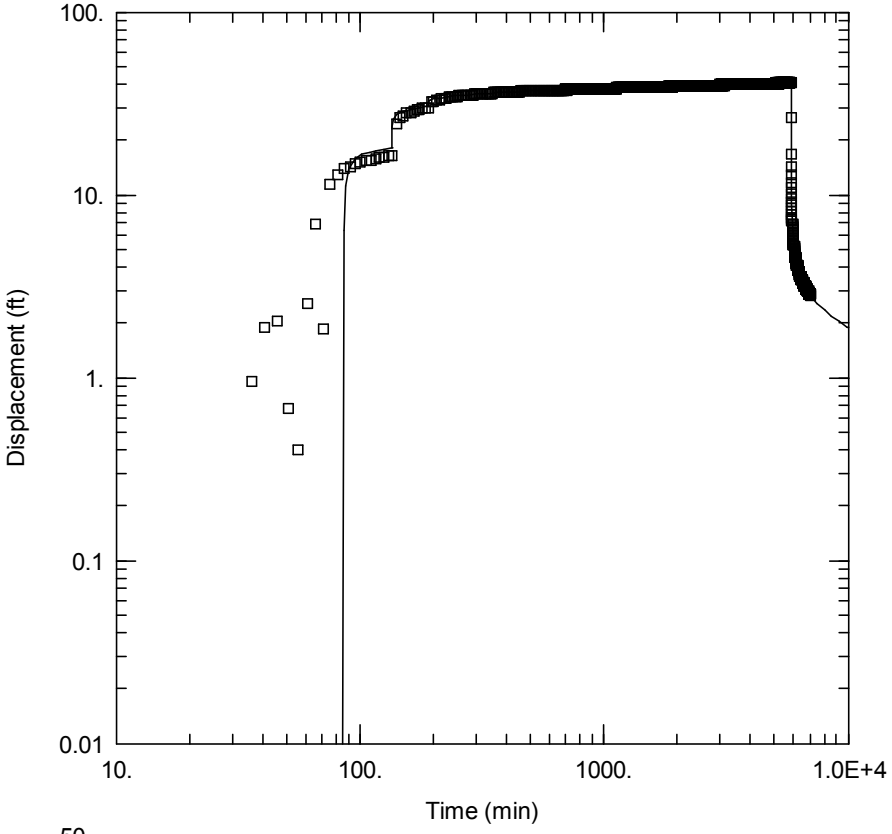


Obs. Wells
□ P-2

Aquifer Model
Confined

Solution
Theis (Recovery)

Parameters
T = 450.2 ft^2/day
S/S' = 3.306

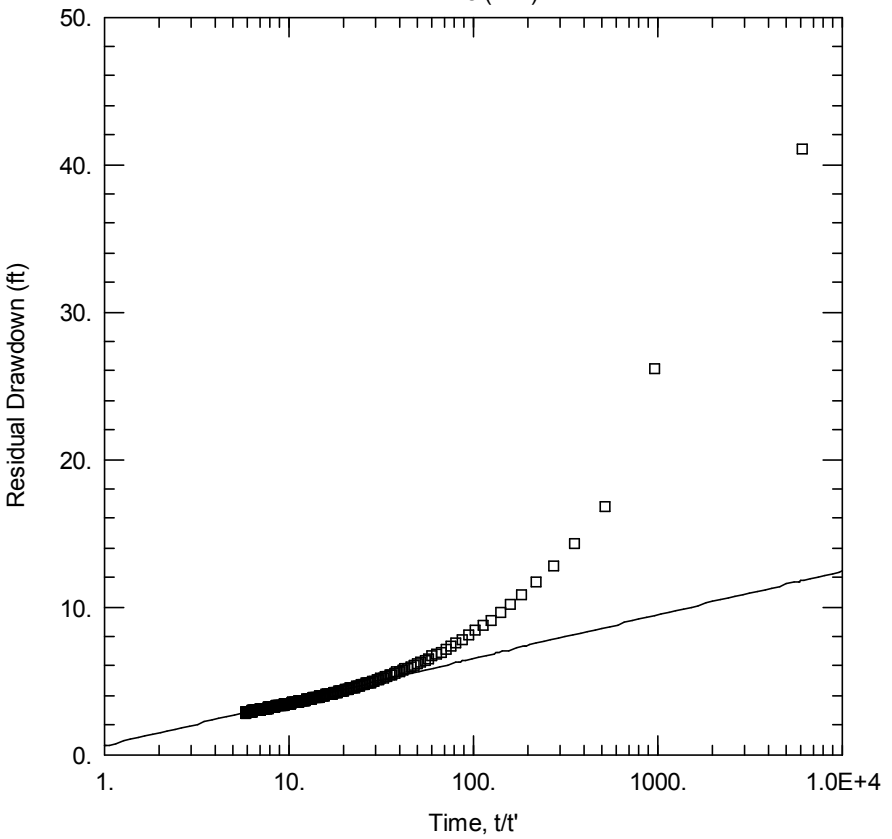


Obs. Wells
□ P-3

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.3999 ft/day
Ss = 1.878E-6 ft^{-1}
K' = 0.0001239 ft/day
Ss' = 8.139E-6 ft^{-1}
Sw = 0.
Sf = 1.162
r(w) = 0.25 ft
r(c) = 0.25 ft

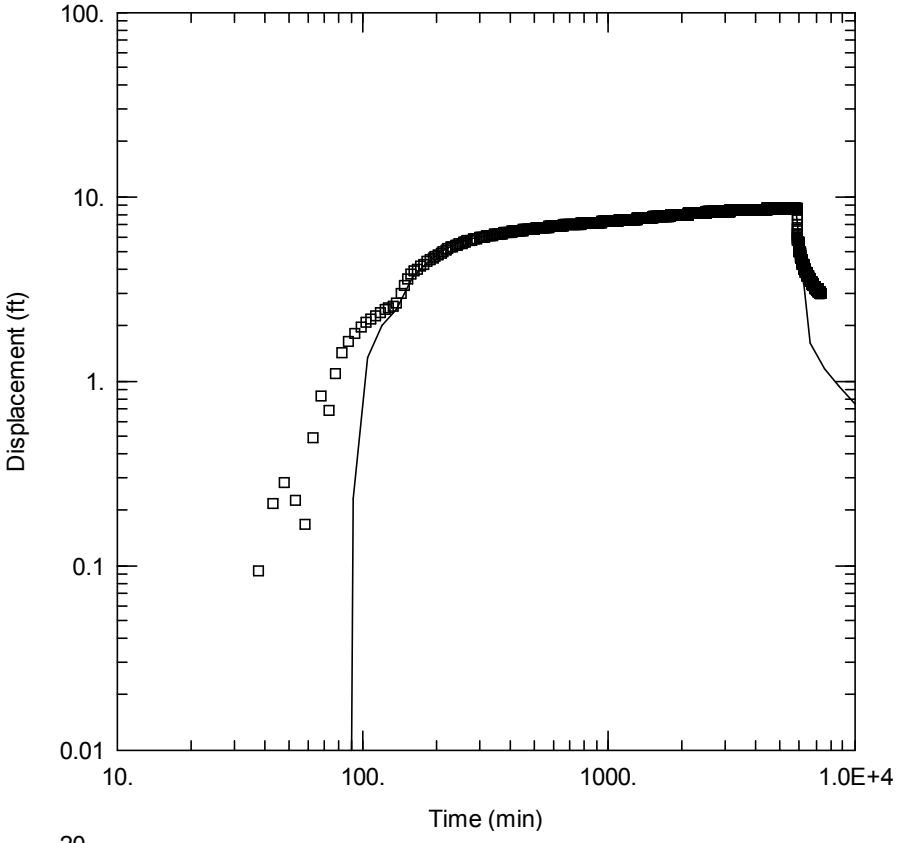


Obs. Wells
□ P-3

Aquifer Model
Confined

Solution
Theis (Recovery)

Parameters
T = 488.6 ft^2/day
S/S' = 0.6466

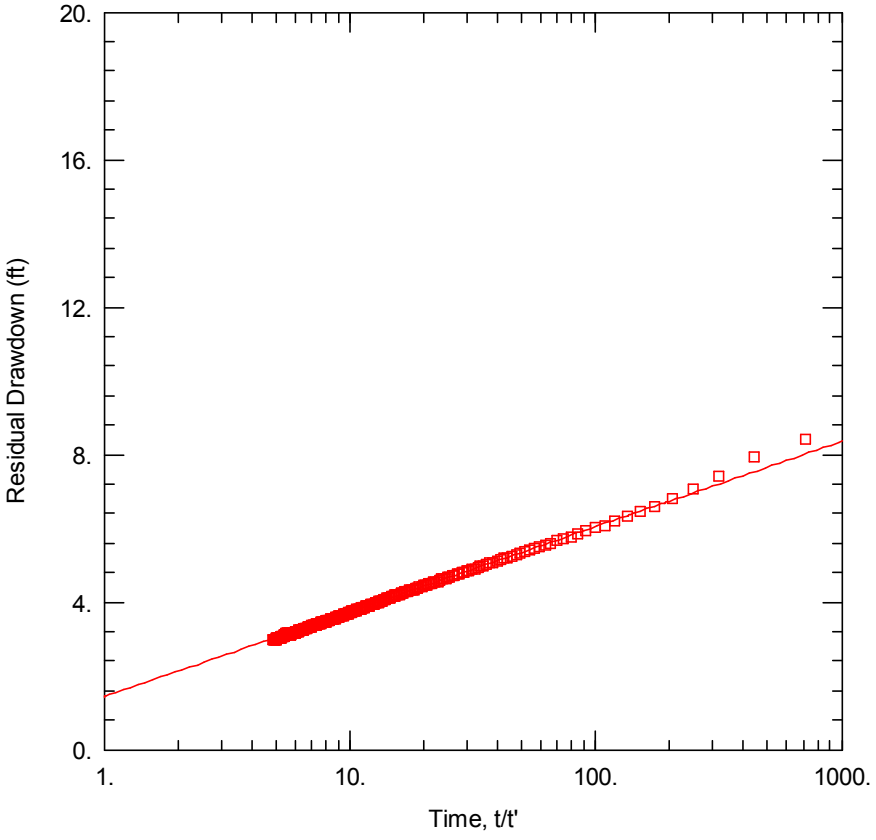


Obs. Wells
□ Ob-3

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.4559 ft/day
Ss = 3.48E-7 ft^{-1}
K' = 1.34E-5 ft/day
Ss' = 2.308E-5 ft^{-1}
Sw = 0.05
Sf = 0.15
r(w) = 0.25 ft
r(c) = 0.25 ft

