

Memorandum

To: Tom Hingsberger, USACE; Tom Hale, USFS; Erik Carlson, MDNR
From: Tina Pint
Subject: Mine Site Surficial Aquifer Dataset Size
Date: July 6, 2012
Project: NorthMet EIS 236908692.00 042 001
c: Jim Scott, PolyMet

The Co-lead agencies recommended that PolyMet sample the Mine Site surficial aquifer wells on a monthly basis until all wells have been operating for about three months. As stated in the Co-lead agencies “Memorandum on Sampling Frequency and the Collection of Monitoring Well Samples” (October 21, 2011), the sampling frequency should be re-evaluated based on: 1) homogeneity or heterogeneity of data acquired to date, 2) total number of samples co-lead agencies and EPA agree to model for the FEIS, and 3) sampling frequency needed to obtain those samples.

There are currently 24 wells installed in the surficial aquifer at the NorthMet Mine Site (Attachment A). The final wells installed were sampled for the forth time in May, 2012. Only one well has been sampled less than three times: MW-10S has only been sampled twice as it has been dry during the last four sampling events. All other wells have been sampled at least three times. The complete set of sampling data collected through May 2012 (155 total samples) is attached (Attachment B).

Based on the previous discussions with the Co-lead and cooperating agencies and the results of the calculation of sample size using the EPA recommended equation presented below, PolyMet is proposing that sampling switch from monthly to three times a year (April, July and October) consistent with NPDES monitoring at the Tailings Basin.

Calculation of Sample Size

EPA has recommended use of the following equation to assess the number of groundwater samples from the surficial aquifer at the NorthMet Mine Site needed for modeling for the FEIS (see ASTM D6311 or EPA, 2010):

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$$n = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2 s^2}{2} + \frac{Z_{1-\alpha}^2}{2}$$

Where

$Z_{1-\alpha}$ = the pth quartile of the standard normal distribution, where α is the probability of making a Type I error (false rejection error rate);

$Z_{1-\beta}$ = the pth quartile of the standard normal distribution, where β is the probability of making a Type II error (false acceptance error rate);

s = an estimate of the standard deviation (s^2 is an estimate of the variance); and

Δ = the width of the gray region or the acceptable inaccuracy.

This equation is used to determine the number of samples necessary to estimate the mean within acceptable probabilities for making a Type I or Type II decision error (α and β).

PolyMet does not agree with the use of this equation for determining the number of background samples of surficial aquifer water quality at the Mine Site needed for environmental review, but is performing this calculation at the request of the Co-lead agencies.

Preliminary Assessment

EPA has suggested that both α and β be equal to 0.05 which correspond to $Z_{(1-\alpha)}$ and $Z_{(1-\beta)}$ values of 1.645 (from “EPA SAS Analysis 1-9-2012.pdf” provided by Mike Sedlacek, EPA). EPA has further suggested that Δ be set at the mean concentration. The mean and standard deviations of the dataset for each solute were calculated using the EPA developed statistical software package ProUCL 4.1, following the associated guidance document (EPA, 2010). Much of the Mine Site surficial aquifer groundwater quality dataset is left-censored, with non-detected concentrations for many of the solutes. In addition, many of the solutes appear to be nonparametric, that is, they do not appear to have a normal, log-normal or gamma distribution. Because of this, the nonparametric Kaplan-Meier (KM) estimation method was used to determine the mean and standard deviation for each solute that had left-censored data.

Table 1 presents the calculated sample size using the EPA recommended equation with the EPA recommended assumptions and the calculated mean and standard deviations. For this assessment, only solutes included in the water quality modeling for the SDEIS are assessed.

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Table 1 Preliminary assessment of the number of additional groundwater samples needed

Solute	Units	Type	Total # Samples	# Non-Detects	# Detects	Mean	Standard Deviation	n	# Additional Samples Needed
Alkalinity	mg/L	Total	155	0	155	62.95	31.43	5	0
Aluminum	ug/L	Dissolved	155	95	60	123.9	532.7	202	47
Antimony	ug/L	Dissolved	128	127	1	--	--	--	--
Arsenic	ug/L	Dissolved	143	79	64	0.918	0.948	13	0
Barium	ug/L	Total	155	2	153	42.65	64.05	26	0
Beryllium	ug/L	Total	155	137	18	0.232	0.143	6	0
Boron	ug/L	Total	155	147	8	41.42	5.702	2	0
Cadmium	ug/L	Dissolved	155	152	3	--	--	--	--
Calcium	ug/L	Total	155	0	155	16429	8497	5	0
Chloride	mg/L	Total	155	69	86	1.515	6.364	193	38
Chromium	ug/L	Dissolved	155	108	47	1.467	1.689	16	0
Cobalt	ug/L	Dissolved	129	38	91	1.016	1.524	26	0
Copper	ug/L	Dissolved	155	29	126	3.574	5.541	28	0
Fluoride	mg/L	Total	155	116	39	0.112	0.0321	3	0
Iron	ug/L	Dissolved	143	57	86	1338	3237	65	0
Lead	ug/L	Total	155	104	51	1.372	2.177	29	0
Magnesium	ug/L	Total	155	0	155	7238	3639	5	0
Manganese	ug/L	Dissolved	146	2	144	312.7	424.6	22	0
Nickel	ug/L	Dissolved	155	37	118	2.375	3.358	23	0
Potassium	ug/L	Total	155	0	155	1877	1110	6	0
Selenium	ug/L	Dissolved	155	152	3	--	--	--	--
Silver	ug/L	Dissolved	155	155	0	--	--	--	--
Sodium	ug/L	Total	155	2	153	5832	5484	11	0
Sulfate	mg/L	Total	155	3	152	9.91	5.026	5	0
Thallium	ug/L	Total	155	153	2	--	--	--	--
Vanadium	ug/L	Dissolved	128	117	11	6.121	1.277	2	0
Zinc	ug/L	Dissolved	155	114	41	7.501	4.507	6	0

NOTE: "Type" refers to whether the samples were filtered ("Dissolved") or unfiltered ("Total")

For antimony, cadmium, selenium, silver and thallium there were not enough detected concentrations to be able to calculate meaningful mean and standard deviation values (it is not recommended to calculate statistics on datasets with less than 4-6 detected concentrations [EPA, 2010]); as a result the sample size calculation was not performed for these solutes. Using the EPA recommended equation and assumptions,

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an additional 47 samples of aluminum and 38 samples of chloride would be needed. For all other solutes, the existing number of samples is adequate. Given this result, the calculation of sample size for aluminum and chloride was further assessed.

Identification of Outliers

Outliers are measurements (usually larger or smaller than the majority of the data values in a sample) that may or may not be representative of the population from which they were drawn. Outliers are common in environmental data. They may represent errors (sample contamination, measurement system problems, data-coding errors), data from a different population (a sample impacted by a known unusual event, samples taken from time periods before and after a significant change), or true extreme values of a distribution. Because of this, care needs to be taken as to how outliers are handled. The inclusion of outliers in a dataset can result in distorted statistics, which may lead to incorrect conclusions; any outliers should be thoroughly investigated prior to a decision to include or exclude the data for computation of statistics. Specifically, the size of the standard deviation for aluminum and chloride data sets relative to the mean indicate that the presence of outliers may be skewing the standard deviation and resulting in a large calculated sample size.

Both the aluminum and chloride datasets were assessed for outliers using graphical displays. A rank order plot of aluminum concentrations sorted from low to high is shown on Figure 1. There appears to be one outlier, the first sample collected from MW-2 on 11/9/2011 (see Attachment B). The dissolved aluminum concentration for this sample is reported at 6,510 ug/L, which is a geochemically implausible aluminum concentration for water at circumneutral pH (Appelo and Postma, 2006; Hem, 1985). The dissolved aluminum concentration in all subsequent samples collected from this well was below the detection limit of 25 ug/L. In addition, the turbidity of the sample was higher than subsequent sampling events (Attachment B). MW-2 has an extremely slow recovery rate and it is not feasible to purge the well and obtain field parameter stabilization prior to collecting a sample. Instead, the well is purged dry, allowed to recover for a period of approximately 24 hours, and then a sample is collected. It appears that the first sample from this well, collected shortly after installation, was impacted by the presence of particulate matter in the sample that was able to pass through the 0.45 micron filter used to collect the sample, which was subsequently dissolved when the sample was acidified, and does not represent actual groundwater conditions.

