# Phase III Hydrogeologic Investigation

# RS10A – Hydrogeological – Drill Hole Monitoring and Data Collection – Phase 3

PolyMet Mining, Inc.

March 2007

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# RS10A – Hydrogeological – Drill Hole Monitoring and Data Collection – Phase 3 Phase III Hydrogeologic Investigation NorthMet Mine Site March 2007

## **Table of Contents**

1.0		Introduction	1				
	1.1	Background	1				
	1.2	Scope of Work					
	1.3	Report Organization	2				
2.0		Aquifer Performance Testing	3				
	2.1	Field Activities and Data Collection Methodology					
		2.1.1 Pumping Test					
		2.1.2 Specific Capacity Tests					
	2.2	Field Investigation Observations and Results					
		2.2.1 Pumping Tests					
		2.2.2 Specific Capacity Tests					
3.0		Groundwater Sampling	8				
	3.1	Sampling Methodology					
	3.2	Analytical Results					
	3.3	Quality Assurance					
4.0		Summary and Conclusions	12				

### Table of Contents (continued)

#### List of Tables

- Table 1Field Parameters for P-2 Sampling
- Table 2Isotope Data Summary
- Table 3Analytical Data Summary

#### **List of Figures**

- Figure 1 Mine Site Layout
- Figure 2 Pumping and Observation Locations Phase III Hydrogeologic Investigation
- Figure 3 Pre-Pumping Test Water Levels
- Figure 4 Observer Drawdown and Recovery in Wetland Piezometers
- Figure 5 Drawdown and Recovery in 20P Corrected for Regional Water Level Changes
- Figure 6 Pumping Test Analysis
- Figure 7 Specific Capacity Test Analysis P-3
- Figure 8 Specific Capacity Test Analysis P-4 Step 1
- Figure 9 Specific Capacity Test Analysis P-4 Step 2
- Figure 10 Groundwater Sampling Locations
- Figure 11 P-2 Isotope Data Compared to Regional Precipitation Data

#### List of Appendices

- Appendix A Work Plan
- Appendix B Field Sampling Data Sheets

#### **Supplemental Electronic Data**

Aquifer Test Groundwater Elevation Data (available upon request)

Groundwater Analytical Data Reports (available upon request)

#### List of RS Documents Referenced

- RS02 Hydrogeological Drill hole monitoring and data collection Phase 1
- RS10 Hydrogeological Drill hole monitoring and data collection Phase 2
- RS44 Wetlands Hydrology Study (baseline)

# **1.0 Introduction**

This report was prepared for PolyMet Mining Inc (PolyMet) by Barr Engineering Company (Barr) to document the results of the Phase III Hydrogeologic Investigation that was conducted at PolyMet's NorthMet mine site (the Mine Site)(Figure 1). The objectives of this work were to evaluate the possible effects of mine dewatering on the wetland areas in the vicinity of the Mine Site, to gather additional specific-capacity data for wells completed in the Virginia Formation, and to gather additional water-quality data for groundwater within the surficial deposits, the Virginia Formation, and the Duluth Complex.

# 1.1 Background

A scoping Environmental Assessment Worksheet (EAW) was submitted in June 2005 for PolyMet's proposed NorthMet Mine and Ore Processing Facility, located near Hoyt Lakes, Minnesota. The NorthMet deposit is in the Duluth Complex, a large mafic intrusion that was emplaced into flood basalts along a portion of the Middle Proterozoic Midcontinent Rift System. Underlying the Duluth Complex at NorthMet is the sedimentary Lower Proterozoic Virginia Formation, which in turn, is underlain by the Biwabik Iron-Formation. The Biwabik Iron-Formation will not be intersected during mining operations. The Virginia Formation will likely form a portion of the footwall of the proposed mine pits.

Based on coring data collected by PolyMet, the bedrock surface appears to be hummocky at the Mine Site. Much of the Mine Site is covered by peat/wetland deposits, with the remaining area covered by rolling to undulating topography formed from Wisconsin Rainey Lobe drift. Rainey Lobe drift is generally a bouldery till with high clay content. In the region, only the Embarrass River basin northwest of the Mine Site and the Dunka River basins northeast of the Mine Site appear to have significant quantities of outwash (sand and gravel), with thicknesses greater than 100 feet (Olcott and Siegel, 1978). Elsewhere in the region, including the Mine Site, the surficial deposits form a thin cover over the bedrock.

Two phases of hydrogeologic investigations were previously performed at the Mine Site (RS02 and RS10). The Phase I Hydrogeologic Investigation (Barr, 2006a) studied the hydrogeologic properties and water quality of the Duluth Complex and the surficial deposits. The Phase II Hydrogeologic Investigation (Barr, 2006b) studied the hydrogeologic properties and water quality of the Virginia Formation.

A baseline wetland hydrology study has been implemented at the Mine Site (RS44) and will continue into the future. The objective of this study is to gain a better understanding of the wetland hydrology at the Mine Site, collect baseline hydrology data, and determine the potential for indirect wetland impacts resulting from the project. As part of this work, 24 shallow wetland monitoring wells were installed at the Mine Site. The Phase III Hydrogeologic Investigation was designed, in part, to help determine the potential interaction between the wetlands and the bedrock, which will assist in predicting the potential for indirect wetland impacts resulting from the proposed mine pits.

## 1.2 Scope of Work

Three main activities were conducted during this phase of investigation at the Mine Site:

- pumping test to evaluate the connectivity of the bedrock and the surficial deposits;
- specific capacity tests to evaluate potential vertical variability of hydraulic conductivity in the Virginia Formation; and
- groundwater sampling to further characterize water quality within the surficial deposits, the Virginia Formation, and the Duluth Complex.

All work was performed in accordance with the Work Plan (Appendix A) unless noted otherwise. The most significant change to the work plan that was made was the duration of pumping for the pumping test, which was increased from 10 days to 30 days. This change was made at the request of the Minnesota Department of Natural Resources.

# 1.3 Report Organization

This report is organized into four sections, including this introduction. Section 2 summarizes the field activities, data collection methodology, and results from the aquifer performance tests. Section 3 presents the groundwater sampling methodology and results. A summary of the investigation and conclusions are presented in Section 4.

# 2.1 Field Activities and Data Collection Methodology

## 2.1.1 Pumping Test

A 30-day aquifer performance test (i.e., pumping test) was conducted in pumping well P-2. Water levels in pumping well P-2 and six observation wells, Ob-2, 20, 20P, 2P, 12, and 12P, were monitored using pressure transducers and data loggers for 10 days prior to pumping, 30 days during pumping, and 10 days after pumping. Pumping and observation well locations are shown on Figure 2.

Pumping well P-2, completed within the Virginia Formation, and observation well Ob-2, completed within the Duluth Complex, were previously installed during the Phase II Investigation. Observation wells 20, 20P, 2P, 12, and 12P were previously installed in the muck/peat layer in the wetland north of P-2 as part of the Wetland Hydrology Study, which was conducted concurrently with this investigation. Pumping well P-2 is 610 feet deep, observation well Ob-2 is 100 feet deep, observation wells 20P, 2P, and 12P are approximately 7.5 feet deep, and observation wells 20 and 12 are 2.4 and 3 feet deep, respectively.

Water levels were measured using LevelTroll and miniTroll data logging probes, both manufactured by In Situ, Inc. The probes automatically measured and recorded water levels in the wells and also automatically corrected for changes in atmospheric pressure. Background water levels in the pumping well were measured and recorded by the Trolls every hour for 10 days prior to pumping, every 30 minutes during the 30-day pumping test, and every 30 minutes during the 10-day recovery. Additionally, manual water levels were measured at least twice daily during the 30-day pumping test.

A submersible pump was placed in pumping well P-2 at a depth of 302 feet below ground surface (bgs). An inline flowmeter was used to measure pumping rates. In order to avoid hydraulic interference with the pumping test, discharge water was routed via hoses 3000 feet to a down-slope upland (i.e. non-wetland) area shown in Figure 2.

Pumping began on October 19, 2006 at a flow rate of 25 gallons per minute (gpm). After pumping for 4 hours, the flow rate was decreased to 23 gpm. Because the water level continued to drop for the next two days, on October 21, 2006 the flow rate was again decreased to approximately 22 gpm. On November 1, 2006, pumping was briefly interrupted to change generators. With the change in

generators, the pumping rate changed to approximately 20 gpm. Two days later, on November 3, 2006, the flow rate was increased to approximately 21.5 gpm; pumping continued at that flow rate until the pump was turned off on November 18, 2006.

The pump was pulled from pumping well P-2 two days after pumping ended and the pump, drop pipe, and cable were cleaned with Liquinox after use. Trolls in all seven wells were left in place to monitor the recovery and were pulled ten days after pumping ended. Water level data from the logging probes is included as supplemental electronic data.

### 2.1.2 Specific Capacity Tests

Specific capacity tests were conducted in isolated vertical intervals in pumping wells P-3 and P-4 (Figure 2), using a packer assembly and a submersible pump. In order to isolate the upper half of the well from the lower half, a 2.5 foot long packer was set at approximately the midpoint of the well and the pump was set above the packer assembly. The upper half of the well was pumped at a steady rate until the water level became relatively stable. The pumping rate was then increased and the test ran until the water level again stabilized. Both tests lasted approximately four hours.

Water levels were monitored both above and below the packer assembly, using LevelTroll data logging probes, manufactured by In Situ, Inc. The probes automatically measured and recorded water levels in the wells and also automatically corrected for changes in atmospheric pressure; however the Troll below the packer at pumping well P-4 did not correct for changes in atmospheric pressure. Trolls above the packer recorded water levels on a log cycle with a maximum of 10 minutes between readings. Trolls below the packer recorded during the tests at least every 5 minutes. Additionally, manual water levels were recorded during the tests at least every 20 minutes for the zone above the packer assembly. Discharge water was routed via hoses 1,000 feet to a down-slope upland (i.e. non-wetland) area. An in-line flowmeter was used to measure pumping rates. Water level data from the logging probes are included as supplemental electronic data.

Pumping well P-3, installed during the Phase II Investigation, is 610 feet deep and is completed within the Virginia Formation. The packer assembly was placed in the well at an approximate depth of 301.5 – 304 feet below ground surface (bgs). The packer was inflated to 290 psi at 13:39 on October 17, 2006. Pumping began at 13:44 at a flow rate of 27 gpm. At 13:47, three minutes after beginning the test, the pumping rate was turned down to 19.2-19.4 gpm. At 16:08, after 2.4 hours of pumping, the water level was relatively stable and the pumping rate was increased to 25 gpm. Because a higher pumping rate was desired, the pumping rate was again increased at 16:09 to 37.5-

39.5 gpm. At 17:43, after 1.6 hours of pumping at the increased rate, the water level again stabilized and the test was terminated. Packer deflation and pump removal began shortly thereafter. The pump, drop pipe, and cable were cleaned with Liquinox after use.

Pumping well P-4, installed during the Phase II Investigation, is 485 feet deep and is completed within the Virginia Formation. The packer assembly was intended to be placed in this well at an approximate depth of 242 feet bgs. However, an obstruction was encountered approximately 207 feet bgs. As a result, the packer was placed at an approximate depth interval of 198.8 – 201.3 feet bgs. The packer was inflated to 290 psi at 15:38 on November 21, 2006. Pumping began at 15:50 at a flow rate of 17 gpm. At 15:52, two minutes after beginning the test, the pumping rate was increased. At 15:55, three minutes later, the pumping rate was again increased to 19.2-20.6 gpm. At 17:52, after 2.0 hours of pumping, the water level was relatively stable and the pumping rate was increased to 37 gpm. At 19:49, after 2.0 hours of pumping at the increased rate, the water level again stabilized and the test was terminated. Packer deflation and pump removal began shortly thereafter.

# 2.2 Field Investigation Observations and Results

#### 2.2.1 Pumping Tests

Data collected prior to pumping are shown on Figure 3. Overall, water levels rose during the prepumping test period at each of the monitoring locations. Throughout the pre-test period, the responses of piezometers 12 and 20 (both screened in the shallow wetland deposits) are strongly correlated, with a gradual fall in water levels for the first 5 days of monitoring. Both appear to respond with an increase in water levels following a precipitation event on October 11. Following this, water levels at both locations generally fall until an abrupt rise in water levels on October 16. This rise does not correlate with a known precipitation event. Following the abrupt rise, the water levels at these locations generally drop for the last 2 days of the pre-test monitoring period. The responses of the three wetland piezometers screened deeper in the wetland deposits (2P, 12P, and 20P) appear to correlate reasonably well throughout the pre-test period. Water levels in P-2 and Ob-2, completed in the bedrock aquifer, both show a general rise throughout the pre-test monitoring period. Superimposed on this overall rise are shorter period water-level fluctuations (on the scale of hours) that may be the result of "earth tides." Earth tides are caused by elastic deformation of the Earth as it rotates within the gravitational field of the Sun and Moon.

Pumping at P-2 commenced on October 19. During the pumping period, which lasted until November 18, most of the wetland piezometer locations showed a general decrease in water levels

(Figure 4). Water levels in wetland piezometer 2P fluctuated during the pumping period, but did not display the overall downward trend that was observed in the other piezometers. With the exception of 20P, the deep piezometer located closest to the pumping well, the decrease in water levels in the piezometers are not attributed to pumping. The decrease in water levels in the piezometers generally began on October 17, two days before the pump was turned on, and continued without a discernable change in trend following the start of pumping. When the pump was turned off, water levels in piezometers 2P, 12, 12P, and 20 continued to decrease for the remaining 10 days of the test. In contrast, the water level in piezometer 20P began to increase after the pump was turned off. Because water levels in piezometer 2P appeared to be unaffected by the pumping, data from piezometer 2P were used to filter out the background changes in water levels and to determine which portions of the observed drawdown at piezometers 20P were related to pumping. Results of this analysis are shown on Figure 5.

Pumping test data from P-2 and Ob-2 were evaluated using conventional time-drawdown analysis techniques. The aquifer testing software AQTESOLV (Hydrosolve, 2000) was used to perform the analysis. The pumping test data were analyzed using the Moench method (1984) for drawdown in an unconfined, fractured aquifer with slab shaped blocks (Figure 6). The Moench method is an analytical solution for predicting water-level displacements in response to pumping in a fractured aquifer assuming a dual-porosity model with slab-shaped matrix blocks, fracture skin, and wellbore skin. The Moench method assumes that the aquifer is of infinite areal extent, uniform thickness, and consists of a dual-porosity system with low-permeability, primary porosity blocks and high-permeability, secondary porosity fissures. The skin parameter allows for modeling of variable 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. 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.

The hydraulic conductivity of the fractures estimate obtained from this analysis is 0.047 feet/day. This value is consistent with results obtained during the Phase II Hydrogeologic Investigation (Barr 2006b) which estimated a hydraulic conductivity of 0.072 feet/day at pumping well P-2.

#### 2.2.2 Specific Capacity Tests

The specific capacity test data were analyzed using the Moench method (1984) for drawdown in an unconfined, fractured aquifer with slab shaped blocks. This is the same method that was used to

analyze pumping test data as part of the Phase II Hydrogeologic Investigation (RS10). For the test of pumping well P-3, a single set of aquifer parameters was able to match the drawdown data from both steps of the test (Figure 7). Analysis of this test data results in a value of hydraulic conductivity for the fractures in the upper 300 feet of the formation of 0.63 ft/day. The pumping test conducted using the entire 600 foot well had an average hydraulic conductivity value for the fractures of 0.4 ft/day. Each step from the test conducted in pumping well P-4 was analyzed separately and the results are shown on Figures 8 and 9. The calculated average hydraulic conductivity value for the upper 200 feet of the aquifer at P-4 was 0.7 ft/day. The pumping test conducted using the entire 485 foot well had an average hydraulic conductivity value of 0.33 ft/day.

# 3.1 Sampling Methodology

Groundwater samples for water-quality analyses were collected from the following permanent wells: monitoring wells MW-05-02, MW-05-08, MW-05-09, observation wells Ob-1, Ob-2, Ob-3, Ob-4, Ob-5, and pumping well P-2. Sampling locations are shown on Figure 10. Analytical reports from NTS are provided as supplemental data.

Monitoring wells MW-05-02, MW-05-08, and MW-05-09 were sampled in October and November 2006. These wells were installed during the Phase I Investigation and are screened in unconsolidated material. Observation wells Ob-1, Ob-2, Ob-3, Ob-4, and Ob-5 were sampled in October 2006. These wells were installed during the Phase II Investigation and are completed as open hole bedrock wells. All wells were developed after well construction. All wells were purged prior to sampling; purging was considered complete when the field measurements stabilized or when six borehole volumes of groundwater were evacuated. However, because MW-05-09 recovered very slowly, only one well volume was purged from the well, the well was allowed to recover, and the sample was collected. Field sampling data sheets are included in Appendix B. Groundwater samples were collected and placed into laboratory-supplied containers and submitted to Northeast Technical Services of Virginia, Minnesota (NTS) for laboratory analysis of general chemistry parameters, dissolved metals, and total metals.

Pumping well P-2 was sampled weekly for the duration of the 30-day pumping test in October and November 2006. Pumping well P-2 was installed during the Phase II Investigation and was completed as an open hole bedrock well. Groundwater samples were collected from a sampling spigot located on the discharge line, at the wellhead. Prior to collecting the sample, the sampling spigot was flushed by allowing it to flow for at least several minutes. Samples were collected by the Barr geologist on-site. Because the first sample from pumping well P-2 was collected after a week of pumping, purging was considered complete at the time the first sample was collected. Field parameters (temperature, conductivity, pH, ORP, and DO) were documented and are included in Table 1. Groundwater samples for laboratory analysis of general chemistry parameters, dissolved metals, and total metals were collected and placed into laboratory-supplied containers and submitted to NTS. Groundwater samples for laboratory analysis of  $\delta D$ ,  $\delta^{18}O$ , tritium, and  $\delta^{13}C$  of dissolved

inorganic carbon (DIC) were collected, filtered, and placed into laboratory-supplied containers and submitted to Isotech Laboratories, Inc. (Champaign, Illinois).

# 3.2 Analytical Results

Isotope analysis results of groundwater samples from pumping well P-2 are presented in Table 2. The data indicate that there was very little variability in water quality with time, with the exception of the delta carbon-13 of dissolved inorganic carbon ( $\delta^{13}$ C DIC), which increased as pumping progressed. The presence of tritium in the samples (2.77-3.82 TU) suggests that at least a portion of the water pumped is post-1952 water. The water isotope data was plotted with precipitation data from the Marcell Experimental Forest Northern Research Station, located approximately 70 miles west of the Mine Site. The precipitation data was used to estimate a meteoric water line for the Mine Site. The data from pumping well P-2 plots very near this inferred meteoric water line. This suggests that the source of the majority of the water that was pumped was aquifer recharge and not seepage from surface water features, such as the Peter Mitchell Pit or area wetlands. Evaporation from open water enriches the water in the heavier isotopes. Groundwater that is derived from seepage from surface water, as opposed to aquifer recharge, is expected to be enriched in oxygen-18 and deuterium and would not fall on the regional meteoric water line.

Analytical results of groundwater samples from monitoring wells MW-05-02, MW-05-08, MW-05-09, Ob-1, Ob-2, Ob-3, Ob-4, and Ob-5 and pumping well P-2 are presented in Table 3. 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. A hardness of 100 mg/l was used to derive the criteria.

The groundwater sample from monitoring well MW-05-08 exceeded the nitrogen (ammonia as N) and aluminum criteria, with concentrations of 420 ug/L and 2,620 ug/L, respectively. The sample from monitoring well MW-05-08 had exceedences of aluminum (27,100 ug/L), chromium (55 ug/L), cobalt (8.8 ug/L), copper (99.6 ug/L), and mercury (0.288 ug/L). The sample from observations well Ob-3 exceeded the aluminum and nickel criteria, with concentrations of 368 ug/L and 128 ug/L respectively. The pH criterion was exceeded in the observation well Ob-4 sample (6.1). The sample

from observation well Ob-5 had exceedences of pH (6.0), aluminum (181 ug/L) and mercury (0.0049 ug/L). The samples from well pumping well P-2 that were collected on November 7 and November 14, 2006 exceeded the zinc criteria (125 ug/L and 122 ug/L, respectively). The samples from monitoring well MW-05-08 and observation well Ob-2 exceeded the mercury criteria, with concentrations of 0.0016 ug/L. However, based on the blank data validation procedure, these detections are potential false positive values. There were no other exceedences of water quality criteria.

The groundwater samples collected weekly from pumping well P-2 during the pumping test showed some trends in water quality. In general, concentrations of calcium, magnesium, iron, manganese, potassium and strontium increased during the duration of the pumping test, while the concentrations of sulfate and boron decreased. These data suggest a decreasing redox potential for the source water. The decreasing redox potential is likely associated with the collection of water with longer flow paths or older water (i.e. water that has been in the subsurface longer).

## 3.3 Quality Assurance

A quality assurance and quality control (QA/QC) 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 analyses were performed by NTS, except methyl mercury, cyanide, palladium, platinum, and isotope analysis. All methyl mercury analyses were performed by Frontier Geosciences, Inc. located in Seattle, Washington. Minnesota Valley Testing Laboratories, located in New Ulm, Minnesota, performed all cyanide analyses. All palladium and platinum analyses were performed by Pace Analytical, located in Minneapolis, Minnesota. Isotech Laboratories, Inc., located in Champaign, Illinois performed all isotope analyses.

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*. For one data package, the date of analysis for sulfate and chloride was reported incorrectly. NTS was contacted and a revised report was issued. All holding times were met for all the samples submitted to all laboratories.

One field blank and one pour blank were collected during the sampling event. Mercury was detected in both blanks at concentrations above the reporting limit. Seven samples had detections of mercury

above the reporting limit and within 5 times the highest blank value. All seven samples were qualified and should be considered potential false positive values. No other qualifiers were applied based on blank data.

NTS indicated that matrix spike recoveries were below laboratory acceptance criteria for antimony (81%) and silver (84%). Because spike levels were not provided and the recoveries were within standard acceptance criteria of 80-120%, no data were qualified for antimony or silver. NTS did not identify any other issues with their QA/QC parameters in the reports provided for the analyzed samples.

One field duplicate from observation well Ob-4 was collected during this sampling event and analyzed for all parameters. The concentration of sulfate was above the reporting limit in the native sample, but below the reporting limit in the duplicate. The native sample and duplicate were both qualified as estimated for sulfate. All other parameters met acceptance criteria for the field duplicate.

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

The objectives of this work were to evaluate the possible effects of mine dewatering on the wetland areas in the vicinity of the Mine Site, to gather additional specific capacity data for wells completed in the Virginia Formation, and to gather additional water quality data for groundwater within the surficial deposits, the Virginia Formation and the Duluth Complex. Three main activities were conducted to meet these objectives:

- pumping test to evaluate the connectivity of the bedrock and the surficial deposits;
- specific capacity tests conducted to evaluate potential vertical variability of hydraulic conductivity in the Virginia Formation; and
- groundwater sampling to further characterize water quality within the surficial deposits, the Virginia Formation, and the Duluth Complex.

Data collected during the pumping test at P-2 showed a small amount of drawdown in the nearest deep wetland piezometer (20P) but no detectable drawdown at other water table or deep wetland piezometers, including piezometer 20, the water table piezometer that is nested with piezometer 20P. Based on the results from this test, it is reasonable to expect that dewatering of the proposed mine pits will increase the vertical gradient through the surficial and wetland deposits at the Mine Site, but that significant and widespread drawdown of the water table within these deposits is not anticipated. This is further supported by the analytical and isotope data collected during the pumping test in well P-2. The only water quality trends that were observed in samples collected weekly from pumping well P-2 suggest decreasing redox conditions in the source water. The decreasing redox potential is likely associated with the collection of water with longer flow paths or older water. There were no trends in the amount of tritium.

Data from the specific capacity tests conducted in wells P-3 and P-4, along with data collected during previous pumping tests in these wells (see RS10), indicate that the upper portion of the Virginia Formation is more permeable than the lower portion. This is consistent with what has been reported

for the Duluth Complex, where the upper 200 to 300 feet of the formation is reported to be more permeable due to the increased amount of secondary porosity features such as fractures and joints.<sup>1</sup>

Groundwater samples collected from monitoring wells on site exceeded the Minnesota 2B Chronic water criteria for metals (including mercury, aluminum, cobalt, copper, lead, nickel, and zinc), pH, and Nitrogen (ammonia as N). Samples collected weekly during the pumping of well P-2 showed water quality trends that suggest a decreasing redox potential for the source water. The samples from pumping well P-2 all contained measurable tritium, indicating that at least a portion of the source water is post-1952 water

<sup>&</sup>lt;sup>1</sup> Siegel, D.I., and D.W. Ericson, 1980. *Hydrology and Water Quality of the Copper-Nickel Study Region, Northeastern Minnesota*. U.S. Geological Survey Water-Resources Investigations Open-File Report 80-739.

Tables

Location	Date	Time	Temp (°C)	Cond. @ 25 (uS/cm)	рН	ORP (mV)	D.O. (mg/L)
P-2	10/24/2006	1025	5.4	150	7.75	*	*
P-2	10/31/2006	1025	5.0	316	9.04	21.0	6.96
P-2	11/7/2006	1027	6.2	228	7.85	114.7	6.42
P-2	11/14/2006	0932	5.4	257	7.98	219.6	5.78

Table 1 Field Parameters for P-2 Sampling

\* Not recorded

Sample	δD H <sub>2</sub> O	δ <sup>18</sup> Ο Η₂Ο	Tritium	Std. Dev.	δ <sup>13</sup> C DIC
Name	‰	‰	TU		‰
P-2 10/24/2006	-85.4	-12.25	3.27	0.28	-18.85
P-2 10/31/2006	-85.9	-12.28	2.77	0.28	-17.78
P-2 11/07/2006	-85.9	-12.29	2.99	0.26	-16.86
P-2 11/14/2006	-85.4	-12.27	3.82	0.29	-15.79

 Table 2
 Isotope Data Summary

# Table 3Analytical Data SummaryPolymet Mining, Inc.(concentrations in ug/L, unless noted otherwise)

Location	MN SW Quality	MW-05-02	MW-05-08	MW-05-09	OB-1	OB-2	OB-3	OB-4
Date	Class 2B	11/20/2006	11/28/2006	10/5/2006	10/5/2006	10/3/2006	10/16/2006	10/4/2006
Lab	Chronic (1)	11/20/2000	11,20,2000	10/0/2000	10/0/2000	10/0/2000	10/10/2000	10/ 1/2000
Dup	1/31/2000							DUP
Aquifer		Surficial	Surficial	Surficial	Duluth	Duluth	Virginia	Virginia
Exceedance Key	Bold							8
General Parameters								
Alkalinity, total, mg/L		68.3	67.7	26.4	47.4	<10	66.2	17.6
Chemical Oxygen Demand, mg/L		<10	<10	<10	10	<10	<10	<10
Chloride, mg/L	230	1.11	1.17	0.69	15.7	0.55	93.1	< 0.5
Sulfate, mg/L		16.4	11.2	10.4	<37.2	10.9	66.4	8.55 *
Calcium, mg/L		18.6	12.1	7.08	29.7	10.8	21	5.48
Magnesium, mg/L		5.65	6.47	6.83	7.72	12	21.4	2.52
Phosphorus total, mg/L		< 0.1	0.14	0.25	< 0.1	< 0.1	< 0.1	<0.1
Fluoride, mg/L		< 0.1	0.11	<0.1	< 0.11	0.22	0.97	< 0.1
Hardness, total, mg/L		69.7	56.8	45.8	106	76.4	140	24.1
Carbon, total organic, mg/L		2.6	1.6	5.2	1.5	1.9	3.2	1.9
Cyanide, ug/L		<20	<20	<20	<20	<20	<20	<20
Nitrate + Nitrite, ug/L		1420	150	<100	<100	<100	<100	<100
Nitrogen, ammonia as N, ug/L	40	<100	420	<100	<100	<100	<100	<100
pH, standard units	6.5-9.0 PH	6.5	6.9	7.5	9.0	7.6	6.6	5.7
Metals								
Aluminum	125	31.6	2620	27100	111	62.4	368	62.1
Antimony	31	<3	<3	<3	<3	<3	<3	<3
Arsenic	53	<2	<2	4.8	<2	<2	4.1	<2
Barium		<10	28.1	214	<10	<10	<10	<10
Beryllium		<0.2	<0.2	0.7	<0.2	< 0.2	<0.2	<0.2
Boron		<50	<50	<50	<50	93.1	<50	<50
Cadmium	1.1 HD	<0.2	<0.2	<0.2	<0.2	< 0.2	< 0.2	<0.2
Chromium	11 CR6	<1	3.2	55	1.7	5	<2.5	<1
Cobalt	5.0	<1	<1	8.8	<1	<1	4.1	<1
Copper	9.3 HD	2.4	5.7	99.6	<2	2.8	2.1	<2
Iron		54.3	1860	29800	87.9	334	7040	<50
Lead	3.2 HD	<1	<1	6.1	<2	<1	<1	<1
Manganese		61.9	152	584	<10	41.6	383	<10
Mercury	0.0013	0.0005 b	0.0016 b	0.0288	< 0.0005	0.0016 b	0.0008 b	0.001 b
Mercury methyl		< 0.000146	< 0.000056	0.000130	< 0.000056	< 0.000056	< 0.000056	< 0.000056
Molybdenum		<5	<5	12.1	<5	<5	<5	<5
Nickel	52 HD	<2	3	40.2	<2	3.6	128	<2
Palladium		<0.1	<0.1	<0.1	< 0.1	<0.1	<0.1	<0.1
Platinum		< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.1
Potassium		1.93	1.51	6.87	1.81	1.48	2.33	0.99
Selenium	5.0	<2	<2	<2	<2	<10	<2	<10
Silver	1.0 HD	<2	<2	<1	<1	<1	<1	<1
Sodium		5.38	7.3	12	7.38	19.7	6.33	<2
Strontium		88.6	32.6	65.1	112	58.7	74.8	18.8
Thallium	0.56	<2	<2	<2	<2	<2	<2	<2
Titanium Zizza		<20	57	1040	<20	<20	<20	<20
Zinc	106 HD	<25	<25	46.3	<25	<25	<25	<25
		-25	100	420	65.0	105	-25	-25
Aluminum, dissolved		<25	199	430	55.2	<25	<25	<25
Cadmium, dissolved		< 0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium, dissolved		1.1	1.2	1.2	<1	<1	<1	<1
Copper, dissolved		<2	<2	7.9	2.2	<2	<2	<2
Molybdenum dissolved		<5	<5	8.8	<5	<5	<5	<5
Nickel, dissolved		<2	<2	3	<2	<2	100	<2
Selenium, dissolved		<2	<2	<2	<2	<2	<2	<2
Silver, dissolved		<1	<1	<1	<1	<1	<1	<1
Zinc, dissolved		<25	<25	<25	<25	<25	<25	<25

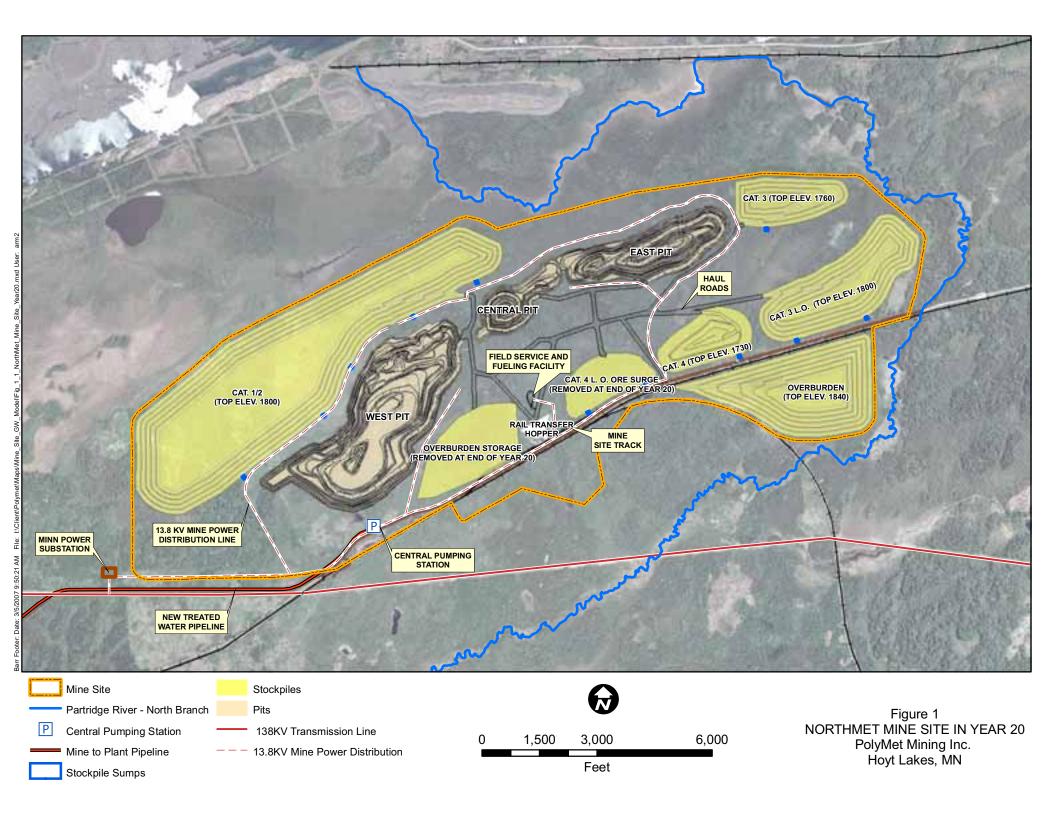
# Table 3Analytical Data SummaryPolymet Mining, Inc.(concentrations in ug/L, unless noted otherwise)

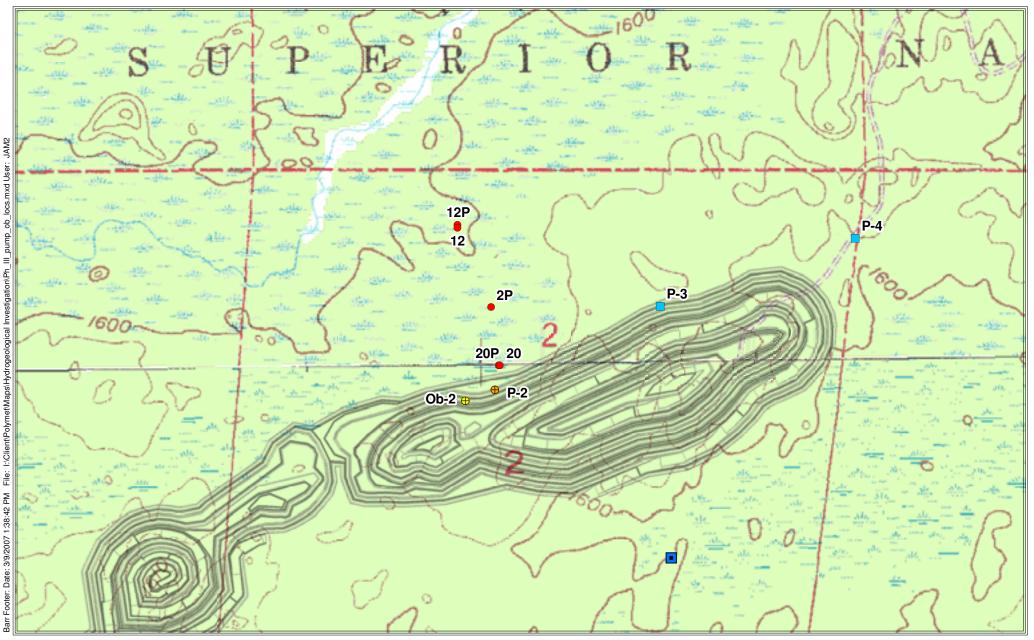
Location	MN SW Quality	OB-4	OB-5	P-2	P-2	P-2	P-2
Date	Class 2B	10/4/2006	10/4/2006	10/24/2006	10/31/2006	11/7/2006	1-2
Lab	Chronic (1)	10/4/2000	10/4/2000	10/24/2000	10/31/2000	11///2000	11/14/2000
Dup	1/31/2000						
Aquifer	1/31/2000	Virginia	Virginia	Dul.+Virginia	Dul +Virginia	Dul.+Virginia	Dul.+Virginia
Exceedance Key	Bold	v ii giina	v ii giina	Duit Vii giina	Duit Virginia	Duit Virginia	Duit Virginia
General Parameters	Dold						
Alkalinity, total, mg/L		17.6	25.5	101	105	74	108
Chemical Oxygen Demand, mg/L		<10	<10	<10	<10	<10	<10
Chloride, mg/L	230	0.5	<0.5	1.29	1.4	1.35	1.3
Sulfate, mg/L		<1 *	8.24	9.06	7.88	6.53	5.76
Calcium, mg/L		5.4	7.66	12.8	13.5	15.5	16.7
Magnesium, mg/L		2.48	2.81	7.67	8.48	9.41	10
Phosphorus total, mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride, mg/L		<0.1	<0.1	0.31	0.15	0.13	0.37
Hardness, total, mg/L		23.7	30.7	63.5	68.6	77.4	82.9
Carbon, total organic, mg/L		2.2	2.0	3.3	3.9	4.5	5.3
Cyanide, ug/L		<20	<20	<20	<20	<20	<20
Nitrate + Nitrite, ug/L		<100	<100	<100	<100	<100	<100
Nitrogen, ammonia as N, ug/L	40	<100	<100	<100	<100	<100	<100
pH, standard units	6.5-9.0 PH	6.1	6.0	7.7	7.1	8.4	7.5
Metals							
Aluminum	125	55.4	181	<25	<25	<25	<25
Antimony	31	<3	<3	<3	<3	<3	<3
Arsenic	53	<2	<2	<2	<2	<2	<2
Barium		<10	<10	<10	<10	<10	<10
Beryllium		<0.2	<0.2	<0.2	0.2	0.2	<0.2
Boron		<50	<50	194	168	153	148
Cadmium	1.1 HD	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	11 CR6	<1	2.2	<1	<1	1.1	<1
Cobalt	5.0	<1	<1	<1	<1	<1	<1
Copper	9.3 HD	<2	3.5	<2	<2	<2	<2
Iron		<50	548	253	271	325	351
Lead	3.2 HD	<1	<1	<5	<1	<1	<1
Manganese		<10	<10	21.7	23.6	26.2	27.3
Mercury	0.0013	0.0009 b	0.0049	< 0.0005	< 0.0005	0.0005 b	< 0.0005
Mercury methyl		< 0.000056	< 0.000056	< 0.000056	0.000070	< 0.000056	< 0.000056
Molybdenum		<5	<5	<5	<5	<5	<5
Nickel	52 HD	<2	4.6	<2	<2	<2	<2
Palladium		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Platinum		<0.1	<0.1	<0.02	< 0.02	< 0.02	< 0.02
Potassium		0.98	1.26	1.03	1.04	1.04	1.1
Selenium	5.0	<10	<10	<2	4	<2	<4
Silver	1.0 HD	<1	<1	<1	<1	<1	<1
Sodium	<u> </u>	<2	<2	24.4	23.2	23.3	23.9
Strontium		18.5	19.3	56.5	60.7	69.7	74.9
Thallium	0.56	<2	<2	<2	<2	<2	<2
Titanium		<20	<20	<20	<20	<20	<20
Zinc	106 HD	<25	<25	65.4	67.7	125	122
Aluminum, dissolved		<25	<25	<25	<25	<25	<25
Cadmium, dissolved		<0.2	<0.2	<0.2	0.2	<0.2	< 0.2
Chromium, dissolved		<1	<1	<1	<1	<1	<1
Copper, dissolved		<2	2.3	<2	<2	<2	<2
Molybdenum dissolved		<5	<5	<5	<5	<5	<5
Nickel, dissolved		<2	5.9	<2	<2	<2	<2
Selenium, dissolved		<2	<2	<2	<2	<2	<2
Silver, dissolved		<1	<1	<1	<1	<1	<1
Zinc, dissolved	<u> </u>	<25	<25	59.1	68.2	134	122

#### Table 3 Analytical Data Summary Polymet Mining, Inc. Footnotes

- -- 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.
- DUP Duplicate sample.
- HD Hardness dependent. The specific analyte should be referenced in Minnesota Rules Chapter 7050.0222 for specific exp.
- calculations. The value reported is assuming a hardness of 100 mg/L.
- PH Not less than 6.5 nor greater than 9.0.