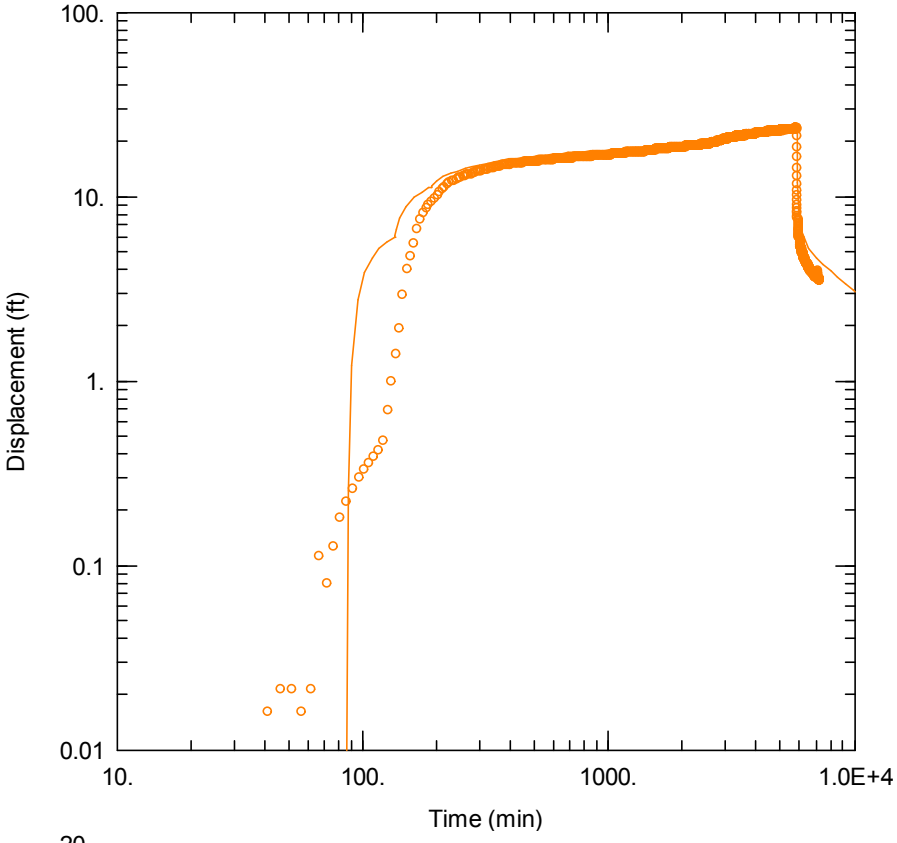


Obs. Wells
□ Ob-3

Aquifer Model
Confined

Solution
Theis (Recovery)

Parameters
T = 627.1 ft^2/day
S/S' = 0.2402

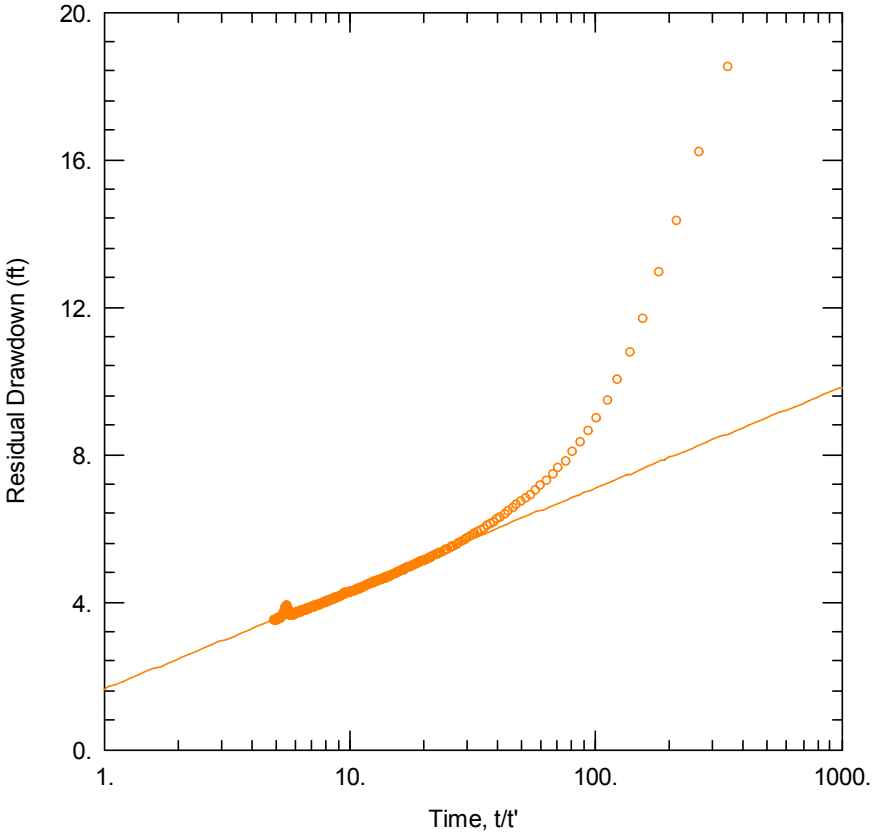


Obs. Wells
- Ob-3a

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.273 ft/day
Ss = 9.719E-8 ft^{-1}
K' = 8.497E-5 ft/day
Ss' = 5.49E-7 ft^{-1}
Sw = 0.
Sf = 10.
r(w) = 0.25 ft
r(c) = 0.25 ft

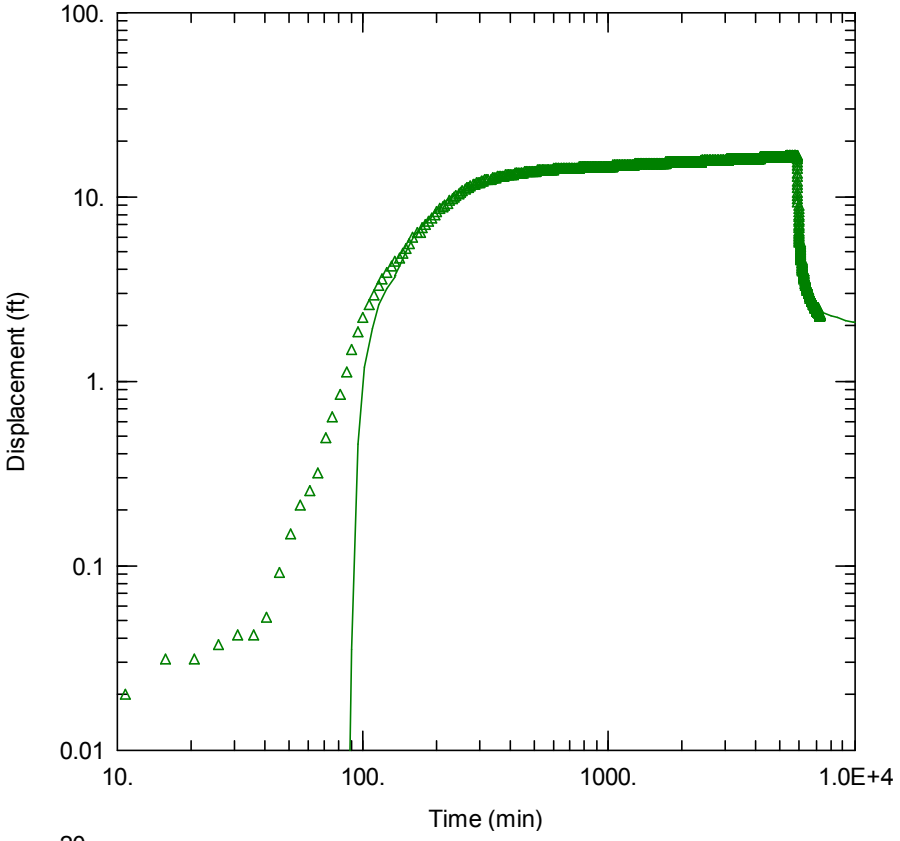


Obs. Wells
- Ob-3a

Aquifer Model
Confined

Solution
Theis (Recovery)