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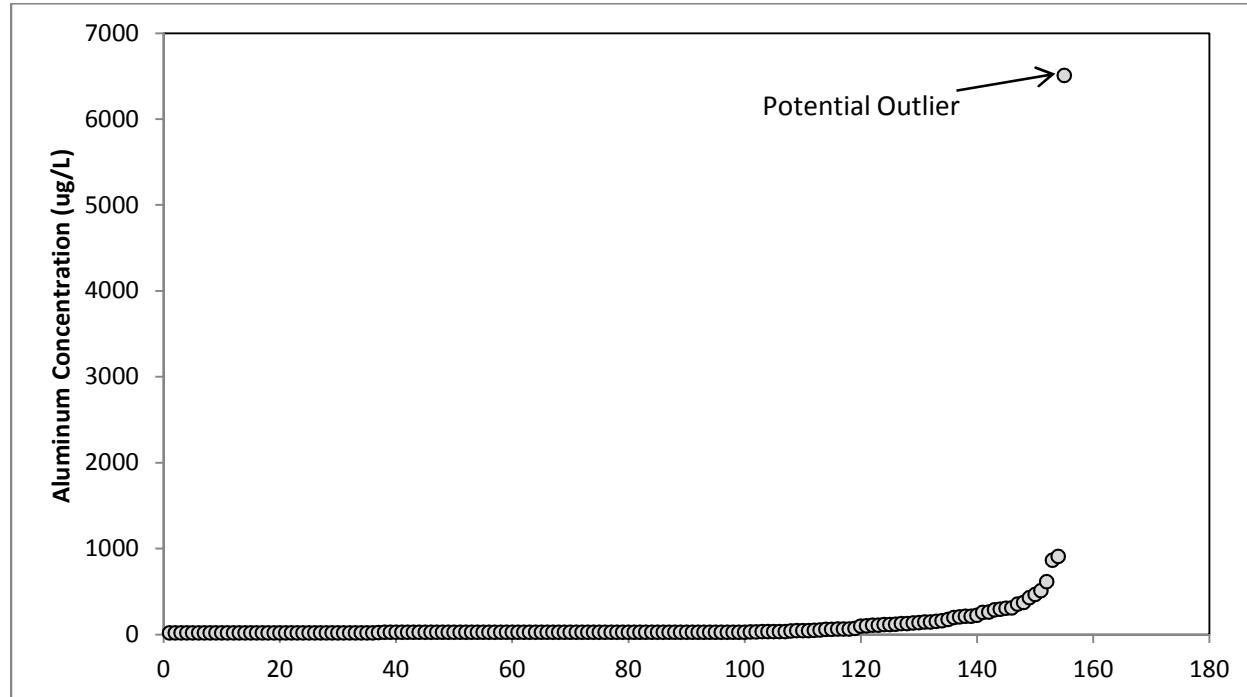


Figure 1 Rank order plot of aluminum concentrations with non-detects plotted at detection limit

A rank order plot of chloride concentrations sorted from low to high is shown on Figure 2. For chloride, there appear to be two outliers: the first sample collected from MW-18 on 2/23/2012 (74.9 mg/L) and the second sample collected from MW-18 on 3/27/2012 (27 mg/L). The turbidity of the first sample was much higher (1111 NTU) than that of the subsequent sample from this well (Attachment B). MW-18 has poor recovery and is sampled by purging dry and returning the next day for sampling. The downward trend in chloride concentrations in MW-18 following well installation (Figure 3) suggests that the initial chloride concentrations are not reflective of groundwater conditions, but have been impacted by ground disturbance during drilling or materials used during well installation; these impacts have had a diminished effect on subsequent samples.

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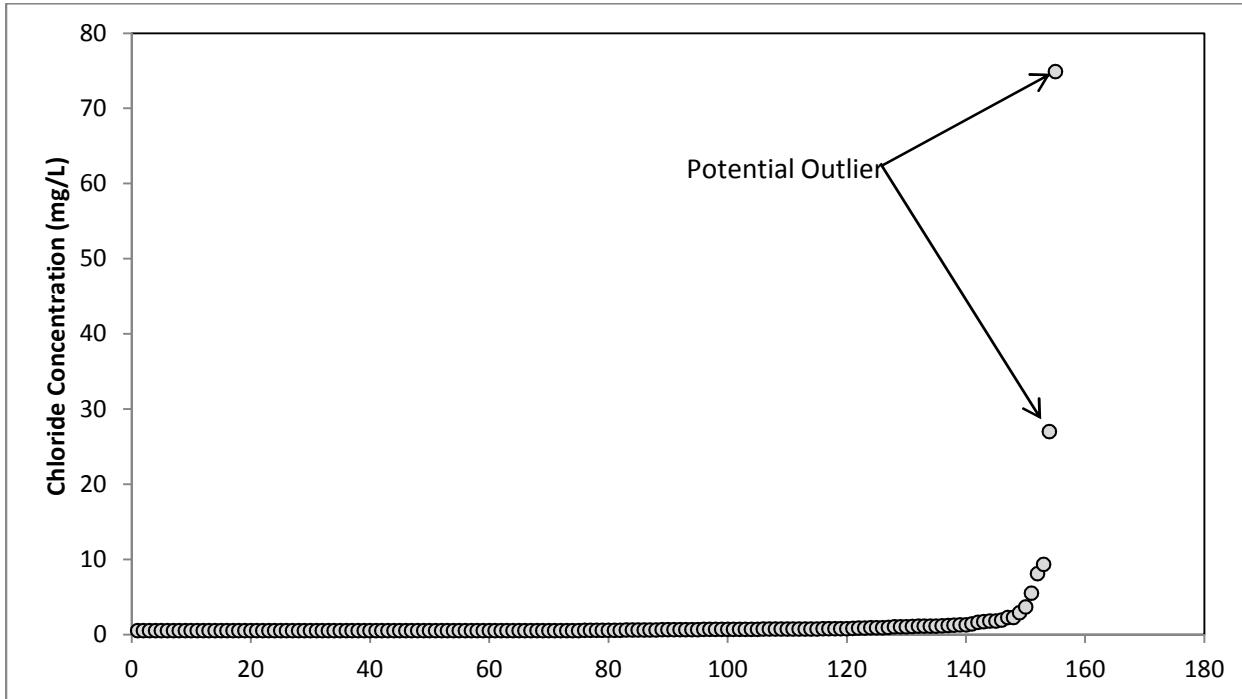


Figure 2 Rank order plot of chloride concentrations with non-detects plotted at detection limit

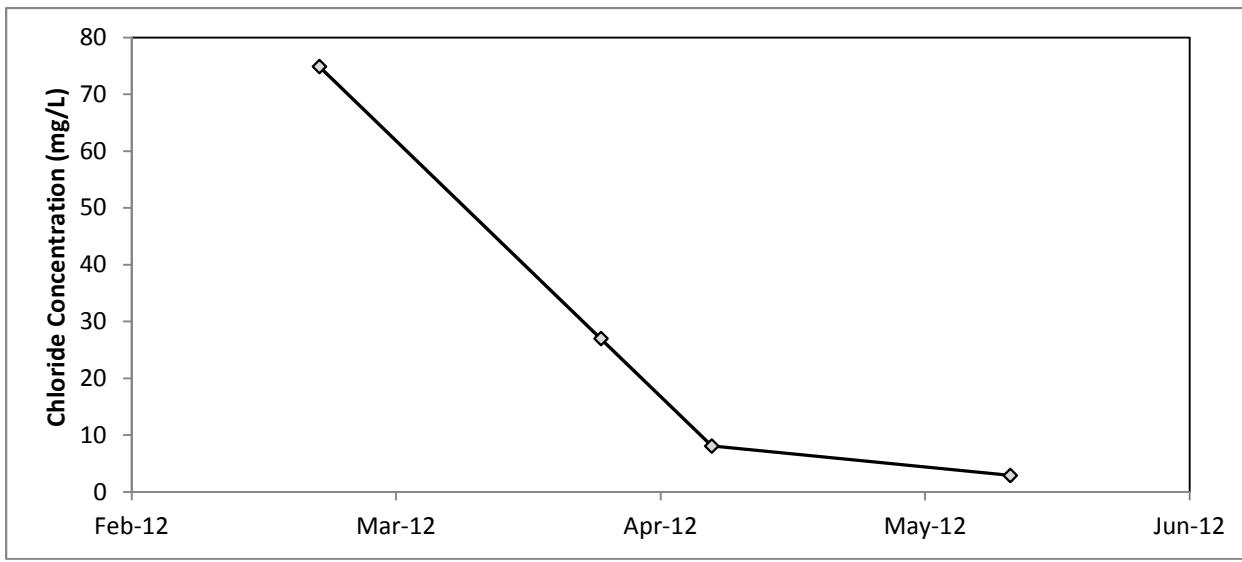


Figure 3 Chloride Concentrations measured in MW-18

The aluminum sample from MW-2 on 11/9/2011 and the chloride samples from MW-18 on 2/23/2012 and 3/27/2012 are outliers. These values do not represent true extreme values from the target population.

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They were impacted by well installation activities (MW-18 samples) or the presence of excessive particulate matter in the well water (MW-2) and are, therefore, from a statistically different population. These outliers should not be included in the calculation of sample size.

Revised Assessment

The three outliers were removed from the dataset and the number of samples recalculated for aluminum and chloride (Table 2). Based on this assessment, no additional groundwater samples are needed from the Mine Site surficial aquifer for the NorthMet EIS.