Figures





- File: I:\Client\Polymet\Maps\Hydrogeological Investigation\Ph\_III\_pump\_ Date: 3/9/2007 1:38:42 PM
- 20 Year mine plan
- Pumping well  $\oplus$
- Bedrock observation well  $\oplus$
- Specific capacity test location
- Wetland piezometer monitoring location
- Pumping test discharge point

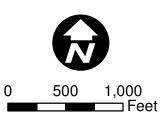


Figure 2

PUMPING AND OBSERVATION LOCATIONS PHASE III HYDROGEOLOGIC INVESTIGATION PolyMet Mining, Inc. Hoyt Lakes, Minnesota

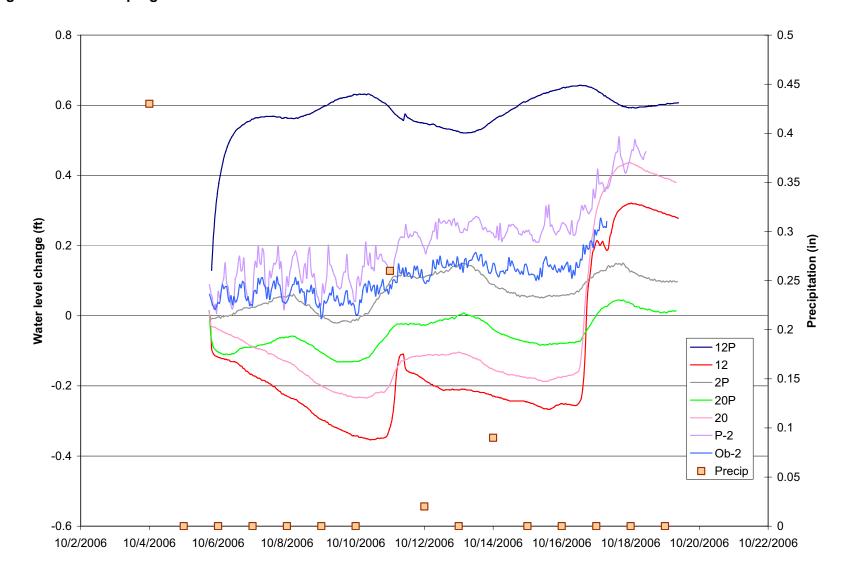


Figure 3 Pre-Pumping Test Water Levels

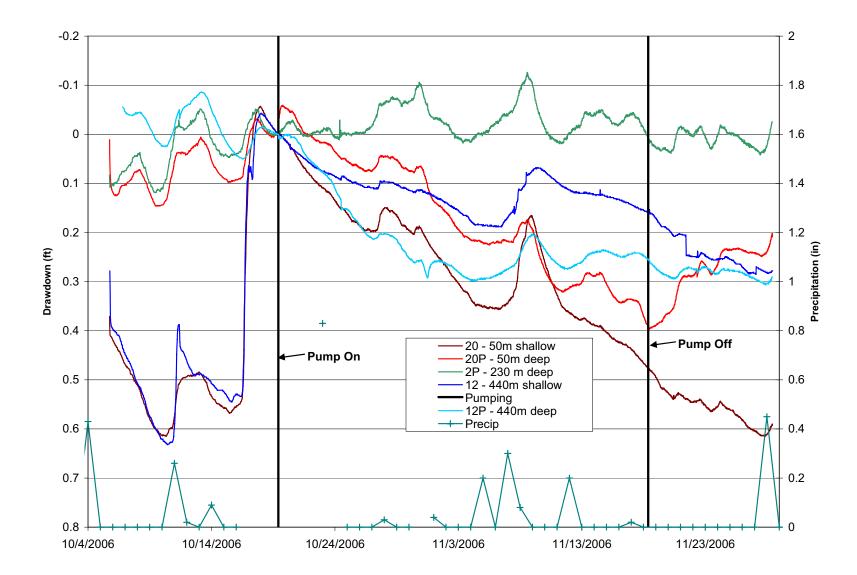
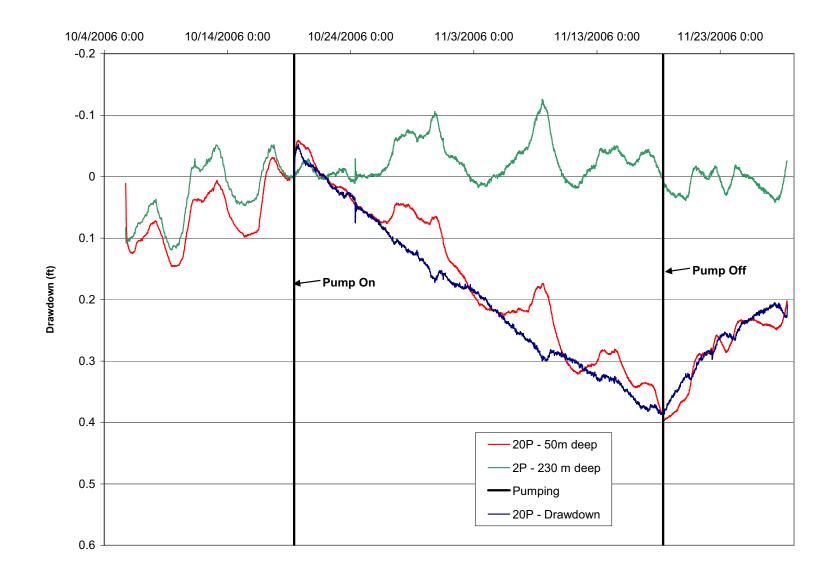


Figure 4 Observed Drawdown and Recovery in Wetland Piezometers



## Figure 5 Drawdown and Recovery in 20P Corrected for Regional Water Level Changes

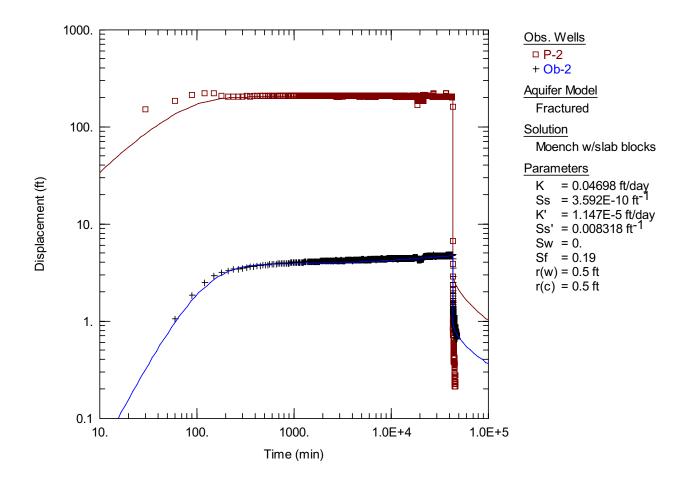


Figure 6 Pumping Test Analysis of Bedrock Wells

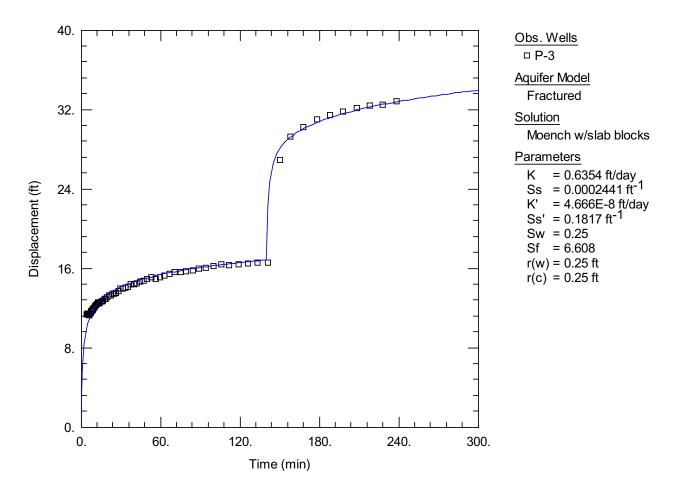


Figure 7 Specific Capacity Test Analysis – P-3

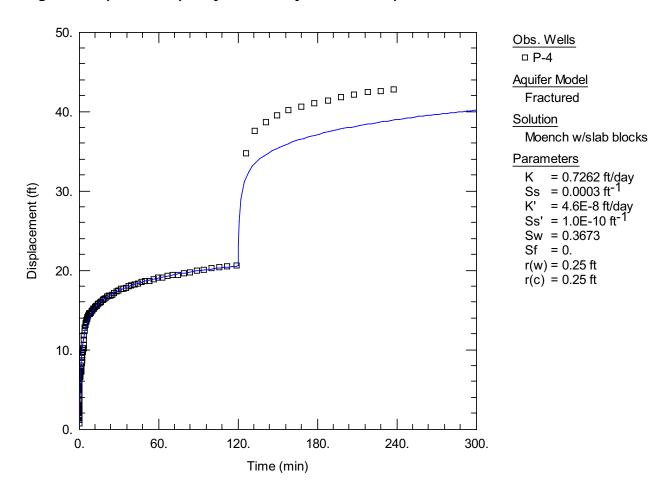


Figure 8 Specific Capacity Test Analysis – P-4 Step 1

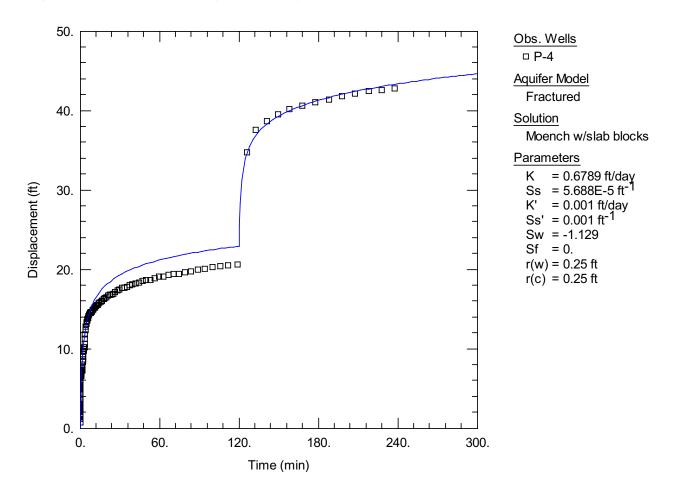
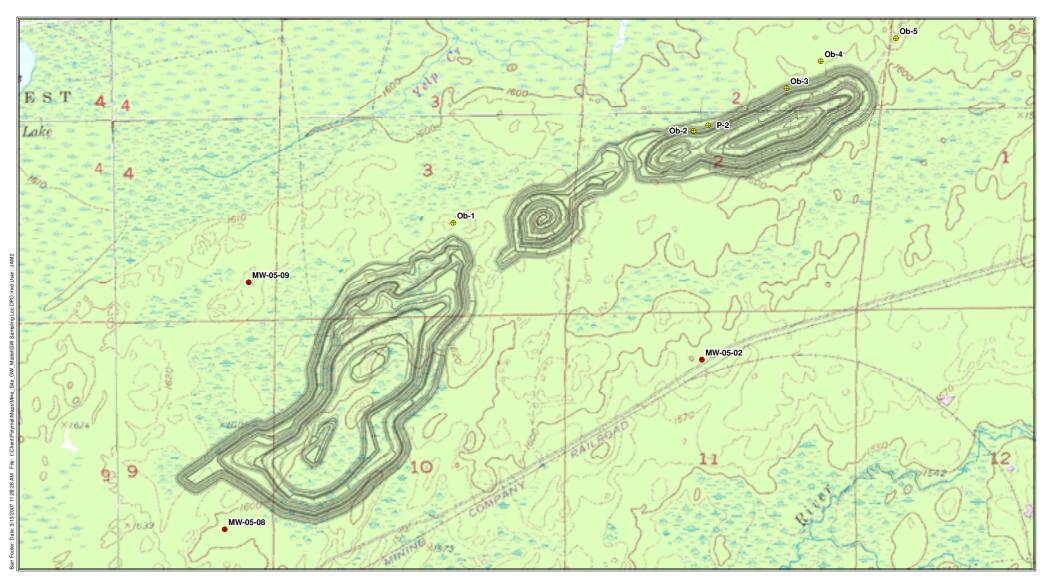


Figure 9 Specific Capacity Test Analysis – P-4 Step 2



— 20 Year mine plan

#### Groundwater sampling locations

- Bedrock pumping/observation well
- Surficial aquifer monitoring well



Figure 10

GROUNDWATER SAMPLING LOCATIONS PHASE III HYDROGEOLOGIC INVESTIGATION PolyMet Mining, Inc. Hoyt Lakes, Minnesota

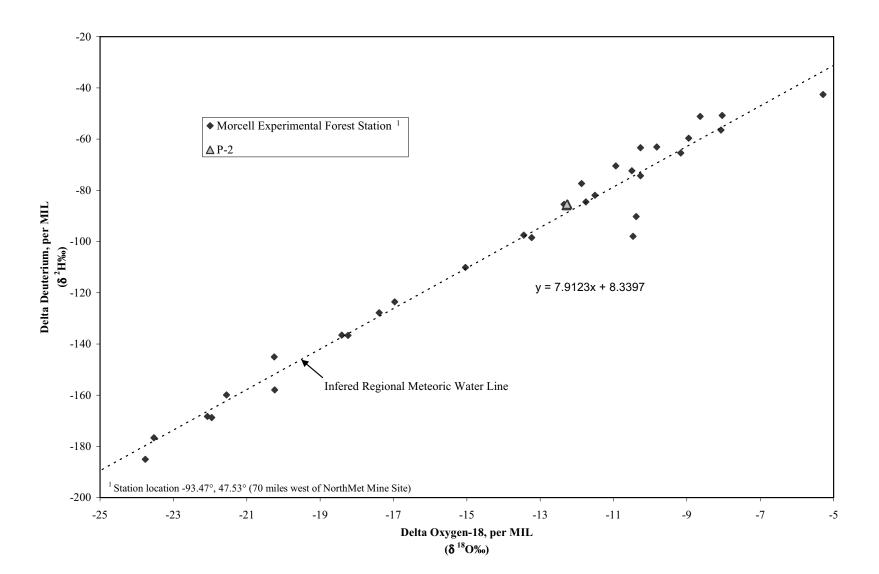


Figure 11 P-2 Isotope Data Compared to Regional Precipitation Data

Appendix A



Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO

July 6, 2006

Stuart Arkley Ecological Services Division MN DNR 500 Lafayette Road N. St. Paul, MN 55155

#### Re: Hydrogeologic Investigation – Phase III PolyMet NorthMet Mine Site Babbitt, Minnesota

Dear Stuart Arkley:

As discussed at the EIS kick-off meeting in May, further hydrogeologic investigative work is proposed for the NorthMet Mine Site, in order to better understand the possible effects of mine dewatering in the bedrock aquifer on the wetland areas in the vicinity of the Mine Site. Pumping tests performed during Phases I and II of the Hydrogeologic Investigation were not designed to investigate the nature of the hydraulic connection between the bedrock aquifer and adjacent wetland areas. This letter describes the proposed scope and schedule of Phase III of the Hydrogeologic Investigation. Phase III will consist of conducting and analyzing the results from a pumping test. The results from the test will be used to better understand the response of water levels within the wetland areas to pumping groundwater (dewatering) at the Mine Site.

The Phase III Investigation will also include focused specific-capacity testing in two of the wells that were installed during the Phase II Investigation. This specific-capacity testing is a follow-up to work conducted in Phase II and is intended to evaluate the relative water supply vs. depth in the bedrock aquifer at the Mine Site. In addition, a round of groundwater samples will be collected from Mine Site monitoring wells.

### Objective

The primary objective of the proposed Phase III Hydrogeologic Investigation is to conduct a pumping test to evaluate the response of the wetland areas to future pumping related to mine dewatering at PolyMet's proposed NorthMet Mine located near Babbitt, Minnesota.

The Phase I Hydrologic Investigation completed by Barr Engineering Company (Barr) in June 2005 (RS02) provided information about the surficial aquifer system and the Duluth Complex. The Phase II Hydrologic Investigation completed by Barr in January 2006 (RS10) provided information about the ability of the Virginia Formation to transmit water to the proposed NorthMet pit and to characterize the quality of the water found in this formation. During Phase II, multiple pumping tests were conducted in order to characterize the Virginia Formation at the Mine Site. However, the effects on the adjacent wetland due to pumping at the Mine Site have yet to be quantified. Phase III

will provide data to determine the connection between the bedrock aquifers and the surficial aquifer in the adjacent wetland.

A secondary objective of the proposed work will be to evaluate whether the majority of the water in the bedrock aquifer moves through near-surface fractured and weathered zones, or if there may also be one or more deeper zones with significant amounts of groundwater flow. Most evidence leads to the assumption that the primary source of water is the near-surface bedrock. However, during the Phase II drilling activities, there was some indication of a possible void space in the bedrock at depth in well P-4. In order to confirm whether or not there is a high transmissivity zone at depth in the bedrock aquifer (in the eastern portion of the mine site), specific-capacity testing will be conducted in isolated portions of pumping wells P-3 and P-4.

## Scope of Work - Aquifer Performance Testing

An aquifer performance test (i.e., pumping test) will be performed in pumping well P-2. The pumping phase of the test will run for 10 days. Pressure transducers and data loggers will be temporarily installed in the pumping well P-2 and in five observation wells in the vicinity of the pumping well (Figure 1). Water level data will be measured "continuously" (approximately one measurement every 10 minutes) for all six wells being monitored.

The installation of pumping well P-2 and observation well Ob-2 was completed during the Phase II Investigation. Piezometers 2P, 12P, 20, and 20P will be installed in the peat/muck layer in the wetland north of P-2 as part of the Wetland Hydrology Study, which is being conducted concurrently with this investigation. Pumping well P-2 is 610 feet deep, observation well Ob-2 is 100 feet deep, piezometers 2P, 12P, and 20P will be 6 feet deep, and piezometer 20 will be 1.5 feet deep.

Water levels from pumping and observation wells will be measured using data logging probes. The probes automatically measure and record water levels in the wells and also automatically correct for changes in barometric pressure. Probes will be installed in pumping well P-2 and in the five observation wells 10 days prior to pumping, in order to record background conditions. The probes will monitor water levels in the piezometers for the 10 days prior to the pumping test, during the test, and during the recovery.

The pumping rate for the test will be established so that the pumping well maintains a stable water column equal to approximately one-third of the original water column height. Based on the results from the pumping test conducted at well P-2 during the Phase II Investigation, a pumping rate of 20 gallons per minute (gpm) is proposed for the Phase III Investigation. Water levels collected by the data loggers will be verified with manual measurements as often as practical. The pumping well will be pumped at a constant rate for 10 days. After reaching this time limit, the pump will be turned off and the water level in the well will be allowed to recover for up to10 days.

Water extracted during the pumping tests will be discharged at the site. In order to avoid hydraulic interference with the pumping test, the chosen discharge location will be approximately 3000 feet from the pumping well and in an upland (non-wetland) area. Water will be pumped directly to the discharge location.

The data collected during the pumping and recovery portions of the tests from both the pumping and observation wells will be analyzed using conventional analytical techniques.

## Scope of Work – Specific-Capacity Testing

Specific-capacity tests will be conducted in isolated vertical intervals in pumping wells P-3 and P-4, using a packer assembly and submersible pump. For each of the tests, the packer will be set at an

approximate depth of 300 feet, to isolate the upper portion of the aquifer from the deeper portion. The pump will be placed either above or below the packer, depending on the drilling contractor's capabilities. Once the pump is installed in the isolated interval, a short-term (3 to 4 hour) specific-capacity test will be run. The pump will be run at a fixed discharge rate for approximately 2 hours until the water level is relatively stable. The discharge rate will then be increased slightly and pumping will continue until the water level is again relatively stable, at which time the test will be terminated. If possible, water levels will be monitored in both of the isolated zones (i.e., pumped and non-pumped) during the duration of the test. Whether this is possible will depend on the equipment supplied by the drilling contractor. It is anticipated that the specific-capacity testing will be conducted during the two days immediately prior to the start of the pumping phase of the pumping test at well P-2.

The data collected during the specific-capacity tests will be analyzed using conventional analytical techniques.

## Scope of Work – Groundwater Sampling

Groundwater samples will be collected from the five bedrock observations wells installed as part of the Phase II Hydrogeologic Investigation (Ob-1 through Ob-5) and the three surficial monitoring wells installed as part of the Phase I Hydrogeologic Investigation (MW-05-02, MW-05-08 and MW-05-09). All wells will be purged and allowed to stabilize before collection of the samples. Groundwater samples will be analyzed for the parameters listed in Table 1.

## **Investigation Report and Schedule**

The results from the pumping test and specific-capacity tests will be summarized and incorporated into a report. The report will include field data, aquifer performance test analysis, pumping and observation well locations, conclusions and recommendations. Documentation supporting the discussion of the results will be included in tables, figures, and appendices, as appropriate.

Based on the assumption that this scope of work is approved by August 4, 2006, it is anticipated that the field work can be initiated by mid-August. Field work will last approximately four to five weeks. It is anticipated that data analysis and preparation of a draft Phase III Hydrogeologic Investigation Report will be completed within approximately four weeks after the end of field work. Based on these assumptions, it is anticipated that the draft report will be completed by late October to mid November, 2006.

Please contact Tina Pint at (952) 832-2692 or Mark Hagley at (218) 529-8206 with any questions or comments related to this proposed scope of work.

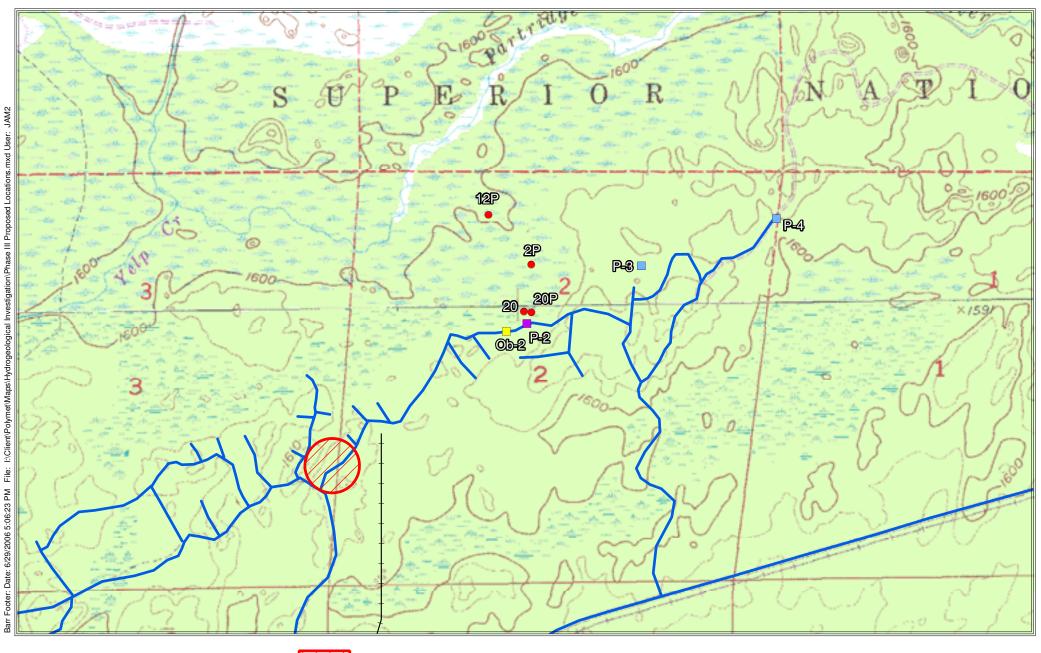
Sincerely,

John Borovsky Vice President

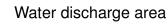
Description	Method	Detection Limit
Alkalinity, Total as CaCO3	EPA 310.1	10 mg/L
Carbon, Total Organic	EPA 415.1	1 mg/L
Chemical Oxygen Demand	STD METH 5220D, 18TH ED	10 mg/L
Chloride	EPA 325.2	0.5 mg/L
Cyanide Total	EPA 335.2	0.02 mg/L
Fluoride	EPA 340.1	0.1 mg/L
Hardness, Total (calculated)	EPA 200.7	1 mg/L
Nitrogen, Ammonia	EPA 350.1	0.1 mg/L
Nitrogen, Nitrate + Nitrite	EPA 353.2	0.1 mg/L
рН	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

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

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



- Pumping well
- Specific capacity test well
- Bedrock observation well
- Wetland observation well



Roads





750 — Meters



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

Appendix B



Client: PolyMet	Minine		M	onitoring F	Point: MW	-05-07	2			
Location: Northm	et			nte: 11/20						
Project #: 23/69-	862 004 00	9		mple Time		1230				
GENERAL				STABILIZATION TEST						
Barr lock:	yes	_								
Casing diameter:	2" pvc	Time/ Volume	Temp. ⁰C	Cond. @ 25	pН	ORP Etr	D.O.	Turbidity Appearance		
Total well depth:*	10.34	1125/0.1gai 1127/0.4gai		356 347	7.37 7.17	8.7 63	7.38 4.51	Cloudy Uear		
Static water level:*	9.83	HZ71132/1.00 1136/1.4gal	al 5.6	342 313	7.17 7.06	72 86	4.65	11		
Water depth:*	0.5	1140/1.7gal 1144/2.1gal	5.7 5.6	275 241	6.89 6.74	97 113	3.15 3.47	2.f 3.1		
Well volume: (gal)	0.083	1147/2.4gal 1151/2.7gal	5.6 5.8	214 196	6.59 6.55	131 139	3.98 4.39	L1 Lj		
Purge method:	peristaltic	1154/3.0gal 1157/3.2gal	5.7	180 173	6.50 6.47	138 145	5.00 4.79	• 1  1		
Sample method:	peristaltic	1200 /3.5ga	15.8	165	6.50	148	4.95			
Start time:	11:24	Odor: n	one d	etected						
Stop time:	12:30	Purge Appe	arance:	Uear						
Duration: (minutes)	66	Sample App	earance:	clear						
Rate, gpm:	11:24-11:32 0.13 11:32 -12:30 0.00									
Volume, purged:	6.1 gal	-								
Duplicate collected?	no	_								
Sample collection by:	LMG	CO2-	Ν	/In2-	Fe(T	-)-	Fe2-			
Others present:	Elimitangare	Well	Condition	good			- <b>1</b> -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			
MW. groundwater monitor	ing well WS: wate	r supply well	SW: su	Irface water	SE: sedir	ment c	other:			
VOC- semi-volat	ile- gene	eral- / n	utrient- /	cyani	de- /	DRO-	Sulfide	-		
oil,grease- bacter	ria- total	metal- 2	filtered	d metal- /	met	hane-	filte	er-		
Others:	Toc-1,	LLHg-1,	Meth	y1 Hg-1						



Client: PolyMet	Minin		Mc	nitoring P	oint: MW	-05-08	3	
Location: North				te: 11/28				
Project #: 23/69-			Sa	mple Time	: 0920-	0931		
GENERAI				STAB	ILIZATION	TEST		
Barr lock:	yes	- -	<b>T</b>			ORP		
Casing diameter:	2" pre	Time/ Volume	Temp. ℃	Cond. @ 25	рН	Ætr	D.O.	Turbidity Appearance
Total well depth:*	20.9	Volume 0845/ 2.6ga 0855/	16.7	125	7.30	86	0.75	clear
Static water level:*	4.02	52 gai	6.7	119	7.31	52	0.77	61
Water depth:*	16.88	7.8 gal	6.8	117	7.28	49	0.69	U
Well volume: (gal)	2.75	0915/ 10.4ga	6.8	115	7.27	47	0.70	11
Purge method:	peristaltic							
Sample method:	peristaltic							
Start time:	08:35	Odor: 🎸	ione a	detected				
Stop time:	09:31	Purge Appea	arance:	clear				
Duration: (minutes)	56	Sample App	earance:	clea	.(			
Rate, gpm:	0.26	Comments:						
Volume, purged:	14.6 gal							
Duplicate collected?	no							
Sample collection by:	LMG, JAM2	CO2-	M	ln2-	Fe(T)	)-	Fe2-	
Others present:		Well C	Condition:	good				
MW: groundwater monitor	ing well WS: water	supply well	SW: su	rface water	SE: sedim	ient ot	her:	
VOC- semi-volat	tile- gene	eral-   ni	utrient-	( cyanio	de- /	DRO-	Sulfide	
oil,grease- bacter	ria- total	metal- 2	filtered	metal- /	meth	iane-	filte	er-
Others:	Toc-1,	LLHg-1	, Met	hyl Hy	2-1			



Client: PolyMet	Minine		Monitorir	ng Po	int: <sub>MW</sub>	- 05-0	9	
Location: NorthM	ut			0/5/				
Project #: 23/69-9		9	Sample Time: 1400					
GENERAL	DATA		ST	ABIL	IZATION	TEST		
Barr lock:	yes							
Casing diameter:	2"pvc		mp. Con °C @ 2	1	pН	ORP Etr	D.O.	Turbidity Appearance
Total well depth:*	16.5	1033 9.	6 73	,	6.78	89	1.80	Slightly cloudy
Static water level:*	12.65							-
Water depth:*	3.9							
Well volume: (gal)	0.6							
Purge method:	peristaltic							
Sample method:								
Start time:	10:25	Odor: none	detecte	d				
Stop time:		Purge Appearan	ce: begin	- cle	ear, end	d-slig	htly c	loudy
Duration: (minutes)		Sample Appeara				•	•	
Rate, gpm:	0.1	Comments:	·			·		
Volume, purged:	~ 0.6 gal	Well pi Extremely	rrged di	m a	utter 1	wen	volum	C.
Duplicate collected?	no	Christian	Clam 1	ecni	Mge. sc	imp lea	a	14:00.
Sample collection by:	KSJ	CO2-	Mn2-		Fe(T)	-	Fe2-	
Others present:	******	Well Cond	ition: 90	od				
MW groundwater monitori	ing well WS: water	supply well S	N: surface wat	ter	SE: sedim	ent otl	ner:	
VOC- semi-volati	ile- gene	ral- <sup>V</sup> 2 nutrier	nt- cy	yanide	- [	DRO-	Sulfide-	
oil,grease- bacter	ia- total	metal- / fil	tered metal-	1	meth	ane-	filte	:r-
Others:	Toc	-1, LLHg-	1, Meth	11 H	g-1			



Client: PolyMet,	Mining Corp.		Мо	nitoring P	oint: 0b-	-1			
Location: North Me	t Mine Site		Da	Date: (0/5/06					
Project #: 23/69-			Sa	nple Time	: 1340				
GENERAL	_ DATA	STABILIZATION TEST							
Barr lock:	Yes								
Casing diameter:	4"	Time/ Volume	Temp. °C	Cond. @ 25	рН	Eh	D.O.	Turbidity Appearance	
Total well depth:*	94.4	1134/142	5.96	170	9,73	-)4	0.65	cloudy	
Static water level:*	13,22	1215/186	6.90	173	9.93	-53	9,51	clear	
Water depth:*	81.2	1256/215		163	9.75	-48	11.29	clear	
Well volume: (gal)	53	1337/262	6.96	158	9,73	-47	9.59	clear	
Purge method:	Submersible								
Sample method:	submersible								
Start time:	0815	Odor: NO	ne du	rected					
Stop time:	1340	Purge Appe	arance: (	lear, ·	then c	loudy	, then	clear	
Duration: (minutes)	325	Sample App							
Rate, gpm:	0815-1900-1.5 0900 seeright	Comments:	pumpin	rates lo	1pm):				
Volume, purged:	262		0900	)-0945 -1054	0,5				
Duplicate collected?	no		1054	-1200 1 -1340 0	.3				
Sample collection by:	LMG	CO2-		n2-		)-	Fe2-		
Others present:		Well	Condition:						
MW: groundwater monitor	ing well WS: water	supply well	SW: su	face water	SE: sedin	nent ot	her:		
VOC- semi-volat	tile- gene	ral- / n	utrient-	l cyanic	de- /	DRO-	Sulfide-		
oil,grease- bacter	ria- total	metal- Z	filtered	metal-	metl	nane-	filte	er-	
Others: UL I-G-1	, Methyl t	4-1, T	0(-1						



Client: PolyMet	Mining		м	onitoring P	oint: 06.	-2			
Location: North			D	ate: /0/3/	06				
Project #: 23/69-			S	ample Time	:1200				
GENERAI	DATA			STABILIZATION TEST					
Barr lock:	485	-							
Casing diameter:	2# 4"	Time/ Volume	Temp. °C	Cond. @ 25	pН	ORP Etr	D.O.	Turbidity Appearance	
Total well depth:*	101.1	1059/ 60 ga 1	5.6	187	7.90	-132	2.90	clear	
Static water level:*	8.86	120001	5.5	189	8.11	-160	2.14	1(	
Water depth:*	92.2	1147/ 180 gai	5.6	187	8.09	-148	2.15	¥1	
Well volume: (gal)	60	, ,							
Purge method:	Submersible								
Sample method:	submersible & peristaltic								
Start time:	10:35	Odor:	none	detected					
Stop time:	11:47	Purge Appe	arance:	clear					
Duration: (minutes)	72	Sample App	earance	: clear					
Rate, gpm:	2.5	Comments:							
Volume, purged:	180 gal								
Duplicate collected?	по	-							
Sample collection by:	KSJ, LMG	CO2-		Mn2-	Fe(T	)-	Fe2-		
Others present:		Well	Condition	n: good					
MW: groundwater monitor	ing well WS: water	supply well	SW: s	urface water	SE: sedin	nent ot	her:		
VOC- semi-volat	ile- gene	ral- ( n	utrient-	۱ cyanic	le- l	DRO-	Sulfide		
oil,grease- bacte	ria- total	metal- 2 🤹	filtere	d metal-	met	hane-	filt	er-	
Others:	706-1,	LLHg-1,	Met	hyl Hg-	1				



Client: PolyMet	Mining		Mo	nitoring P	oint: 06-	3					
Location: NorthM	et		Da	te: 10/16/	06						
Project #: 23/69-1	862 004 000	1	Sa	Sample Time: 1215							
GENERA		STABILIZATION TEST									
Barr lock:	Yes										
Casing diameter:	411	Time/ Volume	Temp. °C	Cond. @ 25	pН	ORP -Eti	D.O.	Turbidity Appearanc			
Total well depth:*	104.0	0952/ 61 gal	8.4	209	9.44	-69	1.12	Cloude			
Static water level:*	10.65	1010/ 122 gal	8.3	206	7.45	-63	0.86	clear			
Water depth:*	93.4	1041/ 183gal	8.4	205	6.95	-60	1.18	vt			
Well volume: (gal)	61.1	1111/ 244 gal	8.2	199	6.81	-63	0.82	Ę1			
Purge method:	Submersible	1142/ 306 gal	8.3	199	6.72	-63	0.81	£¢.			
Sample method:	Submersible	1212/ 367gal	8.3	198	6.72	-63	0.80	t ç			
Start time:	0909	Odor: No	ne d.	etected							
Stop time:	1215	Purge Appea	arance:	cloudy	, then	clear					
Duration: (minutes)	186	Sample App	earance:								
Rate, gpm:	2.0	Comments:									
Volume, purged:	372 gal										
Duplicate collected?	no										
Sample collection by:	LMG	CO2-	М	n2-	Fe(T	)-	Fe2-				
Others present:		Well (	Condition:	good							
MW: groundwater monito	ring well WS: water	supply well	SW: su	face water	SE: sedim	nent ot	her:				
VOC- semi-vola	tile- gene	eral- / ni	utrient-	/ cyanio	de- /	DRO-	Sulfide-				
oil,grease- bacte	ria- total	metal- 2	filtered	metal-	meth	nane-	filte	er-			
Others:	Toc-1,	LL HG-	I, Me	thy1 f	Y-1						



Client: PolyMet M	linie		M	onitoring P	Point: 06	-4				
Location: NorthM			Da	ite: 10/4	106					
Project #: 23/69-1			Sa	mple Time	: 1210					
GENERAI			p	STABILIZATION TEST						
Barr lock:	yes									
Casing diameter:	4"	Time/ Volume	Temp. ⁰C	Cond. @ 25	рН	ORP Etr	D.O.	Turbidity Appearance		
Total well depth:*	100.2	Volume 0902/ 559a 0938/	17.9	47	6.20	185	6.17	clear		
Static water level:*	15.68	110 gal	7.9	48	9.55	202	5.91	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
Water depth:*	84.5	1014 / 166 gal 1051/	7.9	49	7.66	205	5.77	4		
Well volume: (gal)	55	221ga	179	49	6.18	191	5.63	XI.		
Purge method:	submersible	1126/ 276 ga	17.9	51	5.87	147	5.57	~~		
Sample method:	Submersible \$ Peristaltic	276 ga 1203/ 331ga	1 8.0	49	5.80	119	5.47	w		
Start time:	08:25			detecte	d					
Stop time:	12:03	Purge Appe	arance:	clear						
Duration: (minutes)	221	Sample App	earance:	Clear						
Rate, gpm:	1.5	Comments:								
Volume, purged:	331 gal	-								
Duplicate collected?	M-1	-								
Sample collection by:	KSJ, LMG	CO2-	Ν	1n2-	Fe(T	-)-	Fe2-			
Others present:		Well (	Condition	good						
MW: groundwater monitor	ing well WS: water	supply well	SW: su	U Inface water	SE: sedir	nent ot	her:			
VOC- semi-volat	ile- gene	ral- <i>1</i> <b>†1</b> n	utrient-	<b> + </b> cyani	de-1+1	DRO-	Sulfide-			
oil,grease- bacter	ria- total	metal-2+2	_ filtered	l metal- 1 -	+/ met	hane-	filte	er-		
Others:	oc- ItI, Ll	-Hq-1+	1, M	ethyl	<u>Hq - 1</u> +	1				



Client: PolyMet	Mining		Мо	Monitoring Point: 06-5						
Location: North	-		Dat	Date: 10/4/06						
Project #: 23/69-6	862 004 009		Sar	Sample Time: ///30						
GENERAI				STAB	ILIZATION	TEST				
Barr lock:	Yes	_				000				
Casing diameter:	4"	Time/ Volume	Temp. °C	Cond. @ 25	pН	ORP .Ett	D.O.	Turbidity Appearance		
Total well depth:*	99.6	0758/ 16.1gal	8.8	44	7.43	186	7.16	clear		
Static water level:*	12.34	0821/ 32 gal	8.3	44	6.51	182	7.50	81		
Water depth:*	87.3	0843/48 ga	1 8.7	45	6.32	189	7.38	17		
Well volume: (gal)	57	0905	86	45	6.20	190	7.25	1 I		
Purge method:	submersible	78 001	8.6	46	6.18	186	7.21	11		
Sample method:	Submersible & peristaltic	1030/ 123gal	8.3	45	6.24	183	7.04	**		
Start time:	07:35	Odor: NO	ne de	tected						
Stop time:	10:30	Purge Appe	arance: (	lear						
Duration: (minutes)	175	Sample App	earance:	LLHG &	UHg & M Methyl	ethy Hy Hq - C	loudy			
Rate, gpm:	D.7	Commontos				•	•			
Volume, purged:	123	Pulled P	eristal	tie su	ibmersize	ourge, t	hen sar P, Puti	nple. 'n peristal		
Duplicate collected?	ho	pump. F	low clou	ady; flo	wstart	ed clei	aring; L	LHg ø me ar.		
Sample collection by:	KSJ,LMG	ry samp	nes col M	n2-	Fe(1	omplete )-	ely clea Fe2-	ar.		
Others present:		Well (	Condition:	good						
MW: groundwater monitor	ring well WS: wate	r supply well	SW: sur	face water	SE: sedir	ment o	ther:			
VOC- semi-volat	tile- gene	eral- / n	utrient-	cyani	<sub>de-</sub> /	DRO-	Sulfide-			
oil,grease- bacte	ria- total	metal- 2	filtered	metal-	met	hane-	filte	er-		
Others:	Toc-1, LI	-Hg=1, M	lethy 1	Hg-1						

Page 1 of 4



Laboratory Results

**Northeast Technical Services** 

315 Chestnut Street PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

MDH Certification: 027-137-157

NTS COC: 72433 Received: 10/3/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Approved by:

· · · ·

Renee Stone

Barr Engineering Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435

RECEIVED

ENGINEERING CO.