Parameters
T = 529.9 ft^2/day
S/S' = 0.2518

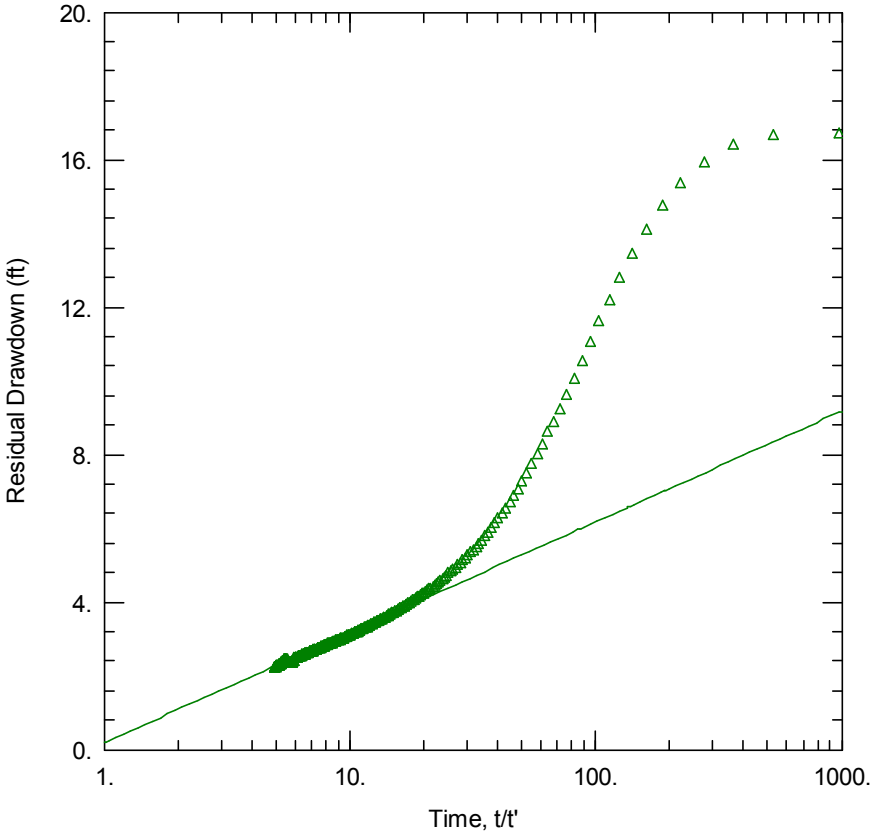


Obs. Wells
△ Water Well

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.1648 ft/day
Ss = 4.197E-8 ft^{-1}
K' = 1.017E-5 ft/day
Ss' = 1.847E-6 ft^{-1}
Sw = 0.
Sf = 1.489
r(w) = 0.25 ft
r(c) = 0.25 ft

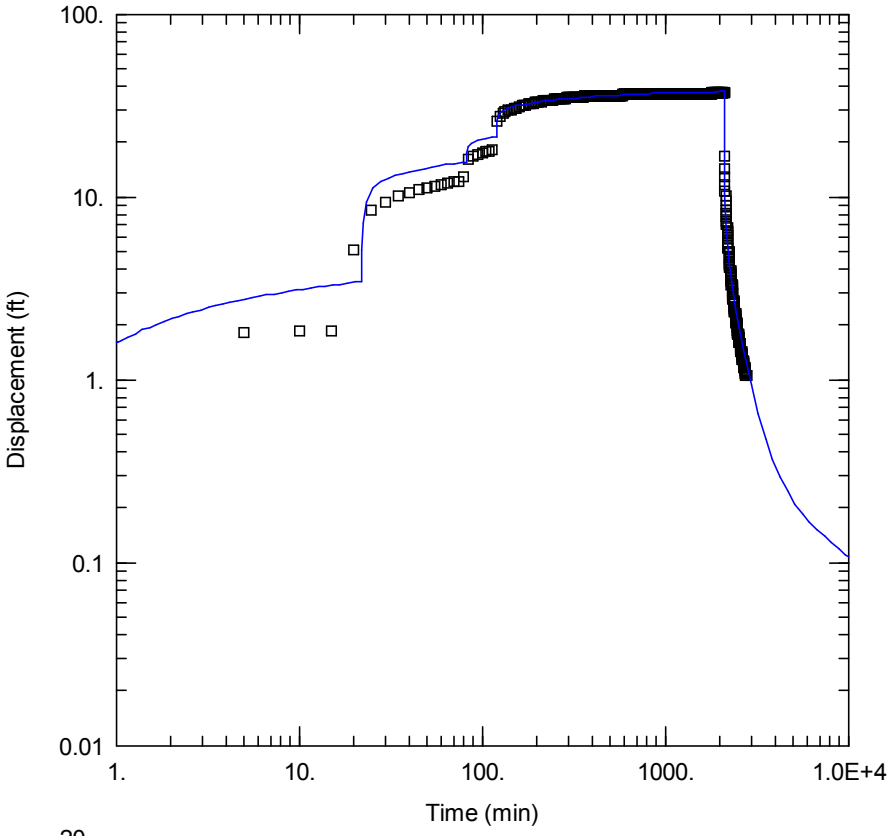


Obs. Wells
△ Water Well

Aquifer Model
Confined

Solution
Theis (Recovery)

Parameters
T = 482.6 ft^2/day
S/S' = 0.8689

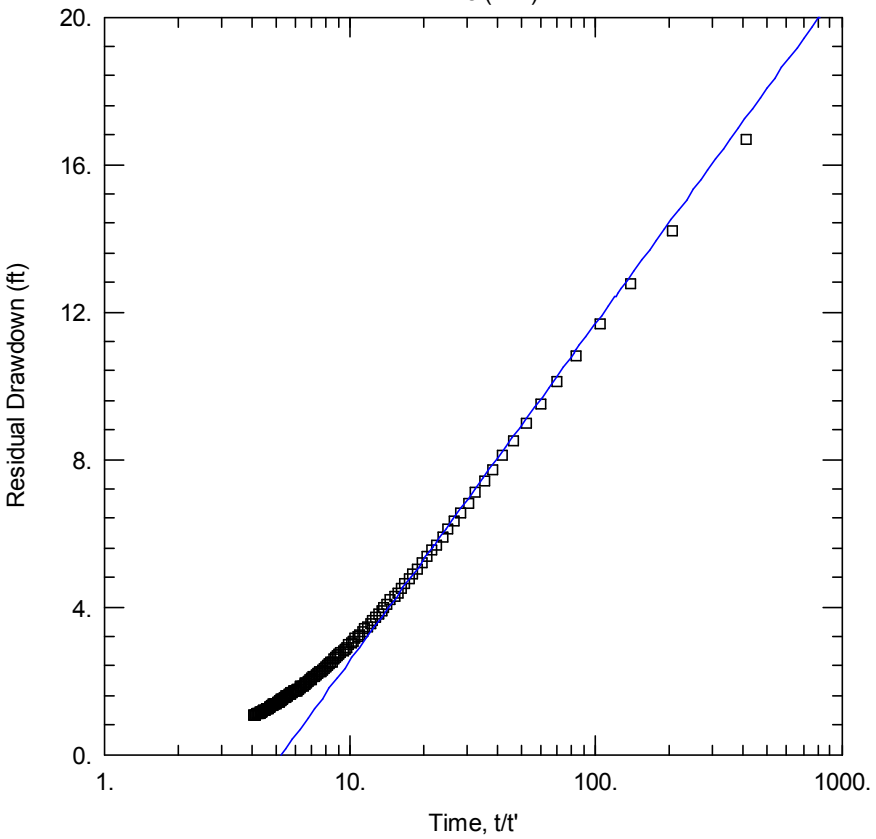


Obs. Wells
□ P-4

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.3259 ft/day
Ss = 2.462E-5 ft^{-1}
K' = 0.0004775 ft/day
Ss' = 0.00631 ft^{-1}
Sw = 0.
Sf = 0.4237
r(w) = 0.25 ft
r(c) = 0.25 ft



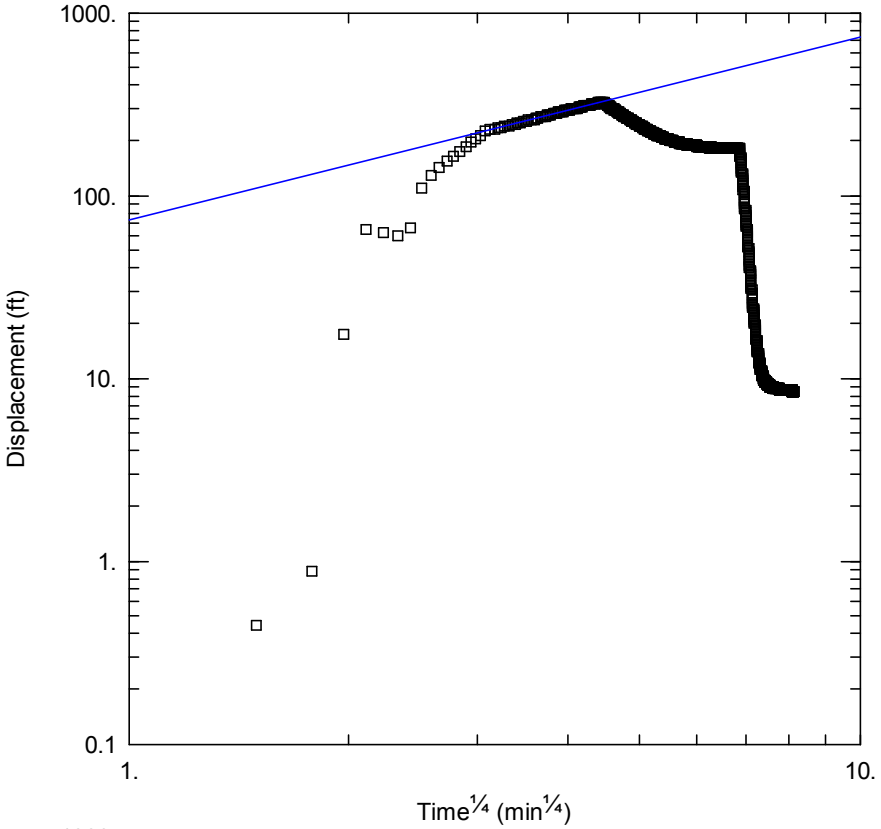
Obs. Wells
□ P-4

Aquifer Model
Confined

Solution
Theis (Recovery)