Table 2 Revised assessment of the number of additional groundwater samples needed

Solute	Units	Type	Total # Samples	# Non-Detects	# Detects	Mean	Standard Deviation	N	# Additional Samples Needed
Aluminum (outlier removed)	ug/L	Dissolved	154	95	47	82.4	138	32	0
Chloride (outliers removed)	mg/L	NA	153	69	84	0.869	1.082	19	0

Future Sampling

Using the equation and equation assumptions recommended by EPA, an adequate dataset has been established to define baseline groundwater conditions at the NorthMet Mine Site for purposes of the environmental review. Given the adequacy of this dataset and the propensity for wells to be frozen in the winter, PolyMet proposes that sampling switch from monthly to three times a year (April, July and October) consistent with NPDES monitoring at the Tailings Basin.

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References

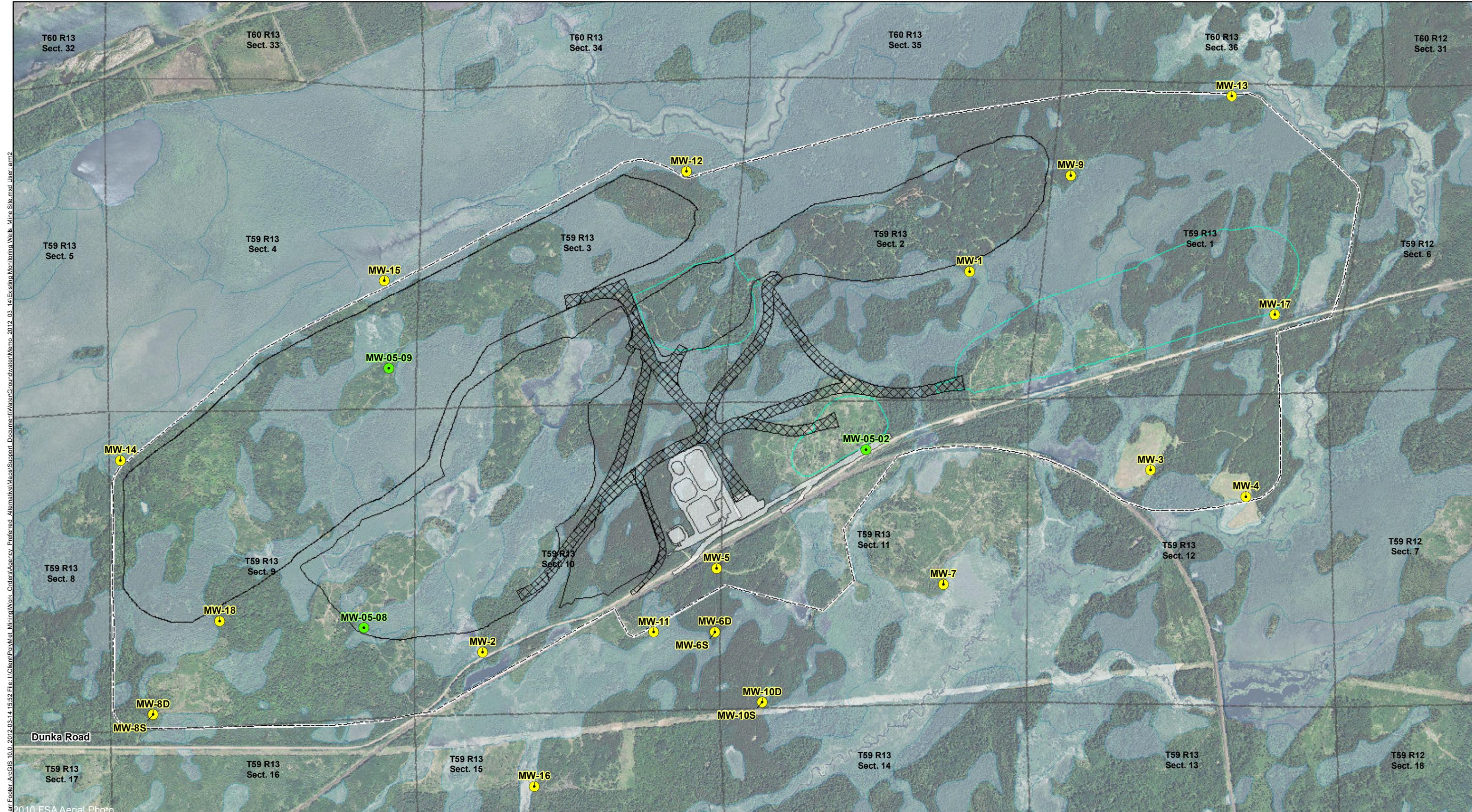
Appelo, C.A.J., and Postma, D., 2006. Geochemistry, Groundwater, and Pollution. Second Edition. Leiden:A.A. Balkema Publishers.

EPA, 2010. "ProUCL Version 4.1.00 Technical Guide (Draft) – Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations." EPA/600/R-07/041.

Hem, J.D., 1985. Study and Interpretation of the Chemical Characteristics of Natural Water, Third Edition. U.S. Geological Survey Water-Supply Paper 2254.