NTS Sample: 116041 Description: OB-2 Sample Date: 10/3/2006 12:00:00 PM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	10/25/2006	SUB	S7

 $\Delta s$ 

This report may not be reproduced, except in full, without written consent of NTS laboratory.

Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report. NTS Sample: 116215 Description: OB-2 Sample Date: 10/3/2006 12:00:00 PM Matrix: Aqueous Sample Type: Grab NTS COC: 72433 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Notes: No Field Blank was received with this sample. A Field Blank is required for all samples analyzed for Mercury by EPA Method

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	62.4	µg/L	25	EPA 200.7	10/13/2006	CSD
Antimony	<3	μg/L	3	EPA 204.2	10/13/2006	KJD
Arsenic	<2	µg/L	2	EPA 206.2	10/7/2006	KJD
Barium	<10	μg/L	10	EPA 200.7	10/13/2006	CSD
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/17/2006	KJD
Boron	93.1	µg/L	50	EPA 200.7	10/13/2006	CSD
Cadmium	<0.2	μg/L	0.2	EPA 213.2	10/17/2006	KJD
Calcium	10.8	mg/L	1	EPA 200.7	10/13/2006	CSD
Chromium	5	µg/L	1	EPA 218.2	10/20/2006	KJD
Cobalt	<1	µg/L	1	EPA 219.2	10/13/2006	KJD
Copper	2.8	µg/L	2	EPA 220.2	10/11/2006	KJD
Iron	334	µg/L	50	EPA 200.7	10/13/2006	CSD
Lead	<1	µg/L	1	EPA 239.2	10/13/2006	KJD
Magnesium	12	mg/L	1	EPA 200.7	10/13/2006	CSD
Manganese	41.6	µg/L	10	EPA 200.7	10/13/2006	CSD
Mercury, Low Level	1.6	ng/L	0.5	EPA 1631E	10/20/2006	RH
Molybdenum	<5	µg/L	5	EPA 246.2	10/12/2006	KJD
Nickel	3.6	µg/L	2	EPA 249.2	10/11/2006	KJD
Potassium	1.48	mg/L	0.25	EPA 200.7	10/13/2006	CSD
Selenium	<10	µg/L	2	EPA 270.2	10/6/2006	KJD c
Silver	<1	µg/L	1	EPA 272.2	10/17/2006	KJD
Sodium	19.7	mg/L	2	EPA 200.7	10/13/2006	CSD
Strontium	58.7	μg/L	5	EPA 200.7	10/13/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	10/11/2006	KJD
Titanium	<20	µg/L	20	EPA 283.2	10/19/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/13/2006	CSD
тос	1.9	mg/L	1	EPA 415.1	10/11/2006	CSD
Alkalinity, Total	<10	mg/L as CaCO3	10	EPA 310.1	10/6/2006	JLC
Chloride	0.55	mg/L	0.5	EPA 300.0 ATP	10/4/2006	LXP
COD	<10	mg/L	10	SM 18th Ed 5220D	10/16/2006	JLC
Fluoride	0.22	mg/L	0.1	EPA 300.0	10/4/2006	LXP
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/4/2006	DB
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/10/2006	LL
рН	7.6	Std Units	0.1	EPA 150.1	10/4/2006	LXP
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/6/2006	DB
Sulfate	10.9	mg/L	1	EPA 300.0 ATP	10/4/2006	LXP
Hardness, Total (calc)	76.4	mg/L	3	EPA 200.7	10/31/2006	RMS

c Elevated Reporting Limit.

S2 Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN

S4 Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN

See Attached Report.

NTS Sample: 116215		Matrix: Aqueous
Description: OB-2		Sample Type: Grab
Sample Date: 10/3/2006	12:00:00 PM	

NTS COC: 72433 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Notes: No Field Blank was received with this sample. A Field Blank is required for all samples analyzed for Mercury by EPA Method

Analyte	Result	Units	RL	Method	Analysis Date	Analys	t
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/11/2006	SUB	S2
Palladium	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4
Platinum	<0.02	µg/L	0.02	EPA 200.8	10/23/2006	SUB	S4

Qualifier	Description	Note
c	Elevated Reporting Limit.	
S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	
S4	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.

NTS Sample: 116218 Description: OB-2 Sample Date: 10/3/2006 12:00:00 PM Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 72433 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	μg/L	25	EPA 200.7	10/9/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	10/10/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	10/7/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	10/6/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	10/7/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	10/6/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/10/2006	KJD
Zinc	<25	μg/L	25	EPA 200.7	10/9/2006	CSD



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

07 November 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,





# ANALYTICAL REPORT FOR SAMPLES

•	Frontier GeoSciences, Inc. Northeast Technical Services Inc.		SDG: Project: <u>Methyl</u>	<u>Mercury</u>	
Sample ID		Laboratory ID	Matrix	Date Sampled	Date Received

116041

0610008-01

Water

03-Oct-06 12:00

04-Oct-06 12:30

Frontier GeoSciences, Inc.

Jenny Flater

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# CASE NARRATIVE

Work Order Number: 0610008:

### SAMPLE RECEIPT

One (1) water sample was received on October 4, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 1.2 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was stored in a refrigerator until distillation and analysis.

### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits.

Frontier GeoSciences, Inc.

Jenny Flats

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entircly.



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

# **CHAIN OF CUSTODY FORMS**

	AST TECHNICAL SERV2 IS Chesinut Street PO Box 1142 Arginia, MN 55792 I-4290 Fox (218)742-1	CES	606IC							adinen.					PML CHAIN OF CUS	TODY RECORD	,
CLIENT NAME NORTHEAST TECHNICAL SERVICES 315 Chestaut Street PO Bax 1142 Virginia, MN 55792 (218)741-4230 Fax (218)742-1010	INVOICE TO: Renee Shone @ Ni	S	REPORT TO						ACNORM NO PARS.	HURDERID - KISH	PETALS-6423	AMARK-NEL	tis adaret - Her		Galocal and thoot	KON BY	
PO NUMBER: 72433/3033	ALUPLE COLUMN	SAREGOUS		COMP	TYPE GRAB	NACTOR	IX BC1.	filer	Ň					L			
116041	10/3/2005	1	) p.m.		<u>×</u>	X			1				4400044			Melhyl Ho	
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# ANALYTICAL RESULTS

# 116041

Matrix: Water

Laboratory ID: 0610008-01

## **Total Metals**

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Analyte	Result	MRL	Units	Dilution	Batch	Prepared	Seauence	Analyzed	Method	Notes
Methyl Mercury	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U

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## MATRIX DUPLICATES/TRIPLICATES

## SOURCE: 0610034-01

Matrix: Water

Sequence: <u>6J30004</u>

Batch: F610163

Lab Number: F610163-DUP1

Preparation: Methyl Hg Distillation for Water

### **Total Metals**

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.021	ND	0.056	ND	25	FGS-070	

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# MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

## SOURCE: 0610034-01

Matrix: Water

Batch: F610163

Sequence: 6J30004

Lab Number: F610163-MS/MSD1

Preparation: Methyl Hg Distillation for Water

### **Total Metals**

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.021	2.008	1.808	89.0	70 - 130	FGS-070	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	2.033	100	11.7	70 - 130	25	FGS-070	

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## LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

## **RECOVERY AND RPD**

Matrix: Water

Batch: F610163

Sequence: 6J30004

Lab Number: F610163-BS/BSD1

Preparation: Methyl Hg Distillation for Water

### **Total Metals**

Analyte		Spike Added (ng/L)	LCS Concentr (ng/L	ation	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury		2.008	1.892	2	94.2	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	LCSD Concentration (ng/L)	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes

95.6

1.47

70 - 130

25

FGS-070

1.920

2.008

Methyl Mercury

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# **PREPARATION BLANKS**

Matrix: Water
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Instrument: MeHg-15

Sequence: <u>6J30004</u>

Preparation: Methyl Hg Distillation for Water

**Total Metals** 

	Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
L	F610163-BLK1	Methyl Mercury	0.002	0.056	ng/L	F610163	FGS-070	U
	F610163-BLK2	Methyl Mercury	-0.002	0.056	ng/L	F610163	FGS-070	U
	F610163-BLK3	Methyl Mercury	0.008	0.056	ng/L	F610163	FGS-070	U

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# **Notes and Definitions**

U A	nalyte in	cluded in	the analysis,	but not detected
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- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

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	e t j		Number of Containers/Preser	rvative # 12423c	of
4700 West 77th Street			Water	Soil $\overline{\mathcal{F}}$	ger: CDP
BARR Minneapolis, MN 55435-4803 (952) 832-2600	# 3933	Volatile Organics (Pres.)*1Semivolatile Organics *2Semivolatile Organics *2Dissolved Metals (HNO3)Total Metals (HNO3)General (Unpreserved)*3Cvanide (NaOH)	04) *4 (H <sub>2</sub> S04) etate) 203) 203) <b>Me Pecury</b> red McOH)*1	GRO, BTEX (2-oz tared MeOH)*1 DRO (2-oz tared) - 25 grams Metals (2-oz unpreserved) SVOCs (2 or 4-oz unpreserved) SVOCs (2 or 4-oz unpres.)*2 % Moisture (plastic vial, unpres.) Total No. Of Containers :	act: <u>KDP</u>
Project Number $23 \cdot 69 - 86200$ Project Name POLY Met	<u>9  0,0,9</u> № 21470	rganics e Orgar Metals ( Jnpreser aOH)	(H <sub>2</sub> SO <sub>4</sub> ) rease (I n Aceta Na <sub>2</sub> S <sub>2</sub> O 1) 1)	TEX (2-02 tared) 2-02 tared) (2-02 unpu (2-02 unpu (2-07 4-05) (2-07 4-05) (2-	act: <u>KDP</u> KSJ/LMG
Sample Collection	Matrix Type	latile O mivolatil ssolved tal Meta taral (1 anide (N	Nutrients (H <sub>2</sub> SO <sub>4</sub> ) *4 Oil and Grease (H <sub>2</sub> SO <sub>4</sub> ) Sulfide (Zn Acetate) Methane Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ) DRO (HCl) TOC Horton (HCl) No Prece	GRO, BTEX (2-oz tared Me DRO (2-oz tared) - 25 g Metals (2-oz unpreserved SVOCs (2 or 4-oz unpre % Moisture (plastic vial, ui Total No. Of Containers rice and the set of the se	NTS
Identification Date Time	Water Water Soil Grab	Cy Ge To Vo			Remarks:
· 06-2/116041 10/3/06 120	o X X	1211	1 111	9 Table	_ /
<sup>1.</sup> 0b-2/116041 10/3/06 120 <sup>2.</sup> 116215					
3. //62/8					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
Common Parameter/Container - Preservation Key	Relinquished By:	N	D Ice? Date Time N 10/3/06 1:50 pw	Received by:	Date Time
<ul> <li>*1 - Volatile Organics = BTEX, GRO, TPH, Full List</li> <li>*2 - Semivolatile Organics = PAHs, PCP, Dioxins, Full List Herbicide/Pesticide/PCBs</li> </ul>	Relinquished By:		On Ice? Date Time	Received by: P. Almahue	10/3/04 Time 10/3/04 150p-
*3 - General = pH, Chloride, Flouride, Alkalinity, TSS, TDS, TS, Sulfate		Air Freight Federal	Express Sampler	Air Bill Number:	3.3°Cnice

\*4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

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Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

From Ph. II Wark Plan

Coc#72433 273

Table 1.	<b>Proposed Parameters</b>	for Groundwater	Sample Analysis.	Detection limits in ug/L
unless of	herwise 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 -48 W.h	olding EPA 1631E	0.02 ng/L
Molybdenum, Total	time EPA 246.2	5
Molybdenum, Dissolved	EPA 246.2	5
Nickel, Total	EPA 249.2	2

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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

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Page 1 of 12



Northeast Technical Services 315 Chestnut Street PO Box 1142

Laboratory Results

MDH Certification: 027-137-157

Virginia, MN 55792 Phone: 218-741-4290

Fax: 218-742-1010

RECEIVED

Barr Engineering Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435 DEC 1 8 2006 BARR ENGINEERING CO. NTS COC: 72484 Received: 10/4/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/14/2006

Approved by:

Renee Stone

Revision #1

NTS Sample: 116289 Description: 0B-5 Sample Date: 10/4/2006 10:30:00 AM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	10/26/2006	SUB	S7

Qualifie	Description		Note
S7		414 Pontius Ave. N. Seattle, WA	See Attached Report.

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Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US BPA and the Minnesota Department of Health, where applicable, unless noted in the report.

NTS Sample: 116290 Description: OB-4 Sample Date: 10/4/2006 12:10:00 PM			Aqueous Type: Grab		NTS COC: 72484 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/14/2006			
Analyte	Result	Units	RL	Method	Analysis Date	Analyst		
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	10/26/2006	SUB	S7	

Page	3	of	12
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NTS Sample: 116291 Description: M-1 Sample Date: 10/4/2006			Matrix: Aqueous Sample Type: Grab		NTS COC: 72484 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 F Sampled By: Client Report Date: 12/14/2006			≽t
Analyte	Result	Units	RL	Method		Analysis Date	Analyst	
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630		10/26/2006	SUB	S7

NTS Sample: 116350 **Description: 0B-5** Sample Date: 10/4/2006 10:30:00 AM

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Matrix: Aqueous Sample Type: Grab NTS COC: 72484 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/14/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	181	μg/L	25	EPA 200.7	10/13/2006	CSD
Antimony	<3	µg/L	3	EPA 204.2	10/13/2006	KJD
Arsenic	<2	µg/L	2	EPA 206.2	10/7/2006	KJD
Barium	<10	µg/L	10	EPA 200.7	10/13/2006	CSD
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/17/2006	KJD
Boron	<50	µg/L	50	EPA 200.7	10/13/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/17/2006	KJD
Calcium	7.66	mg/L	1	EPA 200.7	10/13/2006	CSD
Chromium	2.2	µg/L	1	EPA 218.2	10/20/2006	KJD
Cobalt	<1	µg/L	1	EPA 219.2	10/13/2006	KJD
Copper	3.5	µg/L	2	EPA 220.2	10/11/2006	KJD
Iron	548	µg/L	50	EPA 200.7	10/13/2006	CSD
Lead	<1	µg/L	1	EPA 239.2	10/13/2006	KJD
Magnesium	2.81	mg/L	1	EPA 200.7	10/13/2006	CSD
Manganese	<10	µg/L	10	EPA 200.7	10/13/2006	CSD
Mercury, Low Level	4.9	ng/L	2	EPA 1631E	10/20/2006	RH
Molybdenum	<5	µg/L	5	EPA 246.2	10/12/2006	KJD
Nickel	4.6	µg/L	2	EPA 249.2	10/11/2006	KJD
Potassium	1.26	mg/L	0.25	EPA 200.7	10/13/2006	CSD
Selenium	<10	µg/L	2	EPA 270.2	10/6/2006	KJD c
Silver	<1	µg/L	1	EPA 272.2	10/17/2006	KJD
Sodium	<2	mg/L	2	EPA 200.7	10/13/2006	CSD
Strontium	19.3	µg/L	5	EPA 200.7	10/13/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	10/11/2006	KJD
Titanium	<20	µg/L	20	EPA 283.2	10/19/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/13/2006	CSD
тос	2.0	mg/L	1	EPA 415.1	10/11/2006	CSD
Alkalinity, Total	25.5	mg/L as CaCO3	10	EPA 310.1	10/6/2006	JLC
Chloride	<0.5	mg/L	0.5	EPA 300.0 ATP	10/6/2006	DB
COD	<10	mg/L	10	SM 18th Ed 5220D	10/16/2006	JLC
Fluoride	<0.1	mg/L	0.1	EPA 300.0	10/6/2006	DB
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/12/2006	LL
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/10/2006	LL
pH	6.0	Std Units	0.1	EPA 150.1	10/5/2006	JLC
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/6/2006	DB
Sulfate	8.24	mg/L	1	EPA 300.0 ATP	10/6/2006	DB
Hardness, Total (calc)	30.7	mg/L	3	SM 2340B	10/31/2006	RMS
Qualifier Description		Note				

See Attached Report.

Qualifier Description С

Elevated Reporting Limit.

Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN S2

Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN **S**4

NTS Sample: 116350 Description: 0B-5 Sample Date: 10/4/2006	10:30:00 AM		Aqueous e Type: Grab		NTS COC: 72484 Client: 0662 - Barr Engineerin Project: 3933 - 23/69-86200400 Sampled By: Client Report Date: 12/14/2006	-	≯t
Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/11/2006	SUB	S2
Palladium	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4
Platinum	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4

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Qualif	fier Description	Note
С	Elevated Reporting Limit.	
S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New	Ulm, MN
\$4	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapo	lis, MN See Attached Report.

NTS Sample: 116351 Description: 0B-5 Sample Date: 10/4/2006 10:30:00 AM

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Matrix: Aqueous Sample Type: Grab - Filtered

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	10/9/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	10/10/2006	KJD
Copper	2.3	μg/L	2	EPA 220.2	10/7/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	10/6/2006	KJD
Nickel	5.9	μg/L	2	EPA 249.2	10/7/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	10/6/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/10/2006	KJD
Zinc	<25	μg/L	25	EPA 200.7	10/9/2006	CSD

NTS Sample: 116352 Description: OB-4 Sample Date: 10/4/2006 12:10:00 PM Matrix: Aqueous Sample Type: Grab NTS COC: 72484 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/14/2006

Notes: No Field Blank was received with this sample. A Field Blank is required for all samples anayzed for Mercury by EPA Method 1

Analyte	Result	Units	RL	Method	Analysis Date	Analyst		
Aluminum	55.4	µg/L	25	EPA 200.7	10/13/2006	CSD		
Antimony	<3	µg/L	3	EPA 204.2	10/13/2006	KJD		
Arsenic	<2	µg/L	2	EPA 206.2	10/7/2006	KJD		
Barium	<10	µg/L	10	EPA 200.7	10/13/2006	CSD		
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/17/2006	KJD		
Boron	<50	µg/L	50	EPA 200.7	10/13/2006	CSD		
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/17/2006	KJD		
Calcium	5.4	mg/L	1	EPA 200.7	10/13/2006	CSD		
Chromium	<1	µg/L	1	EPA 218.2	10/20/2006	KJD		
Cobalt	<1	µg/L	1	EPA 219.2	10/13/2006	KJD		
Copper	<2	µg/L	2	EPA 220.2	10/11/2006	KJD		
Iron	<50	μg/L	50	EPA 200.7	10/13/2006	CSD		
Lead	<1	µg/L	1	EPA 239.2	10/13/2006	KJD		
Magnesium	2.48	mg/L	1	EPA 200.7	10/13/2006	CSD		
Manganese	<10	µg/L	10	EPA 200.7	10/13/2006	CSD		
Mercury, Low Level	0.9	ng/L	0.5	EPA 1631E	10/20/2006	RH		
Molybdenum	<5	µg/L	5	EPA 246.2	10/12/2006	KJD		
Nickel	<2	μg/L	2	EPA 249.2	10/11/2006	KJD		
Potassium	0.98	mg/L	0.25	EPA 200.7	10/13/2006	CSD		
Selenium	<10	µg/L	2	EPA 270.2	10/6/2006	KJD c		
Silver	<1	µg/L	1	EPA 272.2	10/17/2006	KJD		
Sodium	<2	mg/L	2	EPA 200.7	10/13/2006	CSD		
Strontium	18.5	µg/L	5	EPA 200.7	10/13/2006	CSD		
Thallium	<2	µg/L	2	EPA 279.2	10/11/2006	KJD		
Titanium	<20	µg/L	20	EPA 283.2	10/19/2006	KJD		
Zinc	<25	µg/L	25	EPA 200.7	10/13/2006	CSD		
тос	2.2	mg/L	1	EPA 415.1	10/11/2006	CSD		
Alkalinity, Total	17.6	mg/L as CaCO3	10	EPA 310.1	10/6/2006	JLC		
Chloride	0.5	mg/L	0.5	EPA 300.0 ATP	10/6/2006	DB		
COD	<10	mg/L	10	SM 18th Ed 5220D	10/16/2006	JLC		
Fluoride	<0.1	mg/L	0.1	EPA 300.0	10/6/2006	DB		
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/12/2006	LL		
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/10/2006	LL		
pH	6.1	Std Units	0.1	EPA 150.1	10/5/2006	JLC		
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/6/2006	DB		
Sulfate	<1	mg/L	1	EPA 300.0 ATP	10/6/2006	DB		
Hardness, Total (calc)	23.7	mg/L	3	SM 2340B	10/31/2006	RMS		
Qualifier Description				Note				

c Elevated Reporting Limit.

S2 Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN

S4 Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN See Attached Report.

NTS Sample: 116352 Description: OB-4 Sample Date: 10/4/2006 12:10:00 PM

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Matrix: Aqueous Sample Type: Grab NTS COC: 72484 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/14/2006

Notes: No Field Blank was received with this sample. A Field Blank is required for all samples anayzed for Mercury by EPA Method 1

Analyte	Result	Units	RL	Method	Analysis Date	Analyst		
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/11/2006	SUB	S2	
Palladium	<0.1	μg/L	0.1	EPA 200.8	10/23/2006	SUB	S4	
Platinum	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4	

Qualifier	Description	Note
c	Elevated Reporting Limit.	
S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	
S4	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.

NTS Sample: 116353 Description: OB-4 Sample Date: 10/4/2006 12:10:00 PM

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Matrix: Aqueous Sample Type: Grab - Filtered

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	10/9/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	10/10/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	10/7/2006	KJD
vlolybdenum	<5	µg/L	5	EPA 246.2	10/6/2006	KJD
lickel	<2	µg/L	2	EPA 249.2	10/7/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	10/6/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/10/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/9/2006	CSD

NTS Sample: 116354 **Description: M-1** Sample Date: 10/4/2006

.

Matrix: Aqueous Sample Type: Grab NTS COC: 72484 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/14/2006

Notes: No Field Blank was received with this sample. A Field Blank is required for all samples analyzed for Mercury by EPA Method

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	62.1	µg/L	25	EPA 200.7	10/13/2006	CSD
Antimony	<3	µg/L	3	EPA 204.2	10/13/2006	KJD
Arsenic	<2	µg/L	2	EPA 206.2	10/7/2006	KJD
Barium	<10	µg/L	10	EPA 200.7	10/13/2006	CSD
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/17/2006	KJD
Boron	<50	μg/L	50	EPA 200.7	10/13/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/17/2006	KJD
Calcium	5.48	mg/L	1	EPA 200.7	10/13/2006	CSD
Chromium	<1	µg/L	1	EPA 218.2	10/20/2006	KJD
Cobalt	<1	µg/L	1	EPA 219.2	10/13/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	10/11/2006	KJD
Iron	<50	µg/L	50	EPA 200.7	10/13/2006	CSD
Lead	<1	μg/L	1	EPA 239.2	10/13/2006	KJD
Magnesium	2.52	mg/L	1	EPA 200.7	10/13/2006	CSD
Manganese	<10	µg/L	10	EPA 200.7	10/13/2006	CSD
Mercury, Low Level	1.0	ng/L	0.5	EPA 1631E	10/20/2006	RH
Molybdenum	<5	µg/L	5	EPA 246.2	10/12/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	10/11/2006	KJD
Potassium	0.99	mg/L	0.25	EPA 200.7	10/13/2006	CSD
Selenium	<10	µg/L	2	EPA 270.2	10/6/2006	KJD c
Silver	<1	µg/L	1	EPA 272.2	10/17/2006	KJD
Sodium	<2	mg/L	2	EPA 200.7	10/13/2006	CSD
Strontium	18.8	µg/L	5	EPA 200.7	10/13/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	10/11/2006	KJD
Titanium	<20	µg/L	20	EPA 283.2	10/19/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/13/2006	CSD
тос	1.9	mg/L	1	EPA 415.1	10/11/2006	CSD
Alkalinity, Total	17.6	mg/L as CaCO3	10	EPA 310.1	10/6/2006	JLC
Chloride	<0.5	mg/L	0.5	EPA 300.0 ATP	10/6/2006	DB
COD	<10	mg/L	10	SM 18th Ed 5220D	10/16/2006	JLC
Fluoride	<0.1	mg/L	0.1	EPA 300.0	10/6/2006	DB
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/12/2006	LL
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/10/2006	LL
pH	5.7	Std Units	0.1	EPA 150.1	10/5/2006	JLC
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/6/2006	DB
Sulfate	8.55	mg/L	1	EPA 300.0 ATP	10/6/2006	DB
Hardness, Total (calc)	24.1	mg/L	3	SM 2340B	10/31/2006	RMS
Qualifier Description		*****		Note		**************************************

See Attached Report.

Elevated Reporting Limit. С

Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN \$2

\$4

Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN

NTS Sample: 116354 Description: M-1 Sample Date: 10/4/2006

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Matrix: Aqueous Sample Type: Grab NTS COC: 72484 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/14/2006

Notes: No Field Blank was received with this sample. A Field Blank is required for all samples analyzed for Mercury by EPA Method

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/11/2006	SUB	S2
Palladium	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4
Platinum	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4

Qualifier	Description	Note
c	Elevated Reporting Limit.	
S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	
S4	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.
<u></u>	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Anached Report.

NTS Sample: 116355 Description: M-1 Sample Date: 10/4/2006

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Matrix: Aqueous Sample Type: Grab - Filtered

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	10/9/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	10/10/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	10/7/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	10/6/2006	KJD
Nickel	<2	µg/L	2	EPA 249.2	10/7/2006	KJD
Selenium	<2	μg/L	2	EPA 270.2	10/6/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/10/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/9/2006	CSD



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

\*

07 November 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenny Flats

Jennifer Cahn For Kristina Spadafora Project Manager



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

# ANALYTICAL REPORT FOR SAMPLES

Client: Northeast Technical Services Inc.

Project: Methyl Mercury

SDG:

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
116289	0610013-01	Water	04-Oct-06 10:30	05-Oct-06 10:25
116290	0610013-02	Water	04-Oct-06 12:10	05-Oct-06 10:25
116291	0610013-03	Water	04-Oct-06 00:00	05-Oct-06 10:25

Frontier GeoSciences, Inc.

Jempflat

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Jennifer Cahn For Kristina Spadafora, Project Manager



## CASE NARRATIVE

Work Order Number: 0610013:

#### SAMPLE RECEIPT

Three (3) water samples were received on October 5, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 0.8 degrees Celsius.

Upon receipt, the water samples for methyl mercury were preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottles for methyl mercury analysis were stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits.

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Jennifer Cahn For Kristina Spadafora, Project Manager



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# CHAIN OF CUSTODY FORMS

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CLIENT NAME NORTHEAST TECHNICAL SERVICES 315 Chestnut Street PO Box 1142 Virginia, MN 55792 (213)741-4290- Fax (218)742-1010	ikvoics to: Renee Scove @ N	fS	<i>Renee S</i> x		NTS					2				Sheed we share		
PO NUMBER: 72484/3933	SANFLE COLLECTION	RANFLE COLL	×7.0*	244915	TYPE	MATI	Rec	Rtor	8	2			¥			
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Frontier GeoSciences, Inc.

Jenne Flats

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# Methyl Mercury Analytical Results

Matrix: Water

Extraction: Methyl Hg Distillation for Water

### **Total Metals**

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Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
						I Tepareu	Sequence	Analyzeu	methou.	ivotes
116289	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U
116290	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U
116291	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U

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# MATRIX DUPLICATES/TRIPLICATES

# SOURCE: 0610034-01

Matrix: Water

Sequence: 6J30004

Batch: F610163

Lab Number: F610163-DUP1

Preparation: Methyl Hg Distillation for Water

### Total Metals

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.021	ND	0.056	ND	25	FGS-070	

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Jennifer Cahn For Kristina Spadafora, Project Manager

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# MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

# SOURCE: 0610034-01

Matrix: Water

Batch: F610163

Sequence: 6J30004

Lab Number: F610163-MS/MSD1

Preparation: Methyl Hg Distillation for Water

## **Total Metals**

Analyte	Sample Concentrat (ng/L)	ĸ	Conce	MS MS Concentration % (ng/L) Recovery 1.808 89.0		Revovery Limits	Method	Notes
Methyl Mercury Analyte	0.021	2.008	1			70 - 130	FGS-070	
	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	2.033	100	11.7	70 - 130	25	FGS-070	

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# LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

## **RECOVERY AND RPD**

Matrix: Water

Sequence: 6J30004

Batch: F610163

Lab Number: F610163-BS/BSD1

Preparation: Methyl Hg Distillation for Water

### **Total Metals**

Analyte	Spike Added (ng/L)	LCS Concentration (ng/L)	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	2.008	1.892	94.2	70 - 130	FGS-070	

Analyte	Spike Added (ng/L)	LCSD Concentration (ng/L)	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2,008	1.920	95.6	1.47	70 - 130	25	FGS-070	

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## **PREPARATION BLANKS**

Matrix: <u>Water</u>

Instrument: MeHg-15

Sequence: <u>6J30004</u> Preparation: <u>Methyl Hg Distillation for Water</u>

**Total Metals** 

	Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
<u> </u>	F610163-BLK1	Methyl Mercury	0.002	0.056	ng/L	F610163	FGS-070	U.
	F610163-BLK2	Methyl Mercury	-0.002	0.056	ng/L	F610163	FGS-070	U
	F610163-BLK3	Methyl Mercury	0.008	0.056	ng/L	F610163	FGS-070	U

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Jennifer Cahn For Kristina Spadafora, Project Manager

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# **Notes and Definitions**

U	Analyte included in the analysis, but not detected
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DET Analyte Detected

MRL Minimum Reporting Limit

- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

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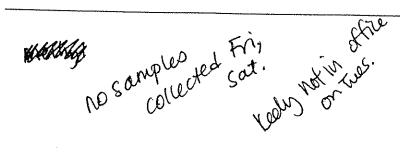
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From Ph. II Work Plan

Coc#72433 273

Table 1. Proposed Parameters for Groundwater Sample	Analysis. Detecti	on 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 1	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	l mg/L
Nitrogen, Ammonia		EPA 350.1	0.1 mg/L
Nitrogen, Nitrate + Nitrite		EPA 353.2	0.1 mg/L
pH 1		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 - 48 W	. holding	EPA 1631E	0.02 ng/L
Molybdenum, Total	time	EPA 246.2	5
Molybdenum, Dissolved		EPA 246.2	5
Nickel, Total		EPA 249.2	2



€€ 10		Coc#72 4.
		PF 3073
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

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# Northeast Technical Services

315 Chestnut Street PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

MDH Certification: 027-137-157

NTS COC: 72541 Received: 10/5/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Approved by:

**Renee Stone** 

Barr Engineering Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435

RECEIVED

NOV 2 0 2006 ENGINEERING CO.

NTS Sample: 116430 Description: OB-1 Sample Date: 10/5/2006 1:40:00 PM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	10/26/2006	SUB	S7

This report may not be reproduced, except in full, without written consent of NTS laboratory.

Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report.

NTS Sample: 116431 Description: MW-05-09 Sample Date: 10/5/2006	2:00:00 PM		x: Aqueous ble Type: Grab		NTS COC: 72541 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006
Analyte	Result	Units	RL	Method	Analysis Date Analyst
Methyl Mercury	0.130	ng/L	0.056	EPA 1630	10/26/2006 SUB S7

NTS Sample: 116432			Aqueous			NTS COC: 725			
Description: FB-1		Sample	e Type: G	irab		Client: 0662 - I	Barr Engineering		
Sample Date: 10/5/2006 7:45:00 /	7:45:00 AM					Project: 3933 -	23/69-862004009	Poly Me	et
						Sampled By: C	lient		
						Report Date: 1	1/16/2006		
Analyte	Result	Units		RL	Method		Analysis Date	Analyst	
Methyl Mercury	<0.056	ng/L	0.0	056	EPA 1630		10/26/2006	SUB	S7

**S**7

10/26/2006

SUB

NTS Sample: 116433		Matrix: Aqu	leous	NTS COC	: 72541	
Description: Pour Blank	c	Sample Type	e: Grab	Client: 00	662 - Barr Engineering	g
Sample Date: 10/5/2006	7:45:00 AM			Sampled	3933 - 23/69-8620040( By: Client ate: 11/16/2006	09 Poly Met
Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Mercury, Low Level	0.4	ng/L	0.2	EPA 1631E	10/25/2006	RH

0.056 EPA 1630

<0.056

ng/L

Methyl Mercury

NTS Sample: 116535 Description: OB-1 Sample Date: 10/5/2006 1:40:00 PM Matrix: Aqueous Sample Type: Grab NTS COC: 72541 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Aluminum	111	μg/L	25	EPA 200.7	10/17/2006	CSD	
Antimony	<3	µg/L	3	EPA 204.2	10/13/2006	KJD	
Arsenic	<2	µg/L	2	EPA 206.2	10/11/2006	KJD	
Barium	<10	µg/L	10	EPA 200.7	10/17/2006	CSD	
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/17/2006	KJD	
Boron	<50	µg/L	50	EPA 200.7	10/17/2006	CSD	
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/17/2006	KJD	
Calcium	29.7	mg/L	1	EPA 200.7	10/17/2006	CSD	
Chromium	1.7	µg/L	1	EPA 218.2	10/20/2006	KJD	
Cobalt	<1	µg/L	1	EPA 219.2	10/13/2006	KJD	
Copper	<2	µg/L	2	EPA 220.2	10/11/2006	KJD	
Iron	87.9	µg/L	50	EPA 200.7	10/17/2006	CSD	
Lead	<2	µg/L	1	EPA 239.2	10/14/2006	KJD	с
Magnesium	7.72	mg/L	1	EPA 200.7	10/17/2006	CSD	
Manganese	<10	µg/L	10	EPA 200.7	10/17/2006	CSD	
Mercury, Low Level	<0.5	ng/L	0.5	EPA 1631E	10/25/2006	RH	
Molybdenum	<5	μg/L	5	EPA 246.2	10/12/2006	KJD	
Nickel	<2	µg/L	2	EPA 249.2	10/12/2006	KJD	
Potassium	1.81	mg/L	0.25	EPA 200.7	10/17/2006	CSD	
Selenium	<2	µg/L	2	EPA 270.2	10/11/2006	KJD	
Silver	<1	μg/L	1	EPA 272.2	10/17/2006	KJD	
Sodium	7.38	mg/L	2	EPA 200.7	10/17/2006	CSD	
Strontium	112	µg/L	5	EPA 200.7	10/17/2006	CSD	
Thallium	<2	µg/L	2	EPA 279.2	10/11/2006	KJD	
Titanium	<20	µg/L	20	EPA 283.2	10/19/2006	KJD	
Zinc	<25	µg/L	25	EPA 200.7	10/17/2006	CSD	
тос	1.5	mg/L	1	EPA 415.1	10/11/2006	CSD	
Alkalinity, Total	47.4	mg/L as CaCO3	10	EPA 310.1	10/17/2006	JLC	
Chloride	15.7	mg/L	0.5	EPA 300.0 ATP	10/15/2006	DB	
COD	<10	mg/L	10	SM 18th Ed 5220D	10/16/2006	JLC	
Fluoride	0.11	mg/L	0.1	EPA 300.0	10/15/2006	DB	
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/12/2006	LL	
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/17/2006	DB	
pH	9.0	Std Units	0.1	SM 4500-H+	10/9/2006	JLC	
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/12/2006	LL	
Sulfate	37.2	mg/L	1	EPA 300.0 ATP	10/15/2006	DB	
Hardness, Total (calc)	106	mg/L	3	EPA 200.7	11/16/2006	RMS	

Note

Qualifier Description

c Elevated Reporting Limit.