Parameters
T = 154.3 ft^2/day
S/S' = 5.288

Bilinear Flow Plots

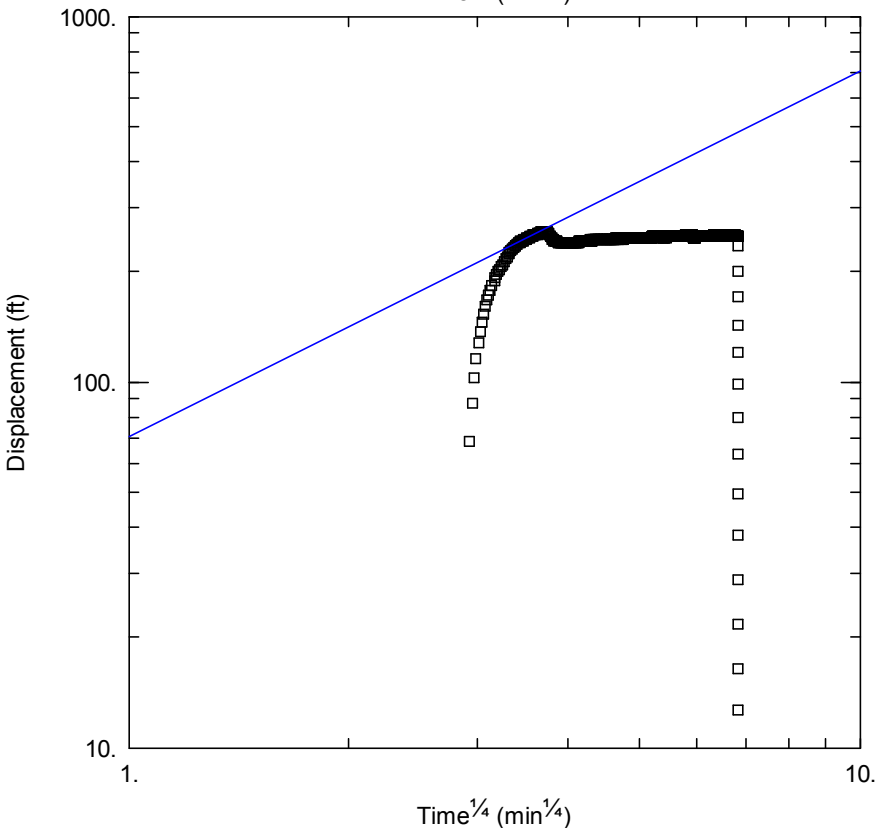


Obs. Wells
□ P-1

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.002351 ft/day
Ss = 2.512E-10 ft^{-1}
K' = 1.0E-6 ft/day
Ss' = 1.736E-5 ft^{-1}
Sw = 0.05
Sf = 1.391
r(w) = 0.25 ft
r(c) = 0.25 ft

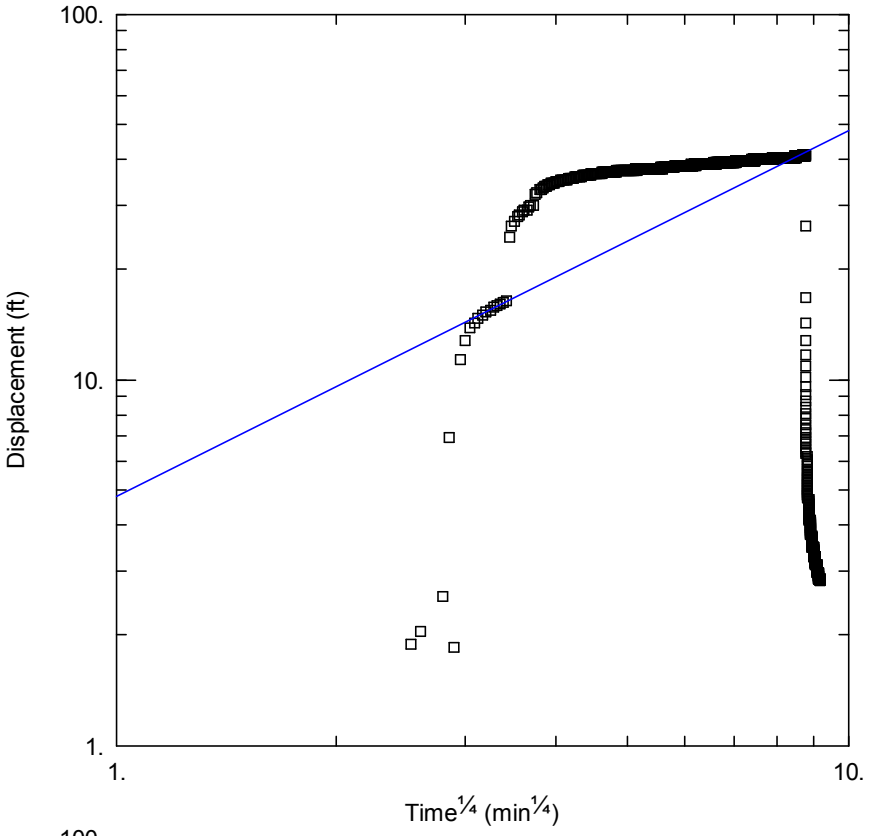


Obs. Wells
□ P-2

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.07172 ft/day
Ss = 1.667E-12 ft^{-1}
K' = 1.019 ft/day
Ss' = 1.0E-10 ft^{-1}
Sw = 0.
Sf = 0.
r(w) = 0.25 ft
r(c) = 0.25 ft

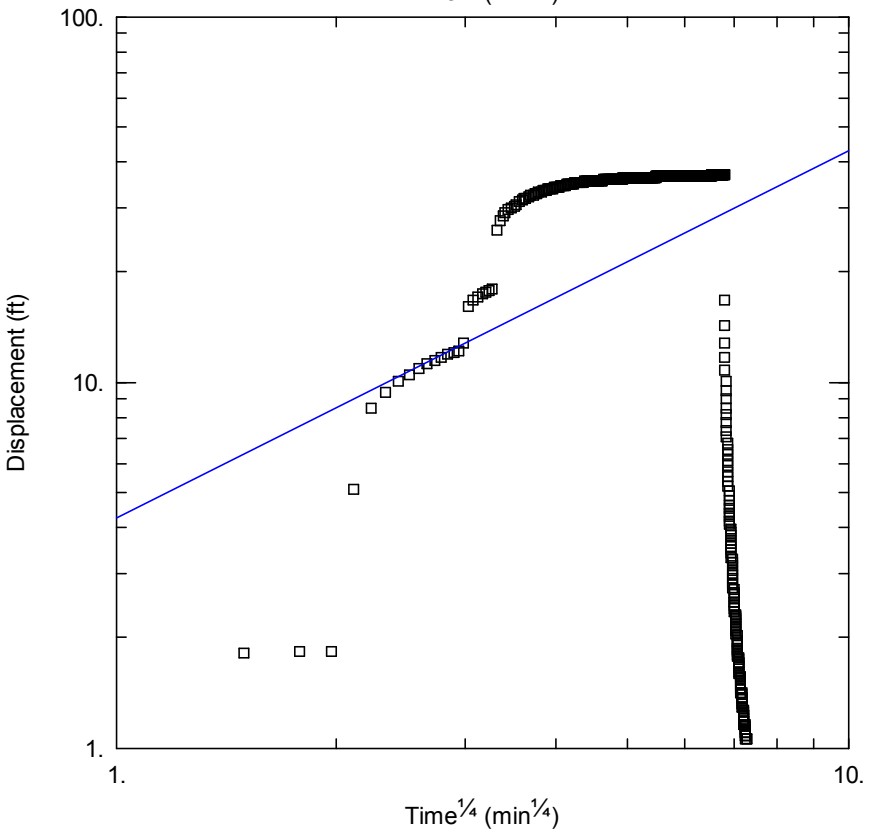


Obs. Wells
□ P-3

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.3999 ft/day
Ss = 1.878E-6 ft^{-1}
K' = 0.0001239 ft/day
Ss' = 8.139E-6 ft^{-1}
Sw = 0.
Sf = 1.162
r(w) = 0.25 ft
r(c) = 0.25 ft



Obs. Wells
□ P-4

Aquifer Model
Fractured

Solution
Moench w/slab blocks

Parameters
K = 0.3259 ft/day
Ss = 2.462E-5 ft^{-1}
K' = 0.0004775 ft/day
Ss' = 0.00631 ft^{-1}
Sw = 0.
Sf = 0.4237
r(w) = 0.25 ft
r(c) = 0.25 ft

Appendix C

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S053561327	**Project #:** 6845	**Sampler:** Client	**Type:** Grab
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63700	
Descript: PolyMet		**Sampled:** 12/22/200511:00 AM	
Location: P-2		**Completed:** 02/07/2006	

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Notes: 23/69-862

Analyte	Analysis Date	Result	Units	RL	Method
Alkalinity, Total as CaCO3	12/30/2005	98.5	mg/L	10	310.1
Aluminum	1/6/2006	<25	ug/L	25	200.7
Antimony	1/4/2006	<3	ug/L	3	204.2
Arsenic	12/29/2005	<2	ug/L	2	206.2
Barium	1/6/2006	<10	ug/L	10	6010B/200.7
Beryllium	1/3/2006	<0.2	ug/L	0.2	210.2
Boron	1/6/2006	170	ug/L	35	200.7
Cadmium	1/3/2006	<0.2	ug/L	0.2	213.2
Calcium	1/4/2006	11.6	mg/L	2	200.7
Chloride	1/6/2006	1.8	mg/L	0.5	325.2
Chromium	12/30/2005	<1	ug/L	1	218.2
Cobalt	12/30/2005	<1	ug/L	1	219.2
COD	1/4/2006	<10	mg/L	10	SM 5220-D
Copper	12/31/2005	<2	ug/L	2	220.2
Cyanide	1/3/2006	<0.02	mg/L	0.02	335.2
Fluoride	1/4/2006	0.53	mg/L	0.1	340.2
Hardness (Calculated)	1/9/2006	56.5	mg/L	1	200.7
Iron	1/4/2006	0.14	mg/L	0.05	200.7
Lead	12/30/2005	<1	ug/L	1	239.2
Magnesium	1/4/2006	6.7	mg/L	2	200.7
Manganese	1/4/2006	0.02	mg/L	0.01	200.7
Mercury, Low Level	1/6/2006	<0.5	ng/L	0.5	1631E

Approved By: RMV

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Northeast Technical Services, Inc. makes no warranty except that the analysis has been made upon the samples received in accordance with generally accepted testing laboratory principles and practices. The results of the analysis may not be characteristic of the whole from which the sample was taken. This warranty is in lieu of all other warranties either expressed or implied.