Attachments

Attachment A



**EXISTING MONITORING WELLS
MINE SITE**
NorthMet Project
PolyMet Mining Inc.
Hoyt Lakes, MN

Attachment B

Table 1
Water Analytical Data Summary
PolyMet Mining Company

	Location Date Sample Type	MW-05-02 3/23/2005 N	MW-05-02 11/20/2006 N	MW-05-02 3/17/2009 N	MW-05-02 5/3/2010 N	MW-05-02 7/27/2010 N	MW-05-02 10/5/2010 N	MW-05-02 4/26/2011		MW-05-02 7/20/2011 N	MW-05-02 5/8/2012		MW-05-08 3/23/2005		MW-05-08 11/28/2006 N	MW-05-08 5/7/2009		MW-05-08 5/5/2010 N	
		N	N	N	N	N	N	N	FD	N	FD	N	FD	N	FD	N	FD	N	
		Fraction	Analysis Location																
General Parameters																			
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	75 mg/l	42.6 mg/l	51.6 mg/l	36.9 mg/l	36 mg/l	36.8 mg/l	--	--	--	--	--	--	--	51.7 mg/l
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	--	--	--	--	--	--	< 10 mg/l	
Alkalinity, total	NA	Lab	88.3 mg/l	68.3 mg/l	76.4 mg/l	75 mg/l	42.6 mg/l	51.6 mg/l	36.9 mg/l	36 mg/l	36.8 mg/l	37.6 mg/l	37.6 mg/l	72.8 mg/l	65.2 mg/l	67.7 mg/l	51.8 mg/l	51.6 mg/l	51.7 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 3 mg/l	--	--	--	--	--	< 2.4 mg/l	
Carbon, dissolved organic	NA	Lab	--	--	--	2.7 mg/l	1.8 mg/l	2.2 mg/l	2.0 h mg/l	2.2 h mg/l	2.5 mg/l	2.5 mg/l	--	--	--	--	--	1.1 mg/l	
Carbon, total organic	NA	Lab	8 mg/l	2.6 mg/l	1.9 mg/l	3.1 mg/l	1.9 mg/l	1.7 mg/l	1.8 h mg/l	1.8 h mg/l	2.5 mg/l	2.4 mg/l	2.2 mg/l	3.8 mg/l	3.3 mg/l	1.6 mg/l	1.2 mg/l	1.2 mg/l	< 1 mg/l
Chemical Oxygen Demand	NA	Lab	12.4 mg/l	< 10 mg/l	< 10 mg/l	20.1 mg/l	< 10 mg/l	< 10 mg/l	12.5 h mg/l	< 10 h mg/l	43.2 mg/l	< 10.0 mg/l	< 10.0 mg/l	12.4 mg/l	8.8 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l
Chloride	NA	Lab	1.3 mg/l	1.11 mg/l	< 0.5 mg/l	0.55 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 h mg/l	< 0.5 h mg/l	0.75 mg/l	< 0.50 mg/l	< 0.50 mg/l	1.1 mg/l	1.3 mg/l	1.17 mg/l	0.52 mg/l	0.55 mg/l	0.58 b mg/l
Cyanide	NA	Lab	< 0.02 mg/l	< 0.02 mg/l	< 0.02 mg/l	< 0.0100 mg/l	< 0.02 mg/l	< 0.0100 mg/l	< 0.0100 mg/l	< 0.0100 mg/l	--	--	< 0.02 mg/l	< 0.02 mg/l	< 0.02 mg/l	< 0.02 mg/l	< 0.02 mg/l	< 0.02 mg/l	< 0.0100 mg/l
Dissolved oxygen	NA	Field	--	4.95 mg/l	8.21 mg/l	2.91 mg/l	10.54 mg/l	6.2 mg/l	10.88 mg/l	--	11.0 mg/l	11.45 mg/l	--	--	--	0.70 mg/l	0.92 mg/l	--	0.7 mg/l
Fluoride	NA	Lab	0.21 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 h mg/l	< 0.1 h mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	0.19 mg/l	0.19 mg/l	0.11 mg/l	0.12 mg/l	0.12 mg/l	< 0.1 mg/l
Hardness, total, as CaCO ₃	NA	Lab	84.8 mg/l	69.7 mg/l	82.8 mg/l	88.8 mg/l	45.8 mg/l	61.5 mg/l	42.4 mg/l	43.4 mg/l	89.6 mg/l	45.4 mg/l	44.0 mg/l	64.3 mg/l	66.1 mg/l	56.8 mg/l	58.9 mg/l	58.9 mg/l	58.9 mg/l
Nitrate + Nitrite, as N	NA	Lab	0.33 mg/l	1.42 mg/l	0.26 mg/l	0.16 mg/l	0.29 mg/l	0.48 mg/l	0.29 h mg/l	0.27 mg/l	0.35 mg/l	0.37 mg/l	0.31 mg/l	0.9 mg/l	0.15 mg/l	0.22 mg/l	0.21 mg/l	0.21 mg/l	0.14 mg/l
Nitrogen, ammonia (NH ₃), as N	NA	Lab	0.24 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.05 mg/l	< 0.05 mg/l	< 0.1 h mg/l	< 0.1 h mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.05 mg/l
pH	NA	Lab	10 pH units	6.5 pH units	7.0 pH units	7.6 pH units	7.1 pH units	7.3 pH units	--	7.0 pH units	--	--	--	7.4 pH units	7.7 pH units	6.9 pH units	7.5 pH units	7.6 pH units	7.5 pH units
pH	NA	Field	10.14 pH units	6.50 pH units	6.79 pH units	7.57 pH units	6.77 pH units	8.2 pH units	6.63 pH units	--	6.3 pH units	6.71 pH units	--	7.20 pH units	--	7.27 pH units	7.87 pH units	--	8.24 pH units
Phosphorus, total	NA	Lab	0.14 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg P/L	< 0.1 mg P/L	< 0.1 mg P/L	< 0.1 h mg P/L	< 0.1 h mg P/L	0.84 mg P/L	--	0.17 mg/l	0.16 mg/l	0.14 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg P/L
Redox (oxidation potential)	NA	Field	11.9 mV	148 mV	433 mV	469 mV	453 mV	437 mV	421 mV	--	556 mV	338 mV	--	-196.5 mV	--	47 mV	390 mV	--	436 mV
Solids, total dissolved	NA	Lab	--	--	--	134 mg/l	72 mg/l	115 mg/l	81 mg/l	87 mg/l	57 mg/l	78.0 mg/l	83.0 mg/l	--	--	--	--	--	95 mg/l
Specific Conductance @ 25oC	NA	Field	201 umhos/cm	165 umhos/cm	197 umhos/cm	512 umhos/cm	76.9 umhos/cm	199 umhos/cm	72.2 umhos/cm	--	54 umhos/cm	51.7 umhos/cm	--	183 umhos/cm	--	115 umhos/cm	119 umhos/cm	--	212 umhos/cm
Sulfate	NA	Lab	10.8 mg/l	16.4 mg/l	23 mg/l	20.5 mg/l	7.1 mg/l	10.7 mg/l	6.6 h mg/l	6.7 h mg/l	6.73 mg/l	7.4 mg/l	7.4 mg/l	21.2 mg/l	20.3 mg/l	11.2 mg/l	9.72 mg/l	9.73 mg/l	10.4 mg/l
Temperature, degrees C	NA	Field	2.98 deg C	5.8 deg C	3.0 deg C	4.3 deg C	11.92 deg C	13.8 deg C	4.49 deg C	--	10.5 deg C	10.6 deg C	--	4.37 deg C	--	6.8 deg C	10.8 deg C	--	4.6 deg C
Turbidity	NA	Field	--	--	0.5 NTU	1 NTU	1.1 NTU	0 NTU	570.0 NTU	6.4 NTU	--	--	--	--	--	47 NTU	--	487 NTU	
Water Elevation, ft/MSL	NA	Field	1580.3	1578.27	1580.78	1583.58	1580.29	1580.05	1585.71	--	1580.84	1585.13	--	1593.95	--	1593.14	1593.42	--	1593.06
Metals																			
Aluminum	Dissolved	Lab	44.6 * ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 20.0 ug/l	< 100 ug/l	214 * ug/l	132 * ug/l	199 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	
Aluminum	Total	Lab	322 ug/l	31.6 ug/l	140 ug/l	428 ug/l	707 * ug/l	144 ug/l	91.5 ug/l	91.3 ug/l	22400 ug/l	--	--	1040 ug/l	1300 ug/l	2620 ug/l	364 ug/l	427 ug/l	661 ug/l
Antimony	Dissolved	Lab	--	--	--	--	--	--	--	--	< 0.50 ug/l	< 0.50 ug/l	--	--	--	--	--	--	
Antimony	Total	Lab	< 3 ug/l	< 3 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	--	< 3 ug/l	< 3 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Arsenic	Dissolved	Lab	--	--	--	--	--	< 1 ug/l	< 1 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	--	--	--	--	--	
Arsenic	Total	Lab	3.2 ug/l	< 2 ug/l	< 2 ug/l	< 1 ug/l	< 1 ug/l	< 1 ug/l	< 0.5 ug/l	< 0.5 ug/l	4.41 ug/l	--	--	4.4 ug/l	3.1 ug/l	< 2 ug/l	< 2 ug/l	< 1 ug/l	< 1 ug/l
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	2.82 ug/l	--	--	--	--	--	--	--	
Barium	Total	Lab	&																