S2 Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN

S4 Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN See Attached Report.

NTS Sample: 116535 Description: OB-1 Sample Date: 10/5/2006 1:40:00 PM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analys	
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/16/2006	SUB	S2
Palladium	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4
Platinum	<0.02	µg/L	0.02	EPA 200.8	10/23/2006	SUB	S4

Qualifier	Description	Note
с	Elevated Reporting Limit.	
S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	
S4	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.

NTS Sample: 116536 Description: MW-05-09 Sample Date: 10/5/2006 2:00:00 PM Matrix: Aqueous Sample Type: Grab NTS COC: 72541 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	27100	µg/L	250	EPA 200.7	10/17/2006	CSD
Antimony	<3	µg/L	3	EPA 204.2	10/13/2006	KJD
Arsenic	4.8	µg/L	2	EPA 206.2	10/11/2006	KJD
Barium	214	µg/L	10	EPA 200.7	10/17/2006	CSD
Beryllium	0.7	µg/L	0.2	EPA 210.2	10/17/2006	KJD
Boron	<50	µg/L	50	EPA 200.7	10/17/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/17/2006	KJD
Calcium	7.08	mg/L	1	EPA 200.7	10/17/2006	CSD
Chromium	55	µg/L	2	EPA 218.2	10/20/2006	KJD
Cobalt	8.8	μg/L	1	EPA 219.2	10/13/2006	KJD
Copper	99.6	µg/L	10	EPA 220.2	10/12/2006	KJD
Iron	29800	µg/L	500	EPA 200.7	10/17/2006	CSD
Lead	6.1	µg/L	2	EPA 239.2	10/14/2006	KJD
Magnesium	6.83	mg/L	1	EPA 200.7	10/17/2006	CSD
Manganese	584	µg/L	10	EPA 200.7	10/17/2006	CSD
Mercury, Low Level	28.8	ng/L	0.5	EPA 1631E	10/25/2006	RH
Molybdenum	12.1	µg/L	、 5	EPA 246.2	10/12/2006	KJD
Nickel	40.2	µg/L	2	EPA 249.2	10/12/2006	KJD
Potassium	6.87	mg/L	2.5	EPA 200.7	10/17/2006	CSD
Selenium	<2	µg/L	2	EPA 270.2	10/11/2006	KJD
Silver	<1	μg/L	1	EPA 272.2	10/17/2006	KJD
Sodium	12	mg/L	2	EPA 200.7	10/17/2006	CSD
Strontium	65.1	µg/L	5	EPA 200.7	10/17/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	10/11/2006	KJD
Titanium	1040	µg/L	200	EPA 283.2	10/19/2006	KJD
Zinc	46.3	µg/L	25	EPA 200.7	10/17/2006	CSD
тос	5.2	mg/L	1	EPA 415.1	10/11/2006	CSD
Alkalinity, Total	26.4	mg/L as CaCO3	10	EPA 310.1	10/17/2006	JLC
Chloride	0.69	mg/L	0.5	EPA 300.0 ATP	10/15/2006	DB
COD	<10	mg/L	10	SM 18th Ed 5220D	10/16/2006	DB
Fluoride	<0.1	mg/L	0.1	EPA 300.0	10/15/2006	DB
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/12/2006	LL
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/17/2006	DB
pН	7.5	Std Units	0.1	SM 4500-H+	10/9/2006	JLC
Phosphorous, Total	0.25	mg/L as P	0.1	EPA 365.4	10/12/2006	LL
Sulfate	10.4	mg/L	1	EPA 300.0 ATP	10/15/2006	DB
Hardness, Total (calc)	45.8	mg/L	3	EPA 200.7	11/16/2006	RMS

**S**4 Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN See Attached Report. NTS Sample: 116536 Description: MW-05-09 Sample Date: 10/5/2006 2:00:00 PM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/16/2006	SUB	S2
Palladium	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4
Platinum	<0.02	µg/L	0.02	EPA 200.8	10/23/2006	SUB	S4

ſ	Qualifier	Description	Note
	\$2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	
l	S4	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.

NTS Sample: 116537 **Description: FB-1** Sample Date: 10/5/2006 7:45:00 AM Matrix: Aqueous Sample Type: Grab NTS COC: 72541 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	μg/L	25	EPA 200.7	10/17/2006	CSD
Antimony	<3	µg/L	3	EPA 204.2	10/13/2006	KJD
Arsenic	<2	µg/L	2	EPA 206.2	10/11/2006	KJD
Barium	<10	µg/L	10	EPA 200.7	10/17/2006	CSD
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/17/2006	KJD
Boron	<50	µg/L	50	EPA 200.7	10/17/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/17/2006	KJD
Calcium	<1	mg/L	1	EPA 200.7	10/17/2006	CSD
Chromium	<1	µg/L	1	EPA 218.2	10/20/2006	KJD
Cobalt	<1	µg/L	1	EPA 219.2	10/13/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	10/12/2006	KJD
Iron	<50	µg/L	50	EPA 200.7	10/17/2006	CSD
Lead	<2	µg/L	1	EPA 239.2	10/14/2006	KJD c
Magnesium	<1	mg/L	1	EPA 200.7	10/17/2006	CSD
Manganese	<10	µg/L	10	EPA 200.7	10/17/2006	CSD
Mercury, Low Level	0.9	ng/L	0.5	EPA 1631E	10/25/2006	RH
Molybdenum	<5	µg/L	5	EPA 246.2	10/12/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	10/12/2006	KJD
Potassium	<0.25	mg/L	0.25	EPA 200.7	10/17/2006	CSD
Selenium	<2	µg/L	2	EPA 270.2	10/11/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/17/2006	KJD
Sodium	<2	mg/L	2	EPA 200.7	10/17/2006	CSD
Strontium	<5	µg/L	5	EPA 200.7	10/17/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	10/11/2006	KJD
Titanium	<20	µg/L	20	EPA 283.2	10/19/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/17/2006	CSD
тос	<1	mg/L	1	EPA 415.1	10/11/2006	CSD
Alkalinity, Total	<10	mg/L as CaCO3	10	EPA 310.1	10/17/2006	JLC
Chloride	<0.5	mg/L	0.5	EPA 300.0 ATP	10/15/2006	DB
COD	<10	mg/L	10	SM 18th Ed 5220D	10/16/2006	JLC
Fluoride	<0.1	mg/L	0.1	EPA 300.0	10/15/2006	DB
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/12/2006	LL
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/17/2006	DB
pН	8.9	Std Units	0.1	SM 4500-H+	10/9/2006	JLC
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/12/2006	LL
Sulfate	<1	mg/L	1	EPA 300.0 ATP	10/15/2006	DB
Hardness, Total (calc)	<10	mg/L	10	EPA 200.7	11/16/2006	RMS
Qualifier Description	****	*****		Note		······································

С Elevated Reporting Limit.

S2 Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN

Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN S4

See Attached Report.

NTS Sample: 116537 Description: FB-1 Sample Date: 10/5/2006 7:45:00 AM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/16/2006	SUB	S2
Palladium	<0.1	µg/L	0.1	EPA 200.8	10/23/2006	SUB	S4
Platinum	<0.02	µg/L	0.02	EPA 200.8	10/23/2006	SUB	S4

Qualifier	Description	Note
c	Elevated Reporting Limit.	
\$2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	
S4	Analysis performed by Pace: MDH# 027-053-137 1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.

NTS Sample: 116538 Description: OB-1 Sample Date: 10/5/2006 1:40:00 PM Matrix: Aqueous Sample Type: Grab - Filtered

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	55.2	µg/L	25	EPA 200.7	10/9/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	10/10/2006	KJD
Copper	2.2	µg/L	2	EPA 220.2	10/10/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	10/21/2006	KJD
Nickel	<2	µg/L	2	EPA 249.2	10/10/2006	KJD
Selenium	<2	μg/L	2	EPA 270.2	10/11/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/10/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/9/2006	CSD

NTS Sample: 116539 Description: MW-05-09 Sample Date: 10/5/2006 2:00:00 PM

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Matrix: Aqueous Sample Type: Grab - Filtered

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	430	µg/L	25	EPA 200.7	10/9/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	1.2	µg/L	1	EPA 218.2	10/10/2006	KJD
Copper	7.9	µg/L	2	EPA 220.2	10/10/2006	KJD
Molybdenum	8.8	µg/L	5	EPA 246.2	10/21/2006	KJD
Nickel	3	µg/L	2	EPA 249.2	10/10/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	10/11/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/10/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/9/2006	CSD

NTS Sample: 116540 Description: FB-1 Sample Date: 10/5/2006 7:45:00 AM

Matrix: Aqueous Sample Type: Grab - Filtered

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	10/9/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	10/10/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	10/10/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	10/21/2006	KJD
Nickel	<2	µg/L	2	EPA 249.2	10/10/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	10/11/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	10/10/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/9/2006	CSD



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

07 November 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Jennifer Cahn For Kristina Spadafora Project Manager FRONTIER GEOSCIENCES INC.

414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

# ANALYTICAL REPORT FOR SAMPLES

Laboratory: Frontier GeoSciences, Inc.	Laboratory:	Frontier GeoSciences, Inc.
----------------------------------------	-------------	----------------------------

Client: Northeast Technical Services Inc.

Project: Methyl Mercury

SDG:

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
116430	0610024-01	Water	05-Oct-06 00:00	06-Oct-06 10:24
116431	0610024-02	Water	05-Oct-06 00:00	06-Oct-06 10:24
116432	0610024-03	Water	05-Oct-06 00:00	06-Oct-06 10:24
116433	0610024-04	Water	05-Oct-06 00:00	06-Oct-06 10:24

Frontier GeoSciences, Inc.

Jenny Flator

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# CASE NARRATIVE

Work Order Number: 0610024:

#### SAMPLE RECEIPT

Four (4) water samples were received on October 6, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 3.0 degrees Celsius.

Upon receipt, the water samples for methyl mercury were preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottles for methyl mercury analysis were stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits.

Frontier GeoSciences, Inc.

Jennez Flator

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Sec. and

## CHAIN OF CUSTODY FORMS

NORTHEAST TECHNICAL SERVICES 315 Chesthuit Street PD Box 1142 Vinginio, MN 55792 (218)741-4200 Fax (218)742-1010         TEW P-3-0 V(LOD 3'4         Chann of CUSTODY RECORD MFEOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOFOF_	:													-						
CLIENT NAME     INVOICE TO:     REPORT TO:       NOXTREAST TECHNICAL SERVICES     INVOICE TO:     REPORT TO:       NOXTREAST TECHNICAL SERVICES     Renee Stone @ NTS     Renee Stone @ NTS       Yeghna, MN 53792     Renee Stone @ NTS     Renee Stone @ NTS       Yeghna, MN 53792     Renee Stone @ NTS     Yeghna       Yeghna     Yeghna     Yeghna     Yeghna	ND	315 # Viro	Chestnut Stre 20 Box 1142 Inia, MN 5571	eet 192	(		34	Ten Ogi	, p- 00	<b>З</b> эч	.0	ŀ					MAST. OF			
NCATH REAST TECHNICAL SERVICES       315 Chestnut Street       PO BX 1142       Visghia, MN 55792       (216)741-4290 Fax (218)742-1016       PO NUMBERI       72541/3933       Descriptions       Date       Twe       Court of the state       116430       10/5/2006       X       116431       10/5/2006       X       116432       10/5/2006       X       X       116432			1	1			Nerrich			() 			ter T	T			SPECIAL INSTRUCTS	5N150	e and a fill of the	
PO NUMBERI         72544/3933           DEBCRIPTION:         DATE         TATE         COMP GRAD         VARIAU           DESCRIPTION:         DATE         TATE         COMP GRAD         VARIAU           116430         10/5/2006         x         X         1         Methyl Mercury           116432         10/5/2006         x         X         1         Methyl Mercury           116432         10/5/2006         x         X         1         Methyl Mercury	ATHEAST TECHNIC 5 Chestnut Street	IL SERVICES																		
PO NUMBERI         72544/3933           DEBCRIPTION:         DATE         TATE         COMP GRAD         VARIAU           DESCRIPTION:         DATE         TATE         COMP GRAD         VARIAU           116430         10/5/2006         x         X         1         Methyl Mercury           116432         10/5/2006         x         X         1         Methyl Mercury           116432         10/5/2006         x         X         1         Methyl Mercury	gènia, MN 55792	18)742-1010	Renee Stone	e 🖗 NTS		Renee Su	one @	NTS				RAL - NO PRES	142 C (1823	NI 1914	ZH KENK	ANG NY TRA				
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118430         10/5/2006         x         X         1         Melhyl Mercury           118431         10/5/2008         x         X         1         Methyl Mercury           118432         10/5/2006         x         X         1         Methyl Mercury	12582101							t:	100 Automation	fr	+					1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ntrikki menerana		
118431         10/5/2006         x         X         1         Methyl Mercury           118432         10/5/2006         x         X         1         Methyl Mercury	K /	///*****					41225-14-44		window of	22234	Ť	•	T		Ī	ľ	1	Melfed Mercu	i	
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# Methyl Mercury Analytical Results

Matrix: Water

Extraction: Methyl Hg Distillation for Water

#### **Total Metals**

Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
116430	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U
116431	0.130	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	
116432	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U
116433	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U

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## MATRIX DUPLICATES/TRIPLICATES

## SOURCE: 0610034-01

Matrix: Water

Sequence: <u>6J30004</u>

Batch: F610163

Lab Number: F610163-DUP1

Preparation: Methyl Hg Distillation for Water

#### **Total Metals**

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.021	ND	0.056	ND	25	FGS-070	

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## MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

## SOURCE: 0610034-01

Matrix: Water

Sequence: 6J30004

Batch: F610163

Lab Number: F610163-MS/MSD1

Preparation: Methyl Hg Distillation for Water

#### **Total Metals**

	d Notes	Method	Revovery Limits	Recovery	(ng/L)	(ng/L)	Concentration (ng/L)	Analyte
Methyl Mercury         0.021         2.008         1.808         89.0         70 - 130         FGS-07	0	FGS-070	70 - 130	89.0	1.808	2.008	0.021	Methyl Mercury

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	2.033	100	11.7	70 - 130	25	FGS-070	

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## LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

## **RECOVERY AND RPD**

Matrix: Water

Batch: F610163

Sequence: 6J30004

Lab Number: F610163-BS/BSD1

Preparation: Methyl Hg Distillation for Water

#### **Total Metals**

Analyte		Spike Added (ng/L)	LC Concent (ng/	ration	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	******	2.008	1.89	2	94.2	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	LCSD Concentration (ng/L)	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes

1			•				
Methyl Mercury	2.008	1.920	95.6	1.47	70 - 130	25	FGS-070

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# PREPARATION BLANKS

Matrix:	Water	Sequence:	<u>6J30004</u>
Instrument:	MeHg-15	Preparation:	Methyl Hg Distillation for Water

**Total Metals** 

*****	Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
	F610163-BLK1	Methyl Mercury	0.002	0.056	ng/L	F610163	FGS-070	U
	F610163-BLK2	Methyl Mercury	-0.002	0.056	ng/L	F610163	FGS-070	U
	F610163-BLK3	Methyl Mercury	0.008	0.056	ng/L	F610163	FGS-070	U

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# **Notes and Definitions**

U	Analyte	included	in the	analysis,	but not detected
U	Analyte	menuaea	m me	anarysis,	out not detected

- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

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Jemystak

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			Number of Containers/Prese		COC of
Chain of Custody4700 West 77th StreetMinneapolis, MN 55435-4803(952) 832-2600	, ,	;;)*/ 2 )3) *3	Water	(2-oz tarcd MeOH)*1tared) - 25 gramsz unpreserved)or 4-oz unpres.)*2(plastic vial, unpres.)of Containers	Project Manager: <u>CD</u>
	04.0.0.9	cs (Pres ganics * ls (HNO 1NO <sub>3</sub> ) :served)	11) 2SO4) *4 ase (H2SO4) Acetate) 2S2O3) 2S2O3) Hf Hared MeOH) *1	(2-oz tared Me i tared) - 25 <u>1</u> oz unpreservec or 4-oz unpre (plastic vial, u (plastic vial, u	Project Contact: KDP
Project Number 23/69-8620 Project Name PolyMet	Nº 22059	Organi utile Or d Metal ctals (F			Sampled by: <u>LMG, KSJ</u> Laboratory: <u>NTS</u>
J Sample Identification Date Time	Matrix Type Matric Mater OC Comb	Volatile Organics (Pres.)*1 Semivolatile Organics *2 Dissolved Metals (HNO <sub>3</sub> ) Total Metals (HNO <sub>3</sub> ) General (Unpreserved)*3	Cyanide (NaOH) Nutrients (H <sub>2</sub> SO <sub>4</sub> ) *4 Oil and Grease (H <sub>2</sub> SO <sub>4</sub> ) Sulfide (Zn Acetate) Methane Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ) DRO (HCl) TOC C C MOTLA VOCS (Z-oz tared MeOH	GRO, BTEX (2-oz tared MeOH)*J DRO (2-oz tared) - 25 grams Metals (2-oz unpreserved) SVOCs (2 or 4-oz unpres.)*2 % Moisture (plastic vial, unpres.) Total No. Of Containers	Laboratory: <u>NTS</u> Remarks:
1. 06-1 10/5/06 1340	XXX	121		9	Table 1
<sup>2</sup> MW-05-09 10/5/06 1400 <sup>3</sup> FB-1 10/5/06 0745 <sup>4</sup> POUR Blank 10/5/06 0745	XX		1 (1(	7	
<sup>3.</sup> FB-1 10/5/06 07.45	XX	121	<u>1</u> 111	9	Table 1
4. POUR Blank 10/5/040745				2	LL Hg, Methyl Hg
16430 116535 1165	38				
6. 116431 116536 1165 7. 116122 116536 1165	37				
<ol> <li>116432 116537 11654</li> <li>116433</li> </ol>	0				
9.					
10.					
11.					
12.					
Common Parameter/Container - Preservation Key *1 - Volatile Organics = BTEX, GRO, TPH, Full List *2 - Semivolatile Organics = PAHs, PCP, Dioxins, Full List,	Refinquished By:	nur-	On Ice? Date Time Y N Date Time	Received by:	KOLI 10-5-04 110:05 Date Time 5.9°C Mice
Herbicide/Pesticide/PCBs *3 - General = pH, Chloride, Flouride, Alkalinity, TSS, TDS, TS, Sulfate *4 Nutrients = COD, TOC, Physick, Ammonia	Samples Shipped VIA:	] Air Freight [] Federa		Air Bill Number:	5.9°C on ice

\*4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

CoC#72433 273

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

From Ph. II Work Plan

amess other wise 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
Aluminum, Total	EPA 200.7	<u>1 mg/L</u> 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	0.2 0.2 0.5 mg/L
Chromium, Total	EPA 218.2	<u>0.5 Mg/L</u>
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 - 48 h	. holding EPA 1631E	0.02 ng/L
Molybdenum, Total	time EPA 246.2	5
Molybdenum, Dissolved	EPA 246.2	5
Nickel, Total	EPA 249.2	2

No samples ded Fri, office No samples ded sat. not in rus. Kolub or rus.

, <i>1</i>		COC#73 43
		PF 373
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

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Page 1 of 3



Laboratory Results

315 Chestnut Street

PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

**Northeast Technical Services** 

MDH Certification: 027-137-157

NTS COC: 72829 Received: 10/16/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Approved by:

Renee Stone

**Barr Engineering** Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435

RECEIVED

ENGINEERING CO.

NTS Sample: 119232 Description: OB-3 Sample Date: 10/16/2006 12:15:00 PM Matrix: Aqueous Sample Type: Grab

Notes: A Field Blank did not accompany this sample. All samples analyzed for Mercury by EPA Method 1631 require Field Blanks.

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Mercury, Low Level	0.8	ng/L	0.5	EPA 1631E	11/1/2006	SUB	
тос	3.2	mg/L	1	EPA 415.1	10/18/2006	CSD	
Alkalinity, Total	66.2	mg/L as CaCO3	10	EPA 310.1	10/17/2006	JLC	
Chloride	93.1	mg/L	0.5	EPA 300.0 ATP	10/17/2006	DB	
COD	<10	mg/L	10	SM 18th Ed 5220D	10/31/2006	JLC	
Fluoride	0.97	mg/L	0.1	EPA 300.0	10/17/2006	DB	
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	10/19/2006	DB	
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/17/2006	DB	
рН	6.6	Std Units	0.1	SM 4500-H+	10/17/2006	LXP	
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/19/2006	DB	
Sulfate	66.4	mg/L	1	EPA 300.0 ATP	10/17/2006	DB	
Cyanide	<0.02	mg/L	0.02	EPA 335.2	10/20/2006	SUB	S2
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	10/26/2006	SUB	S7

Qualifier	Description	Note
\$2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	
<b>S</b> 7	Analysis performed by Frontier Geosciences: MDH# 053-999-381 414 Pontius Ave. N. Seattle, WA	See Attached Report.

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Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report. NTS Sample: 119233 Description: OB-3 Sample Date: 10/16/2006 12:15:00 PM Matrix: Aqueous Sample Type: Grab NTS COC: 72829 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Aluminum	368	µg/L	25	EPA 200.7	10/25/2006	CSD	
Antimony	<3	µg/L	3	EPA 204.2	10/28/2006	KJD	
Arsenic	4.1	µg/L	2	EPA 206.2	11/3/2006	KJD	
Barium	<10	µg/L	10	EPA 200.7	10/25/2006	CSD	
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/28/2006	KJD	
Boron	<50	µg/L	50	EPA 200.7	10/25/2006	CSD	
Cadmium	<0.2	µg/L	0.2	EPA 7131A	10/31/2006	KJD	
Calcium	21	mg/L	1	EPA 200.7	10/25/2006	CSD	
Chromium	<2.5	µg/L	2.5	EPA 200.7	10/25/2006	CSD	
Cobalt	4.1	µg/L	1	EPA 219.2	10/21/2006	KJD	
Copper	2.1	µg/L	2	EPA 220.2	10/27/2006	KJD	
Iron	7040	µg/L	50	EPA 200.7	10/25/2006	CSD	
Lead	<1	µg/L	1	EPA 239.2	10/20/2006	KJD	
Magnesium	21.4	mg/L	1	EPA 200.7	10/25/2006	CSD	
Manganese	383	µg/L	10	EPA 200.7	10/25/2006	CSD	
Molybdenum	<5	µg/L	5	EPA 246.2	10/27/2006	KJD	
Nickel	128	µg/L	5	EPA 200.7	10/25/2006	CSD	
Potassium	2.33	mg/L	0.25	EPA 200.7	10/25/2006	CSD	
Selenium	<2	µg/L	2	EPA 7740	11/2/2006	KJD	
Silver	<1	µg/L	1	EPA 272.2	10/21/2006	KJD	n
Sodium	6.33	mg/L	2	EPA 200.7	10/25/2006	CSD	
Strontium	74.8	μg/L	5	EPA 200.7	10/25/2006	CSD	
Thallium	<2	µg/L	2	EPA 279.2	10/28/2006	KJD	
Titanium	<20	µg/Ľ	20	EPA 283.2	10/28/2006	KJD	
Zinc	<25	µg/L	25	EPA 200.7	10/25/2006	CSD	
Hardness, Total (calc)	140	mg/L	3	3 EPA 200.7 10/25/2006		CSD	
Palladium	<0.1	µg/L	0.1	0.1 EPA 200.8 10/27/2006		SUB	S4
Platinum	<0.02	µg/L	0.02	EPA 200.8	10/27/2006	SUB	S4

	*****	
Qualifier	Description	Note
n	Matrix Spike recovery not within control limits.	=84%
	Analysis performed by Pace: MDH# 027-053-137	See Attached Report.

NTS Sample: 119234 Description: OB-3 Sample Date: 10/16/2006 12:15:00 PM

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Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 72829 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 11/16/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	μg/L	25	EPA 200.7	10/24/2006	CSD
Cadmium	<0.2	μg/L	0.2	EPA 213.2	10/21/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	11/4/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	11/4/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	10/21/2006	KJD
Nickel	100	µg/L	10	EPA 249.2	11/4/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	10/24/2006	KJD
Silver	<1	µg/L	1	EPA 7761	11/4/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	10/24/2006	CSD



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

07 November 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,





17-Oct-06 14:20

## ANALYTICAL REPORT FOR SAMPLES

Laboratory: <u>F</u>	rontier GeoSciences, Inc.								
Client: N	Jortheast Technical Services Inc.		Project: Methyl	oject: Methyl Mercury					
			******						
Sample ID		Laboratory ID	Matrix	Date Sampled	Date Received				

Water

16-Oct-06 12:15

0610074-01

119232

Frontier GeoSciences, Inc.

Jenny Flator

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



## CASE NARRATIVE

Work Order Number: 0610074:

#### SAMPLE RECEIPT

One (1) water samples were received on October 17, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 2.2 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits.

Frontier GeoSciences, Inc.

Jenny Flater

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## CHAIN OF CUSTODY FORMS

	T TECHNICAL SERVI F Chestnut Street PO Box 1142 ginia, MN 55792 1290 Fax (218)742-1	010	÷ 56			*									CHAIN OF CUST		
CLIENT NAME NORTHEAST TECHNICAL SERVICES 315 Chastnut Street PO Box 1142 Wirginia, MN 55792	avoice to: Renee Stone @ M	s	REPORT TO	2:	NTS			3° 919	ko presk	-422M	. 40054		1.451	6040) 1	272022 N.STALSTA		
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Frontier GeoSciences, Inc.

JennyFlat

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# ANALYTICAL RESULTS

# 119232

Matrix: Water

Laboratory ID: 0610074-01

#### **Total Metals**

Г

Analyte	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Methyl Mercury	ND	0.056	ng/L	1.25	F610163	25-Oct-06	6J30004	26-Oct-06	FGS-070	U

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Jenneztlak

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## MATRIX DUPLICATES/TRIPLICATES

## SOURCE: 0610034-01

Matrix: Water

Sequence: 6J30004

Batch: F610163

Lab Number: F610163-DUP1

Preparation: Methyl Hg Distillation for Water

### Total Metals

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.021	ND	0.056	ND	25	FGS-070	 

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# MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

## SOURCE: 0610034-01

Matrix: Water

Sequence: 6J30004

Batch: F610163

Lab Number: F610163-MS/MSD1

Preparation: Methyl Hg Distillation for Water

### **Total Metals**

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.021	2.008	1.808	89.0	70 - 130	FGS-070	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	2.033	100	11.7	70 - 130	25	FGS-070	

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# LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

## **RECOVERY AND RPD**

Matrix: Water

Sequence: <u>6J30004</u>

Batch: F610163

Lab Number: F610163-BS/BSD1

Preparation: Methyl Hg Distillation for Water

#### **Total Metals**

Analyte		Spike Added (ng/L)	LCS Concentration (ng/L)	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury		2.008	1.892	94.2	70 - 130	FGS-070	<del></del>
	Spike Added	LCSD Concentration	LCSD % %	Revovery	RPD		

	Added	Concentration	%	%	Revovery	RPD		
Analyte	(ng/L)	(ng/L)	Recovery	RPD	Limits	Limit	Method	Notes
Methyl Mercury	2.008	1.920	95.6	1.47	70 - 130	25	FGS-070	

Frontier GeoSciences, Inc.

Jenny Flats

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# **PREPARATION BLANKS**

Matrix: <u>Water</u>

Instrument: MeHg-15

Sequence: <u>6J30004</u>

Preparation: Methyl Hg Distillation for Water

**Total Metals** 

	Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
۰ <u>ــــ</u>	F610163-BLK1	Methyl Mercury	0.002	0.056	ng/L	F610163	FGS-070	Ū
	F610163-BLK2	Methyl Mercury	-0.002	0.056	ng/L	F610163	FGS-070	U
	F610163-BLK3	Methyl Mercury	0.008	0.056	ng/L	F610163	FGS-070	U

Frontier GeoSciences, Inc.

Jenny Flater

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Sample Identification	Colle	ction Time	Water W	atrix	O 148 Urap		Volatile	Semivola	Dissolve Total Mo	General	Cyanide	Nutrient	Oil and Sulfide	Methane	Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> )	DKU (F	1140	nerus	VOCs (2-02 fared MeOH) *1	GRO, BT	DKU (2 Metals	SVOCs (2 or 4-oz unpres.)*2	% Moist		Total No. Of Containers	Laboratory:		NTS emarks:	>		
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<ul> <li>Semivolatile Organics = PAHs Herbicide/Pesticide/PCBs</li> <li>General = pH, Chloride, Flour TDS, TS, Sulfate</li> </ul>	, PCP, Dioxins, ide, Alkalinity,	Full List,		•	hed E pped ∨	IA:	]Air ] Oth		n [	]Fedd		∑n I Y Expres	N		Date pler			Time	e		r Bi		by⊱ umbo	;r:				Date		Tim	e 
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CoC#72433 273

<b>Table I.</b> Proposed Parameters for G unless otherwise noted	Broundwater Sample Analysis	Detection limits in us/
unless otherwise noted.	- mapio i mai jois.	Detection minutes in ug/L

From Ph. II Work Plan

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	l mg/L
Nitrogen, Ammonia	EPA 350.1	0.1 mg/L
Nitrogen, Nitrate + Nitrite	EPA 353.2	0.1 mg/L
<u>pH</u> !	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	<u>0.5 mg/L</u>
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	<u>0.05 hig/L</u>
Magnesium, Total	EPA 200.7	1 0.5 mg/L
Manganese, Total	EPA 200.7	0.03 mg/L
Mercury, Low Level Total	EPA 1631E	<u>2 ng/L</u>
Methyl Mercury, Total - 48 Wr.	holding EPA 1631E	0.02 ng/L
Molybdenum, Total	time EPA 246.2	<u>0.02 lig/L</u> 5
Molybdenum, Dissolved	EPA 246.2	5
Nickel, Total	EPA 249.2	2

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		Co cth 7 pg. 3
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



# **Notes and Definitions**

- U Analyte included in the analysis, but not detected
- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

Frontier GeoSciences, Inc.

Jennez Flater

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Page 1 of 5



Laboratory Results

## **Northeast Technical Services**

315 Chestnut Street PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

MDH Certification: 027-137-157

DEC 0 7 2006

W SANC TO

Report Date: 12/5/2006 Approved by:

Client: 0662 - Barr Engineering

Project: 3933 - 23/69-862004009 Poly Met

NTS COC: 73067

Received: 10/24/2006

Sampled By: Client

Renee Stone

**Barr Engineering** Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435

NTS Sample: 121862 **Description: P-2** Sample Date: 10/24/2006 9:00:00 AM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	11/17/2006	SUB	S7

This report may not be reproduced, except in full, without written consent of NTS laboratory.

Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report.

	Page	2	of	5
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**S**4

SUB

10/27/2006

NTS Sample: 121863 Description: P-2 Sample Date: 10/24/2006	9:00:00 AM	Matrix: <i>A</i> Sample 1	Aqueous ⊺ype: Grab	Clien Proje Samj	COC: 73067 t: 0662 - Barr Engineering ect: 3933 - 23/69-86200400 oled By: Client ort Date: 12/5/2006		et
Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Palladium	<0.1	µg/L	0.1	EPA 200.8	10/27/2006	SUB	S4

0.02

EPA 200.8

µg/L

µg/L

<0.02

1

4

Palladium

Platinum

Oualifier	Description		Note
S4		1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.

Page 3 of 5

NTS Sample: 121871 **Description: P-2** Sample Date: 10/24/2006 9:00:00 AM

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Matrix: Aqueous Sample Type: Grab NTS COC: 73067 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/5/2006

Notes: A Field Blank was not received with this sample. A Field Blank is required for all samples analyzed for mercury by EPA Metho

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Aluminum	<25	µg/L	25	EPA 200.7	11/2/2006	CSD	
Antimony	<3	µg/L	3	EPA 204.2	10/28/2006	KJD	
Arsenic	<2	µg/L	2	EPA 206.2	11/3/2006	KJD	
Barium	<10	µg/L	10	EPA 200.7	11/2/2006	CSD	
Beryllium	<0.2	µg/L	0.2	EPA 210.2	10/28/2006	KJD	
Boron	194	µg/L	50	EPA 200.7	11/2/2006	CSD	
Cadmium	<0.2	µg/L	0.2	EPA 7131A	10/31/2006	KJD	
Calcium	12.8	mg/L	1	EPA 200.7	11/2/2006	CSD	
Chromium	<1	µg/L	1	EPA 218.2	11/1/2006	KJD	
Cobalt	<1	µg/L	1	EPA 219.2	11/1/2006	KJD	
Copper	<2	µg/L	2	EPA 220.2	10/28/2006	KJD	
Iron	253	µg/L	50	EPA 200.7	11/2/2006	CSD	
Lead	<5	µg/L	5	EPA 239.2	10/31/2006	KJD	с
Magnesium	7.67	mg/L	1	EPA 200.7	11/2/2006	CSD	
Manganese	21.7	μg/L	10	EPA 200.7	11/2/2006	CSD	
Mercury, Low Level	<0.5	ng/L	0.5	EPA 1631E	11/7/2006	SUB	
Molybdenum	<5	μg/L	5	EPA 7481	11/1/2006	KJD	
Nickel	<2	µg/L	2	EPA 249.2	10/27/2006	KJD	
Potassium	1.03	mg/L	0.25	EPA 200.7	11/2/2006	CSD	
Selenium	<2	µg/L	2	EPA 7740	11/2/2006	KJD	
Silver	<1	µg/L	1	EPA 272.2	10/31/2006	KJD	
Sodium	24.4	mg/L	2	EPA 200.7	11/2/2006	CSD	
Strontium	56.5	µg/L	5	EPA 200.7	11/2/2006	CSD	
Thallium	<2	µg/L	2	EPA 279.2	10/27/2006	KJD	
Titanium	<20	µg/L	20	EPA 283.2	10/28/2006	KJD	
Zinc	65.4	µg/L	25	EPA 200.7	11/2/2006	CSD	
тос	3.3	mg/L	1	EPA 415.1	11/9/2006	CSD	i
Alkalinity, Total	101	mg/L as CaCO3	10	EPA 310.1	10/26/2006	DB	i
Chloride	1.29	mg/L	0.5	EPA 300.0 ATP	10/30/2006	LXP	i
COD	<10	mg/L	10	SM 18th Ed 5220D	10/31/2006	JLC	i
Fluoride	0.31	mg/L	0.1	EPA 300.0	10/30/2006	LXP	i
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	11/21/2006	LXP	ł
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	10/26/2006	LXP	i
pH	7.7	Std Units	0.1	EPA 150.1	10/26/2006	DB	i
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	10/27/2006	DB	i
Sulfate	9.06	mg/L	1	EPA 300.0 ATP	10/30/2006	LXP	i
Hardness, Total (calc)	63.5	mg/L	3	SM 2340B	12/5/2006	RMS	
Qualifier Description	*******	***************************************		Note			

Qualifier Description Elevated Reporting Limit.

С i

Sample received at 6.2 °C

Improper sample preservation noted, analysis performed.

Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN S2

Page	4	of	5	
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NTS Sample: 121871 Description: P-2 Sample Date: 10/24/2006 Notes: A Field Blank was		Sample	Aqueous Type: Grab Field Blank i	C F S F	ITS COC: 73067 Client: 0662 - Barr Engineering Project: 3933 - 23/69-86200400 Sampled By: Client Report Date: 12/5/2006 all samples analyzed for merc	9 Poly Me	
Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Cyanide	<0.02	mg/L	0.02	EPA 335.3	10/31/2006	SUB	i,S2

е I

Γ	Qualifier	Description	Note
	С	Elevated Reporting Limit.	
		Improper sample preservation noted, analysis performed.	Sample received at 6.2 °C
L	S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 I	Iorth Front St. New Uim, MN

NTS Sample: 121872 Description: P-2 Sample Date: 10/24/2006 9:00:00 AM

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Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 73067 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/5/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	10/26/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 7131A	11/8/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	11/4/2006	KJD
Copper	<2	μg/L	2	EPA 220.2	11/4/2006	KJD
Volybdenum	<5	μg/L	5	EPA 7481	11/8/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	11/4/2006	KJD
Selenium	<2	μg/L	2	EPA 7740	11/2/2006	KJD
Silver	<1	μg/L	1	EPA 7761	11/4/2006	KJD
Zinc	59.1	μg/L	25	EPA 200.7	10/26/2006	CSD



Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

November 01, 2006

Ms. Renee Stone Northeast Technical Services 315 Chestnut Street Virginia, MN 55792

RE: Project: 3933 Pace Project No.: 1040740

Dear Ms. Stone:

Enclosed are the analytical results for sample(s) received by the laboratory on October 25, 2006. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Colin Schaft

Colin Schuft

colin.schuft@pacelabs.com Project Coordinator

Illinois Certification #: 200011 Iowa Certification #: 368 Minnesota Certification #: 027-053-137 Wisconsin Certification #: 999407970

Enclosures

## **REPORT OF LABORATORY ANALYSIS**

Page 1 of 6

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1040740001

121863

Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

#### SAMPLE SUMMARY

# Project: 3933 Pace Project No.: 1040740 Lab ID Sample ID Matrix Date Collected Date Received

10/25/06 09:05

Water	10/24/06 09:00

## **REPORT OF LABORATORY ANALYSIS**

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Page 2 of 6



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#### SAMPLE ANALYTE COUNT

Lab ID	Sample ID	Method	Reported
Lab ID	Sample ID	Method	Analytes Reported

#### **REPORT OF LABORATORY ANALYSIS**

Page 3 of 6

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3933

Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

#### ANALYTICAL RESULTS

Project: Pace Project No.: 1040740 Matrix: Water Received: 10/25/06 09:05 Sample: 121863 Lab ID: 1040740001 Collected: 10/24/06 09:00 Report CAS No. Qual DF Prepared Analyzed Parameters Results Units Limit MDL Analytical Method: EPA 200.8 Preparation Method: EPA 200.8 200.8 MET ICPMS 10/26/06 00:00 10/27/06 20:59 7440-05-3 ND ug/L 0.10 0.050 1 Palladium 0.010 10/26/06 00:00 10/27/06 20:59 7440-06-4 ND ug/L 0.020 1 Platinum

1/2/06 hand entered results, ped

Date: 11/01/2006 06:55 PM

#### **REPORT OF LABORATORY ANALYSIS**

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Page 4 of 6



Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

#### QUALITY CONTROL DATA

3933 Project: Pace Project No.: 1040740 EPA 200.8 MPRP/7609 Analysis Method: QC Batch: Analysis Description: 200.8 MET QC Batch Method: EPA 200.8 Associated Lab Samples: 1040740001 METHOD BLANK: 276300 Associated Lab Samples: 1040740001 Blank Reporting Qualifiers Limit Parameter Units Result ND 0.10 Palladium ug/L ND 0.020 Platinum ug/L LABORATORY CONTROL SAMPLE: 276301 LCS LCS % Rec Spike Limits Qualifiers Conc. Result % Rec Parameter Units 85-115 101 ug/L 80 81.0 Palladium 85-115 ug/L 99 80 79.6 Platinum MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 276303 276304 MSD MS Spike MSD MS MSD % Rec Max 1040738006 MS Spike RPD RPD Qual Conc. Result Result % Rec % Rec Limits Units Result Conc. Parameter 70-130 1 20 75.7 96 95 ND 76.6 Palladium ug/L 80 80 95 94 70-130 .5 20 ND 80 75.8 75.4 80 Platinum ug/L SAMPLE DUPLICATE: 276302 1040658001 Dup Max Qualifiers RPD RPD Result Result Units Parameter ND ND 72 20 D7 ug/L Palladium 20 D7 ND ND 200 ug/L Platinum

Date: 11/01/2006 06:55 PM

#### **REPORT OF LABORATORY ANALYSIS**

Page 5 of 6

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ace Analytical www.cacelabs.com

Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

#### QUALIFIERS

Project: 3933 Pace Project No.: 1040740

#### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

**DUP - Sample Duplicate** 

RPD - Relative Percent Difference

NC - Not Calculable.