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S053561327 **Project #:** 6845		**Sampler:** Client	**Type:** Grab
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63700	
Descript: PolyMet		**Sampled:** 12/22/200511:00 AM	
Location: P-2		**Completed:** 02/07/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/24/2006	0.059	ng/L	0.02	1631E
Molybdenum, GF	1/4/2006	<5	ug/L	5	246.2
Nickel	12/31/2005	<2	ug/L	2	249.2
Nitrogen, Ammonia	12/30/2005	0.27	mg/L	0.1	350.1
Nitrogen, Nitrate + Nitrite	12/29/2005	<0.1	mg/L	0.1	353.2
Palladium	1/4/2006	<0.1	ug/L	0.1	200.8
pH	12/22/2005	7.8	SU	0.1	150.1
Phosphorous, Total	12/23/2005	0.11	mg/L	0.1	365.4
Platinum	1/4/2006	<0.02	ug/L	0.02	200.8
Potassium	1/6/2006	1.1	mg/L	0.2	200.7
Selenium, GF	12/29/2005	<2	ug/L	2	270.2
Silver, GF	12/30/2005	<1	ug/L	1	272.2
Sodium	1/4/2006	24.3	mg/L	2	200.7
Strontium	1/4/2006	37.9	ug/L	10	200.7
Sulfate	1/12/2006	10.5	mg/L	1	375.4
Thallium	12/31/2005	<2	ug/L	2	279.2
Titanium	1/4/2006	<10	ug/L	10	283.2
TOC	12/22/2005	2.4	mg/L	1	415.1
Zinc	1/4/2006	<10	ug/L	10	200.7

Approved By: _____

Project Manager:

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S053561341 **Project #:** 6845		**Sampler:** Client	**Type:** Grab
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63700	
Descript: PolyMet		**Sampled:** 12/22/200511:30 AM	
Location: P-4		**Completed:** 02/07/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Alkalinity, Total as CaCO3	12/30/2005	69.2	mg/L	10	310.1
Aluminum	1/6/2006	57.2	ug/L	25	200.7
Antimony	1/4/2006	<3	ug/L	3	204.2
Arsenic	12/29/2005	5.7	ug/L	2	206.2
Barium	1/6/2006	<10	ug/L	10	6010B/200.7
Beryllium	1/3/2006	<0.2	ug/L	0.2	210.2
Boron	1/6/2006	55	ug/L	35	200.7
Cadmium	1/3/2006	<0.2	ug/L	0.2	213.2
Calcium	1/4/2006	17.7	mg/L	2	200.7
Chloride	1/6/2006	<0.5	mg/L	0.5	325.2
Chromium	12/30/2005	<1	ug/L	1	218.2
Cobalt	12/30/2005	<1	ug/L	1	219.2
COD	1/4/2006	17	mg/L	10	SM 5220-D
Copper	12/31/2005	<2	ug/L	2	220.2
Cyanide	1/3/2006	<0.02	mg/L	0.02	335.2
Fluoride	1/4/2006	0.35	mg/L	0.1	340.2
Hardness (Calculated)	1/9/2006	76.2	mg/L	1	200.7
Iron	1/4/2006	0.19	mg/L	0.05	200.7
Lead	12/30/2005	<1	ug/L	1	239.2
Magnesium	1/4/2006	7.8	mg/L	2	200.7
Manganese	1/4/2006	0.06	mg/L	0.01	200.7
Mercury, Low Level	1/6/2006	0.7	ng/L	0.5	1631E

Approved By: _____

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S053561341	**Project #:** 6845	**Sampler:** Client	**Type:** Grab
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63700	
Descript: PolyMet		**Sampled:** 12/22/200511:30 AM	
Location: P-4		**Completed:** 02/07/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/12/2006	<0.025	ng/L	0.025	1631E
Molybdenum, GF	1/4/2006	34.5	ug/L	5	246.2
Nickel	12/31/2005	<2	ug/L	2	249.2
Nitrogen, Ammonia	12/30/2005	0.11	mg/L	0.1	350.1
Nitrogen, Nitrate + Nitrite	12/29/2005	<0.1	mg/L	0.1	353.2
Palladium	1/4/2006	<0.1	ug/L	0.1	200.8
pH	12/22/2005	8.1	SU	0.1	150.1
Phosphorous, Total	12/23/2005	<0.1	mg/L	0.1	365.4
Platinum	1/4/2006	<0.02	ug/L	0.02	200.8
Potassium	1/6/2006	1.7	mg/L	0.2	200.7
Selenium, GF	12/29/2005	<2	ug/L	2	270.2
Silver, GF	12/30/2005	<1	ug/L	1	272.2
Sodium	1/4/2006	4.4	mg/L	2	200.7
Strontium	1/4/2006	45.5	ug/L	10	200.7
Sulfate	1/12/2006	14.1	mg/L	1	375.4
Thallium	12/31/2005	<2	ug/L	2	279.2
Titanium	1/4/2006	<10	ug/L	10	283.2
TOC	12/22/2005	2.2	mg/L	1	415.1
Zinc	1/4/2006	<10	ug/L	10	200.7

Approved By:

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Sample ID:	S053561342	**Project #:**	6845	**Sampler:** Client	**Type:** Grab
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63700	
Descript:	PolyMet			**Sampled:** 12/22/2005	
Location:	P-2 Trip Blank			**Completed:** 02/07/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/24/2006	0.035	ng/L	0.02	1631E

Approved By: _____

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Northeast Technical Services, Inc. makes no warranty except that the analysis has been made upon the samples received in accordance with generally accepted testing laboratory principles and practices. The results of the analysis may not be characteristic of the whole from which the sample was taken. This warranty is in lieu of all other warranties either expressed or implied.

Sample ID:	S053561343	**Project #:** 6845	**Sampler:** Client	**Type:** Grab	
Client:	Barr Engineering		**Status:** Normal	**Matrix:** Liquid	
Study:	Consultant		**NTS COC No:** 63700		
Descript:	PolyMet		**Sampled:** 12/22/2005		
Location:	P-4 Trip Blank		**Completed:** 02/07/2006		

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/24/2006	< 0.025	ng/L	0.025	1631E

Approved By:

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Northeast Technical Services, Inc. makes no warranty except that the analysis has been made upon the samples received in accordance with generally accepted testing laboratory principles and practices. The results of the analysis may not be characteristic of the whole from which the sample was taken. This warranty is in lieu of all other warranties either expressed or implied.

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID:	S053561344	**Project #:**	6845	**Sampler:** Client	**Type:** Grab
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63700	
Descript:	PolyMet			**Sampled:** 12/22/2005	
Location:	P-4 Field Blank			**Completed:** 01/06/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, LL Field Blank	1/6/2006	0.3	ng/L	0.2	1631E

Approved By: _____

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Northeast Technical Services, Inc. makes no warranty except that the analysis has been made upon the samples received in accordance with generally accepted testing laboratory principles and practices. The results of the analysis may not be characteristic of the whole from which the sample was taken. This warranty is in lieu of all other warranties either expressed or implied.

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S053561346 **Project #:** 6845		**Sampler:** Client	**Type:** Grab - Filtered
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63700	
Descript: PolyMet		**Sampled:** 12/22/200511:30 AM	
Location: P-4		**Completed:** 01/10/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Aluminum	12/29/2005	<25	ug/L	25	200.7
Cadmium	1/10/2006	<0.2	ug/L	0.2	213.2
Chromium	1/5/2006	<1	ug/L	1	218.2
Copper	12/29/2005	<2	ug/L	2	220.2
Molybdenum, GF	1/5/2006	28.9	ug/L	5	246.2
Nickel	12/29/2005	<2	ug/L	2	249.2
Selenium, GF	12/29/2005	<2	ug/L	2	270.2
Silver, GF	1/5/2006	<1	ug/L	1	272.2
Zinc	12/29/2005	<10	ug/L	10	200.7

Approved By:

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

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Sample ID:	S05356134A	**Project #:**	6845	**Sampler:** Client	**Type:** Grab
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63700	
Descript:	PolyMet			**Sampled:** 12/22/2005	
Location:	P-2 Field Blank			**Completed:** 01/06/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, LL Field Blank	1/6/2006	0.4	ng/L	0.2	1631E

Approved By: _____

Project Manager:

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID:	S05356134B	**Project #:**	6845	**Sampler:** Client	**Type:** Grab - Filtered
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63700	
Descript:	PolyMet			**Sampled:** 12/22/200511:00 AM	
Location:	P-2			**Completed:** 01/10/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Aluminum	12/29/2005	<25	ug/L	25	200.7
Cadmium	1/10/2006	<0.2	ug/L	0.2	213.2
Chromium	1/5/2006	<1	ug/L	1	218.2
Copper	12/29/2005	<2	ug/L	2	220.2
Molybdenum, GF	1/5/2006	<5	ug/L	5	246.2
Nickel	12/29/2005	<2	ug/L	2	249.2
Selenium, GF	12/29/2005	<2	ug/L	2	270.2
Silver, GF	1/5/2006	<1	ug/L	1	272.2
Zinc	12/29/2005	<10	ug/L	10	200.7

Approved By: DMV

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

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Frontier GeoSciences Inc.

414 Pontius Ave N
Seattle, WA 98109

206-622-6960
fax 206-622-6870

February 02, 2006

Laura Lubahn
Northeast Technical Services
315 Chestnut Street
P.O. Box 1142
Virginia, MN 55792

Dear Ms. Lubahn,

Enclosed are the results for methyl Hg in the water samples collected on December 22, 2005. The samples were received by Frontier GeoSciences in good condition on December 23, 2005 within a sealed cooler at a temperature of 1.8°C.