Table 1
Water Analytical Data Summary
Polymet Mining Company

Location			MW-05-08	MW-05-08	MW-05-08	MW-05-08		MW-05-08		MW-05-08		MW-05-08	MW-05-08		MW-05-08		MW-05-09	MW-05-09	
Date			7/29/2010	10/7/2010	4/26/2011	7/21/2011		10/5/2011		11/2/2011		12/8/2011	3/26/2012		4/24/2012		5/4/2012	3/23/2005	10/5/2006
Sample Type			N	N	N	FD	N	FD	N	FD	N	N	FD	N	FD	N	N		
Fraction	Analysis Location																		
General Parameters																			
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	54.1 mg/l	55 mg/l	54.1 mg/l	52.7 mg/l	55.2 mg/l	54.0 mg/l	53.2 mg/l	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate, as CaCO ₃	NA	Lab	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	54.1 mg/l	55 mg/l	54.1 mg/l	52.7 mg/l	55.2 mg/l	54.0 mg/l	53.2 mg/l	54.9 mg/l	55 mg/l	55.7 mg/l	55.4 mg/l	54.3 mg/l	55.5 mg/l	56.6 mg/l	54.9 mg/l	47 mg/l	26.4 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 3 mg/l	< 2.4 mg/l	--	--	--	--	--	--	--	--	--	--
Carbon, dissolved organic	NA	Lab	1.3 mg/l	1.5 mg/l	1.8 mg/l	1.9 mg/l	1.8 mg/l	3.4 mg/l	2.7 mg/l	2.5 mg/l	2.4 mg/l	1.8 mg/l	1.9 mg/l	1.7 mg/l	1.5 mg/l	1.8 mg/l	1.4 mg/l	--	--
Carbon, total organic	NA	Lab	1.4 mg/l	1.1 mg/l	1.1 h mg/l	1.5 mg/l	1.6 mg/l	2.3 mg/l	1.8 mg/l	1.5 mg/l	1.4 mg/l	1.5 mg/l	1.4 mg/l	1.8 mg/l	1.4 mg/l	1.5 mg/l	1.1 mg/l	4.6 mg/l	5.2 mg/l
Chemical Oxygen Demand	NA	Lab	< 10 mg/l	10.3 mg/l	< 10 h mg/l	16.3 mg/l	12.2 mg/l	18 mg/l	17.8 mg/l	< 10 mg/l	10.6 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10.0 mg/l	< 10.0 mg/l	6.9 mg/l	< 10 mg/l
Chloride	NA	Lab	0.52 mg/l	< 0.5 mg/l	0.54 h mg/l	0.54 mg/l	0.73 mg/l	0.86 mg/l	0.67 mg/l	0.51 mg/l	< 0.5 mg/l	0.63 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	5.5 mg/l	0.69 mg/l
Cyanide	NA	Lab	< 0.02 mg/l	< 0.02 mg/l	0.0371 mg/l	< 0.0100 mg/l	< 0.0100 mg/l	< 0.0100 mg/l	< 0.0100 mg/l	--	--	--	--	--	--	--	< 0.02 mg/l	< 0.02 mg/l	
Dissolved oxygen	NA	Field	1.02 mg/l	1.9 mg/l	1.6 mg/l	0 mg/l	--	5.9 mg/l	--	4.93 mg/l	--	6.65 mg/l	3.01 mg/l	--	2.34 mg/l	--	2.67 mg/l	--	1.80 mg/l
Fluoride	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 h mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	0.1 mg/l	< 0.1 mg/l
Hardness, total, as CaCO ₃	NA	Lab	58.5 mg/l	58 mg/l	61.3 mg/l	68.8 mg/l	67.8 mg/l	56.6 mg/l	59.4 mg/l	55.3 mg/l	54.6 mg/l	54.5 mg/l	59.3 mg/l	55.8 mg/l	55.6 mg/l	56.5 mg/l	57.0 mg/l	53.4 mg/l	45.8 mg/l
Nitrate + Nitrite, as N	NA	Lab	0.19 mg/l	0.17 mg/l	0.2 h mg/l	0.19 mg/l	0.2 mg/l	0.23 mg/l	0.22 mg/l	0.26 mg/l	0.26 mg/l	0.29 mg/l	0.34 mg/l	0.29 mg/l	0.30 mg/l	0.30 mg/l	0.29 mg/l	< 0.1 mg/l	< 0.1 mg/l
Nitrogen, ammonia (NH ₃), as N	NA	Lab	< 0.05 mg/l	< 0.05 mg/l	< 0.1 h mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.1 mg/l	< 0.1 mg/l
pH	NA	Lab	8.2 pH units	7.5 pH units	--	7.4 pH units	7.4 pH units	7.4 pH units	7.3 pH units	--	--	--	--	--	--	--	--	7.5 pH units	7.5 pH units
pH	NA	Field	8.18 pH units	7.0 pH units	7.21 pH units	6.6 pH units	--	6.8 pH units	--	7.03 pH units	--	8.54 pH units	7.25 pH units	--	7.68 pH units	--	7.18 pH units	6.62 pH units	6.78 pH units
Phosphorus, total	NA	Lab	< 0.1 mg P/L	< 0.1 mg P/L	< 0.1 h mg P/L	0.15 mg P/L	0.12 mg P/L	< 0.1 mg P/L	< 0.1 mg P/L	--	--	--	--	--	--	--	--	0.47 mg/l	0.25 mg/l
Redox (oxidation potential)	NA	Field	397 mV	326 mV	395 mV	406 mV	--	419 mV	--	330 mV	--	368 mV	418 mV	--	521 mV	--	301 mV	187.8 mV	89 mV
Solids, total dissolved	NA	Lab	94 mg/l	87 mg/l	91 mg/l	104 mg/l	95 mg/l	128 mg/l	90 mg/l	127 mg/l	106 mg/l	112 mg/l	113 mg/l	102 mg/l	98.0 mg/l	92.0 mg/l	113 mg/l	--	--
Specific Conductance @ 25oC	NA	Field	116 umhos/cm	120 umhos/cm	104.6 umhos/cm	88 umhos/cm	--	130 umhos/cm	--	125 umhos/cm	--	129.6 umhos/cm	125.3 umhos/cm	--	122.9 umhos/cm	--	81.8 umhos/cm	139 umhos/cm	73 umhos/cm
Sulfate	NA	Lab	9.52 mg/l	9.46 mg/l	8.93 h mg/l	9.1 mg/l	9.43 mg/l	9.23 mg/l	9.04 mg/l	8.92 mg/l	8.85 mg/l	9.5 mg/l	8.86 mg/l	8.85 mg/l	8.8 mg/l	8.9 mg/l	13.8 mg/l	10.4 mg/l	
Temperature, degrees C	NA	Field	8.21 deg C	11.7 deg C	4.46 deg C	8.5 deg C	--	13.2 deg C	--	10.81 deg C	--	11.46 deg C	4.29 deg C	--	6.31 deg C	--	6.23 deg C	4.20 deg C	9.6 deg C
Turbidity	NA	Field	9.7 NTU	2.3 NTU	2.3 NTU	81.0 NTU	--	32.0 NTU	--	2.40 NTU	--	0 NTU	0 NTU	--	0 NTU	--	0 NTU	--	--
Water Elevation, ft/MSL	NA	Field	1590.75	1592.75	1593.12	1592.5	--	1591.67	--	1592.93	--	1592.47	1592.93	--	1592.94	--	1593.02	1608.7	1614.91
Metals																			
Aluminum	Dissolved	Lab	58.4 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 20 ug/l	< 20 ug/l	< 20.0 ug/l	< 20.0 ug/l	910 * ug/l	430 ug/l		
Aluminum	Total	Lab	627 ug/l	136 ug/l	465 ug/l	5020 ug/l	5140 ug/l	1920 ug/l	2560 ug/l	--	--	--	--	--	--	--	4640 ug/l	27100 ug/l	
Antimony	Dissolved	Lab	--	--	--	--	--	--	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	--	--
Antimony	Total	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	--	--	--	--	--	--	--	< 3 ug/l	< 3 ug/l	
Arsenic	Dissolved	Lab	< 1 ug/l	< 1 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	--	--
Arsenic	Total	Lab	< 1 ug/l	< 1 ug/l	< 0.5 ug/l	0.77 ug/l	0.95 ug/l	0.56 ug/l	0.62 ug/l	--	--	--	--	--	--	--	3.4 ug/l	4.8 ug/l	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	17.9 ug/l	15.9 ug/l	15.1 ug/l	39.9 ug/l	44.1 ug/l	24.8 ug/l	27 ug/l	14.5 ug/l	13.5 ug/l	13.5 ug/l	13.3 ug/l	12.8 ug/l	12.5 ug/l	12.8 ug/l	90.7 ug/l	214 ug/l	
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	0.3 ug/l	0.7 ug/l
Boron	Dissolved	Lab	--	--	--	--	< 50 ug/l	< 50 ug/l	< 50 ug/l	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	40.2 ug/l	< 50 ug/l	
Cadmium	Dissolved	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.03 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l
Cadmium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	0.08 j ug/l	0.28 ug/l	< 0.2 ug/l	--	--	--	--	--	--	--	--	< 0.2 ug/l	< 0.2 ug/l	
Calcium	Total	Lab	12400 ug/l	12400 ug/l	13100 ug/l	14000 ug/l	13900 ug/l	11900 ug/l	12500 ug/l	11400 ug/l	11400 ug/l	11400 ug/l	12400 ug/l	11400 ug/l	11400 ug/l	11600			