#### ANALYTE QUALIFIERS

D7 The sample and/or duplicate results for this parameter are less than the reporting limit, calculations are based on estimated values and may be statistically unreliable.

#### **REPORT OF LABORATORY ANALYSIS**

Page 6 of 6

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Northe 315 Chestnut P.O. Box 114/ Virginia, MN Phone: 218-74 Fax: 218-742-

#### Northeast Technical Services 315 Chestnut Street

"我了"的方言 έ.

P.O. Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

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DATE	10/24/2006
<b>PO Number</b>	73067/3933
PROJECT MGR	Rence Stone

73067

3933

COC #

NTS Job #

Vendor: Pace Analytical Svcs., Inc. Address: 1700 Elm Street SE Suite #200 Minneapolis, MN 55414

		· · ·
Qty	Description	
1	Pd,Pt	

TOTAL TESTS 1

#### SHIPPER UPS

## SHIPPING CHARGE

~	Sam	iple C	ondi	tion	Upon Re	eceipt			104	0740	
Pace Analytical	Client Name:		W7	rs	•		Proj€	ect #	-1040	790,	10-2506
+ tering and the state of the s	235700 44	48				-		P/O	nal Due Date Name		
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Packing Material: Dubble V	Vrap 🗍 Bubble I	Bags	No 🏹	me [	Other						
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Chain of Custody Relinquished:		CX Yes	DNo		3.						
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Short Hold Time Analysis (<7	ihr):	D'Yes	Offic		6.						j
Rush Turn Around Time Requ	ested:	D'Yes	Şino		7.		12 Y 2				
Sufficient Volume:		gives.			<u>8</u> .		***				
Correct Containers Used:		pares.	[]No	⊡n/a	9.						
-Pace Containers Used:			Silvio	CIN/A	و دون و و و و و و و و و و و و و و و و و						
Containers Intact:		<b>D</b> Cres		ONA	10.			, <u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>			
Filtered volume received for Dis	scived tests	()Yee	Dino	WIN/A	11.						
Sample Labels match COC:	<b></b>	WYes	Cine	CIN/A	12.						
Includes date/time/ID/Analy	sis Matrix	WI								****	
All containers needing preservation h	eve been checked.	(Vos		C)n/A	13.						
All containers needing preservation compliance with EPA recommandat	are found to be in tion.	W.		<b>Din</b> a			. <b>I</b> I as i	t of added			
exceptions: VOA, celiform, TOC, O&G,	Wi-DRO (water)	⊡Y <b>e</b> s	DNo		Initial when completed	Æ		ervative			
Samples checked for dechlorin		□ Yes		-	14.		_				
Headspace in VOA Vials ( >6m				NZINVA	T						
Trip Blank Present:	<u> </u>	D'Yes		- Giva	16.						
Trip Blank Custody Seals Pies	ent			- SAWA	1						
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Project Manager Review:			Ĵ	, <u> </u>	<u>An</u>	<u>l</u>		Date	18 25	106	
•		$\mathcal{O}$			7	· · · · · · · · · · · · · · · · · · ·					
Note: Whenever there is a discre	pancy affecting North	Carolina	complia	ance se	mples, a cop	y of this fo	orm will be	sent to the	North Carolina	UEHNH	

Note: Whenever there is a discrepancy affecting North Carolina compliance surples, a cupy of this form will be sent to the restriction Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

F-ALLC003rev.3, 11September2006

1040240



Northeast Technical Services 315 Chestnut Street

je.

315 Chestnut Street PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

# Chain of Custody Record

Analysis to be performed by: Pace

C	COC:		1	NTS CC NTS Proje Project De	ct: #393	33	g, 23/69-86	12004009 F	Poly Met	-		
Sample	Col	lected	T	ne	Fil		Loca	lion		Container		S (ACTIONAL)
121863	10/24/2006	9:00:00 AM	G	ado 🛛		and the second secon	P-2		·	1	Pd,Pt	1040740001
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Relinqui	shed By:	(Signature)	Date 11:25-06	Time 09205	No	ceived By:	that.	he				
Receive	d for Lab By:	(Signature)	Date	Time	Tê	mp at Aniv	at: 1.4	°C				

5740 - ct3 10/26/a

÷.



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

01 December 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

linishina Spadajina

Kristina Spadafora Project Manager



### ANALYTICAL REPORT FOR SAMPLES

-	Frontier GeoSciences, Inc. Northeast Technical Services Inc.	SDG: Project: Methyl Mercury				
Sample ID		Laboratory ID	Matrix	Date Sampled	Date Received	

0610097-01

121862

24-Oct-06 09:00

Water

00 25-Oct-06 09:36

Frontier GeoSciences, Inc.

tina Joadajba

Kristina Spadafora, Project Manager



#### CASE NARRATIVE

Work Order Number: 0610097:

#### SAMPLE RECEIPT

One (1) water sample was received on October 25, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 1.8 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits, except the duplicate for F611088-Dup1, which is reported as none detected since one value is below the minimum reporting limit and qualified with QR-04.

Frontier GeoSciences, Inc.

tina Joadafoa

Kristina Spadafora, Project Manager



#### CHAIN OF CUSTODY FORMS

### 0610097



Northeast Technical Services 315 Chestnut Street PO Baz 1342 Vignis, 1343 Vignis, 1344 Social Screet Phenes 216-241-2200 Phenes 216-241-2010

Chain of Custody Record

Analysis to be parlowed by: Frentier Geosciences

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4

\* Tansday, October 24, 1986

Page 2 of 2

Frontier GeoSciences, Inc.

ristina Spadajona

Kristina Spadafora, Project Manager



### Methyl Mercury Analytical Results

Matrix: Water		Extraction: Methyl Hg Distillation for Water								
Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
121862	ND	0.056	ng/L	1.25	F611088	16-Nov-06	6K22002	17-Nov-06	FGS-070	

Frontier GeoSciences, Inc.

kristina Spadajora

Kristina Spadafora, Project Manager



#### MATRIX DUPLICATES/TRIPLICATES

#### SOURCE: 0611034-02

Matrix: Water

Sequence: 6K22002

Batch: F611088

Lab Number: F611088-DUP1

Preparation: Methyl Hg Distillation for Water

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.124	ND	0.056	ND	25	FGS-070	QR-04, U

Frontier GeoSciences, Inc.

hishina Spadafora

Kristina Spadafora, Project Manager



### MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

#### SOURCE: 0611034-02

Matrix: Water

Sequence: <u>6K22002</u>

Batch: F611088

Lab Number: F611088-MS/MSD1

Preparation: Methyl Hg Distillation for Water

Analyte	Sample Concentratio (ng/L)	Spike on Added (ng/L)	ed Concentration		MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.124	2.008	1	.865	86.7	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	1.636	75.3	13.1	70 - 130	25	FGS-070	

Frontier GeoSciences, Inc.

Kristina Spadajora

Kristina Spadafora, Project Manager



### LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

Matrix: <u>Water</u> Batch: <u>F611088</u> Preparation: <u>Methyl Hg Distillation for W</u>	ater	Sequence: <u>6K22002</u> Lab Number: <u>F611088-BS/BSD1</u> LCS Source: <u>LCS</u>							
Analyte	Spike Added (ng/L)	LC Concent (ng/)	ration	LCS % Recovery	Revovery Limits	Method	Notes		
Methyl Mercury	2.008	1.89	14	94.3	70 - 130	FGS-070			
Spike Addec Analyte (ng/L	d Concentration	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes		
Methyl Mercury 2.008	1.865	92.9	1.54	70 - 130	25	FGS-070			

#### **RECOVERY AND RPD**

Frontier GeoSciences, Inc.

hna Spadafna

Kristina Spadafora, Project Manager



### PREPARATION BLANKS

Matrix: <u>Water</u> Instrument: <u>MeHg-15</u> Sequence: <u>6K22002</u>

Preparation: Methyl Hg Distillation for Water

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F611088-BLK1	Methyl Mercury	0.013	0.056	ng/L	F611088	FGS-070	l
F611088-BLK2	Methyl Mercury	0.008	0.056	ng/L	F611088	FGS-070	U
F611088-BLK3	Methyl Mercury	0.014	0.056	ng/L	F611088	FGS-070	

Frontier GeoSciences, Inc.

knistina Spadajora

Kristina Spadafora, Project Manager



### **Notes and Definitions**

- U Analyte included in the analysis, but not detected
- QR-04 RPD and/or RSD value exceeded control limit. Sample concentrations less than 10 times the reporting limit and the difference between the QC values were less than 2 times the reporting limit.
- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

Frontier GeoSciences, Inc.

Kristina Spadajova

Kristina Spadafora, Project Manager

	<i>.</i>													r of	Con	tain	iers/	Pre	serv	ative		t				COC	1 of	
Chain of 4700 West 77th Minneapolis, M Minneapolis, 200	Custody h Street IN 55435-4	- 7 803	30	le			I*()	3)		*3			ater					11) 41	/+(H) +/	DRO (2-oz tared) - 25 grams	Sc (pa	res.)*2 =	unpres. J		S	Project Mana		
<b>BARR</b> Minneapolis, M. (952) $832-2600$ Project Number 2 3 / 6 9 - 2 Project Name Sample Identification	, 3.6.2	<u>, 0</u> , 0	54	( D	0	9	cs (Pres.	Is (HNO	HNO3)	General (Unpreserved) *3	Cyanide (NaUH) Niitrients (H <sub>2</sub> SO <sub>4</sub> ) *4	(H <sub>2</sub> SO.	Sulfide (Zn Acetate)	, ,	203)			49	red MeU	ed) - 25	npreserv	I dun zo-f	suc viai,		Of Containers	Project Conta Sampled by:_	ict: KDI	>
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Sample	Colle	ction	Mat	rix	Typ -g g		latile	ssolved	tal Mc	neral	anige (	l and	lfide (	Methane	Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ) DRO (HCI)	P	シフ・フ	X X X	DCS (2	RO (2-	etals (	VOCs (	MOISTU		Total No.	Laboratory:	NTS	
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*I - Volatile Organics = BTEX, GR *2 - Semivolatile Organics = PAHs,	O, TPH, Full L	ist	Reling	/a	$\leq$	<u>_</u>	H	¥			On	N Ice N			<b>Y-0</b> ate	5		ne me		Rece	ivefi	ÞĦ	5	,	K		Date 10-24-06	Time 14:15
Herbicide/Pesticide/PCBs *3 - General = pH, Chloride, Flouri TDS, TS, Sulfate		TSS,	Samples	s Shippo	ed VI/		Air Fr Other			Federa				ample	r	1				Air	Bill	Nun	nber	01	2	°C on	ice_	Time 74:15
*4 <sup>*</sup> - Nutrients = COD TOC. Pheno	le Ammonia				Window Angel				-						The second second second	10000000000							and the second second	Contraction of the				

4<sup>\*-</sup> Nutrients = COD, TOC, Phenols, Ammo. Nitrogen, TKN

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

CoC#72433 283

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

From Ph. II Work Plan

DescriptionMethodDetection LimiAlkalinity, Total as CaCO3EPA 310.1 $10 mg/L$ Carbon, Total OrganicEPA 310.1 $10 mg/L$ Charbon, Total OrganicEPA 415.1 $1 mg/L$ Chemical Oxygen DemandSTD METH 5220D, 18TH ED $10 mg/L$ Cyanide TotalEPA 335.2 $0.02 mg/L$ FluorideEPA 335.2 $0.02 mg/L$ FluorideEPA 340.1 $0.1 mg/L$ Varingen, AmmoniaEPA 350.1 $0.1 mg/L$ Nitrogen, Nitrate + NitriteEPA 353.2 $0.1 mg/L$ PH1EPA 355.2 $0.1 mg/L$ SulfateEPA 355.4 $1 mg/L$ Aluminum, TotalEPA 200.7 $25$ -Aluminum, DissolvedEPA 200.7 $25$ Animony, TotalEPA 200.8 $2$ Barium, TotalEPA 200.7 $35$ Cadmium, TotalEPA 200.7 $35$ Cadmium, TotalEPA 200.7 $35$ Cadmium, TotalEPA 200.7 $35$ Cadmium, TotalEPA 210.2 $0.2$ Boron, TotalEPA 213.2 $0.2$ Cobalt, TotalEPA 213.2 $0.2$ Cobalt, TotalEPA 210.2 $2$ Copper, TotalEPA 210.2 $2$ Copper, TotalEPA 200.7 $0.5 mg/L$ Chronium, TotalEPA 210.2 $2$ Copper, TotalEPA 200.7 $0.5 mg/L$ Chronium, TotalEPA 210.2 $2$ Copper, TotalEPA 210.2 $2$ Copper, TotalEPA 210.2 $2$ Chronium, Dissolved	rest under mise noted.		0
Internative         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 335.2         0.02 mg/L           Cyanide Total         EPA 335.2         0.02 mg/L           Fluoride         EPA 335.2         0.02 mg/L           Vitrogen, Ammonia         EPA 330.1         0.1 mg/L           Nitrogen, Ammonia         EPA 350.1         0.1 mg/L           Nitrogen, Nitrate + Nitrite         EPA 353.2         0.1 mg/L           Ph         1         EPA 355.2         0.1 mg/L           Nitrogen, Nitrate + Nitrite         EPA 353.2         0.1 mg/L           Sulfate         EPA 355.2         0.1 mg/L           Aluminum, Total         EPA 200.7         25           Aluminum, Dissolved         EPA 200.7         25           Animony, Total         EPA 200.8         2           Barium, Total         EPA 200.7         35           Cadmium, Total         EPA 210.2         0.2           Cadmium, Total         EPA 210.2         0.2           Cadmium, Total         EPA 213.2         0.2           Cadmium, Total         EPA 21		Method	Detection Limit
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 335.2         0.02 mg/L           Hardness, Total (calculated)         EPA 300.7         1 mg/L           Nitrogen, Ammonia         EPA 350.1         0.1 mg/L           Nitrogen, Nitrate + Nitrite         EPA 353.2         0.1 mg/L           pH         1         EPA 352.2         0.1 mg/L           Nitrogen, Nitrate + Nitrite         EPA 350.1         0.1 SU           Phosphorus, Total         EPA 365.2         0.1 mg/L           Sulfate         EPA 200.7         25           Aluminum, Total         EPA 200.7         25           Antimony, Total         EPA 200.7         10           Barium, Total         EPA 200.7         10           Beryllium, Total         EPA 200.7         0.2           Cadmium, Total         EPA 200.7         0.2           Cadmium, Total         EPA 210.2         0.2           Cadmium, Total         EPA 210.2         0.2           Cadmium, Total <td< td=""><td></td><td></td><td></td></td<>			
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 300.7         1 mg/L           Nitrogen, Ammonia         EPA 350.1         0.1 mg/L           Nitrogen, Nitrate + Nitrite         EPA 353.2         0.1 mg/L           PH         1         EPA 150.1         0.1 sU           Phosphorus, Total         EPA 355.2         0.1 mg/L           Sulfate         EPA 355.2         0.1 mg/L           Aluminum, Total         EPA 200.7         25           Aluminum, Dissolved         EPA 200.7         25           Antimony, Total         EPA 200.7         25           Antimony, Total         EPA 200.7         35           Barium, Total         EPA 200.7         35           Cadmium, Total         EPA 200.7         35           Cadmium, Dissolved         EPA 210.2         0.2           Cadmium, Total         EPA 210.2         0.2           Cadmium, Dissolved         EPA 213.2         0.2           Cadmium, Dissolved         EPA 213.2	Carbon, Total Organic		
Chloride         EPA 325.2 $10 \text{ mg/L}$ Cyanide Total         EPA 335.2 $0.5 \text{ mg/L}$ Fluoride         EPA 335.2 $0.02 \text{ mg/L}$ Hardness, Total (calculated)         EPA 340.1 $0.1 \text{ mg/L}$ Nitrogen, Ammonia         EPA 350.1 $0.1 \text{ mg/L}$ Nitrogen, Nitrate + Nitrite         EPA 353.2 $0.1 \text{ mg/L}$ PH         1         EPA 355.2 $0.1 \text{ mg/L}$ Phosphorus, Total         EPA 355.2 $0.1 \text{ mg/L}$ Sulfate         EPA 375.4 $1 \text{ mg/L}$ Aluminum, Total         EPA 200.7         25           Antimony, Total         EPA 200.7         25           Antimony, Total         EPA 200.7         25           Antimony, Total         EPA 200.7         10           Beryllium, Total         EPA 200.7         35           Cadmium, Total         EPA 210.2 $0.2$ Boron, Total         EPA 213.2 $0.2$ Cadmium, Total         EPA 213.2 $0.2$ Cadmium, Total         EPA 218.2 $1$ Chromium, Dissolved         EPA 218.2 $1$ Copper, Total<	Chemical Oxygen Demand		
Cyanide Total         EPA 335.2 $0.03 \text{ mg/L}$ Fluoride         EPA 340.1 $0.1 \text{ mg/L}$ Hardness, Total (calculated)         EPA 200.7 $1 \text{ mg/L}$ Nitrogen, Ammonia         EPA 350.1 $0.1 \text{ mg/L}$ Nitrogen, Nitrate + Nitrite         EPA 353.2 $0.1 \text{ mg/L}$ pH         1         EPA 355.2 $0.1 \text{ mg/L}$ Sulfate         EPA 375.4 $1 \text{ mg/L}$ Sulfate         EPA 200.7         25           -Aluminum, Total         EPA 200.7         25           Antimony, Total         EPA 200.7         10           Barium, Total         EPA 200.7         10           Beryllium, Total         EPA 200.7         10           Beryllium, Total         EPA 200.7         35           Cadmium, Total         EPA 200.7         0.2           Boron, Total         EPA 210.2         0.2           Cordmium, Dissolved         EPA 213.2         0.2           Cadmium, Total         EPA 213.2         0.2           Cadmium, Total         EPA 213.2         0.2           Cordmium, Dissolved         EPA 213.2         1           Cobalt, Total         EPA 219.2			
FluorideEPA 340.1 $0.02 \text{ mg/L}$ Hardness, Total (calculated)EPA 200.71 mg/LNitrogen, AmmoniaEPA 350.1 $0.1 \text{ mg/L}$ Nitrogen, Nitrate + NitriteEPA 353.2 $0.1 \text{ mg/L}$ pH1EPA 355.2 $0.1 \text{ mg/L}$ SulfateEPA 375.41 mg/LAluminum, TotalEPA 200.725Antimony, TotalEPA 200.725Antimony, TotalEPA 200.725Antimony, TotalEPA 200.710Beryllium, TotalEPA 200.710Beryllium, TotalEPA 200.70.2Boron, TotalEPA 200.70.2Boron, TotalEPA 200.735Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 218.21Chromium, DissolvedEPA 218.21Copper, TotalEPA 200.70.5 mg/LCopper, TotalEPA 200.70.5 mg/LCopper, TotalEPA 200.70.5 mg/LLead, TotalEPA 200.70.5 mg/LMagnesium, TotalEPA 218.21Copper, TotalEPA 200.70.5 mg/LLead, TotalEPA 200.70.5 mg/LMagnese, TotalEPA 200.70.5 mg/LMolybdenum, TotalEPA 200.70.5	Cyanide Total		
Hardness, Total (calculated)EPA 200.7 $1 \text{ mg/L}$ Nitrogen, AmmoniaEPA 350.1 $0.1 \text{ mg/L}$ Nitrogen, Nitrate + NiriteEPA 353.2 $0.1 \text{ mg/L}$ pH!EPA 150.1 $0.1 \text{ SU}$ Phosphorus, TotalEPA 365.2 $0.1 \text{ mg/L}$ SulfateEPA 375.4 $1 \text{ mg/L}$ Aluminum, TotalEPA 200.725-Aluminum, DissolvedEPA 200.725Antimony, TotalEPA 200.725Antimony, TotalEPA 200.725Barium, TotalEPA 200.710Beryllium, TotalEPA 200.710Boron, TotalEPA 200.735Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 218.21Chromium, TotalEPA 218.21Chromium, TotalEPA 218.21Cobalt, TotalEPA 200.70.5 mg/LCopper, TotalEPA 200.70.5 mg/LCopper, TotalEPA 200.70.5 mg/LMagnesium, TotalEPA 200.70.05 mg/LMagnesium, TotalEPA 200.70.05 mg/LMagnesium, TotalEPA 200.70.05 mg/LMagnese, TotalEPA 200.70.5 mg/LMagnese, TotalEPA 200.70.5 mg/LMagnese, TotalEPA 1631E2 ng/LMolybdenum, DissolvedEPA 1631E0.02 ng/LMolybdenum, DissolvedEPA 246.25Molybdenum, DissolvedEPA 246.25	Fluoride		
Nitrogen, Ammonia         EPA 350.1         0.1 mg/L           Nitrogen, Nitrate + Nitrite         EPA 353.2         0.1 mg/L           pH         1         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 200.7         25           Antimony, Total         EPA 200.7         25           Antimony, Total         EPA 200.7         25           Barium, Total         EPA 200.7         0.2           Barium, Total         EPA 200.7         10           Beryllium, Total         EPA 200.7         35           Cadmium, Total         EPA 213.2         0.2           Cadmium, Dissolved         EPA 213.2         0.2           Calcium, Total         EPA 218.2         1           Chromium, Dissolved         EPA 219.2         1           Copper, Total         EPA 220.2         2           Copper, Total         EPA 200.7         0.5 mg/L           Lead, Total         EPA 7421         1	Hardness, Total (calculated)		
Nitrogen, Nitrate + NitriteEPA 353.2 $0.1 \text{ mg/L}$ pH!EPA 150.1 $0.1 \text{ SU}$ Phosphorus, TotalEPA 365.2 $0.1 \text{ mg/L}$ SulfateEPA 375.4 $1 \text{ mg/L}$ Aluminum, TotalEPA 200.725Aluminum, DissolvedEPA 200.725Antimony, TotalEPA 200.725Antimony, TotalEPA 200.710Barium, TotalEPA 200.710Beryllium, TotalEPA 200.735Cadmium, TotalEPA 200.735Cadmium, TotalEPA 200.735Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 218.21Chromium, TotalEPA 218.21Chromium, TotalEPA 219.21Copper, TotalEPA 200.70.5 mg/LCopper, TotalEPA 200.70.05 mg/LLead, TotalEPA 200.70.05 mg/LManganese, TotalEPA 200.70.05 mg/LManganese, TotalEPA 200.70.05 mg/LManganese, TotalEPA 200.70.05 mg/LManganese, TotalEPA 200.70.03 mg/LMethyl Mercury, Total - 4% Wr, WeldiegEPA 1631E2 ng/LMolybdenum, DissolvedEPA 246.25Molybdenum, DissolvedEPA 246.25			
pH         i         EPA 150.1         0.1 mg/L           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 200.7         25           Antimony, Total         EPA 200.7         25           Barium, Total         EPA 200.8         2           Barium, Total         EPA 200.7         10           Beryllium, Total         EPA 200.7         35           Cadmium, Total         EPA 210.2         0.2           Boron, Total         EPA 213.2         0.2           Cadmium, Dissolved         EPA 213.2         0.2           Cadmium, Total         EPA 213.2         0.2           Cadmium, Total         EPA 218.2         1           Chromium, Total         EPA 218.2         1           Cobalt, Total         EPA 200.7         0.5 mg/L           Copper, Total         EPA 200.7         0.05 mg/L           Lead, Total         EPA 200.7         0.05 mg/L           Lead, Total         EPA 200.7         0.05 mg/L           Lead, Total </td <td>Nitrogen, Nitrate + Nitrite</td> <td></td> <td></td>	Nitrogen, Nitrate + Nitrite		
Phosphorus, TotalEPA 365.2 $0.1 \text{ mg/L}$ SulfateEPA 375.41 mg/LAluminum, TotalEPA 200.725Aluminum, DissolvedEPA 200.725Antimony, TotalEPA 204.23Arsenic, TotalEPA 200.82Barium, TotalEPA 200.710Beryllium, TotalEPA 210.20.2Boron, TotalEPA 210.20.2Boron, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 218.21Chromium, TotalEPA 218.21Chromium, TotalEPA 218.21Chromium, TotalEPA 219.22Cobalt, TotalEPA 200.70.05 mg/LCopper, TotalEPA 200.70.05 mg/LLead, TotalEPA 200.70.05 mg/LLead, TotalEPA 200.70.05 mg/LMagnesium, TotalEPA 200.70.05 mg/LMagnese, TotalEPA 200.70.05 mg/LMagnese, TotalEPA 200.70.03 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 4% w, weldikeEPA 1631E0.02 ng/LMolybdenum, TotalTimeEPA 246.25Molybdenum, DissolvedEPA 246.25			
SulfateEn A 305.2 $0.1 \text{ mg/L}$ Aluminum, TotalEPA 375.4 $1 \text{ mg/L}$ Aluminum, DissolvedEPA 200.725Antimony, TotalEPA 200.725Antimony, TotalEPA 200.725Arsenic, TotalEPA 200.82Barium, TotalEPA 200.710Beryllium, TotalEPA 200.70.2Boron, TotalEPA 200.735Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 218.21Chromium, TotalEPA 218.21Chromium, TotalEPA 218.21Cobalt, TotalEPA 219.21Copper, TotalEPA 220.22Copper, TotalEPA 200.70.05 mg/LLead, TotalEPA 74211Magnesium, TotalEPA 74211Magnese, TotalEPA 200.70.3 mg/LManganese, TotalEPA 200.70.03 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 46 wr, weldingEPA 1631E2 ng/LMolybdenum, TotalTimeEPA 246.25Nickel TotalEPA 246.255	Phosphorus, Total		1
Aluminum, TotalEPA 200.7 $25$ Aluminum, DissolvedEPA 200.7 $25$ Antimony, TotalEPA 204.2 $3$ Arsenic, TotalEPA 200.8 $2$ Barium, TotalEPA 200.7 $10$ Beryllium, TotalEPA 210.2 $0.2$ Boron, TotalEPA 210.2 $0.2$ Boron, TotalEPA 213.2 $0.2$ Cadmium, DissolvedEPA 213.2 $0.2$ Cadmium, TotalEPA 200.7 $0.5 mg/L$ Cadmium, TotalEPA 218.2 $1$ Chromium, TotalEPA 218.2 $1$ Chromium, TotalEPA 219.2 $1$ Cobalt, TotalEPA 220.2 $2$ Copper, TotalEPA 220.2 $2$ Copper, TotalEPA 200.7 $0.05 mg/L$ Lead, TotalEPA 200.7 $0.05 mg/L$ Maganesium, TotalEPA 200.7 $0.03 mg/L$ Maganese, TotalEPA 200.7 $0.03 mg/L$ Manganese, TotalEPA 200.7 $0.03 mg/L$ Methyl Mercury, Low Level TotalEPA 1631E $2 ng/L$ Methyl Mercury, TotalTimeEPA 246.2 $5$ Molybdenum, DissolvedEPA 246.2 $5$ Nickel TotalEPA 246.2 $5$			j
Aluminum, DissolvedEPA 200.725Antimony, TotalEPA 200.725Ansenic, TotalEPA 204.23Barium, TotalEPA 200.82Barium, TotalEPA 200.710Beryllium, TotalEPA 210.20.2Boron, TotalEPA 210.20.2Boron, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Cadmium, TotalEPA 213.20.2Calcium, TotalEPA 218.21Chromium, TotalEPA 218.21Cobalt, TotalEPA 219.21Copper, TotalEPA 220.22Copper, TotalEPA 220.22Iron, TotalEPA 200.70.05 mg/LLead, TotalEPA 200.70.05 mg/LMaganesium, TotalEPA 200.70.05 mg/LMaganese, TotalEPA 200.70.05 mg/LManganese, TotalEPA 1631E2 ng/LMethyl Mercury, Low Level TotalEPA 1631E2 ng/LMolybdenum, TotalTimeEPA 246.25Nickel TotalEPA 246.25	Aluminum, Total		1
Antimony, Total         EPA 204.2         3           Arsenic, Total         EPA 204.2         3           Barium, Total         EPA 200.8         2           Barium, Total         EPA 200.7         10           Beryllium, Total         EPA 200.7         0.2           Boron, Total         EPA 200.7         35           Cadmium, Total         EPA 213.2         0.2           Cadmium, Total         EPA 200.7         35           Cadmium, Total         EPA 200.7         0.5 mg/L           Chromium, Total         EPA 218.2         1           Chromium, Total         EPA 218.2         1           Cobalt, Total         EPA 219.2         1           Copper, Total         EPA 220.2         2           Copper, Total         EPA 200.7         0.05 mg/L           Lead, Total         EPA 200.7         0.05 mg/L           Lead, Total         EPA 7421         1           Maganesium, Total         EPA 200.7         0.5 mg/L           Manganese, Total         EPA 200.7         0.5 mg/L           Manganese, Total         EPA 200.7         0.03 mg/L           Methyl Mercury, Low Level Total         EPA 1631E         2 ng/L           Methyl Merc			1
Arsenic, Total       EPA 200.8       2         Barium, Total       EPA 200.7       10         Beryllium, Total       EPA 210.2       0.2         Boron, Total       EPA 210.2       0.2         Boron, Total       EPA 213.2       0.2         Cadmium, Total       EPA 213.2       0.2         Cadmium, Total       EPA 213.2       0.2         Cadmium, Total       EPA 213.2       0.2         Calcium, Total       EPA 213.2       0.2         Calcium, Total       EPA 213.2       0.2         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 200.7       0.5 mg/L         Maganesium, Total       EPA 200.7       0.03 mg/L         Manganese, Total       EPA 200.7       0.03 mg/L         Mercury, Low Level Total       EPA 1631E       2 ng/L         Methyl Mercury, Total - 4% W, Woldige       EPA 1631E       0.02 ng/L         Molybde			1
Barium, Total       EPA 200.7       10         Beryllium, Total       EPA 210.2       0.2         Boron, Total       EPA 200.7       35         Cadmium, 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 200.7       0.5 mg/L         Chromium, Total       EPA 213.2       1         Chromium, Total       EPA 218.2       1         Cobalt, Total       EPA 218.2       1         Cobalt, Total       EPA 220.2       2         Copper, Total       EPA 220.2       2         Copper, Dissolved       EPA 220.2       2         Iron, Total       EPA 200.7       0.05 mg/L         Lead, Total       EPA 200.7       0.05 mg/L         Magnesium, Total       EPA 200.7       0.03 mg/L         Magnesium, Total       EPA 200.7       0.03 mg/L         Magnesium, Total       EPA 1631E       2 ng/L         Manganese, Total       EPA 1631E       0.02 ng/L         Methyl Mercury, Low Level Total       EPA 1631E       0.02 ng/L         Mol			
Beryllium, TotalEPA 210.2 $10$ Boron, TotalEPA 210.2 $0.2$ Boron, TotalEPA 200.7 $35$ Cadmium, TotalEPA 213.2 $0.2$ Cadmium, DissolvedEPA 213.2 $0.2$ Calcium, TotalEPA 200.7 $0.5 mg/L$ Chromium, TotalEPA 218.2 $1$ Chromium, DissolvedEPA 218.2 $1$ Cobalt, TotalEPA 219.2 $1$ Copper, TotalEPA 220.2 $2$ Copper, DissolvedEPA 220.2 $2$ Iron, TotalEPA 200.7 $0.05 mg/L$ Lead, TotalEPA 200.7 $0.05 mg/L$ Magnesium, TotalEPA 200.7 $0.05 mg/L$ Manganese, TotalEPA 200.7 $0.5 mg/L$ Manganese, TotalEPA 200.7 $0.03 mg/L$ Mercury, Low Level TotalEPA 1631E $2 ng/L$ Methyl Mercury, Total - 46 w, holdingEPA 1631E $0.02 ng/L$ Molybdenum, DissolvedEPA 246.2 $5$ Nickel TotalEPA 246.2 $5$			
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, 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 200.7         0.05 mg/L           Lead, Total         EPA 200.7         0.05 mg/L           Lead, Total         EPA 200.7         0.05 mg/L           Magnesium, Total         EPA 200.7         0.5 mg/L           Manganese, Total         EPA 200.7         0.5 mg/L           Mercury, Low Level Total         EPA 1631E         2 ng/L           Methyl Mercury, Total - 4% W. Nelding         EPA 1631E         0.02 ng/L           Molybdenum, Total         tww         EPA 246.2         5           Nickel, Total         EPA 246.2         5         5			}
Cadmium, TotalEPA 213.20.2Cadmium, DissolvedEPA 213.20.2Calcium, TotalEPA 200.70.5 mg/LChromium, TotalEPA 218.21Chromium, DissolvedEPA 218.21Cobalt, TotalEPA 219.21Copper, TotalEPA 220.22Copper, TotalEPA 220.22Ion, TotalEPA 200.70.05 mg/LLead, TotalEPA 74211Magnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.5 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 4% br, holdingEPA 1631E0.02 ng/LMolybdenum, TotaltimeEPA 246.25Nickel, TotalEPA 246.25	Boron, Total		1
Cadmium, DissolvedEPA 213.20.2Calcium, TotalEPA 213.20.2Chromium, TotalEPA 200.70.5 mg/LChromium, DissolvedEPA 218.21Cobalt, TotalEPA 218.21Copper, TotalEPA 219.21Copper, TotalEPA 200.70.05 mg/LCopper, DissolvedEPA 200.70.05 mg/LLead, TotalEPA 200.70.05 mg/LMagnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.5 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, TotalTimeEPA 1631E0.02 ng/LMolybdenum, TotalTimeEPA 246.25Nickel, TotalEPA 246.25			1
Calcium, TotalEPA 200.70.2Chromium, TotalEPA 218.21Chromium, DissolvedEPA 218.21Cobalt, TotalEPA 219.21Copper, TotalEPA 220.22Copper, TotalEPA 220.22Ion, TotalEPA 200.70.05 mg/LLead, TotalEPA 200.70.05 mg/LMagnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.5 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 4% W, holdingEPA 1631E0.02 ng/LMolybdenum, TotalTimeEPA 246.25Molybdenum, DissolvedEPA 246.25			1
Chromium, TotalEPA 218.21Chromium, DissolvedEPA 218.21Chromium, DissolvedEPA 218.21Cobalt, TotalEPA 219.21Copper, TotalEPA 220.22Copper, DissolvedEPA 220.22Iron, TotalEPA 200.70.05 mg/LLead, TotalEPA 74211Magnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.03 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 48 w. woldingEPA 1631E0.02 ng/LMolybdenum, TotaltimeEPA 246.25Molybdenum, DissolvedEPA 246.25		[	
Chromium, DissolvedEFA 218.21Cobalt, TotalEPA 218.21Copper, TotalEPA 219.21Copper, TotalEPA 220.22Copper, DissolvedEPA 220.22Iron, TotalEPA 200.70.05 mg/LLead, TotalEPA 74211Magnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.03 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total-4% w. woldingEPA 1631E0.02 ng/LMolybdenum, TotaltimeEPA 246.25Molybdenum, DissolvedEPA 246.255		1	0.5 mg/L
Cobalt, TotalEPA 219.21Copper, TotalEPA 220.22Copper, DissolvedEPA 220.22Iron, TotalEPA 200.70.05 mg/LLead, TotalEPA 74211Magnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.03 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 46 W. holdingEPA 1631E0.02 ng/LMolybdenum, TotaltimeEPA 246.25Molybdenum, DissolvedEPA 246.25			1
Copper, TotalEPA 220.22Copper, DissolvedEPA 220.22Iron, TotalEPA 200.70.05 mg/LLead, TotalEPA 74211Magnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.03 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 4% W. heldingEPA 1631E0.02 ng/LMolybdenum, TotalTimeEPA 246.25Molybdenum, DissolvedEPA 246.25			1
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Magnesium, TotalEPA 200.70.5 mg/LManganese, TotalEPA 200.70.03 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 46 Wr, WoldingEPA 1631E0.02 ng/LMolybdenum, TotaltimeEPA 246.25Molybdenum, DissolvedEPA 246.25Nickel TotalEPA 246.25	Lead, Total		
Manganese, TotalEPA 200.70.3 mg/LMercury, Low Level TotalEPA 1631E2 ng/LMethyl Mercury, Total - 48 hr, holdingEPA 1631E0.02 ng/LMolybdenum, TotaltrimeEPA 246.25Molybdenum, DissolvedEPA 246.25	Magnesium, Total		
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Molybdenum, TotaltimeEPA 246.25Molybdenum, DissolvedEPA 246.25Nickel TotalEPA 246.25	Methyl Mercury, Total - 48 W	holding EPA 1631E	
Molybdenum, Dissolved     EPA 246.2     5       Nickel Total     EDE 246.2     5	Molybdenum, Total		A construction of the second
Nickel Total			
		EPA 249.2	2

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·		17: 3 J 3
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

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### Northeast Technical Services

315 Chestnut Street PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

MDH Certification: 027-137-157

## RECEIVED

Barr Engineering Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435 JAN 0 3 2007 Barr Engineering Co.

Project: 3933 - 23/69-862004009	Poly Met
Sampled By: Client	
Report Date: 12/29/2006	

VIIV

Client: 0662 - Barr Engineering

Approved by:

NTS COC: 73258

Received: 10/31/2006

Renee Stone

NTS Sample: 124045 Description: P-2 Sample Date: 10/31/2006 10:25:00 AM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Methyl Mercury	0.070	ng/L	0.056	EPA 1630	11/17/2006	SUB	S7

Qualifier	Description		Note
S7	Analysis performed by Frontier Geosciences: MDH# 053-999-381	414 Pontius Ave. N. Seattle, WA	See Attached Report.

This report may not be reproduced, except in full, without written consent of NTS laboratory.

Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report.

Page .	2	of	5
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NTS Sample: 124046 Description: P-2 Sample Date: 10/31/2006	10:25:00 AM		: Aqueous e Type: Grab	(   	NTS COC: 73258 Client: 0662 - Barr Engineering Project: 3933 - 23/69-86200400 Sampled By: Client Report Date: 12/29/2006		et
Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Palladium	<0.1	μg/L	0.1	EPA 200.8	11/6/2006	SUB	S4
Platinum	<0.02	µg/L	0.02	EPA 200.8	11/6/2006	SUB	S4

Qualifier	Description		Note
S4	Analysis performed by Pace: MDH# 027-053-137	1700 Elm St. S.E. Suite 200 Minneapolis, MN	See Attached Report.

NTS Sample: 124047 Description: P-2 Sample Date: 10/31/2006 10:25:00 AM Matrix: Aqueous Sample Type: Grab NTS COC: 73258 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Notes: A Field Blank was not received with this sample. All samples analyzed for mercury by EPA Method 1631 require a Field Blank.

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Aluminum	<25	μg/L	25	EPA 200.7	11/8/2006	CSD	
Antimony	<3	µg/L	3	EPA 204.2	11/15/2006	KJD	
Arsenic	<2	µg/L	2	EPA 206.2	11/3/2006	KJD	
Barium	<10	µg/L	10	EPA 200.7	11/8/2006	CSD	
Beryllium	0.2	µg/L	0.2	EPA 210.2	11/16/2006	KJD	
Boron	168	µg/L	50	EPA 200.7	11/8/2006	CSD	
Cadmium	<0.2	µg/L	0.2	EPA 213.2	11/16/2006	KJD	
Calcium	13.5	mg/L	1	EPA 200.7	11/8/2006	CSD	
Chromium	<1	µg/L	1	EPA 218.2	11/16/2006	KJD	
Cobalt	<1	µg/L	1	EPA 219.2	11/15/2006	KJD	
Copper	<2	µg/L	2	EPA 220.2	11/14/2006	KJD	
Iron	271	µg/L	50	EPA 200.7	11/8/2006	CSD	
Lead	<1	µg/L	1	EPA 239.2	11/15/2006	KJD	
Magnesium	8.48	mg/L	1	EPA 200.7	11/8/2006	CSD	
Manganese	23.6	µg/L	10	EPA 200.7	11/8/2006	CSD	
Mercury, Low Level	<0.5	ng/L	0.5	EPA 1631E	11/13/2006	SUB	
Molybdenum	<5	µg/L	5	EPA 246.2	11/17/2006	KJD	
Nickel	<2	µg/L	2	EPA 249.2	11/14/2006	KJD	
Potassium	1.04	mg/L	0.25	EPA 200.7	11/8/2006	CSD	
Selenium	4	µg/L	2	EPA 270.2	11/2/2006	KJD	С
Silver	<1	µg/L	1	EPA 272.2	11/15/2006	KJD	
Sodium	23.2	mg/L	2	EPA 200.7	11/8/2006	CSD	
Strontium	60.7	µg/L	5	EPA 200.7	11/8/2006	CSD	
Thallium	<2	µg/L	2	EPA 279.2	11/14/2006	KJD	
Titanium	<20	µg/L	20	EPA 283.2	11/17/2006	KJD	
Zinc	67.7	µg/L	25	EPA 200.7	11/8/2006	CSD	
DRO	<0.1	mg/L	0.1	WI(95) DRO	11/6/2006	CSD	n
тос	3.9	mg/L	1	EPA 415.1	11/9/2006	CSD	
Alkalinity, Total	105	mg/L as CaCO3	10	EPA 310.1	11/8/2006	DB	
Chloride	1.4	mg/L	0.5	EPA 300.0 ATP	11/4/2006	LXP	
COD	<10	mg/L	10	SM 18th Ed 5220D	11/8/2006	LXP	
Fluoride	0.15	mg/L	0.1	EPA 340.2	11/8/2006	JLC	
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	11/1/2006	DB	
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	11/1/2006	DB	
pH	7.1	Std Units	0.1	EPA 150.1	11/1/2006	LXP	
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	11/3/2006	DB	
Sulfate	7.88	mg/L	1	EPA 300.0 ATP	11/4/2006	LXP	
Qualifier         Description           c         Elevated Reporting Limit.           n         Matrix Spike recovery not within S2		# 027-015-125 1126 Nort	h Front St.	Note = 118% New Ulm, MN See Attached	Report.		

Page	4	of	5	
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NTS Sample: 124047	Matrix: Aqueous	NTS COC: 73258
Description: P-2	Sample Type: Grab	Client: 0662 - Barr Engineering
Sample Date: 10/31/2006 10:25:00 AM		Project: 3933 - 23/69-862004009 Poly Met
		Sampled By: Client
		Report Date: 12/29/2006
Notes: A Field Blank was not received with this	sample. All samples analyzed for	mercury by EPA Method 1631 require a Field Blank.

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Hardness, Total (calc)	68.6	mg/L	3	SM 2340B	12/29/2006	RMS	
Cyanide	<0.02	mg/L	0.02	EPA 335.3	11/3/2006	SUB	S2

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Qualifi	er Description	Note
c	Elevated Reporting Limit.	
n	Matrix Spike recovery not within control limits.	= 118%
S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN	See Attached Report.
<u></u> ,		

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NTS Sample: 124048 Description: P-2 Sample Date: 10/31/2006 10:25:00 AM Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 73258 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	11/18/2006	BAM
Cadmium	0.2	μg/L	0.2	EPA 7131A	11/8/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	11/4/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	11/4/2006	KJD
Volybdenum	<5	µg/L	5	EPA 246.2	11/8/2006	KJD
Nickel	<2	µg/L	2	EPA 249.2	11/4/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	11/2/2006	KJD
Silver	<1	µg/L	1	EPA 7761	11/4/2006	KJD
Zinc	68.2	μg/L	25	EPA 200.7	11/29/2006	CSD

## MINNESOTA VALLEY TESTING LABORATORIES, INC.



1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724 35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885 www.mvtl.com



Page: 1 of 1

Report Date: 5 Nov 06

RENEE STONE NORTHEAST TECHNICAL SERVICES PO BOX 1142 VIRGINIA MN 55792-1142

Project Number: 3933 Sample Description: 124047 Lab Number: 06-A49045 Work Order #:12-12425 Account #: 022015 Sample Matrix: WASTEWATER Date Sampled: 31 Oct 06 10:25 Date Received: 1 Nov 06 9:35 PO #: 73258/3933 Chain of Custody Number: 73258 Temp at Receipt: 1.0C

	As Receive Result	d	Method RL	Method Reference	Date Analyzed	Analyst
Cyanide, Total	< 0.02	mg/L	0.02	SM 4500E	3 Nov 06 11:50	JD

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\_\_\_\_\_ Approved by: Jason G. Smith, Inorganic

Jason G. Smith, Inorganic Laboratory Manager New Ulm, MN

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration ! = Due to sample quantity + = Due to extract volume CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

01 December 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

knishna Spadajina

Kristina Spadafora Project Manager



### ANALYTICAL REPORT FOR SAMPLES

Laboratory: Frontier GeoSciences, Inc. Client: Northeast Technical Services Inc.		SDG: Project: <u>Methy</u>	I Mercury	
Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
124045	0611002-01	Water	31-Oct-06 10:25	01-Nov-06 10:19

Frontier GeoSciences, Inc.

tina Joadafora

Kristina Spadafora, Project Manager



#### CASE NARRATIVE

Work Order Number: 0611002:

#### SAMPLE RECEIPT

One (1) water samples were received on November 1, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 4.0 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits, except the duplicate for F611088-Dup1, which is reported as none detected since one value is below the minimum reporting limit and qualified with QR-04.

Frontier GeoSciences, Inc.

istina Joadafba

Kristina Spadafora, Project Manager



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### CHAIN OF CUSTODY FORMS



Northeast Technical Services 35 Checked Sheet PO Box 142 Vipini, MN 85782 Physics 218741-4200 Faz 218-744-4200

Chain of Custody Record

Analysis to be performed by: Frontier Geosciences

		· · · · · · · · · · · · · · · · · · ·	
COC:	NTS Projects	45933 Ban Engineering, 23/69-562034009, P	
Sample Collected	Type Fi	Matrix Location	Containers Analyses
124055 10/31/2005 10:25:00 AM	Gisb	Acjussus P-2	Melky Eg
Retroyanter Sc. (Semulure)	Osie Time	Received By: (Signature)	sample enced in check specific jar. Je-co
Relinquisities By: (Biganturo)	Dole line	Received By: (Signature)	
Received for Lab By: (Signature)	Date Time 11-1-66 (0145	Terro at Anival: Actual biante 4-0 °C	
Trance Color	U*152-1000	•	

Jennier Cahn

WOD 0611002

Tuesday, Occoder 31, 2006

Page 3 of 4

Frontier GeoSciences, Inc.

tina Joudapora

Kristina Spadafora, Project Manager



### **Methyl Mercury Analytical Results**

	Matrix: Water	Extraction: Methyl Hg Distillation for Water									
	Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
L	124045	0.070	0.056	ng/L	1.25	F611088	16-Nov-06	6K22002	17-Nov-06	FGS-070	

Frontier GeoSciences, Inc.

Kristina Spadafora

Kristina Spadafora, Project Manager



### MATRIX DUPLICATES/TRIPLICATES

#### SOURCE: 0611034-02

Matrix: Water

Sequence: <u>6K22002</u>

Batch: F611088

Lab Number: F611088-DUP1

Preparation: Methyl Hg Distillation for Water

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.124	ND	0.056	ND	25	FGS-070	QR-04, U

Frontier GeoSciences, Inc.

rishna Spadajora

Kristina Spadafora, Project Manager



## MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

#### SOURCE: 0611034-02

Matrix: Water

Sequence: <u>6K22002</u>

Batch: F611088

Lab Number: F611088-MS/MSD1

Preparation: Methyl Hg Distillation for Water

Analyte	Sample Concentratio (ng/L)	Spike on Added (ng/L)	Conce	MS entration eg/L)	MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.124	2.008	1.865		86.7	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	1.636	75.3	13.1	70 - 130	25	FGS-070	

Frontier GeoSciences, Inc.

ristina Spadajora

Kristina Spadafora, Project Manager



### LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

Matrix: Water			Sequenc	e: <u>6K22002</u>			
Batch: <u>F611088</u>		La	b Numbe	r: <u>F611088-</u> E	S/BSD1		
Preparation: Methyl Hg Distillation for V	Vater	LCS Source: LCS					
Analyte	Spike Added (ng/L)	LC Concent (ng/	tration	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	2.008	1.8	94	94.3	70 - 130	FGS-070	
Spik Adde Analyte (ng/I	ed Concentration	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury 2.00	8 1.865	92.9	1.54	70 - 130	25	FGS-070	

#### **RECOVERY AND RPD**

Frontier GeoSciences, Inc.

hna Spadafora

Kristina Spadafora, Project Manager



### **PREPARATION BLANKS**

Matrix: <u>Water</u> Instrument: <u>MeHg-15</u> Sequence: <u>6K22002</u>

Preparation: Methyl Hg Distillation for Water

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F611088-BLK1	Methyl Mercury	0.013	0.056	ng/L	F611088	FGS-070	
F611088-BLK2	Methyl Mercury	0.008	0.056	ng/L	F611088	FGS-070	U
F611088-BLK3	Methyl Mercury	0.014	0.056	ng/L	F611088	FGS-070	

Frontier GeoSciences, Inc.

Kristina Spadajora

Kristina Spadafora, Project Manager



### **Notes and Definitions**

- U Analyte included in the analysis, but not detected
- QR-04 RPD and/or RSD value exceeded control limit. Sample concentrations less than 10 times the reporting limit and the difference between the QC values were less than 2 times the reporting limit.
- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

Frontier GeoSciences, Inc.

kristina Spadajosa

Kristina Spadafora, Project Manager

						Number of Containers/Preservative													of									
Chain of Custody4700 West 77th StreetMinneapolis, MN 55435-4803(952) 832-2600				· · · · · · · · · · · · · · · · · · ·			(S, )*I	ž 03)		) *3		Wa († C			T a		Methy He MeOH)*1	0H) */	S grams	DRO (2-oz tared) - 25 grams Metals (2-oz unpreserved)	SVOCs (2 or 4-oz unpres.) *2 20	% Moisture (plastic vial, unpres.)		: F S			er: <u>CDP</u>	
Project Number $23/69-8$	.6.2	0,0	) <u>(</u>	ł. 0	D	9	cs (Pre	ls (HN	INO <sub>3</sub> )	served	04) *4	(H <sub>2</sub> S(	etate)	203)	trade			ed Me	ed) - 2	npreser	un zo-	stic vial		Of Containers			t: <u>KD</u> Ρ,	WDS
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Sample Identification	Colle		Water	atrix	Ty uap	pe OC	Volatile Organics (Pres.)*1 Semivolatile Organics *2	issolved	otal Mc	eneral	utrients	Oil and Grease (H <sub>2</sub> SO <sub>4</sub> )	Sulfide ( Methone	Bacteria (Na 2S 2O 3)	KO (H	1.74	rethe	OCs (2	RO (2-	Metals (2-oz unpreserved)	VOCs (	, Moistu	*****	Total No.	Laborator		_MG	
<sup>1.</sup> P-2	Date	Time	i ≷ X		X	30	N O		2		) Z 	0	S A	≦ <u>m</u> (			2 1			2	S				Table		nd ext	ended
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*1 - Volatile Organics = BTEX, GRO, TPH, Full List *2 - Semivolatile Organics = PAHs, PCP, Dioxins, Full List, Relinquished By:				$\begin{array}{c c} & Op \ Ice? \\ \hline & M \\ \hline & On \ Ice? \\ & On \ Ice? \\ Y \ N \\ \hline & Date \\ \hline & Time \\ \hline \end{array}$							Received by:					Time												
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COC#72433-273

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

 unless otherwise noted.

From Ph. I Work Plan

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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
<u>pH</u>	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 - 48 h	holding EPA 1631E	0.02 ng/L
Molybdenum, Total	time EPA 246.2	5
	i	
Molybdenum, Dissolved Nickel, Total	EPA 246.2	5

No samples red Fris office No samples red sat. not in rules. Keeles or rules

÷ *		Coctor	(33
		Coct 725	3
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	
Lating & Viai		10	

EPA 200.7

Zinc, Dissolved

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10





Northeast Technical Services

315 Chestnut Street PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

Laboratory Results

MDH Certification: 027-137-157



DEC 1 3 2006

BARR ENGINEERING CO.

Barr Engineering Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435 NTS COC: 73431 Received: 11/7/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/7/2006

Approved by:

Renee Stone

NTS Sample: 126375 Description: P-2 Sample Date: 11/7/2006 10:35:00 AM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	11/7/2006	SUB	S7

	Description		Note
S7	Analysis performed by Frontier Geosciences: MDH# 053-999-381	414 Pontius Ave. N. Seattle, WA	See Atlached Report.

This report may not be reproduced, except in full, without written consent of NTS laboratory.

Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report.

Met

NTS Sample: 126376	Matrix: Aqueous	NTS COC: 73431
Description: P-2 Sample Date: 11/7/2006 10:35:00 AM	Sample Type: Grab	Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly I
		Sampled By: Client

Report Date: 12/7/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Palladium	<0.1	µg/L	0.1	EPA 200.8	11/17/2006	SUB
Platinum	<0.02	µg/L	0.02	EPA 200.8	11/17/2006	SUB

Page 3 of 5

NTS Sample: 126377 Description: P-2 Sample Date: 11/7/2006 10:35:00 AM Matrix: Aqueous Sample Type: Grab NTS COC: 73431 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/7/2006

Notes: A Field Blank was not received with this sample. All samples analyzed for mercury by EPA Method 1631 require a Field Blank.

Antimony Arsenic	<25 <3 <2	µg/L	25	EPA 200.7	11/21/2006	CSD
Arsenic		1100			T T T THE T T THE VE WAY OF	000
Arsenic	<2	µg/L	3	EPA 204.2	11/15/2006	KJD
Barium		µg/L	2	EPA 7060A	11/9/2006	KJD
Darian	<10	μg/L	10	EPA 200.7	11/21/2006	CSD
Beryllium	0.2	µg/L	0.2	EPA 210.2	11/16/2006	KJD
-	153	µg/L	50	EPA 200.7	11/21/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	11/16/2006	KJD
Calcium	15.5	mg/L	1	EPA 200.7	11/21/2006	CSD
Chromium	1.1	µg/L	1	EPA 218.2	11/16/2006	KJD
Cobalt	<1	µg/L	1	EPA 219.2	11/16/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	11/14/2006	KJD
	325	µg/L	50	EPA 200.7	11/21/2006	CSD
Lead	<1	µg/L	1	EPA 239.2	11/15/2006	KJD
	9.41	mg/L	1	EPA 200.7	11/21/2006	CSD
-	26.2	µg/L	10	EPA 200.7	11/21/2006	CSD
Mercury, Low Level	0.5	ng/L	0.5	EPA 1631E	11/15/2006	SUB
Molybdenum	<5	µg/L	5	EPA 246.2	11/17/2006	KJD
Nickel	<2	µg/L	2	EPA 249.2	11/14/2006	KJD
	1.04	mg/L	0.25	EPA 200.7	11/21/2006	CSD
Selenium	<2	µg/L	2	EPA 270.2	11/9/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	11/15/2006	KJD
	23.3	mg/L	2	EPA 200.7	11/21/2006	CSD
Strontium	69.7	µg/L	5	EPA 200.7	11/21/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	11/14/2006	KJD
Titanium	<20	µg/L	20	EPA 283.2	11/17/2006	KJD
Zinc	125	µg/L	25	EPA 200.7	11/21/2006	CSD
тос	4.5	mg/L	1	EPA 415.1	11/10/2006	CSD
Alkalinity, Total	74	mg/L as CaCO3	10	EPA 310.1	11/10/2006	JLC
•	1.35	mg/L	0.5	EPA 300.0 ATP	11/9/2006	DB
COD	<10	mg/L	10	SM 18th Ed 5220D	11/8/2006	LXP
	0.13	mg/L	0.1	EPA 300.0	11/9/2006	DB
	<0.1	mg/L as N	0.1	EPA 350.1	11/8/2006	LXP
	<0.1	mg/L as N	0.1	EPA 353.2	11/9/2006	LXP
pH	8.4	Std Units	0.1	EPA 150.1	11/8/2006	JLC
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	11/9/2006	LXP
-	6.53	mg/L	1	EPA 300.0 ATP	11/9/2006	DB
Hardness, Total (calc)	77.4	mg/L	3	SM 2340B	12/7/2006	RMS

Fage 4 UI J	Page	4	of	5
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NTS Sample: 126377 Description: P-2			Aqueous Type: Grab	Client:	Client: 0662 - Barr Engineering				
•	0:35:00 AM	•		Project	t: 3933 - 23/69-86200400	9 Poly Met			
				Sample	ed By: Client				
				Report	Date: 12/7/2006				
						1 PP1 2 -1 PP1 1			
Notes: A Field Blank was no Analyte	ot received with th Result	nis sample. Al Units	l samples an	alyzed for mercury l Method	oy EPA Method 1631 req Analysis Date	Analyst			

NTS Sample: 126378 Description: P-2 Sample Date: 11/7/2006 10:35:00 AM Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 73431 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/7/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	11/29/2006	CSD
Cadmium	<0.2	μg/L	0.2	EPA 213.2	11/22/2006	KJD
Chromium	<1	μg/L	1	EPA 218.2	11/24/2006	KJD
Copper	<2	μg/L	2	EPA 220.2	11/25/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	11/11/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	11/25/2006	KJD
Selenium	<2	μg/L	2	EPA 270.2	11/18/2006	KJD
Silver	<1	μg/L	1	EPA 272.2	11/24/2006	KJD
Zinc	134	μg/L	25	EPA 200.7	11/13/2006	BAM



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

01 December 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

knishna Spadajbra

Kristina Spadafora Project Manager



08-Nov-06 10:03

# ANALYTICAL REPORT FOR SAMPLES

-	Frontier GeoSciences, Inc. Northeast Technical Services Inc.				
Sample ID		Laboratory ID	Matrix	Date Sampled	Date Received

126375

0611036-01

Water

07-Nov-06 10:35

Frontier GeoSciences, Inc.

tina Spadajora.

Kristina Spadafora, Project Manager



## CASE NARRATIVE

#### Work Order Number: 0611036:

#### SAMPLE RECEIPT

One (1) water sample was received on November 8, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 1.0 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits, except the duplicate for F611088-Dup1, which is reported as none detected since one value is below the minimum reporting limit and qualified with QR-04.

Frontier GeoSciences, Inc.

ishna Joadqba

Kristina Spadafora, Project Manager



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

# **CHAIN OF CUSTODY FORMS**

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		xoc:	te at and	NTS P	*****	xet: #3	Mis) 403 Ar Erkinsoning	. 23/69-882 I Locati		oly Not	Containers	Analyzana		
9	Sample 126375	11/7/2008	liected 10.25:00 AM	L IX	pe sb	<u>ru</u> f	Anibour Anibour	2-2	91		32001010018	Manyi Ha	unioon nontransministeringen	
	Reinquis	Sugar, Same	(Signature)	Dale (1/71/22) Date	Time 1-520 Time		Received by: 1			Rosnarses.	rnen, 435	<b>5</b>	<u></u>	
:	•		(Signature)	11/g/63 Osto	9.95 Time		Received Dy h.y.(LAS) Tomp at Aniva		*C	Criczba	ineny 102			e .

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Coc: Enthot USTR: Mark. 148/04 Cuscier UPS

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Taxaday, November 07, 2006

Poge 3 of 4

Frontier GeoSciences, Inc.

hna Joudafora

Kristina Spadafora, Project Manager



# **Methyl Mercury Analytical Results**

Matrix: Water	Extraction: Methyl Hg Distillation for Water									
Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
126375	ND	0.056	ng/L	1.25	F611088	16-Nov-06	6K22002	17-Nov-06	FGS-070	

Frontier GeoSciences, Inc.

rishna Spadajbra

Kristina Spadafora, Project Manager



# MATRIX DUPLICATES/TRIPLICATES

### SOURCE: 0611034-02

Matrix: Water

Sequence: <u>6K22002</u>

Batch: F611088

Lab Number: F611088-DUP1

Preparation: Methyl Hg Distillation for Water

	Sample Concentration				RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.124	ND	0.056	ND	25	FGS-070	QR-04, U

Frontier GeoSciences, Inc.

Kna Spadajba

Kristina Spadafora, Project Manager



# MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

## SOURCE: 0611034-02

Matrix: Water

Sequence: 6K22002

Batch: F611088

Lab Number: F611088-MS/MSD1

Preparation: Methyl Hg Distillation for Water

Analyte	Sample Concentratio (ng/L)	on Added (ng/L)	Conce	MS entration g/L)	MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.124	2.008	1	.865	86.7	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	1.636	75.3	13.1	70 - 130	25	FGS-070	

Frontier GeoSciences, Inc.

Rina Spadajbra

Kristina Spadafora, Project Manager



# LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

Matrix: Water				Sequenc	e: <u>6K22002</u>								
Batch: <u>F611088</u>	<u> </u>	Lab Number: F611088-BS/BSD1											
Preparation: Methyl H	Ig Distillation for Water		L	CS Sourc	e: LCS								
Analyte		Spike Added (ng/L)	LC Concent (ng/	tration	LCS % Recovery	Revovery Limits	Method	Notes					
Methyl Mercury		2.008	1.89	94	94.3	70 - 130	FGS-070						
Analyte	Spike Added (ng/L)	LCSD Concentration (ng/L)	LCSD % % Recovery RPD		Revovery Limits	RPD Limit	Method	Notes					
Methyl Mercury	2.008	1.865	92.9	1.54	70 - 130	25	FGS-070						

## **RECOVERY AND RPD**

Frontier GeoSciences, Inc.

istina Spadafra

Kristina Spadafora, Project Manager



1

# PREPARATION BLANKS

Matrix: <u>Water</u> Instrument: <u>MeHg-15</u> Sequence: <u>6K22002</u>

Preparation: Methyl Hg Distillation for Water

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F611088-BLK1	Methyl Mercury	0.013	0.056	ng/L	F611088	FGS-070	
F611088-BLK2	Methyl Mercury	0.008	0.056	ng/L	F611088	FGS-070	U
F611088-BLK3	Methyl Mercury	0.014	0.056	ng/L	F611088	FGS-070	

Frontier GeoSciences, Inc.

linstina Spadafora

Kristina Spadafora, Project Manager



# **Notes and Definitions**

- U Analyte included in the analysis, but not detected
- QR-04 RPD and/or RSD value exceeded control limit. Sample concentrations less than 10 times the reporting limit and the difference between the QC values were less than 2 times the reporting limit.
- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

Frontier GeoSciences, Inc.

kristina Spadajosa

Kristina Spadafora, Project Manager



> Phone: (612)607-1700 Fax: (612)607-6444

November 20, 2006

Ms. Renee Stone Northeast Technical Services 315 Chestnut St. Virginia, MN 55792

RE: Project: 3933 Pace Project No.: 1041800

Dear Ms. Stone:

Enclosed are the analytical results for sample(s) received by the laboratory on November 10, 2006. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Colin Schuft

colin.schuft@pacelabs.com Project Coordinator

Illinois Certification #: 200011 Iowa Certification #: 368 Minnesota Certification #: 027-053-137 Wisconsin Certification #: 999407970

Enclosures

**REPORT OF LABORATORY ANALYSIS** 

Page 1 of 6





> Phone: (612)607-1700 Fax: (612)607-6444

### SAMPLE SUMMARY

Project: Pace Project No.	3933 : 1041800			
Lab ID	Sample	ID Matrix	Date Collected	Date Received
1041800001	126376	Water	11/07/06 10:35	11/10/06 08:50

### **REPORT OF LABORATORY ANALYSIS**

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Page 2 of 6



Phone: (612)607-1700 Fax: (612)607-6444

### SAMPLE ANALYTE COUNT

Project: Pace Project No.:	3933 1041800				
Lab ID	Sample ID		Method	Analytes Reported	
1041800001	126376	EPA 200.8		2	

## **REPORT OF LABORATORY ANALYSIS**

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Page 3 of 6



Phone: (612)607-1700 Fax: (612)607-6444

### ANALYTICAL RESULTS

Project: Pace Project No.:	3933 1041800									
Sample: 126376		Lab ID:	1041800001	Collected	1: 11/07/06	3 10:35	Received: 11/	10/06 08:50 M	atrix: Water	
Param	eters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.8 MET ICPMS	i	Analytica	I Method: EPA	200.8 Prepa	aration Me	hod: EF	PA 200.8			
Palladium Platinum		ND I ND I	0	0.10 0.020	0.050 0.010	1		11/17/06 16:57 11/17/06 16:57		

Date: 11/20/2006 01:26 PM

### **REPORT OF LABORATORY ANALYSIS**

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Page 4 of 6



> Phone: (612)607-1700 Fax: (612)607-6444

#### QUALITY CONTROL DATA

Project:	3933												
Pace Project No.:	104180	00											
QC Batch:	MPRI	P/7768		Analys	is Method	: E	PA 200.8						
QC Batch Method:	EPA 2	200.8		Analys	is Descrip	tion: 2	00.8 MET						
Associated Lab Sa	mples:	1041800001											
METHOD BLANK:	283307	7											
Associated Lab Sa	mples:	1041800001											
				Blank	K R	eporting							
Parar	neter		Units	Resul	t	Limit	Qualifie	rs					
Palladium		ug/L			ND	0.10							
Platinum		ug/L			ND	0.020							
LABORATORY CC	NTROL	SAMPLE: 28330	18										
				Spike	LCS	3	LCS	% Red	>				
Parar	neter		Units	Conc.	Resu	11t	% Rec	Limits	Qu	alifiers			
Palladium		ug/L		80		81.1	101	85	-115				
Platinum		ug/L		80	I	79.8	100	85	-115				
MATRIX SPIKE & I	MATRIX	SPIKE DUPLICA	ΓE: 28464	9		284650							
				MS	MSD								
Parame	ter	10 Units	41800001 Result	Spike Conc.	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Palladium		ug/L	ND	80	80	68.6	72.0	86	90	70-130	5	20	
Platinum		ug/L	ND	80	80	72.8	76.8	91	96	70-130			
SAMPLE DUPLICA	ATE: 28	4651			1871-1871-1971-1971-1971-1971-1971-1971-								
				1041802	001	Dup			Max				
Parar	neter		Units	Resul	lt	Result	RPD		RPD	Qualifie	ers		
Palladium		ug/L			ND	ND		25	20	D7			
Platinum		ug/L			ND	ND	F	0	20				

Date: 11/20/2006 01:26 PM

#### **REPORT OF LABORATORY ANALYSIS**

Page 5 of 6





> Phone: (612)607-1700 Fax: (612)607-6444

### QUALIFIERS

Project:3933Pace Project No.:1041800

#### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

**RPD - Relative Percent Difference** 

NC - Not Calculable.

#### ANALYTE QUALIFIERS

D7 The sample and/or duplicate results for this parameter are less than the reporting limit, calculations are based on estimated values and may be statistically unreliable.

### **REPORT OF LABORATORY ANALYSIS**

Page 6 of 6



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BARR Chain of Chain o	IN 55435-4	803				.es.) *I	(*		£		Water						<i>I</i> *(H)	AeOH)*1 orams		lio2	unpres.)		rs	Project Ma	nager:	DP
Project Number 2, 3, / 6, 9, - 8 Project Name Poly Met Sample Identification 1. P-3	62	004		0.0	2.9	ss (Pres	Semivolatile Organics *2 Dissolved Metals (HNO <sub>2</sub> )	(NO <sub>3</sub> )	General (Unpreserved) *3 Cyanide (NaOH)	)4)*4	Oil and Grease (H <sub>2</sub> SO <sub>4</sub> ) Sulfide (Zn Acetate)		2O3)			\$	VOCs (2-oz tared MeOH) *1	GRO, BTEX (2-oz tared MeOH)*1 DRO (2-oz tared) - 25 orams	Metals (2-oz unpreserved)	4-oz unpres.)*2	% Moisture (plastic vial, unpres.)		Of Containers	Project Co	ntact: <u>K</u> P	>P Z∠HAW S
Project Name Poly Met		N	0	214	176	Organic	tile Or <sub>l</sub> I Metal	tals (H	(Unpre NaOH)	; (H <sub>2</sub> S(	Grease Zn Ace		(Na 2S 2			1 1 1	-oz tar	EX (2-0)	2-02 un	2 or 4	re (plas			Sampled by	<u>, JAM</u>	a/HAW
Sample Identification	Colle	ction	Matr	rab xi	Type duo Uo	olatile	emivola	Total Metals (HNO <sub>3</sub> )	ieneral yanide (	utrients	ulfide (	Methane	Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> )	Tac I	T .	חביניו	'OCs (2	RO, BT.	fetals (	SVOCs (2 or	6 Moistu		Total No.	Laboratory	Remarks:	5
	Date	Time	≯ ŏ	0	00	12	S C	16	50	Z	0 S			-)  }~	<u> </u>	<u> </u>				S	68	_			Kennarks.	
	11/7/06	10;35	K	×			l	a	1 1	1				1	1	1							9	Table	2	
2 126375																										
2. 126375 3. 126377 4. 126378																										
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10.									****																	
11. * Bottles had P-2																										
Written on them. 12 Client Called + the Correct site name is P-2	11.7-01 OK 14:55	ÂM																								
Common Parameter/Containe			Reling			$\overline{\Lambda}$	i			2n	Ice?		Date	Ť		Fime		Re	ceive	d by	:			.ł	Date	Time
*I - Volatile Organics = BTEX, GR *2 - Semivolatile Organics = PAHs,	O, TPH, Full L	list	Reinqu	2	<u>æ.</u> "		w	Z	<u> </u>	Y) On 1 Y	Ice?		Date	6		: 5 Fime		Rea	ceive	d by	: 1	4	P	rosi	11- <del>Date</del>	0 13.55
Herbicide/Pesticide/PCBs *3 - General = pH, Chloride, Flourie TDS, TS, Sulfate	de, Alkalinity,	TSS,	Samples	Shipped		] Air		F	ederal			Samp	oler	ł				Air		Nur Nur				nice		· ·
*4 - Nutrients = COD, TOC, Pheno	ls Ammonia	L													с		1771 K.I					dia pagina p				

\*4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

From Ph. II Work Plan

CoC#72433

283

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	
Chloride	EPA 325.2	<u>10 mg/L</u>
Cyanide Total	EPA 335.2	0.5 mg/L
Fluoride	EPA 340.1	0.02 mg/L
Hardness, Total (calculated)	EPA 200.7	0.1 mg/L
Nitrogen, Ammonia	EPA 350.1	1 mg/L
Nitrogen, Nitrate + Nitrite	EPA 353.2	0.1 mg/L
pH !	ÉPA 150.1	0.1 mg/L
Phosphorus, Total	EPA 365.2	0.1 SU
Sulfate	EPA 375.4	0.1 mg/L
Aluminum, Total	EPA 200.7	1 mg/L
-Aluminum, Dissolved	EPA 200.7	25
Antimony, Total		25
Arsenic, Total	EPA 204.2 EPA 200.8	3
Barium, Total		2
Beryllium, Total	EPA 200.7	10
Boron, Total	EPA 210.2	0.2
Cadmium, Total	EPA 200.7	35
Cadmium, Dissolved	EPA 213.2	0.2
Calcium, Total	EPA 213.2	0.2
Chromium, Total	EPA 200.7	0.5 mg/L
Chromium, Dissolved	EPA 218.2	1
Cobalt, Total	EPA 218.2	<u> </u>
Copper, Total	EPA 219.2	1
Copper, Dissolved	EPA 220.2	2
Iron, Total	EPA 220.2	2
Lead, Total	EPA 200.7	0.05 mg/L
Magnesium, Total	EPA 7421	1
Manganese, Total	EPA 200.7	0.5 mg/L
Mercury, Low Level Total	EPA 200.7	0.03 mg/L
Methyl Mercury, Total - 48 W	EPA 1631E	2 ng/L
Molybdenum, Total	the second secon	0.02 ng/L
Molybdenum, Dissolved	LIA 240.2	5
Nickel, Total	EPA 246.2	5
	EPA 249.2	2

NO Samples ted Fris Strives. No samples ted soit. Not Wries.

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4 <b>*</b>		Coc#72 433 19: 373
		07.373
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

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Page 1 of 5



Northeast Technical Services 315 Chestnut Street

PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

MDH Certification: 027-137-157

NTS COC: 73604 Received: 11/14/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Approved by:

Renee Stone

Barr Engineering Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435

RECEIVED

JAN - 3 2007 ENGINEERING CO.