Immediately following sample receipt, the samples for methyl mercury were preserved to 0.4% (v/v) hydrochloric acid and placed in a refrigerated storage unit with a temperature below 4°C. Methyl mercury in water analysis was determined by distillation, aqueous phase ethylation, isothermal GC separation, and CVAFS detection according to Frontier's standard operating procedure (SOP) FGS-070. The samples were analyzed in two batches, designated as Batch A and Batch B. Batch A was analyzed in January 12, 2006 and Batch B was analyzed on January 24, 2006.

As a measure of the continuing sensitivity of the instrument Continuing Calibration Verification standards (CCVs) are run after every ten samples. During the analysis of Batch A the second CCV fell below the established control limits of 80-120%. Sample S053561341, the matrix duplicate and the matrix spike were reported from this run because they were analyzed prior to the first CCV, which was within the control limits. The matrix spike duplicate was analyzed after the first, passing CCV and before the second, failing CCV however it is reported because the spike recovery is well with control limits. All other samples are reported from Batch B.

There were no other analytical QC issues associated with this report.

Please feel free to contact me with any questions regarding this report.

Sincerely,

Stephanie Grant for
Kristina Spadafora
Project Manager
StephanieG@FrontierGeoSciences.com

Methyl Mercury Results for NTS

Reported: February 02, 2006

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

Sample ID	Batch	Date collected	MeHg ng/L
S053561343	B	12/22/05	<0.025
S053561342	B	12/22/05	0.035
S053561341	A	12/22/05	<0.025
S053561327	B	12/22/05	0.059
Reporting Limit			**0.025**

Methyl Mercury Results for NTS

Reported: February 02, 2006

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

Quality Control Data - Preparation Blank Report

Analyte (ng/L)	PBW1	PBW2	PBW3	Mean	Std Dev	R.L
MeHg Batch A	0.014	0.007	0.015	0.012	0.004	**0.025**
MeHg Batch B	0.000	0.009	0.003	0.004	0.005	**0.025**

St. Dev. = Standard Deviation

R.L.= Reporting Limit

Quality Control Data - Certified Reference Material Report

Analyte (ng/L)	CRM Identity	Cert. Value	Obs. Value	% Rec.
MeHg Batch A	DORM - 2	4470	5340	**119.5**
MeHg Batch B	DORM - 2	4470	4096	**91.6**

CRM Identity = Certified reference material identity

Cert. Value = Certified value

Obs. Value = Experimental result

% Rec. = Percent recovery

Methyl Mercury Results for NTS

Reported: February 02, 2006

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

Quality Control Data - Duplicate Report

Analyte (ng/L)	Sample QC'd	Rep. 1	Rep. 2	Mean	RPD
MeHg Batch A	**S053561341**	<0.025	<0.025	NC	**NC**
MeHg Batch B	**S053561343**	<0.025	<0.025	NC	**NC**

RPD = Relative Percent Difference

Quality Control Data - Matrix Spike / Matrix Spike Duplicate Report

Analyte (ng/L)	Sample QC'd	Mean	Spike Level	MS	% Rec.	Spike Level	MSD	% Rec.	RPD
MeHg Batch A	**S053561341**	<0.025	2.000	1.903	**95.2**	2.000	1.903	**95.2**	**0.0**
MeHg Batch B	**S053561342**	0.035	2.000	1.952	**95.9**	2.000	1.948	**95.7**	**0.2**

MS = Matrix Spike

MSD = Matrix Spike Duplicate

FGS notes: ~~FEDEX~~ UPS 12 559 711 15 5505 1324
Cooler Temp: 0.0 °C VTSR: 7:00 am COC seal = yes intact
Temp Blank temp: 1.8 °C
Client specific containers

Chain of Custody Record

Custody Name: NTS#6845 COC#63700

Samplers Signature:

Sample ID	Collected		Type	Location	Total #	Containers							Remarks
S053561343	12/22/2005		Grab	P-4 Trip Blank				1					Methyl Mercury
S053561342	12/22/2005		Grab	P-2 Trip Blank				1					Methyl Mercury
S053561341	12/22/2005	11:30:00 AM	Grab	P-4				1					Methyl Mercury
S053561327	12/22/2005	11:00:00 AM	Grab	P-2				1					Methyl Mercury

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	~~Relinquished By:~~ Received (Signature)	Date	Time	Received By: (Signature)
[signature]	12-22-05	13:55	[signature]	SMeyer FGS	12-23	710	

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Relinquished By: (Signature)	Date	Time	Received By: (Signature)

Relinquished By: (Signature)	Date	Time	Received for Laboratory By: (Signature)	Date	Time

Remarks

Split Sample

Signature

☐ Accepted ☐ Decline

Releasing Agency:

NTS
315 Chestnut Street
PO Box 1142
Virginia MN 55792-

12/22/2005 1:55:01 PM

Northeast Technical Services, Inc.
315 Chestnut Street
P.O. Box 1142
Virginia, Minnesota 55792
Phone: 218-741-4290
Fax: 218-742-1010

RECEIVED
FEB 10 2006
BARR ENGINEERING CO.

COC# 635700

Page _____ of _____
Date Due: _____

CHAIN OF CUSTODY RECORD

Client Information	Report to: Ward Swanson
Client: Barr Engineering	Address: 4700 W 77th St, Edina, MN 55435
Contact Person: Ward Swanson	
Address: 4700 W. 77th Street, Edina, MN	Invoice to: Tina Pint
Phone: 952-832-2600	Address: (same as above
Fax: 952-822-2601	
Project Information: 23/69-862 004 006	

Lab Use Only / Laboratory ID	Sample Description	Collection Date	Collection Time	Matrix Liquid	Matrix Solid	Matrix Other	Type Grab	Type Comp	Filtered	Analysis Required	Comments
1348 / S0535613 27	P-2	12/22	11:00	X			X				See labels on Jars and 12/22 email to R Stone From T Pint (Barr)
1346 / 1341	P-4	12/22	11:30	X			X				
1342	P-2 Trip BLK										
134A	P-2 field BLK										
1343	P-4 Trip BLK										* Dissolved metals need to be filtered in Lab
1344	P-4 field BLK										

Sampled By:	Date 12/22/05 Time	Received By:	Date Time	Received for Laboratory By:	Date 12-22-05 Time 12:50	NTS Project # 6845
Relinquished By:	Date 12/22/05 Time 12:50	Received By:	Date Time	Temperature on Arrival On Ice X 5.7 Degrees Celsius		Misc. Lab Information

Table 1. Proposed Parameters for Groundwater Sample Analysis. Detection limits in ug/L unless otherwise noted.

Description	Method	Detection Limit
Alkalinity, Total as CaCO3	EPA 310.1	10 mg/L
Carbon, Total Organic	EPA 415.1	1 mg/L
Chemical Oxygen Demand	STD METH 5220D, 18TH ED	10 mg/L
Chloride	EPA 325.2	0.5 mg/L
Cyanide Total	EPA 335.2	0.02 mg/L
Fluoride	EPA 340.1	0.1 mg/L
Hardness, Total (calculated)	EPA 200.7	1 mg/L
Nitrogen, Ammonia	EPA 350.1	0.1 mg/L
Nitrogen, Nitrate + Nitrite	EPA 353.2	0.1 mg/L
pH	EPA 150.1	0.1 SU
Phosphorus, Total	EPA 365.2	0.1 mg/L
Sulfate	EPA 375.4	1 mg/L
Aluminum, Total	EPA 200.7	25
Aluminum, Dissolved	EPA 200.7	25
Antimony, Total	EPA 204.2	3
Arsenic, Total	EPA 200.8	2
Barium, Total	EPA 200.7	10
Beryllium, Total	EPA 210.2	0.2
Boron, Total	EPA 200.7	35
Cadmium, Total	EPA 213.2	0.2
Cadmium, Dissolved	EPA 213.2	0.2
Calcium, Total	EPA 200.7	0.5 mg/L
Chromium, Total	EPA 218.2	1
Chromium, Dissolved	EPA 218.2	1
Cobalt, Total	EPA 219.2	1
Copper, Total	EPA 220.2	2
Copper, Dissolved	EPA 220.2	2
Iron, Total	EPA 200.7	0.05 mg/L
Lead, Total	EPA 7421	1
Magnesium, Total	EPA 200.7	0.5 mg/L
Manganese, Total	EPA 200.7	0.03 mg/L
Mercury, Low Level Total	EPA 1631E	2 ng/L
Methyl Mercury, Total	EPA 1631E	0.02 ng/L
Molybdenum, Total	EPA 246.2	5
Molybdenum, Dissolved	EPA 246.2	5
Nickel, Total	EPA 249.2	2

Description	Method	Detection Limit
Nickel, Dissolved	EPA 249.2	2
Palladium, Total	EPA 200.7	25
Platinum, Total	EPA 200.7	25
Potassium, Total	EPA 200.7	1 mg/L
Selenium, Total	EPA 270.2	2
Selenium, Dissolved	EPA 270.2	2
Silver, Total	EPA 272.2	1
Silver, Dissolved	EPA 272.2	1
Sodium, Total	EPA 200.7	0.5 mg/L
Strontium, Total	EPA 200.7	4
Thallium, Total	EPA 279.2	2
Titanium, Total	EPA 283.2	10
Zinc, Total	EPA 200.7	10
Zinc, Dissolved	EPA 200.7	10

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S060051350	**Project #:** 6845	**Sampler:** Client	**Type:** Grab
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63931	
Descript: PolyMet		**Sampled:** 1/5/2006 11:50 AM	
Location: P-1		**Completed:** 02/07/2006	

RECEIVED
FEB 10 2006
BARR ENGINEERING CO.