Table 1
Water Analytical Data Summary
PolyMet Mining Company

Location			MW-05-09 3/17/2009 N	MW-05-09 5/5/2010 N	MW-05-09 7/29/2010 N	MW-05-09 10/7/2010 N	MW-05-09 3/24/2011		MW-05-09 4/26/2011 N	MW-05-09 7/21/2011 N	MW-05-09 10/5/2011 N	MW-05-09 11/2/2011 N	MW-05-09 12/6/2011 N	MW-05-09 1/11/2012 N	MW-05-09 2/13/2012 N	MW-05-09 3/1/2012 N	MW-05-09 4/9/2012		MW-05-09 5/8/2012 N
Sample Type			Fraction	Analysis Location			N	FD									N	FD	
General Parameters																			
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	20.4 mg/l	18.6 mg/l	17.1 mg/l	20.3 mg/l	20.7 mg/l	16.4 mg/l	18.5 mg/l	15.8 mg/l	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	23.7 mg/l	20.4 mg/l	18.6 mg/l	17.1 mg/l	20.3 mg/l	20.7 mg/l	16.4 mg/l	18.5 mg/l	15.8 mg/l	16.7 mg/l	16 mg/l	15.2 mg/l	13.9 mg/l	14.6 mg/l	16.1 mg/l	16.0 mg/l	16.3 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	< 2.4 mg/l	< 3 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 2.4 mg/l	< 4 mg/l	< 4 mg/l	< 2.4 mg/l	--	--	--	--	--	--	--	--
Carbon, dissolved organic	NA	Lab	--	4.1 mg/l	4.7 mg/l	4.0 mg/l	3.9 mg/l	3.8 mg/l	4.7 h mg/l	5.3 mg/l	4.6 mg/l	4.1 mg/l	3.9 mg/l	3.4 mg/l	3.1 b mg/l	2.86 b mg/l	3.0 mg/l	3.1 mg/l	3.9 mg/l
Carbon, total organic	NA	Lab	4.4 mg/l	5.0 mg/l	3.9 mg/l	3.6 mg/l	4.2 mg/l	4.0 mg/l	3.7 h mg/l	6.3 mg/l	4.0 mg/l	4.5 mg/l	4.1 mg/l	3.0 mg/l	2.78 b mg/l	2.47 mg/l	2.6 mg/l	2.7 mg/l	3.5 mg/l
Chemical Oxygen Demand	NA	Lab	23.9 mg/l	21.9 mg/l	12 mg/l	22.5 mg/l	32.2 mg/l	28.4 mg/l	19.2 h mg/l	24 mg/l	35.2 mg/l	25 mg/l	26.4 mg/l	< 10 mg/l	16.5 mg/l	16.5 mg/l	20.6 mg/l	11.7 mg/l	< 10.0 mg/l
Chloride	NA	Lab	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	0.93 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.50 mg/l	< 0.50 mg/l
Cyanide	NA	Lab	< 0.02 mg/l	< 0.0100 mg/l	< 0.02 mg/l	< 0.02 mg/l	--	--	< 0.0100 mg/l	< 0.0100 mg/l	--	--	--	--	--	--	--	--	--
Dissolved oxygen	NA	Field	3.71 mg/l	12.1 mg/l	11.8 mg/l	7.6 mg/l	2.84 mg/l	--	10.3 mg/l	9.9 mg/l	10.6 mg/l	8.50 mg/l	10.74 mg/l	11.22 mg/l	11.09 mg/l	11.9 mg/l	11.45 mg/l	--	11.72 mg/l
Fluoride	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 h mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l
Hardness, total, as CaCO ₃	NA	Lab	23.0 mg/l	23 mg/l	24.2 mg/l	25.8 mg/l	28.8 mg/l	29 mg/l	26.4 mg/l	75.1 mg/l	40.4 mg/l	33.2 mg/l	36.2 mg/l	27.5 mg/l	21.2 mg/l	19.6 mg/l	27.2 mg/l	28.1 mg/l	11.0 mg/l
Nitrate + Nitrite, as N	NA	Lab	0.11 mg/l	0.18 mg/l	0.18 mg/l	0.35 mg/l	0.22 mg/l	0.23 mg/l	0.13 mg/l	0.21 mg/l	0.2 mg/l	0.27 mg/l	0.25 mg/l	0.24 mg/l	0.25 mg/l	0.39 mg/l	0.33 mg/l	0.19 mg/l	0.19 mg/l
Nitrogen, ammonia (NH ₃), as N	NA	Lab	< 0.1 mg/l	< 0.05 mg/l	0.15 b mg/l	< 0.05 mg/l	< 0.05 mg/l	< 0.05 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.099 mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.050 mg/l
pH	NA	Lab	6.8 pH units	6.9 pH units	7.1 pH units	6.9 pH units	6.5 pH units	6.5 pH units	--	6.9 pH units	7.1 pH units	--	--	--	--	--	--	--	--
pH	NA	Field	8.01 pH units	8.37 pH units	9.20 pH units	7.3 pH units	6.82 pH units	--	6.39 pH units	6.2 pH units	7.4 pH units	6.32 pH units	7.77 pH units	7.81 pH units	6.55 pH units	8.06 pH units	7.1 pH units	--	6.62 pH units
Phosphorus, total	NA	Lab	0.12 mg/l	< 0.1 mg P/L	0.13 mg P/L	0.22 mg P/L	0.18 mg P/L	0.12 h mg P/L	1.75 mg P/L	0.52 mg P/L	--	--	--	--	--	--	--	--	--
Redox (oxidation potential)	NA	Field	203 mV	493 mV	365 mV	257 mV	248 mV	--	431 mV	505 mV	399 mV	369 mV	459 mV	480 mV	399 mV	436 mV	367 mV	--	318 mV
Solids, total dissolved	NA	Lab	--	102 mg/l	52 mg/l	95 mg/l	81.9 mg/l	71.9 mg/l	98 mg/l	114 mg/l	94 mg/l	202 mg/l	125 mg/l	76 mg/l	78 mg/l	88 mg/l	85.0 mg/l	77.0 mg/l	75.0 mg/l
Specific Conductance @ 25°C	NA	Field	80 umhos/cm	70 umhos/cm	63.2 umhos/cm	76.4 umhos/cm	66 umhos/cm	--	49.7 umhos/cm	24 umhos/cm	50 umhos/cm	53 umhos/cm	56.4 umhos/cm	52 umhos/cm	52 umhos/cm	46.1 umhos/cm	77.1 umhos/cm	--	5.7 umhos/cm
Sulfate	NA	Lab	7.38 mg/l	12.6 mg/l	8.99 mg/l	16.9 mg/l	11.6 mg/l	11 mg/l	11.8 h mg/l	8.74 mg/l	7.17 mg/l	9.54 mg/l	11 mg/l	9.81 mg/l	8.83 mg/l	7.82 mg/l	19.7 mg/l	19.6 mg/l	8.6 mg/l
Temperature, degrees C	NA	Field	4.7 deg C	5.9 deg C	10.03 deg C	14.1 deg C	5.3 deg C	--	5.51 deg C	17.3 deg C	13.4 deg C	11.35 deg C	11.78 deg C	9.29 deg C	11.36 deg C	8.92 deg C	10.03 deg C	--	10.13 deg C
Turbidity	NA	Field	133 NTU	1 NTU	470 NTU	54.7 NTU	18 NTU	--	148.9 NTU	860.0 NTU	339.4 NTU	140.40 NTU	311.8 NTU	105.6 NTU	85.6 NTU	41.4 NTU	24.5 NTU	--	13 NTU
Water Elevation, ft/MSL	NA	Field	1608.31	1609.77	--	1607.54	1608.74	--	1611.14	1607.1	1607.34	--	1606.48	1606.31	1606.06	1605.98	1608.26	--	1610.34
Metals																			
Aluminum	Dissolved	Lab	373 ug/l	154 ug/l	296 ug/l	511 ug/l	466 ug/l	411 ug/l	311 ug/l	214 ug/l	102 ug/l	139 ug/l	135 ug/l	205 ug/l	225 ug/l	258 ug/l	353 ug/l	301 ug/l	306 ug/l
Aluminum	Total	Lab	4200 ug/l	5360 ug/l	6550 ug/l	5620 ug/l	9940 ug/l	9950 ug/l	5940 ug/l	32300 ug/l	16500 ug/l	--	--	--	--	--	--	--	--
Antimony	Dissolved	Lab	--	--	--	--	--	--	--	--	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l				
Antimony	Total	Lab	< 0.5 ug/l	0.52 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	--	--	--	--	--	--	--	--
Arsenic	Dissolved	Lab	--	--	< 1 ug/l	< 1 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l
Arsenic	Total	Lab	< 2 ug/l	1.84 ug/l	1.88 ug/l	1.82 ug/l	3.25 ug/l	3.34 ug/l	2.18 ug/l	2.38 ug/l	5.84 ug/l	--	--	--	--	--	--	--	--
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	Total	Lab	59.2 ug/l	65.6 ug/l	71.2 ug/l	66.2 ug/l	98.4 ug/l	99.2 ug/l	71.3 ug/l	301 ug/l	159 ug/l	133 ug/l	121 ug/l	79.4 ug/l	46.8 ug/l	44.8 ug/l	43.2 ug/l	45.6 ug/l	19.6 ug/l
Beryllium	Total	Lab	< 0.2 ug/l																