NTS Sample: 128119 Description: P-2 Sample Date: 11/14/2006 10:00:00 AM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Methyl Mercury	<0.056	ng/L	0.056	EPA 1630	11/22/2006	SUB

	Page	2	of	5
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NTS Sample: 128120		Matrix: Ad	queous	NTS CO	C: 73604	
Description: P-2		Sample Ty	/pe: Grab	Client: (	)662 - Barr Engineering	9
Sample Date: 11/14/2006	10:00:00 AM			Sampleo	3933 - 23/69-86200400 ł By: Client Date: 12/29/2006	9 Poly Met
Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Palladium	<0.1	µg/L	0.1	EPA 200.8	11/29/2006	SUB

Platinum	<0.02	μg/L	0.02	EPA 200.8	11/29/2006	SUB

Page 3 of 5

NTS Sample: 128121 Description: P-2 Sample Date: 11/14/2006 10:00:00 AM

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Matrix: Aqueous Sample Type: Grab NTS COC: 73604 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Notes: A Field Blank was not collected with this sample. All samples analyzed for mercury by EPA Method 1631 require a Field Blank

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Aluminum	<25	µg/L	25	EPA 200.7	11/28/2006	CSD	
Antimony	<3	µg/L	3	EPA 204.2	12/2/2006	KJD	
Arsenic	<2	µg/L	2	EPA 206.2	11/22/2006	KJD	
Barium	<10	µg/L	10	EPA 200.7	11/28/2006	CSD	
Beryllium	<0.2	µg/L	0.2	EPA 210.2	12/5/2006	KJD	
Boron	148	µg/L	50	EPA 200.7	11/28/2006	CSD	
Cadmium	<0.2	µg/L	0.2	EPA 213.2	12/5/2006	KJD	
Calcium	16.7	mg/L	1	EPA 200.7	11/28/2006	CSD	
Chromium	<1	μg/L	1	EPA 218.2	11/28/2006	KJD	
Cobalt	<1	μg/L	1	EPA 219.2	11/28/2006	KJD	
Copper	<2	µg/L	2	EPA 220.2	12/2/2006	KJD	
Iron	351	µg/L	50	EPA 200.7	11/28/2006	CSD	
Lead	<1	μg/L	1	EPA 239.2	11/30/2006	KJD	
Magnesium	10	mg/L	1	EPA 200.7	11/28/2006	CSD	
Manganese	27.3	µg/L	10	EPA 200.7	11/28/2006	CSD	
Mercury, Low Level	<0.5	ng/L	0.5	EPA 1631E	11/21/2006	SUB	
Molybdenum	<5	µg/L	5	EPA 246.2	12/1/2006	KJD	
Nickel	<2	µg/L	2	EPA 249.2	12/2/2006	KJD	
Potassium	1.1	mg/L	0.25	EPA 200.7	11/28/2006	CSD	
Selenium	<4	µg/L	4	EPA 270.2	11/21/2006	KJD	С
Silver	<1	µg/L	1	EPA 272.2	11/28/2006	KJD	
Sodium	23.9	mg/L	2	EPA 200.7	11/28/2006	CSD	
Strontium	74.9	μg/L	5	EPA 200.7	11/28/2006	CSD	
Thallium	<2	μg/L	2	EPA 279.2	12/2/2006	KJD	
Titanium	<20	μg/L	20	EPA 283.2	12/7/2006	KJD	
Zinc	122	µg/L	25	EPA 200.7	11/28/2006	CSD	
тос	5.3	mg/L	1	EPA 415.1	11/21/2006	CSD	i
Alkalinity, Total	108	mg/L as CaCO3	10	EPA 310.1	11/17/2006	JLC	i
Chloride	1.3	mg/L	0.5	EPA 300.0 ATP	11/17/2006	LXP	i
COD	<10	mg/L	10	SM 18th Ed 5220D	11/15/2006	LXP	i
Fluoride	0.37	mg/L	0.1	EPA 300.0	11/17/2006	LXP	i
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	11/21/2006	LXP	1
Nitrogen, Nitrate+Nitrite	<0.1	mg/L as N	0.1	EPA 353.2	11/15/2006	DB	i
pH	7.5	Std Units	0.1	EPA 150.1	11/16/2006	LXP	i
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	11/16/2006	DB	i
Sulfate	5.76	mg/L	1	EPA 300.0 ATP	11/17/2006	LXP	ł
Hardness, Total (calc)	82.9	mg/L	3	SM 2340B	12/29/2006	RMS	
Qualifier Description		۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰		Note	****		
c Elevated Reporting Limit. i Improper sample preservation no	oted, analysis p	performed.		Sample receive	ed at 6.8 °C		

Page	4	of	5
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NTS Sample: 128121			Aqueous		NTS COC: 73604		
Description: P-2		Sample	• Type: Grab	C	Client: 0662 - Barr Engineering	3	
Sample Date: 11/14/2006	10:00:00 AM			F	Project: 3933 - 23/69-86200400	9 Poly M	et
				S	Sampled By: Client		
				F	Report Date: 12/29/2006		
Notes: A Field Blank was	not collected with t	his sample. /	All samples a	nalyzed for me	ercury by EPA Method 1631 rec	quire a Fie	id Blank
Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Cyanide	<0.02	mg/L	0.02	SM 4500E	11/21/2006	SUB	i

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Qualifier	Description	Note
с	Elevated Reporting Limit.	
i	improper sample preservation noted, analysis performed.	Sample received at 6.8 °C

NTS Sample: 128122 Description: P-2 Sample Date: 11/14/2006 10:00:00 AM

4 K

Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 73604 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	μg/L	25	EPA 200.7	11/24/2006	BAM
Cadmium	<0.2	µg/L	0.2	EPA 213.2	11/22/2006	KJD
Chromium	<1	µg/L	1	EPA 218.2	11/24/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	11/25/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	11/24/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	11/25/2006	KJD
Selenium	<2	µg/L	2	EPA 270.2	11/18/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	11/24/2006	KJD
Zinc	122	µg/L	25	EPA 200.7	11/24/2006	BAM



> Phone: (612)607-1700 Fax: (612)607-6444

December 06, 2006

Ms. Renee Stone Northeast Technical Services 315 Chestnut St. Virginia, MN 55792

RE: Project: 3933 Pace Project No.: 1042582

Dear Ms. Stone:

Enclosed are the analytical results for sample(s) received by the laboratory on November 28, 2006. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Colin Schape

Colin Schuft

colin.schuft@pacelabs.com Project Coordinator

Illinois Certification #: 200011 Iowa Certification #: 368 Minnesota Certification #: 027-053-137 Wisconsin Certification #: 999407970

Enclosures

#### **REPORT OF LABORATORY ANALYSIS**

Page 1 of 6



ace Analytical www.pacelebs.com

> Phone: (612)607-1700 Fax: (612)607-6444

#### SAMPLE SUMMARY

1042582001	128120		Water	11/14/06 10:00	11/28/06 08:55
Lab ID		Sample ID	Matrix	Date Collected	Date Received
Pace Project No.:	1042582				
Project:	3933				

#### **REPORT OF LABORATORY ANALYSIS**

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Page 2 of 6



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## SAMPLE ANALYTE COUNT

Project: Pace Project No.:	3933 1042582					
Lab ID		Sample ID		Method	Analytes Reported	
1042582001	128120		EPA 200.8		2	

### **REPORT OF LABORATORY ANALYSIS**

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Page 3 of 6



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#### ANALYTICAL RESULTS

Project: 3933 1042582 Pace Project No.: Sample: 128120 Lab ID: 1042582001 Collected: 11/14/06 10:00 Received: 11/28/06 08:55 Matrix: Water Report CAS No. Qual Results Units Limit MDL DF Prepared Analyzed Parameters 200.8 MET ICPMS Analytical Method: EPA 200.8 Preparation Method: EPA 200.8 0.050 1 11/29/06 00:00 12/04/06 17:24 7440-05-3 Palladium ND ug/L 0.10 11/29/06 00:00 12/04/06 17:24 7440-06-4 0.010 Platinum ND ug/L 0.020 1

Date: 12/06/2006 02:17 PM

#### **REPORT OF LABORATORY ANALYSIS**

Page 4 of 6





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#### QUALITY CONTROL DATA

Project:	3933												
Pace Project No.:	1042582												
QC Batch:	MPRP/7905			Analysi	s Method:	EF	PA 200.8						
QC Batch Method:	EPA 200.8			Analysi	is Descript	ion: 20	0.8 MET						
Associated Lab Sar	nples: 1042	582001											
METHOD BLANK:	288842									<del></del>			
Associated Lab Sar	nples: 1042	582001											
				Blank	R	eporting							
Para	neter		Units	Result	t	Limit	Qualifier	s					
Palladium		ug/L			ND	0.10							
Platinum		ug/L			ND	0.020							
LABORATORY CO	NTROL SAMP	LE: 288	843										
				Spike	LCS	5	LCS	% Rec					
Para	neter		Units	Conc.	Resu	lt	% Rec	Limits	Qu	alifiers	_		
Palladium		ug/L		80		83.3	104		-115				
Platinum		ug/L		80		83.4	104	85	-115				
MATRIX SPIKE & I		DUPLICA	TE: 28884	4		288845					<del></del>		
				MS	MSD								
Parame	ter	Units	878772001 Result	Spike Conc.	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Palladium		ug/L	ND	80	80	76.5	77.6	96	97	70-130	1	20	
Platinum		ug/L	ND	80	80	78.4	78.2	98	98	70-130	.2	20	
SAMPLE DUPLICA	ATE: 288846									······			
				1042582		Dup			Max	Qualif	~~~		
Para	meter		Units	Resul		Result	RPD		RPD	Qualifi	915 		
Palladium		ug/L			ND	ND		30	20				
Platinum		ug/l	-		ND	ND	k i i i i i i i i i i i i i i i i i i i	0	20				

Date: 12/06/2006 02:17 PM

### **REPORT OF LABORATORY ANALYSIS**

Page 5 of 6





> Phone: (612)607-1700 Fax: (612)607-6444

#### QUALIFIERS

Project: 3933 Pace Project No.: 1042582

#### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

**DUP - Sample Duplicate** 

RPD - Relative Percent Difference

NC - Not Calculable.

### **REPORT OF LABORATORY ANALYSIS**

Page 6 of 6



		Northeast Tech 315 Chestnut Street P.O. Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010		D	ATE	11/1	4/2006
-				PO	Number	73604/393	3
				PROJE	CT MGR	Rence Stone	
Vendor: Address:	Pace Analytical Svcs., Inc 1700 Elm Street SE Suite #200 Minneapolis, MN 55414	•			OC # TS Job #	73604 3933	
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	1 Pd,Pt			<u> </u>			)i
TOTAL TESTS							
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	SHIPPER UPS	· · · · · · · · · · · · · · · · · · ·	the second s		Standard and all hearing		
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315 C PO B Virgin Phon	theast Technical Services Chestnut Street ox 1142 nia, MN 55792 e: 218-741-4290 218-742-1010 Chain of Custocy Record Analysis to be performed by: Pace <i>UO4D58D</i>	ی کور ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرون ایرو ایرون ایرون ایرون ایرو ایرون ایرو ایرو ای ایرو ای ای ای ای ای ای ای ای ای ای ای ای ای
COC:	NTS COC: 73604 NTS Project: #3933 NTS Project Desc: Barr Engineering, 23/69-862004009 Poly Met	
Sample Collected	Type Fill Matrix Location Containers Analyses	
128120 11/14/2008 10:00:00 AM	M Grab Aqueous P-2	I
Feinquistied By: (Signature)	Date     Time     Received By: (Signature)     Remarks:       /-2/-Cly     /1/:3.0     //       Date     Time     Received By: (Signature)       //38:06     ////////////////////////////////////	

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San	nple Condition U		
Pace Analytical Client Name	NTS	Project # 1042-582	
courier:  Fed Ex X UPS USPS Clien racking #: 12_559_7//_03_5207_/565	•	Pace Other	
custody Seal on Cooler/Box Present: yes	K no Seals in	tact: yes no	Ĩ
acking Material: Bubble Wrap Bubble	Bags None		
Thermometer Used 230194010	Type of ice: Wet	Blue None Samples on ice, cooling process has begun	7
Cooler Temperature 0.6	Biological Tissue is C	Frozen: Yes No Date and initiale of parcon grandning contents:	
Chain of Custody Present:	YYes DNO DNA 1	*	-
Chain of Custody Filled Out:	DAYOS DNO DNA 2		-
Chain of Custody Relinquished:	YYes DNO DNA 3		
Sampler Name & Signature on COC:	DYPS KIND DINA 4		
Semples Arrived within Hold Time:	NYes CINO CINIA E		-
Short Hold Time Analysis (<72hr):	DY00 KINO CINIA 6		
Rush Turn Around Time Requested:	DVes WNO DNA 3	Y	
Sufficient Volume:	NO DNA		
Correct Containers Used:	ATTYES DINO DINA		
-Pace Containers Used:	DYes XONO DINA	n an	
Containers Intact:	Aires DNO DNA		-
Filtered volume received for Dissolved tests		11. 12.COC-128120, SAmple 128120-318	
Sample Labels match COS:	AVIA SING DINA	12LUG-TADIAC/ Simple and Sim	
-Includes date/time/ID/Analysis Matrix All containers needing preservation have been checked.	WT' Stres DNO DINA	13.	
All containers needing preservation are found to be in compliance with EPA recommendation.	Tres DNO DNA	Initial when Lot # of added	
exceptions: VOA, cotiform, TQC, Q&G, WI-DRO (water)	· · · · · · · · · · · · · · · · · · ·	completed 24 preservative	
Samples checked for dechlorination:	Dyes DNo SNA	14.	·
Headspace in VOA Viels ( >6mm):	TYPE No DAVA	15.	
Trip Blank Present:	DYS DNO DANA	16.	
Trip Blank Custody Seals Present	DYES DNO SANA		
Pace Trip Blank Lot # (if purchased):			
		Reld Data Required? Y / N	
Client Notification/ Resolution: Person Contected:	Date/	Time:	
Comments/ Resolution:			
Commenter Resolution.			
			**************************************
			د. <del>مر</del> ابع ما تا تا
Project Manager Review:	<u> </u>	Date: 11 78 00	
Note: Whenever there is a discrepancy affecting Norf Certification Office ( i.e. out of hold, incorrect preserve	in Carolina compliance sar ative, out of temp, incorrec	nples, a copy of this form will be sent to the North Carolina DEHNR t containers) F-ALLC003ter 5, 11September200	36
		- manuference and option of the	
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# MINNESOTA VALLEY TESTING LABORATORIES, INC.



1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724 35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885 www.mvtl.com



Page: 1 of 1

Report Date: 21 Nov 06

RENEE STONE NORTHEAST TECHNICAL SERVICES PO BOX 1142 VIRGINIA MN 55792-1142

Project Number: 3933 Sample Description: 128121 Lab Number: 06-A51634 Work Order #:12-13093 Account #: 022015 Sample Matrix: WASTEWATER Date Sampled: 14 Nov 06 10:00 Date Received: 17 Nov 06 9:30 PO #: 73604/3933 Chain of Custody Number: 73604 Temp at Receipt: -1.0C

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Cyanide, Total	< 0.02 mg/L	0.02	SM 4500E	21 Nov 06 10:42	JD

Approved by:	for 8. Lan IS
** *	Jason G. Smith, Inorganic Laboratory Manager New Ulm, MN
RL = Reporting Lim	út.

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MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

06 December 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Jennifer Cahn For Kristina Spadafora

Project Manager



15-Nov-06 08:37

# ANALYTICAL REPORT FOR SAMPLES

Sample ID		Laboratory ID	Matri	x Date Sampled	Date Received
Client:	Northeast Technical Services Inc.		Project:	Methyl Mercury	
-	Frontier GeoSciences, Inc.		SDG:	Mathen Manuar	

128119

0611072-01

Water

14-Nov-06 10:00

Frontier GeoSciences, Inc.

Jemily Flater

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# CASE NARRATIVE

Work Order Number: 0611072:

#### SAMPLE RECEIPT

One (1) water sample was received on November 15, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 0.9 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits.

Frontier GeoSciences, Inc.

Jenne Flator



Page 1 of 4

# CHAIN OF CUSTODY FORMS



Northeast Technical Services 315 Chealaul Skoul PO Bas 1342 Viginia, RN 55752 Plone: 216-741-0200 Fac: 216-741-0200 Fac: 216-742-1010

#=06/1072		- AM=KS
Chain e	of Custody	Record
Analysis to be performed by: #	onlier Geotoinnoos	olul-1

	and the second s			
ſ	COC:	NTS C NTS Proj NTS Project D	jech: #3663	Pary Mat
t	Sample Collected	Type	Fill Matrix Location	Containers Analyses
ſ	120219 11/14/2000 10:00:00 AM	Grab	Agadous P-2	Party Hg
THE OTHER PARTY	Relimped for (Signature)	14-01 14:48	Received By: (Signature)	Renarco:
CLASS BOARD IN THE REAL PROPERTY IN	Reingusbod By: (Signature)		S Received By: (Signature)	
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Î	Conte Conter /			COCINPA

PGS 11/15/00 835

Inexitag, November 14, 2006

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Frontier GeoSciences, Inc.

Jennez Flater



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# **Methyl Mercury Analytical Results**

Matrix: Water	Extraction: Methyl Hg Distillation for Water									
Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
128119	ND	0.056	ng/L	1.25	F611148	20-Nov-06	6K29008	22-Nov-06	FGS-070	U

Frontier GeoSciences, Inc.

Jenny Flaks



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# MATRIX DUPLICATES/TRIPLICATES

# SOURCE: 0611027-01

Matrix: Water

Sequence: <u>6K29008</u>

Batch: F611148

Lab Number: F611148-DUP1

Preparation: Methyl Hg Distillation for Water

	Sample	Duplicate Concentration		%	RPD		
Analyte	Concentration ng/L	ng/L	MRL	70 RPD	Limit	Method	Notes
Methyl Mercury	0.671	0.553	0.056	19.3	25	FGS-070	

Frontier GeoSciences, Inc.

Jenny Flater



# MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

# SOURCE: 0611027-05

Matrix: Water

Sequence: 6K29008

Batch: F611148

Lab Number: F611148-MS/MSD1

Preparation: Methyl Hg Distillation for Water

Analyte	Sample Concentratio (ng/L)	on Added (ng/L)	Conce (n	vIS ntration g/L)	MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.461	2.008	2	.457	99.4	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	2.601	107	5.69	70 - 130	25	FGS-070	

Frontier GeoSciences, Inc.

Jemysflat

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

Matrix: Water			Sequence: <u>6K29008</u> Lab Number: <u>F611148-BS/BSD1</u>					
Batch: <u>F611148</u>								
Preparation: Methyl Hg Distillation fo	r Water	LCS Source: LCS						
Analyte		Spike Added (ng/L)	LC Concen (ng/	tration	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury		2.008	1.9	96	99.4	70 - 130	FGS-070	
A	pike Ided g/L)	LCSD Concentration (ng/L)	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury 2.	008	1.910	95.1	4.40	70 - 130	25	FGS-070	

# **RECOVERY AND RPD**

Frontier GeoSciences, Inc.

Jennezzlator

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# PREPARATION BLANKS

 Matrix:
 Water
 Sequence:
 6K29008

 Instrument:
 MeHg-15
 Preparation:
 Methyl Hg Distillation for Water

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F611148-BLK1	Methyl Mercury	0.009	0.056	ng/L	F611148	FGS-070	U
F611148-BLK2	Methyl Mercury	0.003	0.056	ng/L	F611148	FGS-070	U
F611148-BLK3	Methyl Mercury	-0.004	0.056	ng/L	F611148	FGS-070	U

Frontier GeoSciences, Inc.

Jennezdlat

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# **Notes and Definitions**

U Analyte included in the analysis, b	out not detected
---------------------------------------	------------------

- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

Frontier GeoSciences, Inc.

Jenny Flat

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Chain of (	Quetodo	-1-	21 N	U		┣──					Water			nam	1015/1		civa		Soi	1			COC _	of	
BARR Chain of C 4700 West 77th Minneapolis, M (952) 832-2600	Canad	•		,		I*('S)	( )									4)*/	eOH)*1	grams		1		2	Project Man	ager:D	P
(952) \$32-2600 Project Number	) ) (. 2	004		00	) 9	s (Pres.)	(anics *2) s (HNO	NO <sub>3</sub> )	servea) "	) <sub>4</sub> ) *4	(H <sub>2</sub> SO <sub>4</sub> tate)		03)			A MeOH) */	tared M	d) - 25	preserve	tic vial, u		Of Containers	Project Cont	act: KDP	
Aroo West 77th Minneapolis, M (952) 832-2600 Project Number 2,3,/,6,9,-,8 Project Name PolyMet FL Sample Identification	<u>Ш н</u> .	jdro N	0	214	77	Organic	athe Org	etals (H	(NaOH)	ts (H <sub>2</sub> SC	Grease (Zn Ace	í ai	Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ) DRO (HCI)		- - -	2-07 tared	<u>rex (2-02</u>	DRO (2-oz tared) - 25 grams	(2-02 un	% Moisture (plastic vial, unpres.)		_	Sampled by:		
Sample Identification	Colle	ction	Vatri oil	rab x		<sup>7</sup> olatile	emivol Dissolve	otal M	yanide	Jutrien	Dil and ulfide	Aethan	3acteria DRO (1	TOC	LL HJ.	ζ Ω V ζ t	GRO, B'	) RO (;	VICTOR VOCe	% Moist		Total No.	Laboratory: _	NTS Remarks:	
<sup>1.</sup> P-2	Date 11/14/ 06	Time 10:00			1		1	2		1 1	S S				1			Ĭ		, 5			Table	1	
$\frac{1}{P-2}$ $\frac{2}{2}  28 19$ $\frac{3}{2}  28 20$ $\frac{4}{2}  28 21$ $\frac{5}{2}  28 22$	00																					-			
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Common Parameter/Containe *1 - Volatile Organics = BTEX, GR			Relingu			U	w		<u>- (</u>		<u>}</u>	<u>iVi</u>	Date <b>4/0</b>	6 r:		5		l l Recei			- 1		L	Date	Time
<ul> <li>*2 - Semivolatile Organics = DALS, OK</li> <li>*2 - Semivolatile Organics = PAHs, Herbicide/Pesticide/PCBs</li> <li>*3 - General = pH, Chloride, Flouri</li> </ul>	PCP, Dioxins,	Full List,	Kelinqu Samples S			]Air F	reight	F		On Y Expro	N		Date		Ti	me		Receiv	. (	by: Jumb	H er:	K	0001	Date 11-14-06 °C On in	Time 13:35
TDS, TS, Sulfate *4 - Nutrients = COD TOC Pheno		~~~,	1			] Othe					~				-					~			ي. ب		

\*4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

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Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

trom Ph. IL Work Plan

Coc#72433 283

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

	Description		
/	Alkalinity, Total as CaCO3	Method	Detection Limit
~	Carbon, Total Organic	EPA 310.1	10 mg/L
	Chemical Oxygen Demand	EPA 415.1	1 mg/L
7	Chloride	STD METH 5220D, 18TH ED	10 mg/L
4	Cyanide Total	EPA 325.2	0.5 mg/L
4	-Fluoride	EPA 335.2	0.02 mg/L
4	Hardness, Total (calculated)	EPA 340.1	0.1 mg/L
4	Nitrogen, Ammonia	EPA 200.7	l mg/L
4		EPA 350.1	0.1 mg/L
$\checkmark$	Nitrogen, Nitrate + Nitrite pH !	EPA 353.2	0.1 mg/L
$\checkmark$		EPA 150.1	0.1 SU
4	Phosphorus, Total Sulfate	EPA 365.2	0.1 mg/L
ŀ		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
1	Copper, Total	EPA 220.2	2
	Copper, Dissolved	EPA 220.2	2
	Iron, Total	EPA 200.7	0.05 mg/L
1	Lead, Total	EPA 7421	1
	Magnesium, Total	EPA 200.7	0.5 mg/L
	Manganese, Total	EPA 200.7	0.03 mg/L
F	Mercury, Low Level Total	EPA 1631E	2 ng/L
Ę	Methyl Mercury, Total - 48 W	Nolding EPA 1631E	0.02 ng/L
	vlolybdenum, Total	time EPA 246.2	5
<u> </u>	Molybdenum, Dissolved	EPA 246.2	5
11	Vickel, Total	EPA 249.2	

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Coe	#73	۲ <i>3</i> :3	
04	. <del>.</del>	3	
1 Limit			

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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

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Page 1 of 5



Laboratory Results

Northeast Technical Services 315 Chestnut Street PO Box 1142

MDH Certification: 027-137-157

Virginia, MN 55792 Phone: 218-741-4290

Fax: 218-742-1010

NTS COC: 73742 Received: 11/20/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Approved by:

enee Stone

Barr Engineering Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435

RECENTED

JAN - 3 2007

ENGINEERING CO.

NTS Sample: 129030 Description: MW-05-02 Sample Date: 11/20/2006 12:00:00 PM Matrix: Aqueous Sample Type: Grab

Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Methyl Mercury	0.146	ng/L	0.056	EPA 1630	12/1/2006	SUB	S7

Qualifier			Note
	Analysis performed by Frontier Geosciences: MDH# 053-999-381	414 Pontius Ave. N. Seattle, WA	See Attached Report.

This report may not be reproduced, except in full, without written consent of NTS laboratory.

Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report.

N						Page 2 of 5
NTS Sample: 129031		Matrix	: Aqueous		NTS COC: 73742	
Description: MW-05-02		Sampl	e Type: Grab		Client: 0662 - Barr Engineering	
Sample Date: 11/20/2006	12:00:00 PM				Project: 3933 - 23/69-862004009 Sampled By: Client Report Date: 12/29/2006	Poly Met
Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Palladium	<0.1	µg/L	0.1	EPA 200.8	11/29/2006	SUB
Platinum	<0.01	µg/L	0.01	EPA 200.8	11/29/2006	SUB

NTS Sample: 129032 Description: MW-05-02 Sample Date: 11/20/2006 12:00:00 PM Matrix: Aqueous Sample Type: Grab NTS COC: 73742 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Notes: A Field Blank was not received with this sample. All samples analyzed for mercury by EPA Method 1631 require a Field Blank.

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	31.6	µg/L	25	EPA 200.7	12/5/2006	CSD
Antimony	<3	µg/L	3	EPA 204.2	12/5/2006	KJD
Arsenic	<2	µg/L	2	EPA 206.2	12/6/2006	KJD
Barium	<10	µg/L	10	EPA 200.7	12/5/2006	CSD
Beryllium	<0.2	µg/L	0.2	EPA 210.2	12/5/2006	KJD
Boron	<50	µg/L	50	EPA 200.7	12/5/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	12/5/2006	KJD
Calcium	18.6	mg/L	1	EPA 200.7	12/5/2006	CSD
Chromium	<1	µg/L	1	EPA 218.2	12/9/2006	KJD
Cobalt	<1	µg/L	1	EPA 219.2	12/9/2006	KJD
	2.4	µg/L	2	EPA 220.2	12/2/2006	KJD
Iron	54.3	µg/L	50	EPA 200.7	12/5/2006	CSD
Lead	<1	µg/L	1	EPA 239.2	12/8/2006	KJD
Magnesium	5.65	mg/L	1	EPA 200.7	12/5/2006	CSD
Manganese	61.9	µg/L	10	EPA 200.7	12/5/2006	CSD
Mercury, Low Level	0.5	ng/L	0.5	EPA 1631E	11/29/2006	SUB
Molybdenum	<5	µg/L	5	EPA 246.2	12/1/2006	KJD
Nickel	<2	µg/L	2	EPA 249.2	12/2/2006	KJD
Potassium	1.93	mg/L	0.25	EPA 200.7	12/5/2006	CSD
Selenium	<2	μg/L	2	EPA 270.2	12/6/2006	KJD
Silver	<2	µg/L	2	EPA 272.2	12/9/2006	KJD c
Sodium	5.38	mg/L	2	EPA 200.7	12/5/2006	CSD
Strontium	88.6	µg/L	5	EPA 200.7	12/5/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	12/2/2006	KJD
Titanium	<20	µg/L	20	EPA 283.2	12/7/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	12/5/2006	CSD
TOC	2.6	mg/L	1	EPA 415.1	11/21/2006	CSD
Alkalinity, Total	68.3	mg/L as CaCO3	10	EPA 310.1	11/21/2006	LXP
Chloride	1.11	mg/L	0.5	EPA 300.0 ATP	11/21/2006	LXP
COD	<10	mg/L	10	SM 18th Ed 5220D	11/28/2006	DB
Fluoride	<0.1	mg/L	0.1	EPA 300.0	11/21/2006	LXP
Nitrogen, Ammonia	<0.1	mg/L as N	0.1	EPA 350.1	11/28/2006	DB
Nitrogen, Nitrate+Nitrite	1.42	mg/L as N	0.1	EPA 353.2	11/22/2006	DB
pH	6.5	Std Units	0.1	EPA 150.1	11/21/2006	JLC
Phosphorous, Total	<0.1	mg/L as P	0.1	EPA 365.4	11/24/2006	DB
Sulfate	16.4	mg/L	1	EPA 300.0 ATP	11/21/2006	LXP
Hardness, Total (calc)	69.7	mg/L	10	SM 2340B	12/29/2006	RMS
Qualifier Description c Elevated Reporting Limit.				Note	*************************************	

S2 Analysis performed by MVTL - New Ulm: MDH# 027-015-125 1126 North Front St. New Ulm, MN

Page 4 of 5	Page	4	of	5	
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NTS Sample: 129032 Description: MW-05-02			Aqueous Type: Grab		NTS COC: 73742 Client: 0662 - Barr Engineering	1	
Sample Date: 11/20/2006	12:00:00 PM					•	ət
·					Sampled By: Client		
					Report Date: 12/29/2006		
Sampled By: Client Report Date: 12/29/2006 lotes: A Field Blank was not received with this sample. All samples analyzed for mercury by EPA Method 1631 require a Field Blank.							
Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Cyanide	<0.02	mg/L	0.02	EPA 335.3	11/30/2006	SUB	S2

Qualifier	Description		Note
c	Elevated Reporting Limit.		
S2	Analysis performed by MVTL - New Ulm: MDH# 027-015-125	1126 North Front St. New Ulm, MN	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

NTS Sample: 129033 Description: MW-05-02 Sample Date: 11/20/2006 12:00:00 PM Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 73742 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 12/29/2006

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	<25	µg/L	25	EPA 200.7	11/24/2006	BAM
Cadmium	<0.2	µg/L	0.2	EPA 213.2	11/28/2006	KJD
Chromium	1.1	µg/L	1	EPA 218.2	11/30/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	11/25/2006	KJD
Volybdenum	<5	µg/L	5	EPA 246.2	12/6/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	11/25/2006	KJD
Selenium	<2	μg/L	2	EPA 270.2	11/25/2006	KJD
Silver	<1	µg/L	1	EPA 272.2	11/30/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	11/24/2006	BAM

# MINNESOTA VALLEY TESTING LABORATORIES, INC.



1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724 35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885 www.mvtl.com



Page: 1 of 1

RENEE STONE NORTHEAST TECHNICAL SERVICES PO BOX 1142 VIRGINIA MN 55792-1142

Project Number: 3933 Sample Description: 129032 Report Date: 4 Dec 06 Lab Number: 06-A52189 Work Order #:12-13226 Account #: 022015 Sample Matrix: WASTEWATER Date Sampled: 21 Nov 06 11:15 Date Received: 22 Nov 06 9:50 PO #: 73742/3933 Chain of Custody Number: 73742 Temp at Receipt: 3.0C

н. Талана (1997) Алана (1997)	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Cyanide, Total	< 0.02 mg/L	0.02	SM 4500E	30 Nov 06 8:38	JD

S. Approved by: Jason G. Smith, Inorganic

Jason G. Smith, Inorganic Laboratory Manager New Ulm, MN

RL = Reporting Limit

Elevated "Less Than Result" (<): @ \* Due to sample matrix # = Due to sample concentration ! = Due to sample quantity + \* Due to extract volume CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447660 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

December 06, 2006

Ms. Renee Stone Northeast Technical Services 315 Chestnut St. Virginia, MN 55792

RE: Project: 3933 Pace Project No.: 1042584

Dear Ms. Stone:

Enclosed are the analytical results for sample(s) received by the laboratory on November 28, 2006. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Colin Schaft

Colin Schuft

colin.schuft@pacelabs.com Project Coordinator

Illinois Certification #: 200011 Iowa Certification #: 368 Minnesota Certification #: 027-053-137 Wisconsin Certification #: 999407970

Enclosures

#### **REPORT OF LABORATORY ANALYSIS**

Page 1 of 6





1042584001

Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

### SAMPLE SUMMARY

# Project: 3933 Pace Project No.: 1042584 Lab ID Sample ID Matrix Date Collected Date Received

129031 Water	11/21/06 11:20	11/28/06 08:55
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#### **REPORT OF LABORATORY ANALYSIS**

Page 2 of 6





Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

## SAMPLE ANALYTE COUNT

Project: Pace Project No.:	3933 1042584					
Lab ID		Sample ID		Method	Analytes Reported	
1042584001	129031		EPA 200.8		2	

## **REPORT OF LABORATORY ANALYSIS**

This report shall not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc..



Page 3 of 6



Phone: (612)607-1700 Fax: (612)607-6444

#### ANALYTICAL RESULTS

Project: 3933 Pace Project No.: 1042584 Lab ID: 1042584001 Collected: 11/21/06 11:20 Received: 11/28/06 08:55 Matrix: Water Sample: 129031 Report MDL DF Prepared Analyzed CAS No. Qual Results Units Limit Parameters Analytical Method: EPA 200.8 Preparation Method: EPA 200.8 200.8 MET ICPMS 11/29/06 00:00 12/04/06 18:02 7440-05-3 0.10 0.050 1 ND ug/L Palladium 11/29/06 00:00 12/04/06 18:02 7440-06-4 ND ug/L 0.020 0.010 1 Platinum

Date: 12/06/2006 02:17 PM

#### **REPORT OF LABORATORY ANALYSIS**

Page 4 of 6





Phone: (612)607-1700 Fax: (612)607-6444

## QUALITY CONTROL DATA

Project: 3933 Pace Project No.: 1042584											
QC Batch: MPRP/	7905	Analysi	is Method:	EP	A 200.8						
QC Batch Method: EPA 20	0.8	Analysi	is Descript	ion: 20	0.8 MET						
Associated Lab Samples: 1	042584001										
METHOD BLANK: 288842											
Associated Lab Samples:	042584001										
		Blank		eporting	0						
Parameter	Units	Resul		Limit	Qualifiers						
Palladium	ug/L		ND	0.10							
Platinum	ug/L		ND	0.020							
LABORATORY CONTROL S	AMPLE: 288843										
······································		Spike	LCS	;	LCS	% Rec					
Parameter	Units	Conc.	Resu	lit (	% Rec	Limits	Qu	alifiers			
Palladium	ug/L	80		83.3	104		-115				
Platinum	ug/L	80	ł	83.4	104	85	-115				
MATRIX SPIKE & MATRIX S	PIKE DUPI ICATE: 2	88844		288845							
MATTIX OF ITE & MATTIX O		MS	MSD								
	878772	+	Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units Res	ult Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	Qual
Palladium	ug/L	ND 80	80	76.5	77.6	96	97	70-130		20	
Platinum	ug/L	ND 80	80	78.4	78.2	98	98	70-130	.2	20	
SAMPLE DUPLICATE: 288	846										
		1042582		Dup			Max				
Parameter	Units	Resu	lt	Result	RPD		RPD	Qualifi	ers		
Palladium	ug/L.		ND	ND		30	20				
Platinum	ug/L		ND	ND		0	20				

Date: 12/06/2006 02:17 PM

## **REPORT OF LABORATORY ANALYSIS**

Page 5 of 6





Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

Phone: (612)607-1700 Fax: (612)607-6444

#### QUALIFIERS

Project: 3933 Pace Project No.: 1042584

#### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

**DUP - Sample Duplicate** 

RPD - Relative Percent Difference

NC - Not Calculable.

#### **REPORT OF LABORATORY ANALYSIS**

Page 6 of 6



		Northeast Technical Services 315 Chestnut Strest	1042	284
		P.O. Bex 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010	DATE	11/20/2006
,			<b>PO</b> Number	73742/3933
			PROJECT MGR	Rence Stone
Address:	Pace Analytical Svcs., Inc. 1700 Elm Street SE Suite #200 Minneapolis, MN 55414		COC # NTS Job #	73742 3933

Qty	Description	
1	Pd.Pt	
him and the second s		

TOTAL TESTS <u>1</u>

# SHIPPER UPS

SHIPPING CHARGE

100 A

315 Ch PO Boi	heast Technical Services estudi Street (1142) MN 55792	Chain of (	Custody Record	
Phone:	, WR 30752 218-741-4290 8-742-1010	Analysis to be performed by: Pace	1042584	£
COC:	NTS COC: 73742 NTS Project: #3933 NTS Project Desc: Bar Engineering,	23/69-862004009 Poly Met		
Sample         Collected           129031         11/20/2006         12:00:00 PM		Con MW-05-02	tainers Analyses	
Relinquished By: (Signature) Relinquished By: (Signature)	2 -06 (1:20 Date Time Received By:			भर्द्
Received for Lab By: (Signature)	Date Time Tomp at Arrival	~ °C		

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. مرد مشاهی بین ماند مید و مرد م

Page 2 of 4

法法 蜜蜂

Sa	nple Condition Upon R	eceipt
Pace Analytical Client Name	NTS	Project # 10412.584
/ Courier:	5	Other Inc
Packing Material: Bubble Wrap Bubbl		party
Thermometer Used 230194010		one Samples on ice, cooling process has begun Date and Initials of person examinants
Cooler Temperature 0.6	Biological Tissue is Frozen: Comment	Yes No contents: 11-26-26-24-
Chain of Custody Present:	RYes DNo DNA 1.	
Chain of Custody Filled Out:	DIYOS DNO DNA 2.	
Chain of Custody Relinquished:	ALYes DNO DN/A 3.	
Sempler Name & Signature on COC:	Dives BIND DINA 4.	
Samples Arrived within Hold Time:	NYes DNO DNA 5.	
Short Hold Time Analysis (<72hr):	DYes SINO DN/A 8.	
Rush Turn Around Time Requested:	DYes DINO DNA 7.	·
Sufficient Volume:		
Correct Containers Used:	TAYES CIND DINA 9.	
-Pace Containers Used:	DYER DINA	
Conteiners Intact:	MYRE CINO CINA 10.	
Filtered volume received for Dissolved tests	DYes DNo. BANA 11.	-120 031 Sample 129031-324
Sample Labels match COC:	VOYON PSINO CINVA 12. COL	129031, Sample 129031-329
-Includes date/time/ID/Analysis Matrix All containers needing preservation have been checked.	DAVES DINO DINA 13.	
All containers needing preservation are found to be in compliance with EPA recommendation.		
exceptions: VCA, coliform, TOC, O&G, WI-DRO (water)	□Yes □No initial whe	
Samples checked for dechlorination:	DYOS DNO VENA 14.	
Headspace in VOA Vials ( >6mm):	DYES DNO KINA 15.	
Trip Blank Present:	CIYSS CINO SANA 16.	
Trip Blank Custody Seals Present	DYES DNO RANA	
Pace Trip Blank Lot # (If purchased):		
Client Notification/ Resolution: Person Contacted:	Date/Time:	Field Data Required? Y / N
Comments/ Resolution:		
Project Manager Review:	L. Se	Date: 11 28 01
a an farmer an		I have of this form will be sent to the North Carolina DEHNR

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

F-ALLC003rev.3, 11September2006



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

07 December 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenny Flaks



21-Nov-06 09:13

# ANALYTICAL REPORT FOR SAMPLES

Laboratory:	Frontier GeoSciences, Inc.		SDG:		
Client:	Northeast Technical Services Inc.		Project: <u>N</u>	Methyl Mercury	
Sample ID		Laboratory ID	Matrix	Date Sampled	Date Received

129030

0611120-01

Water

20-Nov-06 12:00

Frontier GeoSciences, Inc.

Jennezzlator

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# CASE NARRATIVE

#### Work Order Number: 0611120:

#### SAMPLE RECEIPT

One (1) water sample was received on November 21, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 1.1 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was stored in a refrigerator until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits except for the following;

The trap containing the blank spike (LCS) was not initially burned due to analyst error yielding a non-detectible result. Due to the oversight, the trap used for CCV1 contained both the LCS and CCV yielding a high percent recovery at 167%. The CCV was reanalyzed and in control at 99.6%. As all other QC points were within the control limits, no further corrective action was taken.

Frontier GeoSciences, Inc.

Jempflater



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

# CHAIN OF CUSTODY FORMS

COC:	Phone: 216-741- Fac: 216-742-10	NTS COC: NTS Project:			******				angu panina kata ka Mela Kataka	
	CONTRACTOR CONTRACTOR	Project Desc:	Barr Engineerin	a. 23/69-062004009 Po	y îzet	Containers	Analyses			***
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Received for Leb By: (Signi	iture) Date	Time	Tomp of Anim	· 2.12 · 0		truchy	\$\$ \$ \$ \$ \$	5474 '	(× ) ~	
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- F65	YAX (5 21	o al Chud	t speaka e	(ontrinet.)						

Frontier GeoSciences, Inc.

Jenneztat



# Methyl Mercury Analytical Results

Matrix: Water	Extraction: Methyl Hg Distillation for Water									
Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
129030	ND	0.056	ng/L	1.25	F611199	30-Nov-06	6L06004	01-Dec-06	FGS-070	

Frontier GeoSciences, Inc.

Jenny Flats

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



## MATRIX DUPLICATES/TRIPLICATES

#### SOURCE: 0611110-01

Matrix: Water

Sequence: <u>6L06004</u>

Batch: F611199

Lab Number: F611199-DUP1

Preparation: Methyl Hg Distillation for Water

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.146	0.146	0.056	0.00	25	FGS-070	

Frontier GeoSciences, Inc.

Jenny Flato

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

## SOURCE: 0611110-01

Matrix: Water

Sequence: <u>6L06004</u>

Batch: F611199

Lab Number: F611199-MS/MSD1

Preparation: Methyl Hg Distillation for Water

Analyte	Sample Concentratio (ng/L)	spike n Added (ng/L)	Conce	MS entration eg/L)	MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.146	2.008	2	.248	105	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	2.192	102	2.52	70 - 130	25	FGS-070	

Frontier GeoSciences, Inc.