Notes: 23/69-862

Analyte	Analysis Date	Result	Units	RL	Method
Alkalinity, Total as CaCO3	1/10/2006	<10	mg/L	10	310.1
Aluminum	1/10/2006	59.1	ug/L	25	200.7
Antimony	1/19/2006	<3	ug/L	3	204.2
Arsenic	1/10/2006	2.2	ug/L	2	206.2
Barium	1/10/2006	<10	ug/L	10	6010B/200.7
Beryllium	1/18/2006	<0.2	ug/L	0.2	210.2
Boron	1/10/2006	518	ug/L	35	200.7
Cadmium	1/18/2006	<0.2	ug/L	0.2	213.2
Calcium	1/10/2006	6.2	mg/L	2	200.7
Chloride	1/6/2006	6.6	mg/L	0.5	325.2
Chromium	1/17/2006	1.9	ug/L	1	218.2
Cobalt	1/17/2006	<1	ug/L	1	219.2
COD	1/19/2006	<10	mg/L	10	SM 5220-D
Copper	1/19/2006	<2	ug/L	2	220.2
Cyanide	1/11/2006	<0.02	mg/L	0.02	335.2
Fluoride	1/13/2006	1.1	mg/L	0.1	300.0
Hardness (Calculated)	1/18/2006	15	mg/L	1	200.7
Iron	1/10/2006	0.1	mg/L	0.05	200.7
Lead	1/17/2006	<1	ug/L	1	239.2
Magnesium	1/10/2006	<2	mg/L	2	200.7
Manganese	1/10/2006	0.01	mg/L	0.01	200.7
Mercury, Low Level	1/16/2006	<0.5	ng/L	0.5	1631E

Approved By: _____
Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S060051350	**Project #:** 6845	**Sampler:** Client	**Type:** Grab
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63931	
Descript: PolyMet		**Sampled:** 1/5/2006 11:50 AM	
Location: P-1		**Completed:** 02/07/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/5/2006	<0.025	ng/L	0.025	1631E
Molybdenum, GF	1/11/2006	<5	ug/L	5	246.2
Nickel	1/19/2006	<2	ug/L	2	249.2
Nitrogen, Ammonia	1/11/2006	<0.1	mg/L	0.1	350.1
Nitrogen, Nitrate + Nitrite	1/10/2006	<0.1	mg/L	0.1	353.2
Palladium	1/12/2006	<0.1	ug/L	0.1	200.8
pH	1/5/2006	8.5	SU	0.1	150.1
Phosphorous, Total	1/12/2006	<0.1	mg/L	0.1	365.4
Platinum	1/12/2006	<0.02	ug/L	0.02	200.8
Potassium	1/10/2006	1.2	mg/L	0.2	200.7
Selenium, GF	1/10/2006	<2	ug/L	2	270.2
Silver	1/17/2006	<1	ug/L	1	272.2
Sodium	1/10/2006	43.9	mg/L	10	200.7
Strontium	1/10/2006	33.4	ug/L	5	200.7
Sulfate	1/30/2006	1200	mg/L	1	375.4
Thallium	1/19/2006	<2	ug/L	2	279.2
Titanium	1/18/2006	<10	ug/L	10	283.2
TOC	1/10/2006	2.3	mg/L	1	415.1
Zinc	1/10/2006	17.9	ug/L	10	200.7

Approved By: _____

Project Manager:

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S060051355 **Project #:** 6845
Client: Barr Engineering
Study: Consultant
Descript: PolyMet
Location: P-3

Sampler: Client **Type:** Grab
Status: Normal **Matrix:** Liquid
NTS COC No: 63931
Sampled: 1/5/2006 11:15 AM
Completed: 02/07/2006

Notes:

** Cyanide analyzed at MVTL Laboratories.*

Analyte	Analysis Date	Result	Units	RL	Method
Alkalinity, Total as CaCO3	1/10/2006	97.2	mg/L	10	310.1
Aluminum	1/10/2006	<25	ug/L	25	200.7
Antimony	1/19/2006	<3	ug/L	3	204.2
Arsenic	1/10/2006	<2	ug/L	2	206.2
Barium	1/10/2006	<10	ug/L	10	6010B/200.7
Beryllium	1/18/2006	<0.2	ug/L	0.2	210.2
Boron	1/10/2006	76.3	ug/L	35	200.7
Cadmium	1/18/2006	<0.2	ug/L	0.2	213.2
Calcium	1/10/2006	20.4	mg/L	2	200.7
Chloride	1/6/2006	2.1	mg/L	0.5	325.2
Chromium	1/17/2006	1.2	ug/L	1	218.2
Cobalt	1/17/2006	<1	ug/L	1	219.2
COD	1/19/2006	485	mg/L	10	SM 5220-D
Copper	1/19/2006	<2	ug/L	2	220.2
Cyanide	1/11/2006	*<0.02	mg/L	0.02	335.2
Fluoride	1/31/2006	0.64	mg/L	0.05	300.0
Hardness (Calculated)	1/18/2006	113	mg/L	1	200.7
Iron	1/10/2006	4.37	mg/L	0.25	200.7
Lead	1/17/2006	<1	ug/L	1	239.2
Magnesium	1/10/2006	15	mg/L	2	200.7
Manganese	1/10/2006	0.14	mg/L	0.01	200.7
Mercury, Low Level	1/16/2006	<0.5	ng/L	0.5	1631E

Approved By:

Project Manager:

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID: S060051355	**Project #:** 6845	**Sampler:** Client	**Type:** Grab
Client: Barr Engineering		**Status:** Normal	**Matrix:** Liquid
Study: Consultant		**NTS COC No:** 63931	
Descript: PolyMet		**Sampled:** 1/5/2006 11:15 AM	
Location: P-3		**Completed:** 02/07/2006	

Notes:

** Cyanide analyzed at MVTL Laboratories.*

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/5/2006	<0.025	ng/L	0.025	1631E
Molybdenum, GF	1/11/2006	<5	ug/L	5	246.2
Nickel	1/19/2006	<2	ug/L	2	249.2
Nitrogen, Ammonia	1/11/2006	<0.1	mg/L	0.1	350.1
Nitrogen, Nitrate + Nitrite	1/10/2006	<0.1	mg/L	0.1	353.2
Palladium	1/1/121	0.3	ug/L	0.1	200.8
pH	1/5/2006	6.6	SU	0.1	150.1
Phosphorous, Total	1/12/2006	<0.1	mg/L	0.1	365.4
Platinum	1/12/2006	<0.02	ug/L	0.02	200.8
Potassium	1/10/2006	2.1	mg/L	0.2	200.7
Selenium, GF	1/10/2006	<2	ug/L	2	270.2
Silver	1/17/2006	<1	ug/L	1	272.2
Sodium	1/10/2006	7.5	mg/L	2	200.7
Strontium	1/10/2006	75.2	ug/L	5	200.7
Sulfate	1/30/2006	32.9	mg/L	1	375.4
Thallium	1/19/2006	<2	ug/L	2	279.2
Titanium	1/18/2006	<10	ug/L	10	283.2
TOC	1/10/2006	7.6	mg/L	1	415.1
Zinc	1/10/2006	11.3	ug/L	10	200.7

Approved By: _____

Project Manager:

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID:	S060051356	**Project #:** 6845	**Sampler:** Client	**Type:** Grab - Filtered	
Client:	Barr Engineering		**Status:** Normal	**Matrix:** Liquid	
Study:	Consultant		**NTS COC No:** 63931		
Descript:	PolyMet		**Sampled:** 1/5/2006 11:50 AM		
Location:	P-1		**Completed:** 01/18/2006		

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Aluminum	1/11/2006	<25	ug/L	25	200.7
Cadmium	1/10/2006	<0.2	ug/L	0.2	213.2
Chromium	1/14/2006	<1	ug/L	1	218.2
Copper	1/14/2006	<2	ug/L	2	220.2
Molybdenum, GF	1/17/2006	<5	ug/L	5	246.2
Nickel	1/14/2006	<2	ug/L	2	249.2
Selenium, GF	1/10/2006	<2	ug/L	2	270.2
Silver	1/14/2006	<1	ug/L	1	272.2
Zinc	1/6/2006	<25	ug/L	25	200.7

Approved By: _____

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

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"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID:	S060051359	**Project #:**	6845	**Sampler:** Client	**Type:** Grab - Filtered
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63931	
Descript:	PolyMet			**Sampled:** 1/5/2006 11:15 AM	
Location:	P-3			**Completed:** 01/17/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Aluminum	1/11/2006	<25	ug/L	25	200.7
Cadmium	1/10/2006	<0.2	ug/L	0.2	213.2
Chromium	1/14/2006	<1	ug/L	1	218.2
Copper	1/14/2006	<2	ug/L	2	220.2
Molybdenum, GF	1/17/2006	<5	ug/L	5	246.2
Nickel	1/14/2006	<2	ug/L	2	249.2
Selenium, GF	1/10/2006	<2	ug/L	2	270.2
Silver	1/14/2006	<1	ug/L	1	272.2
Zinc	1/6/2006	<25	ug/L	25	200.7

Approved By: _____

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

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Sample ID:	S06005135A	**Project #:**	6845	**Sampler:** Client	**Type:** Grab - Filtered
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63931	
Descript:	PolyMet			**Sampled:** 1/5/2006 11:50 AM	
Location:	P-1 Field Blank			**Completed:** 01/18/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, LL Field Blank	1/16/2006	0.3	ng/L	0.2	1631E

Approved By:

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Northeast Technical Services, Inc. makes no warranty except that the analysis has been made upon the samples received in accordance with generally accepted testing laboratory principles and practices. The results of the analysis may not be characteristic of the whole from which the sample was taken. This warranty is in lieu of all other warranties either expressed or implied.

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID:	S060051401	**Project #:**	6845	**Sampler:** Client	**Type:** Grab - Filtered
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63931	
Descript:	PolyMet			**Sampled:** 1/5/2006 11:15 AM	
Location:	P-3 Field Blank			**Completed:** 01/18/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, LL Field Blank	1/16/2006	<0.2	ng/L	0.2	1631E

Approved By:

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Northeast Technical Services, Inc. makes no warranty except that the analysis has been made upon the samples received in accordance with generally accepted testing laboratory principles and practices. The results of the analysis may not be characteristic of the whole from which the sample was taken. This warranty is in lieu of all other warranties either expressed or implied.