Table 1
Water Analytical Data Summary
Polymet Mining Company

Location Date Sample Type		MW-1 11/7/2011 N	MW-1 12/8/2011 N		MW-1 1/9/2012 N		MW-1 2/13/2012 N	MW-1 3/19/2012 N	MW-1 4/18/2012 N		MW-1 5/4/2012 N		MW-2 11/9/2011 N	MW-2 12/6/2011 N		MW-2 1/4/2012 N		MW-2 3/27/2012 N	
		Fraction	Analysis Location																
General Parameters																			
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	94.2 mg/l	86.5 mg/l	86.8 mg/l	86.3 mg/l	85.9 mg/l	87.9 mg/l	118 mg/l	96.8 mg/l	97.2 mg/l	88.0 mg/l	87.9 mg/l	111 mg/l	138 mg/l	138 mg/l	141 mg/l	140 mg/l	
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon, dissolved organic	NA	Lab	3.3 mg/l	2.9 mg/l	3.2 mg/l	3.6 mg/l	3.0 mg/l	4.01 b mg/l	4.15 mg/l	3.1 mg/l	2.8 mg/l	2.7 mg/l	5.2 mg/l	6.6 mg/l	7.4 mg/l	6.1 mg/l	5.7 mg/l	6.5 mg/l	
Carbon, total organic	NA	Lab	2.8 mg/l	3.0 mg/l	3.2 mg/l	2.6 mg/l	2.6 mg/l	2.61 b mg/l	3.52 mg/l	2.5 mg/l	2.7 mg/l	2.4 mg/l	5.2 mg/l	5.9 mg/l	6.7 mg/l	5.6 mg/l	5.4 mg/l	5.4 mg/l	
Chemical Oxygen Demand	NA	Lab	10.3 mg/l	13.6 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	22.8 mg/l	24.6 mg/l	< 10.0 mg/l	< 10.0 mg/l	27.4 mg/l	25.3 mg/l	22.5 mg/l	20.4 mg/l	20.9 mg/l	26 mg/l	
Chloride	NA	Lab	2.26 mg/l	1.41 mg/l	2.41 mg/l	2.28 mg/l	2.28 mg/l	1.94 mg/l	1.8 mg/l	1.7 mg/l	1.7 mg/l	1.8 mg/l	1.26 mg/l	1.29 mg/l	1.27 mg/l	1.2 mg/l	1.13 mg/l	0.77 mg/l	
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved oxygen	NA	Field	1.75 mg/l	8.45 mg/l	--	2.68 mg/l	--	2.37 mg/l	1.86 mg/l	1.73 mg/l	--	2.1 mg/l	--	7.12 mg/l	8.02 mg/l	--	8 mg/l	--	10.46 mg/l
Fluoride	NA	Lab	0.22 mg/l	0.25 mg/l	0.24 mg/l	0.22 mg/l	0.22 mg/l	0.2 mg/l	0.14 mg/l	0.18 mg/l	0.17 mg/l	0.20 mg/l	0.21 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l
Hardness, total, as CaCO ₃	NA	Lab	93.1 mg/l	88.6 mg/l	85.1 mg/l	82.4 mg/l	89.8 mg/l	107 mg/l	92.2 mg/l	94.2 mg/l	83.8 mg/l	86.0 mg/l	148 mg/l	143 mg/l	144 mg/l	145 mg/l	148 mg/l	140 mg/l	
Nitrate + Nitrite, as N	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.1 b mg/l	
Nitrogen, ammonia (NH ₃), as N	NA	Lab	< 0.1 mg/l	0.12 mg/l	0.11 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.18 mg/l	0.13 b mg/l	0.19 b mg/l	0.10 mg/l	< 0.1 mg/l	0.11 mg/l	0.13 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
pH	NA	Field	9.20 pH units	9.11 pH units	--	9.34 pH units	--	9.41 pH units	10.02 pH units	9.46 pH units	--	9.32 pH units	--	6.76 pH units	7.34 pH units	--	7.1 pH units	--	6.52 pH units
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Redox (oxidation potential)	NA	Field	507 mV	348 mV	--	361 mV	--	409 mV	114 mV	311 mV	--	--	--	387 mV	476 mV	--	448 mV	--	523 mV
Solids, total dissolved	NA	Lab	163 mg/l	175 mg/l	151 mg/l	116 mg/l	102 mg/l	138 mg/l	151 mg/l	157 mg/l	152 mg/l	148 mg/l	152 mg/l	183 mg/l	209 mg/l	201 mg/l	188 mg/l	202 mg/l	179 mg/l
Specific Conductance @ 25°C	NA	Field	190 umhos/cm	186.7 umhos/cm	--	183.8 umhos/cm	--	184 umhos/cm	227.6 umhos/cm	190.3 umhos/cm	--	143.8 umhos/cm	--	245.1 umhos/cm	306.9 umhos/cm	--	284.2 umhos/cm	--	257.2 umhos/cm
Sulfate, total	NA	Lab	6.65 mg/l	6.81 mg/l	6.81 mg/l	6.22 mg/l	6.2 mg/l	6.35 mg/l	6.4 mg/l	5.7 mg/l	5.8 mg/l	6.3 mg/l	9.24 mg/l	8.34 mg/l	8.34 mg/l	6.09 mg/l	6.06 mg/l	5.89 mg/l	
Temperature, degrees C	NA	Field	7.62 deg C	10.33 deg C	--	4.7 deg C	--	1.25 deg C	10.45 deg C	4.11 deg C	--	5.17 deg C	--	8.71 deg C	13.86 deg C	--	11.09 deg C	--	8.17 deg C
Turbidity	NA	Field	3.3 NTU	0 NTU	--	0.2 NTU	--	0 NTU	0 NTU	--	--	--	214.2 NTU	75.5 NTU	--	59.3 NTU	--	134 NTU	
Water Elevation, ft/MSL	NA	Field	1591.56	1591.39	--	1590.97	--	1589.89	1592.45	1593.43	--	1593.07	--	1576.56	1577	--	1575.65	--	1577.68
Metals																			
Aluminum	Dissolved	Lab	47.3 ug/l	26.4 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 20 ug/l	< 20 ug/l	< 20 ug/l	< 20 ug/l	6510 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 20 ug/l	
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Antimony	Dissolved	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	Dissolved	Lab	1.25 ug/l	0.97 ug/l	0.98 ug/l	1.02 ug/l	1.01 ug/l	0.86 ug/l	0.92 ug/l	0.85 ug/l	0.74 ug/l	0.92 ug/l	0.94 ug/l	3.17 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	15.9 ug/l	14.1 ug/l	13.9 ug/l	11.2 ug/l	11.2 ug/l	11.6 ug/l	25.3 ug/l	15.9 ug/l	16.1 ug/l	10.8 ug/l	10.9 ug/l	154 ug/l	83.4 ug/l	83.6 ug/l	80.2 ug/l	81.1 ug/l	99.8 ug/l
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	0.35 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	70.6 ug/l	69.9 ug/l	66.4 ug/l	77 ug/l	72 ug/l	65.6 ug/l	61.7 ug/l	61.9 ug/l	63.4 ug/l	60.1 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	
Cadmium	Dissolved	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	
Cadmium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium	Total	Lab	26600 ug/l	25000 ug/l	24000 ug/l	22000 ug/l	22000 ug/l	24300 ug/l	32900 ug/l	26600 ug/l	27200 ug/l	22800 ug/l	23700 ug/l	34800 ug/l					

Table 1
Water Analytical Data Summary
Polymet Mining Company

Location Date Sample Type		MW-2 4/9/2012 N	MW-2 5/8/2012 N	MW-3 11/8/2011 N	MW-3 12/12/2011 N		MW-3 1/17/2012 FD		MW-3 2/14/2012 N	MW-3 3/5/2012 N		MW-3 4/19/2012 N		MW-3 5/7/2012 FD		MW-4 11/8/2011 N	MW-4 12/7/2011 N		
		Fraction	Analysis Location																
General Parameters																			
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	114 mg/l	70.6 mg/l	37 mg/l	37.0 mg/l	36.9 mg/l	35.5 mg/l	36 mg/l	37 mg/l	35.9 mg/l	35.8 mg/l	36.0 mg/l	34.4 mg/l	31.8 mg/l	37.4 mg/l	64.5 mg/l	68.3 mg/l	68.9 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon, dissolved organic	NA	Lab	5.8 mg/l	53.9 mg/l	1.9 mg/l	2.3 mg/l	2.1 mg/l	2.1 mg/l	1.7 mg/l	2.45 b mg/l	2.0 mg/l	2.4 mg/l	2.1 mg/l	1.5 mg/l	1.5 mg/l	3.1 mg/l	5.5 mg/l	5.2 mg/l	
Carbon, total organic	NA	Lab	5.3 mg/l	57.6 mg/l	1.6 mg/l	2.3 mg/l	1.8 mg/l	1.7 mg/l	1.9 mg/l	1.92 b mg/l	< 1 mg/l	1.8 mg/l	1.7 mg/l	1.8 mg/l	1.3 mg/l	1.3 mg/l	3.0 mg/l	4.6 mg/l	4.4 mg/l
Chemical Oxygen Demand	NA	Lab	22.6 mg/l	242 mg/l	< 10 mg/l	11.8 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	18.8 mg/l	22.0 mg/l	10.1 mg/l	< 10.0 mg/l	12.2 mg/l	13.4 mg/l	15.2 mg/l	
Chloride	NA	Lab	0.68 mg/l	< 0.50 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.50 h mg/l	< 0.50 h mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	0.71 mg/l	0.72 mg/l	< 0.5 mg/l	
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved oxygen	NA	Field	9.57 mg/l	8.18 mg/l	5.01 mg/l	6.45 mg/l	--	5.5 mg/l	--	7.16 mg/l	4.64 mg/l	--	5.94 mg/l	--	6.35 mg/l	--	3.63 mg/l	7.81 mg/l	
Fluoride	NA	Lab	< 0.10 mg/l	0.18 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 h mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	
Hardness, total, as CaCO ₃	NA	Lab	117 mg/l	34.6 mg/l	45.5 mg/l	43.9 mg/l	44.8 mg/l	39.6 mg/l	39.5 mg/l	44.9 mg/l	38.7 mg/l	39.9 mg/l	39.4 mg/l	39.6 mg/l	38.5 mg/l	38.5 mg/l	70.5 mg/l	73.7 mg/l	73.4 mg/l
Nitrate + Nitrite, as N	NA	Lab	0.12 mg/l	< 0.10 mg/l	0.4 mg/l	0.34 mg/l	0.42 mg/l	0.43 mg/l	0.29 mg/l	0.34 mg/l	0.40 mg/l	0.41 mg/l	0.43 mg/l	0.41 mg/l	0.44 mg/l	0.22 mg/l	0.22 mg/l		
Nitrogen, ammonia (NH ₃), as N	NA	Lab	0.15 mg/l	< 0.050 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.10 b mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l		
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
pH	NA	Field	6.74 pH units	7.69 pH units	6.27 pH units	6.58 pH units	--	6.19 pH units	--	6.68 pH units	6.25 pH units	--	6.42 pH units	--	6.48 pH units	--	6.84 pH units	6.73 pH units	
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Redox (oxidation potential)	NA	Field	373 mV	299 mV	308 mV	400 mV	--	409 mV	--	407 mV	377 mV	--	525 mV	--	367 mV	--	108 mV	365 mV	
Solids, total dissolved	NA	Lab	173 mg/l	159 mg/l	107 mg/l	86 mg/l	97 mg/l	89 mg/l	82 mg/l	95 mg/l	106 mg/l	100 mg/l	68.0 mg/l	88.0 mg/l	68.0 mg/l	73.0 mg/l	121 mg/l	165 mg/l	96 mg/l
Specific Conductance @ 25°C	NA	Field	256.4 umhos/cm	141.5 umhos/cm	113.3 umhos/cm	101.7 umhos/cm	--	92.4 umhos/cm	--	100.1 umhos/cm	93.8 umhos/cm	--	87.8 umhos/cm	--	49.7 umhos/cm	--	157.8 umhos/cm	163.5 umhos/cm	
Sulfate	NA	Lab	12.9 mg/l	17.5 mg/l	11.8 mg/l	11.2 mg/l	11.1 mg/l	9.8 mg/l	9.77 mg/l	11.2 mg/l	9.16 mg/l	9.44 mg/l	11.1 h mg/l	11.1 h mg/l	10.7 mg/l	10.8 mg/l	11.3 mg/l	10.4 mg/l	10.4 mg/l
Temperature, degrees C	NA	Field	10.77 deg C	10.67 deg C	8.78 deg C	4.52 deg C	--	7.61 deg C	--	9.05 deg C	8.92 deg C	--	5.79 deg C	--	11.03 deg C	--	8.44 deg C	7.46 deg C	
Turbidity	NA	Field	88.8 NTU	88.4 NTU	19.6 NTU	0 NTU	--	0 NTU	--	3.3 NTU	0 NTU	--	0.9 NTU	--	15.7 NTU	0 NTU	--	--	
Water Elevation, ft/MSL	NA	Field	1577.76	1578.95	1554.04	1553.49	--	1552.83	--	1552.2	1551.89	--	1556.59	--	1556.6	--	1553.85	1553.45	
Metals																			
Aluminum	Dissolved	Lab	< 20.0 ug/l	51.1 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	27.5 ug/l	28.4 ug/l	29.4 ug/l	
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Antimony	Dissolved	Lab	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Arsenic	Dissolved	Lab	< 0.50 ug/l	1.7 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Barium	Total	Lab	72.7 ug/l	43.0 ug/l	28.3 ug/l	18.6 ug/l	19.7 ug/l	14.7 ug/l	14.7 ug/l	20.6 ug/l	17.4 ug/l	17.8 ug/l	15.2 ug/l	15.3 ug/l	16.2 ug/l	15.6 ug/l	32.6 ug/l	34 ug/l	34.2 ug/l
Beryllium	Total	Lab	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	
Cadmium	Dissolved	Lab	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	
Cadmium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium	Total	Lab	27800 ug/l	8600 ug/l</															