Jenneztlat

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# LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

Matrix: <u>Water</u>				Sequenc	e: <u>6L06004</u>			
Batch: F611199			La	b Numbe	r: <u>F611199-B</u>	<u>S/BSD1</u>		
Preparation: Methyl Hg Distillatio	n for Water		L	CS Sourc	e: <u>LCS</u>			
Analyte		Spike Added (ng/L)	LC Concent (ng/	tration	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury		2.008	NI	)		70 - 130	FGS-070	U
Analyte	Spike Added (ng/L)	LCSD Concentration (ng/L)	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	1.942	96.7		70 - 130	25	FGS-070	

## **RECOVERY AND RPD**

Frontier GeoSciences, Inc.

Jenny Flaker

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# PREPARATION BLANKS

Matrix: <u>Water</u> Instrument: <u>MeHg-7</u> Sequence: <u>6L06004</u>

Preparation: Methyl Hg Distillation for Water

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F611199-BLK1	Methyl Mercury	0.002	0.056	ng/L	F611199	FGS-070	U
F611199-BLK2	Methyl Mercury	-0.003	0.056	ng/L	F611199	FGS-070	U
F611199-BLK3	Methyl Mercury	-0.0007	0.056	ng/L	F611199	FGS-070	U

Frontier GeoSciences, Inc.

JennyFlat

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# **Notes and Definitions**

- U Analyte included in the analysis, but not detected
- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

Frontier GeoSciences, Inc.

Jemily Flater

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

											Nu	mbe	r of	Con	itain	iers/	Pre	eserv	ativ	e					00	of	/
Chain of												ater					_	1*	US -	5	Soil	§.)			Project Mana		
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Project Number	? 1 2	n n	ц	nı	,9	(Pre	anics *	(0 <sup>3</sup> )	erved)	P* (	$\frac{4}{(H_2SC)}$	ate)	-	)3)				d Me(	() - 2	reserv	dun zo	c viai,		ntaine	Project Cont	act: KDP	
A700 West 77th Minneapolis, M (952) 832-2600 Project Number 2,3,4,6,9,-,6 Project Name Sample Identification		<u>, v</u> , v N	<u> </u>	214	74	rganics	le Orga Metals	H) sle	Unpres	(H °SO)	rease	n Acet		Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ) DRO (HCI)			2	VOCs (2-oz tåred MeOH) */	z tarec	dun zo	SVOCs (2 or 4-oz unpres.) *2	(plast		Of Containers	Sampled by:	LMG	
Sample	Colle	ction	Matrix		ype ط	atile O	ivolati	I Met	eral (1	nide (N	and G	ide (Z	hane	teria ( 0 (HC	J	Hig	The	Cs (2-6	0 (2-0	als (2-	DCs (2	aoisture		Total No.	Laboratory: _	NTS	
Identification	Date	Time	Wate Soil	Grab	5 S S	Vola	Sem	Tota	Gen	Cyar	0 III	Sulf	Met	Bac DR(	70	3	2	Õ a	DR	Met	SVC SVC	N 0%		Tota		Remarks:	
<sup>1.</sup> MW-05-02	11/20/06	1200		X			1	2	] )	1					l	1								9	Table 1;	call kee	ly
2.																									Table 1; fearson 800-	with que	istions
3. 129030																									800-	632-22	77-
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*1 - Volatile Organics = BTEX, GR *2 - Semivolatile Organics = PAHs, Herbicide/Pesticide/PCBs	PCP, Dioxins,	Full List,	Relinqui	shed	By:			L		On Y	lce N	?	D۵	ate			me				d by:	A	¥	C	) QU	Date	Time Time S:SS
*3 - General = pH, Chloride, Flouri TDS, TS, Sulfate *4- Nutrients = COD TOC Pheno		TSS,	Samples St	hipped		]Air ] Oth			Federa	u Exp	press	XISa	mple	:r					AIT	ша ļ		2	, 0 (	<u> </u>			

4- Nutrients = COD, TOC, Phenols, Ammon Nitrogen, TKN

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

thom Ph. I Work Plan

CoC#72433

283

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

Description	Method	-
Alkalinity, Total as CaCO3	EPA 310.1	Detection Limit
Carbon, Total Organic ·	EPA 415.1	10 mg/L
Chemical Oxygen Demand		<u>1 mg/L</u>
Chloride	STD METH 5220D, 18TH ED	10 mg/L
Cyanide Total	EPA 325.2	0.5 mg/L
Fluoride	EPA 335.2	0.02 mg/L
Hardness, Total (calculated)	EPA 340.1	0.1 mg/L
Nitrogen, Ammonia	EPA 200.7	l mg/L
Nitrogen, Nitrate + Nitrite	EPA 350.1	0.1 mg/L
pH !	EPA 353.2	0.1 mg/L
Phosphorus, Total	EPA 150.1	0.1 SU
Sulfate	EPA 365.2	0.1 mg/L
Aluminum, Total	EPA 375.4	1 mg/L
Aluminum, Dissolved	EPA 200.7	25
Antimony, Total	EPA 200.7	25
Arsenic, Total	EPA 204.2	3
	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 - 48 W	1	
	holding EPA 1631E	
Molybdenum, Total		0.02 ng/L
Molybdenum, Total Molybdenum, Dissolved Nickel, Total	holding EPA 1631E	

No samples ted Fris office No samples ted sat. not in rules. Kows on we way to be the

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Coc#73 433

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

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Page 1 of 5



Northeast Technical Services 315 Chestnut Street

PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

MDH Certification: 027-137-157

**Barr Engineering** Attn: Keely Pearson 4700 West 77th Street Minneapolis, MN 55435 NTS COC: 73878 Received: 11/28/2006 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 1/5/2007

Approved by: KARM Aor RMS, Renée Stone

RECEIVED

JAN 0 5 2007

ENGINEERING CO.

NTS Sample: 130766 **Description: MW-05-08** Sample Date: 11/28/2006 9:20:00 AM

**Analysis Date** RL Method Analyst Result Units Analyte 0.056 EPA 1630 12/12/2006 SUB **S**7 <0.056 ng/L **Methyl Mercury** 

Matrix: Aqueous

Sample Type: Grab

Qualifier Description

Note

Analysis performed by Frontier Geosciences: MDH# 053-999-381 414 Pontius Ave. N. Seattle, WA See Attached Report. 87

This report may not be reproduced, except in full, without written consent of NTS laboratory.

Results apply only to the sample received. Results for solid matrices are based on dry weight, unless noted. Analysis was performed in accordance with methods approved by the US EPA and the Minnesota Department of Health, where applicable, unless noted in the report.

NTS Sample: 130767 Description: MW-05-08 Sample Date: 11/28/2006	9:20:00 AM		Aqueous Type: Grab		NTS COC: 73878 Client: 0662 - Barr Engineerin Project: 3933 - 23/69-8620040 Sampled By: Client Report Date: 1/5/2007	•	et
Analyte	Result	Units	RL	Method	Analysis Date	Analyst	
Palladium	<0.1	µg/L	0.1	EPA 200.8	12/13/2006	SUB	S4
Platinum	<0.02	µg/L	0.02	EPA 200.8	12/13/2006	SUB	S4

	The second se		
Qualifier	Description		Note
S4	Analysis performed by Pace: MDH# 027-053-137	1700 Elm St. S.E. Suite 200 Minneapolls, MN	See Attached Report.

NTS Sample: 130768 Description: MW-05-08 Sample Date: 11/28/2006 9:20:00 AM Matrix: Aqueous Sample Type: Grab NTS COC: 73878 Cilent: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 1/5/2007

Notes: A Field Blank was not received with this sample. All samples analyzed for mercury by EPA Method 1631 require a Field Blank.

Analyte	Result	Units	RL.	Method	Analysis Date	Analyst
Aluminum	2620	µg/L_	250	EPA 200.7	12/4/2006	CSD
Antimony	<3	µg/L	3	EPA 204.2	12/5/2006	KJD
Arsenic	<2	µg/L	2	EPA 206.2	12/6/2006	KJD
Barium	28.1	µg/L	10	EPA 200.7	12/4/2006	CSD
Beryllium	<0.2	µg/L	0.2	EPA 210.2	12/5/2006	KJD
Boron	<50	µg/L	50	EPA 200.7	12/4/2006	CSD
Cadmium	<0.2	μg/L	0.2	EPA 213.2	12/5/2006	KJD
Calcium	12.1	mg/L	1	EPA 200.7	12/4/2006	CSD
Chromium	3.2	µg/L	1	EPA 218.2	12/14/2006	KJD
Cobalt	<1	µg/L	1	EPA 219.2	12/9/2006	KJD
Copper	5.7	µg/L	2	EPA 220.2	12/2/2006	KJD
Iron	1860	µg/L	50	EPA 200.7	12/4/2006	CSD
Lead	<1	µg/L	1	EPA 239.2	12/8/2006	KJD
Magnesium	6.47	mg/L	1	EPA 200.7	12/4/2006	CSD
Manganese	152	µg/L	10	EPA 200.7	12/4/2006	CSD
Mercury, Low Level	1.6	ng/L	0.5	EPA 1631E	11/30/2006	SUB
Molybdenum	<5	µg/L.	5	EPA 246.2	12/1/2006	KJD
Nickel	3	µg/L	2	EPA 249.2	12/12/2006	KJD
Potassium	1.51	mg/L	0.25	EPA 200.7	12/4/2006	CSD
Selenium	<2	µg/L	2	EPA 270.2	12/6/2006	KJD
Silver	<2	µg/L	2	EPA 272.2	12/9/2006	KJD c
Sodium	7.3	mg/L	2	EPA 200.7	12/4/2006	CSD
Strontium	32.6	µg/L	5	EPA 200.7	12/4/2006	CSD
Thallium	<2	µg/L	2	EPA 279.2	12/2/2006	KJD
Titanium	57	µg/L	20	EPA 283.2	12/7/2006	KJD
Zinc	<25	μg/L	25	EPA 200.7	12/4/2006	CSD
TOC	1.6	mg/L	1	EPA 415.1	12/8/2006	CSD
Alkalinity, Total	67.7	mg/L as CaCO3	10	EPA 310.1	11/30/2006	LXP
Chloride	1.17	mg/L	0.5	EPA 300.0 ATP	11/29/2006	DB
COD	<10	mg/L	10	SM 18th Ed 5220D	12/6/2006	DB
Fluoride	0.11	mg/L	0.1	EPA 340.2	12/5/2006	LXP
Nitrogen, Ammonia	0.42	mg/L as N	0.1	EPA 350.1	11/28/2006	DB
Nitrogen, Nitrate+Nitrite	0.15	mg/L as N	0.1	EPA 353.2	11/30/2006	LXP
pH	6.9	Std Units	0.1	EPA 150.1	11/29/2006	DB
Phosphorous, Total	0.14	mg/L as P	0.1	EPA 365.4	12/1/2006	LXP
Sulfate	11.2	mg/L	1	EPA 300.0 ATP	11/29/2006	DB
Hardness, Total (calc)	56.8	mg/L	10	SM 2340B	12/14/2006	RMS
Qualifier Description		_		Note		
c Elevated Reporting Limit.						

Page 4 d	of 5
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NTS Sample: 130768			Aqueous		C: 73878		
Description: MW-05-08		Sample	Type: Grab		)662 - Barr Engineering	-	
Sample Date: 11/28/200	6 9:20:00 AM			Project:	3933 - 23/69-86200400	9 Poly N	ñet 🛛
				Sampleo	I By: Client		
				Report I	Date: 1/5/2007		
Notes: A Field Blank wa	s not received with t	his sample. Al	li samples an	•		juire a Fic	eld Blani
Notes: A Field Blank wa Analyte	s not received with t Result	his sample. Al Units	li samples an RL	•		juire a Fic Analys	

Å,

Γ	Qualifier	Description		Note
-	С	Elevated Reporting Limit.		
		Analysis performed by MVTL - New Ulm: MDH# 027-015-125	1126 North Front St. New Ulm, MN	See Attached Report.

NTS Sample: 130769 Description: MW-05-08 Sample Date: 11/28/2006 9:20:00 AM

Matrix: Aqueous Sample Type: Grab - Filtered NTS COC: 73878 Client: 0662 - Barr Engineering Project: 3933 - 23/69-862004009 Poly Met Sampled By: Client Report Date: 1/5/2007

Analyte	Result	Units	RL	Method	Analysis Date	Analyst
Aluminum	199	µg/L	25	EPA 200.7	11/29/2006	CSD
Cadmium	<0.2	µg/L	0.2	EPA 213.2	12/11/2006	JK
Chromium	1.2	µg/L	1	EPA 218.2	11/30/2006	KJD
Copper	<2	µg/L	2	EPA 220.2	12/6/2006	KJD
Molybdenum	<5	µg/L	5	EPA 246.2	12/6/2006	KJD
Nickel	<2	μg/L	2	EPA 249.2	12/6/2006	KJD
Selenium	<2	μg/L	2	EPA 270.2	12/6/2006	KJD
Silver	<1	μg/L	1	EPA 272.2	11/30/2006	KJD
Zinc	<25	µg/L	25	EPA 200.7	11/29/2006	CSD

# MINNESOTA VALLEY TESTING LABORATORIES, INC.



1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890 1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724 35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885 www.mvtl.com



1 of 1 Page:

Report Date: 5 Dec 06 Lab Number: 06-A53162

TERRI SABETTI NORTHEAST TECHNICAL SERVICES PO BOX 1142 VIRGINIA MN 55792-1142

Project Number: 3933 Sample Description: 130768

	Work Order #:12-13503
	Account #: 022015
	Sample Matrix: WASTEWATER
	Date Sampled: 28 Nov 06 9:20
	Date Received: 1 Dec 06 9:30
	PO #: 73878/3933
	Chain of Custody Number: 73878
1. C	Temp at Receipt: -2.0C
۰.	

	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst
Cyanide, Total	< 0.02 mg/L	0.02	SM 4500E	5 Dec 06 11:28	JD

Approved by:	Jan 8. Sant IS	
	Jáson G. Smith, Inorganic Laboratory Manager New Ulm, MN	
RI. = Reporting Li	mir	

Elevated "Less Than Result" (<):  $\varrho$  = Due to sample matrix ! = Due to sample quantity # = Due to sample concentration
+ = Due to extract volume CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132

IA LAB #: 022

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.



Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

Phone: (612)607-1700 Fax: (612)607-6444

December 13, 2006

Ms. Renee Stone Northeast Technical Services 315 Chestnut St. Virginia, MN 55792

RE: Project: 3933 Pace Project No.: 1043208

Dear Ms. Stone:

Enclosed are the analytical results for sample(s) received by the laboratory on December 08, 2006. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Colin Schaft

Colin Schuft

colin.schuft@pacelabs.com Project Coordinator

Illinois Certification #: 200011 Iowa Certification #: 368 Minnesota Certification #: 027-053-137 Wisconsin Certification #: 999407970

Enclosures

#### **REPORT OF LABORATORY ANALYSIS**

Page 1 of 6

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Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

#### SAMPLE SUMMARY

1043208001	130767		Water	11/28/06 09:20	12/08/06 08:55
Lab ID		Sample ID	Matrix	Date Collected	Date Received
Pace Project No.:	1043208				
Project:	3933				

#### **REPORT OF LABORATORY ANALYSIS**

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Page 2 of 6



Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414

> Phone: (612)607-1700 Fax: (612)607-6444

#### SAMPLE ANALYTE COUNT

Project: Pace Project No.:	3933 1043208		
Lab ID	Sample ID	Method	Analytes Reported
1043208001	130767	EPA 200.8	2

#### **REPORT OF LABORATORY ANALYSIS**

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Page 3 of 6



Fax: (612)607-6444

#### ANALYTICAL RESULTS

Project: Pace Project No.:	3933 1043208									
Sample: 130767		Lab ID:	1043208001	Collected	: 11/28/06	6 09:20	Received: 12/	/08/06 08:55	Matrix: Water	
Parame	eters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.8 MET ICPMS		Analytica	Method: EPA	200.8 Prepar	ation Meth	nod: EP/	A 200.8			
Palladium Platinum		ND I ND I	0	0.10 0.020	0.050 0.010	1 1	12/12/06 00:04 12/12/06 00:04		23 7440-05-3 23 7440-06-4	

Date: 12/13/2006 11:50 AM

#### **REPORT OF LABORATORY ANALYSIS**

Page 4 of 6

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#### QUALITY CONTROL DATA

Project: 393	3											
Pace Project No.: 104	3208											
QC Batch: M	PRP/7983		Analysi	s Method:	E	PA 200.8						
QC Batch Method: Ef	PA 200.8		Analysi	s Descript	ion: 2	00.8 MET						
Associated Lab Samples	: 1043208001											
METHOD BLANK: 292	588											
Associated Lab Samples	: 1043208001											
			Blank	R	eporting							
Parameter		Units	Result		Limit	Qualifiers	3					
Palladium	ug/L			ND	0.10	)						
Platinum	ug/L			ND	0.020	)						
LABORATORY CONTRO	DL SAMPLE: 29258	9				<u> </u>						
			Spike	LCS	;	LCS	% Rec					
Parameter		Units	Conc.	Resu	lt	% Rec	Limits	C	Qualifiers			
Parameter Palladium	ug/L	Units		Resu	lt 86.1	% Rec 108	·····	115	Qualifiers			
·····		Units	Conc.	Resu			85-		Qualifiers			
Palladium	ug/L	Units	Conc. 80	Resu	86.1	108	85-	115	Qualifiers			
Palladium	ug/L. ug/L.		Conc. 80 80	Resu	86.1	108	85-	115	Qualifiers		<del></del>	
Palladium Platinum	ug/L. ug/L.		Conc. 80 80	Resu	86.1 82.4	108	85-	115	Qualifiers			
Palladium Platinum	ug/L ug/L		Conc. 80 80		86.1 82.4	108	85-	115	Qualifiers		Max	
Palladium Platinum	ug/L ug/L	E: 292590	Conc. 80 80 80 MS	MSD	86.1 82.4 292591	108 103	85- 85-	115 115		RPD	Max RPD	Qual
Palladium Platinum MATRIX SPIKE & MATR	ug/L ug/L IX SPIKE DUPLICATI	E: 292590	Conc. 80 80 MS Spike	MSD Spike	86.1 82.4 292591 MS	108 103 MSD Result	85- 85- MS	115 115 MSD	% Rec Limits 7 70-130	RPD 1 3	RPD 20	Qual

Date: 12/13/2006 11:50 AM

#### **REPORT OF LABORATORY ANALYSIS**

Page 5 of 6

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#### QUALIFIERS

Project: 3933 Pace Project No.: 1043208

#### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

**DUP - Sample Duplicate** 

**RPD - Relative Percent Difference** 

NC - Not Calculable.

#### **REPORT OF LABORATORY ANALYSIS**

Page 6 of 6

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	2005 (20)	Northeast Technical Serv	vices	3208
		315 Chestnut Street P.O. Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010		11/28/20
	a		PO Number	73878/3933
			PROJECT MGR	Rence Stolie
Vendor: Address:	Pace Analytical S 1700 Elm Street S Sulte #200 Minneapolis, MN	SE .		73878 3933
	- A			É.
	Qty	Description		
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Northeast Technical Services 315 Chestnut Street PO Box 1142 Virginia, MN 55792 Phone: 218-741-4290 Fax: 218-742-1010

# Chain of Custody Record

Analysis to be performed by: Pace

290	-	
i-		

# 10432

COC:	NTS COC NTS Project NTS Project Desc	: #3933 Barr Engineering, 23/69-862004009 Poly Met	
Sample Collected	Type	Fil Matrix Location	Containers Analyses
130767 11/28/2006 9:20:00 AM	Grab	Aqueous MW-05-08	P6.P1 001
Relinquished By (Signature)	Date Time 2-700 13:50	Received By: (Signature) Remarks:	
Relinquished By: (Signature)	Date Time	Received By: (Signature)	
Received for Lab By: (Signature)	1218 BTIME	Temp at Arrival: 2.0 °C	

. .. .

Courier:       Fed Ex       UPS       USPS       Olient         Tracking #:	Con Solution Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction C		cial   Seals i ne [ Wet Issue i	Pace Other ntact:yes Dother Blue None s Frozen: Yes No Comments: 1. 2. 3. 4. 5.	Project # 109 no Samples on ice, cooling pross Date and Initials of pare contents: 4414	es has begun
Image:	Con Solution Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction C		Cial Seals in me [ Wet Issue i Issue i Issue i Issue i Issue i Cinva	Pace Other ntact:yes Dother Blue None s Frozen: Yes No Comments: 1. 2. 3. 4. 5.	no Samples on ice, cooling proce Date and Initials of pers	es has begun on graviting
Tracking #:	Siologi Siologi Sives [ Sives [ Sives ] Sives ] Sives ] Sives ] Sives ] Sives ] Sives ]		Seals i me [ Wet Issue i INVA INVA INVA	ntact: yes Other Blue None SFrozen: Yes No Comments: 1. 2. 3. 4. 5.	no Samples on ice, cooling proce Date and Initials of pers	es has begun on graviting
Packing Material:       Bubble Wrap       Bubble Bag         Thermometer Used       230194010       M         Cooler Temperature       2.0°C       B         Temp should be above freezing to 6°C       B         Chain of Custody Present:       Y         Chain of Custody Filled Out:       Y         Chain of Custody Relinguished:       Y         Sampler Name & Signature on COC:       S         Samples Arrived within Hold Time:       Y	igs ( ype of Biologi Sies ( Sies ( Ves ( Ves ( Ves ) Ves ( Ves )		Wet Issue I Inva Inva Inva Inva	Other         Blue None         s Frozen: Yes No         Comments:         1.         2.         3.         4.         5.	Samples on ize, cooling proce Date and Initials of pars	on examining
Thermometer Used       230194010       Thermometer Used         Cooler Temperature       2.0°C       B         Temp should be above freezing to 6°C       B         Chain of Custody Present:       2         Chain of Custody Filled Out:       2         Chain of Custody Filled Out:       2         Sampler Name & Signature on COC:       5         Samples Arrived within Hold Time:       2	Vype of Biologi Sves [ Sves [ Sves ] Sves ] Sves ] Sves y Sves y		Wet Ssue i DN/A DN/A DN/A DN/A	Blue None s Frozen: Yes No Comments: 1. 2. 3. 4. 5.	Date and initials of pers	on examining
Cooler Temperature       2.0°C       B         Temp should be above freezing to 6°C       Chain of Custody Present:       2         Chain of Custody Present:       2       2         Chain of Custody Present:       2       2         Chain of Custody Filled Out:       2       2         Chain of Custody Filled Out:       2       2         Chain of Custody Filled Out:       2       2         Sampler Name & Signature on COC:       2       2         Samples Arrived within Hold Time:       2       3	Biologi Eves ( Eves ( Eves ( Eves ( Eves )		Inva	s Frozen: Yes No Comments: 1. 2. 3. 4. 5.	Date and initials of pers	on examining
Cooler Temperature	Ves C Sves C Ves C Ves C Ves V Ves V Sves V		Onva Onva Onva Onva Onva	Comments: 1. 2. 3. 4. 5.		
Temp should be above freezing to 6°C Chain of Custody Present:	Sves ( Sves ( Ves ) Ves ) Ves ) Ves y		<ul> <li>N/A</li> <li>N/A</li> <li>N/A</li> <li>N/A</li> </ul>	1. 2. 3. 4. 5.		
Chain of Custody Filled Out:	Sves ( Sves ( Ves ) Ves ) Ves ) Ves y		Onva Onva Onva Cinva	2. 3. 4. 5.		
Chain of Custody Relinguished:	Elves ( Ves ) Elves ) Elves y Elves y		CINVA CINVA	3. 4. 5.		
Samples Arrived within Hold Time:	UYes /	DNO	Cînva Cînva	4 4 5		**************************************
Samples Arrived within Hold Time:	CYes ( DYes y DYes y	DNO KNO	<u>CIN/A</u>			
Samples carries and the treat	DYes y	- No	1	in the second		
Short Hold Time Analysis (<72hr):						
		Zalo		6.		
Rush Turn Around Time Requested:	Elven 8			7.		
Sufficient Volume:			<b>DN/A</b>	8,		
Correct Containers Used:	29Xes	[]No	DN/A	9.		·
-Pace Containers Used:	Ves			and the second		
Conteinera Intact:	ziyee	Citio	CIN/A	10.		i
Filtered volume received for Dissolved tests	C Yes		BINA	11.		
Sample Labels match COC:	XIVes	Cino	C)n/a	12.	· _ · ·	
-includes date/time/ID/Analysis Matrix: VV All containers needing preservation have been checked.		nini The				
n de la constante de la constan	E Yes	UNO	CIN/A	13.	- -	
All containers needing preservation are found to be in compliance with EPA recommendation.	(Ales	DNo	⊡n/a			
	□Yes	⊡No		Initial when completed	Lot # of added preservative	
Samples checked for dechlorination:	□Yes		XINIA	14.		
Headspace In VOA Vials ( >6mm):	Ciyes	DNo	XIN/A	15.	1918-1919-1919-1919-1919-1919-1919-1919	******
Trip Blank Present:	C)Yes		ZINIA	16.		, starter and star
Trip Blank Custody Seals Present	□ Yes	ONo	DAVA			•
Pace Trip Blank Lot # (if purchased):						
Client Notification/ Resolution:					Field Data Required?	Y / N
Person Contacted:			_Date/	Time:	-	
Comments/ Resolution:				-		
, , , , , , , , , , , , , , , , , , ,		********				
	. /	*				
		0		Pa		8 06
Project Manager Review:		_	•	A	Date: 121	01000

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNF Certification Office ( i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

F-ALLC003rev.3, 11September2008



414 Pontius Ave North Seattle, WA 98109 Ph: 206-622-6960 Fx: 206-622-6870

27 December 2006

Renee Stone Northeast Technical Services Inc. 315 Chestnut St Virginia, MN 55792 RE: Methyl Mercury

Enclosed are the analytical results for samples received by Frontier GeoSciences, Inc. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,





30-Nov-06 09:02

# ANALYTICAL REPORT FOR SAMPLES

Laboratory:	Frontier GeoSciences, Inc.		SDG:		
Client:	Northeast Technical Services Inc.		Project: Methyl	Mercury	
r					
Sample ID		Laboratory ID	Matrix	Date Sampled	Date Received

130766

0611147-01

Water

28-Nov-06 13:30

Frontier GeoSciences, Inc.

JennyJlak

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



## CASE NARRATIVE

Work Order Number: 0611147:

#### SAMPLE RECEIPT

One (1) water sample was received on November 30, 2006 for methyl mercury analysis. The sample was received within a sealed cooler at a temperature of 1.1 degrees Celsius.

Upon receipt, the water sample for methyl mercury was preserved to 0.4% (v/v) with ultra-pure hydrochloric acid. The bottle for methyl mercury analysis was refrigerated until distillation and analysis.

#### SAMPLE PREPARATION

Water samples for methyl mercury determination were distilled according to method FGS-013 prior to analysis.

#### SAMPLE ANALYSIS

Daily analytical runs were begun with a 5-point standard curve, spanning the entire analytical range of interest, with additional continuing calibration verification (CCV) standards run every 10 samples. The daily standard curves were calculated using the instrument blank corrected standards, a linear regression forced through zero. For each analytical set, one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples. All results have been corrected for with the mean value of the instrument blanks and the preparation blanks.

#### METHYL MERCURY

Distilled samples were analyzed using aqueous phase ethylation, purging onto a Carbotrap, isothermal GC separation, and CV-AFS detection according to Frontier SOP# FGS-070. Samples were ethylated by the addition of sodium tetraethyl borate and then the volatile ethyl analogs were purged with nitrogen gas onto a Carbotrap. After a trap-drying step, the mercury ethyl analogs were thermally desorbed into an isothermal GC column held at high heat for separation. Peak heights are assessed by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 units.

#### ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties and all quality control analyses were within acceptable limits.

Frontier GeoSciences, Inc.

Jenny Flator

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



# CHAIN OF CUSTODY FORMS

Yephita	101611 1 100111011 (2) 201611 (2) 21142 , MN 56762 218-741-4226 3-742-1010	ervices-#06/11/47		of Cust	ody Record	
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# Methyl Mercury Analytical Results

Matrix: Water					Ex	traction: <u>Me</u>	thyl Hg Disti	llation for Wa	iter	
Sample Name	Result	MRL	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method:	Notes
130766	ND	0.056	ng/L	1.25	F612096	11-Dec-06	6L12005	12-Dec-06	FGS-070	U

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# MATRIX DUPLICATES/TRIPLICATES

#### SOURCE: 0611121-18RE1

Matrix: Water

Sequence: 6L12005

Batch: F612096

Lab Number: F612096-DUP1

Preparation: Methyl Hg Distillation for Water

	Sample Concentration	Duplicate Concentration		%	RPD		
Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Methyl Mercury	0.114	0.131	0.056	13.9	25	FGS-070	

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### MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

## SOURCE: 0611121-19RE1

Matrix: Water

Sequence: 6L12005

Batch: F612096

Lab Number: F612096-MS/MSD1

Preparation: Methyl Hg Distillation for Water

Analyte	Sample Concentratio (ng/L)	Spike on Added (ng/L)	Conce	MS entration g/L)	MS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury	0.026	2.008	1	.908	93.7	70 - 130	FGS-070	
Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury	2.008	2.166	107	12.7	70 - 130	25	FGS-070	

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## LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

Matrix: <u>Water</u> Batch: <u>F612096</u> Preparation: <u>Methyl Hg Distillation for V</u>	Water_			•	e: <u>6L12005</u> r: <u>F612096-E</u> e: <u>LCS</u>	S/BSD1		
Analyte		Spike Added (ng/L)	LC Concent (ng/	tration	LCS % Recovery	Revovery Limits	Method	Notes
Methyl Mercury		2.008	1.8	31	91.2	70 - 130	FGS-070	
Spil Add Analyte (ng/	ed C	LCSD oncentration (ng/L)	LCSD % Recovery	% RPD	Revovery Limits	RPD Limit	Method	Notes
Methyl Mercury 2.00	)8	1.838	91.5	0.382	70 - 130	25	FGS-070	

### **RECOVERY AND RPD**

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# PREPARATION BLANKS

Matrix: <u>Water</u> Instrument: <u>MeHg-7</u> Sequence: 6L12005

Preparation: Methyl Hg Distillation for Water

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F612096-BLK1	Methyl Mercury	0.007	0.056	ng/L	F612096	FGS-070	U
F612096-BLK2	Methyl Mercury	0.007	0.056	ng/L	F612096	FGS-070	U
F612096-BLK3	Methyl Mercury	0.011	0.056	ng/L	F612096	FGS-070	

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# **Notes and Definitions**

U Analyte included in the analysis, but not detected
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- DET Analyte Detected
- MRL Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

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			Number of Containers/Preser		COC of
Chain of Custody 4700 West 77th Street Minneapolis, MN 55435-4803 (952) 832-2600	73878	.)*I 2 3) 3)	Water	GRO, BTEX (2-oz tared MeOH)*1 DRO (2-oz tared) - 25 grams Metals (2-oz unpreserved) SVOCs (2 or 4-oz unpres.)*2 % Moisture (plastic vial, unpres.) Total No. Of Containers Total No. Of Containers	roject Manager: <u>CDP</u>
<b>BARR</b> Minneapolis, MN 55435-4803 (952) 832-2600Project Number $2,3$ $6,9$ $ 8,6$ $2,0$ Project NameCollection DateTime	4 0.0.9	Volatile Organics (Pres.) Semivolatile Organics *2 Dissolved Metals (HNO <sub>3</sub> ) Total Metals (HNO <sub>3</sub> ) General (Unpreserved) *3	Cyanide (NaOH) Nurrients ( $H_2SO_4$ ) *4 Oil and Grease ( $H_2SO_4$ ) Sulfide (Zn Acetate) Methane Bacteria (Na $_2S_2O_3$ ) DRO (HCI) Tec Tec Methyl H9 VOCs (2-02 tared MeOH	GRO, BTEX (2-oz tared MeOH)* DRO (2-oz tared) - 25 grams Metals (2-oz unpreserved) SVOCs (2 or 4-oz unpres.)*2 % Moisture (plastic vial, unpres.) Total No. Of Containers	roject Contact: KDP
Project Name	Nº 21481	Volatile Organics (Pr Semivolatile Organics Dissolved Metals (HNO <sub>3</sub> ) Total Metals (HNO <sub>3</sub> ) General (Unpreserved	Cyanide (NaOH) Nutrients (H <sub>2</sub> SO <sub>4</sub> ) *4 Oil and Grease (H <sub>2</sub> S Sulfide (Zn Acetate) Methane Bacteria (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ) DRO (HCl) Tec Hethyl He VOCs (2 <sup>-</sup> 0z tared Me	EX (2-07 02 tare 2-02 un 2-07 4- 1-01 C	ampled by: LMG/JAM2
Sample Collection	Matrix Type	mivola ssolved tal Me	anide ( anide ( ll and llfide ( ethane ethane acteria RO (H	GRO, BTE DRO (2-c Metals (2 SVOCs (2 % Moistur Total No.	aboratory: <u>NTS</u>
Identification Date Time	O O O O	0 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			Remarks:
$\frac{1}{10} \frac{1}{100} \frac{1}{$		12)	1111111		Table 1
2 130764					
3. 130767					
4 130768					
5. 120769					
6.					
7.					
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10.					
11.					
12.					Date Time Date Time Date JI-28-04 12:25 4.5°C onice
Common Parameter/Container - Preservation Key	Relinguished By:	A Gaster	Price? 11 Pate 10 Dires	Received by:	Date Time
*1 - Volatile Organics = BTEX, GRO, TPH, Full List *2 - Semivolatile Organics = PAHs, PCP, Dioxins, Full List, Harbielde/Berlielde/BCPs	Relinquished By:	1.Gnum	On Ice? Date Time	Received by:	SUI 11-28-06 12:25
Herbicide/Pesticide/PCBs *3 - General = pH, Chloride, Flouride, Alkalinity, TSS, TDS, TS, Sulfate *4 - Nutrients = COD TOC Phenols Ammonia	Samples Shipped VIA:	Air Freight EFeder	al Express Aumpler	Air Bill Number:	4.5°Conice

\*4 - Nutrients = COD, TOC, Phenols, Ammoni Nitrogen, TKN

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

CoC#72433 283

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

from Ph. II Work Plan

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

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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
	EPA 200.7	<u>10</u>

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www.isotechlabs.com mail@isotechlabs.com

Isotech Laboratories, Inc. 1308 Parkland Court Champaign, IL 61821-1826 Telephone 217/398-3490 FAX 217/398-3493

January 31, 2007

Michael Dupay Barr Engineering Company 4700 West 77th Street Minneapolis, MN 55435-4803

Revised

MECENTED FEB 0 8 2007 Barr Engineering Co.

Dear Michael:

Enclosed are revised analysis report sheets for samples originally reported in December 2006. This is the same revised data that was emailed to you, and if you have any questions, please do not hesitate to contact us.

Thank you for choosing Isotech for your analysis needs, we appreciate your business.

Sincerely,

Steven R. Pelphy

Steven R. Pelphrey Laboratory Manager

Enclosure

SRP:cw

# Water Analysis Report



Lab Number:	106330	06330 Job Number		7833
Submitter Sample Name:	P-2 10/24	4/2006		
Submitter Sample ID:				
Submitter Job #:				
Company:	Barr Engineering Company			
Field or Site:	23/69-86	2004 009 PolyMet P	h III Hydro	
Location:				
Depth/Formation:			·	
Container Type:	Plastic Bottle			
Sample Collected:	10/24/200	06		
Results Reported:	12/18/200	06		
Delta D of water		-85.4 per mil relati	ve to VSMOW	
Delta O-18 of water		-12.25 per mil relat	ive to VSMOW	
Tritium content of water		3.27 ± 0.28 TU		
Delta C-13 of DIC		-18.85 per mil relat	ive to VPDB	
Carbon-14 content of DIC		na		

Remarks: Report revised on 1/26/07 to correct hydrogen isotope data.

SOTECH Laboratories, Inc. 1308 Parkland Ct. Champaign, IL 61821 217/398-3490

# Water Analysis Report



Lab Number:	106331		Job Number:	7833
Submitter Sample Name:	P-2 10/3	1/2006		
Submitter Sample ID:				
Submitter Job #:				
Company:	Barr Engineering Company			
Field or Site:	23/69-862004 009 PolyMet Ph III Hydro			
Location:				
Depth/Formation:				
Container Type:	Plastic Bottle			
Sample Collected:	10/31/2006			
Results Reported:	12/18/20	06		
Della Disfunction		~~		
Delta D of water		-85.9 per mil relati	ve to VSMOW	
Delta O-18 of water		-12.28 per mil relat	ive to VSMOW	
Tritium content of water		2.77 ± 0.28 TU		
Delta C-13 of DIC	r en preis ar an ar an (	-17.78 per mil relat	ive to VPDB	
Carbon-14 content of DIC na				

Remarks:

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# Water Analysis Report

REVISED REPORT See "Remarks" section for explanation

Lab Number:	106332		Job Number:	7833
Submitter Sample Name:	P-2 11/07	//2006		
Submitter Sample ID:				
Submitter Job #:				
Company:	Barr Engineering Company			
Field or Site:	23/69-862004 009 PolyMet Ph III Hydro			
Location:				
Depth/Formation:				
Container Type:	Plastic Bottle			
Sample Collected:	11/07/2006			
Results Reported:	ts Reported: 12/18/2006			
Delta D of water	. 100 416 100 100 416 100 416 4	-85.9 per mil relati	ve to VSMOW	
Delta O-18 of water		-12.29 per mil relat		
Tritium content of water		2.99 ± 0.26 TU		
Delta C-13 of DIC		-16.86 per mil relat	ive to VPDB	
Carbon-14 content of DIC		na		

Remarks:

ム) ISOTECH Laboratories, Inc. 1308 Parkland Ct. Champaign, IL 61821 217/398-3490



# Water Analysis Report



Lab Number:	106333		Job Number:	7833
Submitter Sample Name:	P-2 11/1	4/2006		
Submitter Sample ID:				
Submitter Job #:				
Company:	Barr Eng	ineering Company		
Field or Site:	23/69-86	2004 009 PolyMet F	h III Hydro	
Location:				
Depth/Formation:				
Container Type:	Plastic B	ottle		
Sample Collected:	11/14/20	06		
Results Reported:	12/18/2006			
Delta D of water		05 4 n as will us with		
		-85.4 per mil relati	ive to VSMOW	
Delta O-18 of water	544 APR 201 201 201 201 201 201	-12.27 per mil rela	tive to VSMOW	
Tritium content of water	e in in ar in in ar in i	3.82 ± 0.29 TU		
Delta C-13 of DIC		-15.79 per mil rela	tive to VPDB	
Carbon-14 content of DIC		na		

Remarks:

SOTECH Laboratories, Inc. 1308 Parkland Ct. Champaign, IL 61821 217/398-3490