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID:	S060051402	**Project #:**	6845	**Sampler:** Client	**Type:** Grab - Filtered
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63931	
Descript:	PolyMet			**Sampled:** 1/5/2006 11:15 AM	
Location:	P-3 Trip Blank			**Completed:** 02/07/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/5/2006	<0.025	ng/L	0.025	1631E

Approved By: _____

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

Northeast Technical Services, Inc. makes no warranty except that the analysis has been made upon the samples received in accordance with generally accepted testing laboratory principles and practices. The results of the analysis may not be characteristic of the whole from which the sample was taken. This warranty is in lieu of all other warranties either expressed or implied.

"Solutions for Technical Concerns"

MDH Laboratory # 027-137-157

Sample ID:	S06005140A	**Project #:**	6845	**Sampler:** Client	**Type:** Grab - Filtered
Client:	Barr Engineering			**Status:** Normal	**Matrix:** Liquid
Study:	Consultant			**NTS COC No:** 63931	
Descript:	PolyMet			**Sampled:** 1/5/2006 11:50 AM	
Location:	P-1 Trip Blank			**Completed:** 02/07/2006	

Notes:

Analyte	Analysis Date	Result	Units	RL	Method
Mercury, Methyl	1/5/2006	<0.025	ng/L	0.025	1631E

Approved By:

Project Manager:

Analyses were performed by methods approved by the U.S. Environmental Protection Agency and the Minnesota Department of Health.

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Frontier GeoSciences Inc.

414 Pontius Ave N
Seattle, WA 98109

206-622-6960
fax 206-622-6870

February 02, 2006

Laura Lubahn
Northeast Technical Services
315 Chestnut Street
P.O. Box 1142
Virginia, MN 55792

Dear Ms. Lubahn,

Enclosed are the results for methyl Hg in the water samples collected on January 05, 2006. The samples were received by Frontier GeoSciences in good condition on January 06, 2006 within a sealed cooler at a temperature of 0.2°C.

Immediately following sample receipt, the samples for methyl mercury were preserved to 0.4% (v/v) hydrochloric acid and placed in a refrigerated storage unit with a temperature below 4°C. Methyl mercury in water analysis was determined by distillation, aqueous phase ethylation, isothermal GC separation, and CVAFS detection according to Frontier's standard operating procedure (SOP) FGS-070. The samples were analyzed on January 24, 2006.

There were no analytical issues associated with the report.

Please feel free to contact me with any questions regarding this report.

Sincerely,

Stephanie Grant for
Kristina Spadafora
Project Manager
StephanieG@FrontierGeoSciences.com

Kristina

Chain of Custody Record

Custody Name: NTS#6845 COC#63931

Samplers Signature:

Sample ID	Collected		Type	Location	Total #	Containers	Remarks
S06005140A	1/5/2006	11:50:00 AM	Grab - Filtered	P-1 Trip Blank			Methyl Mercury
S060051402	1/5/2006	11:15:00 AM	Grab - Filtered	P-3 Trip Blank			Methyl Mercury
S060051355	1/5/2006	11:15:00 AM	Grab	P-3			Methyl Mercury
S060051350	1/5/2006	11:50:00 AM	Grab	P-1			Methyl Mercury

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Relinquished By: (Signature)	Date	Time	Received By: (Signature)
[signature]	1-5-06	14:25					
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Relinquished By: (Signature)	Date	Time	Received By: (Signature)
Relinquished By: (Signature)	Date	Time	Received for Laboratory By: (Signature)	Date	Time	Remarks	
			E. Goetz	01/06/06	10:25		

Releasing Agency:

NTS
315 Chestnut Street
PO Box 1142
Virginia **MN** **55792-**

Cooler Temp: 0.2 °C
Coc seal: Intact

UPS Track: 1Z559 711 01 5537 4243

Split Sample

Signature

☐ Accepted ☐ Decline

1/5/2006 2:16:23 PM

VTSR: 10:25

Methyl Mercury Results for NTS

Reported: February 02, 2006

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

Sample ID	Date collected	MeHg ng/L
S06005140A	01/05/06	<0.025
S060051402	01/05/06	<0.025
S060051355	01/05/06	<0.025
S060051350	01/05/06	<0.025
Reporting Limit		**0.025**

Methyl Mercury Results for NTS

Reported: February 02, 2006

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

Quality Control Data - Preparation Blank Report

Analyte (ng/L)	PBW1	PBW2	PBW3	Mean	Std Dev	R.L
MeHg	0.000	0.009	0.003	0.004	0.005	**0.025**

St. Dev. = Standard Deviation

R.L.= Reporting Limit

Quality Control Data - Certified Reference Material Report

Analyte (ng/L)	CRM Identity	Cert. Value	Obs. Value	% Rec.
MeHg	DORM - 2	4470	4100	**91.7**

CRM Identity = Certified reference material identity

Cert. Value = Certified value

Obs. Value = Experimental result

% Rec. = Percent recovery

Methyl Mercury Results for NTS

Reported: February 02, 2006

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

Quality Control Data - Duplicate Report

Analyte (ng/L)	Sample QC'd	Rep. 1	Rep. 2	Mean	RPD
MeHg	**S053561343**	<0.025	<0.025	NC	**NC**

RPD = Relative Percent Difference

Quality Control Data - Matrix Spike / Matrix Spike Duplicate Report

Analyte (ng/L)	Sample QC'd	Mean	Spike Level	MS	% Rec.	Spike Level	MSD	% Rec.	RPD
MeHg	**Batch QC**	0.035	2.000	1.952	**95.9**	2.000	1.948	**95.7**	**0.2**

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RECEIVED
FEB 10 2006
BARR ENGINEERING CO.

Northeast Technical Services, Inc.
315 Chestnut Street
P.O. Box 1142
Virginia, Minnesota 55792
Phone: 218-741-4290
Fax: 218-742-1010

COC# 103931

Page 1 of 1
Date Due:

CHAIN OF CUSTODY RECORD

Client Information	Report to: Tina Pint
Client: Barr Engineering	Address: Same
Contact Person: Tina Pint	
Address: 4700 W 77th St Minneapolis, MN 55435	Invoice to: Tina Pint
Phone: 952-832-2692	Address: Same
Fax: 952-832-2601	
Project Information:	

Analyses Listed on Bottles

Lab Use Only Laboratory ID	Sample Description	Collection Date	Collection Time	Matrix Liquid	Matrix Solid	Matrix Other	Type Grab	Type Comp	Filtered	Analysis Required	Comments
S060051350 1356	P-1	1/5/06	11:50	X			X		X	X	
1355 1359	P-3	1/5/06	11:15	X			X		X	X	
135A	P-1 Field Blank										
1401	P-3 Field Blank										
140A	P-1 Trip Blank										
1402	P-3 Trip Blank										

Sampled By:	Date	Received By:	Date	Received for Laboratory By:	Date	NTS Project #
Jere Mohr	Time		Time	[signature]	Time 13:25	6845
Relinquished By: [signature]	Date 1/5/06	Received By:	Date	Temperature on Arrival		Misc. Lab Information
	Time 13:25		Time	On Ice X 2.9 Degrees Celsius		

Table 1. Proposed Parameters for Groundwater Sample Analysis. Detection limits in ug/L unless otherwise noted.

Description	Method	Detection Limit
Alkalinity, Total as CaCO3	EPA 310.1	10 mg/L
Carbon, Total Organic	EPA 415.1	1 mg/L
Chemical Oxygen Demand	STD METH 5220D, 18TH ED	10 mg/L
Chloride	EPA 325.2	0.5 mg/L
Cyanide Total	EPA 335.2	0.02 mg/L
Fluoride	EPA 340.1	0.1 mg/L
Hardness, Total (calculated)	EPA 200.7	1 mg/L
Nitrogen, Ammonia	EPA 350.1	0.1 mg/L
Nitrogen, Nitrate + Nitrite	EPA 353.2	0.1 mg/L
pH	EPA 150.1	0.1 SU
Phosphorus, Total	EPA 365.2	0.1 mg/L
Sulfate	EPA 375.4	1 mg/L
Aluminum, Total	EPA 200.7	25
Aluminum, Dissolved	EPA 200.7	25
Antimony, Total	EPA 204.2	3
Arsenic, Total	EPA 200.8	2
Barium, Total	EPA 200.7	10
Beryllium, Total	EPA 210.2	0.2
Boron, Total	EPA 200.7	35
Cadmium, Total	EPA 213.2	0.2
Cadmium, Dissolved	EPA 213.2	0.2
Calcium, Total	EPA 200.7	0.5 mg/L
Chromium, Total	EPA 218.2	1
Chromium, Dissolved	EPA 218.2	1
Cobalt, Total	EPA 219.2	1
Copper, Total	EPA 220.2	2
Copper, Dissolved	EPA 220.2	2
Iron, Total	EPA 200.7	0.05 mg/L
Lead, Total	EPA 7421	1
Magnesium, Total	EPA 200.7	0.5 mg/L
Manganese, Total	EPA 200.7	0.03 mg/L
Mercury, Low Level Total	EPA 1631E	2 ng/L
Methyl Mercury, Total	EPA 1631E	0.02 ng/L
Molybdenum, Total	EPA 246.2	5
Molybdenum, Dissolved	EPA 246.2	5
Nickel, Total	EPA 249.2	2

Description	Method	Detection Limit
Nickel, Dissolved	EPA 249.2	2
Palladium, Total	EPA 200.7	25
Platinum, Total	EPA 200.7	25
Potassium, Total	EPA 200.7	1 mg/L
Selenium, Total	EPA 270.2	2
Selenium, Dissolved	EPA 270.2	2
Silver, Total	EPA 272.2	1
Silver, Dissolved	EPA 272.2	1
Sodium, Total	EPA 200.7	0.5 mg/L
Strontium, Total	EPA 200.7	4
Thallium, Total	EPA 279.2	2
Titanium, Total	EPA 283.2	10
Zinc, Total	EPA 200.7	10
Zinc, Dissolved	EPA 200.7	10