Table 1
Water Analytical Data Summary
Polymet Mining Company

Table 1
Water Analytical Data Summary
PolyMet Mining Company

Location Date Sample Type			MW-6D 12/9/2011		MW-6D 1/10/2012		MW-6D 2/15/2012		MW-6D 3/6/2012		MW-6D 4/6/2012		MW-6D 5/2/2012 N	MW-6S 11/8/2011 N	MW-6S 12/9/2011 N	MW-6S 1/10/2012 N	MW-6S 2/15/2012 N	MW-6S 3/6/2012 N
			N	FD	N	FD	N	FD	N	FD	N	FD						
General Parameters	Fraction	Analysis Location																
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	88.6 mg/l	88.1 mg/l	88.6 mg/l	87.3 mg/l	87.4 mg/l	87.5 mg/l	87 mg/l	88.1 mg/l	87.8 mg/l	87.7 mg/l	86.5 mg/l	79.6 mg/l	85.6 mg/l	85.2 mg/l	86.9 mg/l	
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon, dissolved organic	NA	Lab	3.0 mg/l	3.2 mg/l	3.0 mg/l	2.6 mg/l	2.39 mg/l	3.01 mg/l	3.1 b mg/l	3.2 b mg/l	2.4 mg/l	2.5 mg/l	2.3 mg/l	2.5 mg/l	3.1 mg/l	3.4 mg/l	2.97 mg/l	3.0 b mg/l
Carbon, total organic	NA	Lab	2.9 mg/l	3.2 mg/l	2.3 mg/l	2.3 mg/l	2.08 mg/l	2.25 mg/l	2.1 mg/l	2.4 mg/l	2.4 mg/l	2.2 mg/l	1.9 mg/l	2.0 mg/l	2.5 mg/l	2.5 mg/l	2.17 mg/l	2.3 mg/l
Chemical Oxygen Demand	NA	Lab	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10.0 mg/l	< 10.0 mg/l	12.6 mg/l	17.6 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l
Chloride	NA	Lab	0.6 mg/l	0.62 mg/l	0.69 mg/l	0.9 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.50 mg/l	< 0.50 mg/l	0.63 mg/l	0.63 mg/l	0.69 mg/l	< 0.5 mg/l	< 0.5 mg/l
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved oxygen	NA	Field	10.54 mg/l	--	2.42 mg/l	--	1.34 mg/l	--	1.3 mg/l	--	4.32 mg/l	--	1.95 mg/l	0 mg/l	5.41 mg/l	1.83 mg/l	1.93 mg/l	1.76 mg/l
Fluoride	NA	Lab	0.13 mg/l	0.12 mg/l	0.11 mg/l	0.13 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.11 mg/l	< 0.10 mg/l	0.11 mg/l	< 0.1 mg/l	0.12 mg/l	0.11 mg/l	< 0.1 mg/l	< 0.1 mg/l
Hardness, total, as CaCO ₃	NA	Lab	97.7 mg/l	97.7 mg/l	92.7 mg/l	96.6 mg/l	97.5 mg/l	91.5 mg/l	93.2 mg/l	92.2 mg/l	90.1 mg/l	94.8 mg/l	85.8 mg/l	94.2 mg/l	90.8 mg/l	98.5 mg/l	91.4 mg/l	
Nitrate + Nitrite, as N	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.29 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	
Nitrogen, ammonia (NH ₃), as N	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.084 mg/l	0.10 mg/l	< 0.050 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
pH	NA	Field	7.5 pH units	--	7.62 pH units	--	7.76 pH units	--	7.56 pH units	--	7.65 pH units	--	7.25 pH units	7.45 pH units	7.52 pH units	7.49 pH units	7.62 pH units	7.54 pH units
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Redox (oxidation potential)	NA	Field	308 mV	--	454 mV	--	390 mV	--	435 mV	--	448 mV	--	330 mV	176 mV	300 mV	428 mV	330 mV	428 mV
Solids, total dissolved	NA	Lab	143 mg/l	151 mg/l	138 mg/l	136 mg/l	140 mg/l	159 mg/l	150 mg/l	134 mg/l	137 mg/l	141 mg/l	137 mg/l	138 mg/l	123 mg/l	140 mg/l	144 mg/l	
Specific Conductance @ 25°C	NA	Field	193.1 umhos/cm	--	195.2 umhos/cm	--	186.6 umhos/cm	--	192.8 umhos/cm	--	0 umhos/cm	--	150.6 umhos/cm	182.8 umhos/cm	186.6 umhos/cm	189.7 umhos/cm	183.7 umhos/cm	192.7 umhos/cm
Sulfate	NA	Lab	10.6 mg/l	10.6 mg/l	9.98 mg/l	10.4 mg/l	9.96 mg/l	9.96 mg/l	9.79 mg/l	9.72 mg/l	10.1 mg/l	10.1 mg/l	9.7 mg/l	11.5 mg/l	11 mg/l	10.5 mg/l	10.4 mg/l	9.92 mg/l
Temperature, degrees C	NA	Field	10.01 deg C	--	6.65 deg C	--	6.23 deg C	--	8.6 deg C	--	18.5 deg C	--	9.31 deg C	8.09 deg C	8.88 deg C	6.11 deg C	4.73 deg C	8.44 deg C
Turbidity	NA	Field	0 NTU	--	0 NTU	--	0 NTU	--	0.7 NTU	--	0.7 NTU	--	1.1 NTU	0.4 NTU	0.4 NTU	0.1 NTU	0.1 NTU	0.8 NTU
Water Elevation, ft/MSL	NA	Field	1569.53	--	1569.42	--	1569.1	--	1569.07	--	1570.91	--	1572.7	1569.5	1569.39	1569.09	1568.95	1568.93
Metals																		
Aluminum	Dissolved	Lab	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25.0 ug/l	< 25.0 ug/l	< 25 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 25 ug/l	< 25 ug/l	< 25.0 ug/l	< 25 ug/l	< 25 ug/l	
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Antimony	Dissolved	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	Dissolved	Lab	0.62 ug/l	0.69 ug/l	0.95 ug/l	0.92 ug/l	0.88 ug/l	0.78 ug/l	0.84 ug/l	0.72 ug/l	0.66 ug/l	0.55 ug/l	0.76 ug/l	0.78 ug/l	0.72 ug/l	0.84 ug/l	0.88 ug/l	0.92 ug/l
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	30.2 ug/l	31.1 ug/l	27.2 ug/l	27.4 ug/l	22.2 ug/l	24.1 ug/l	24.5 ug/l	24.8 ug/l	22.1 ug/l	21.6 ug/l	21.5 ug/l	20.4 ug/l	21.4 ug/l	20.6 ug/l	18.8 ug/l	18 ug/l
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.2 ug/l
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50 ug/l	
Cadmium	Dissolved	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	
Cadmium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium	Total	Lab	22300 ug/l	22300 ug/l	20300 ug/l	21200 ug/l	20200 ug/l	21900 ug/l	20000 ug/l	20500 ug/l	19900 ug/l	19400 ug/l	20300 ug/l	18500 ug/l	19600 ug/l	18700 ug/l	20900 ug/l	18800 ug/l
Chromium																		

Table 1
Water Analytical Data Summary
Polymet Mining Company

Location Date Sample Type			MW-6S 4/6/2012	MW-6S 5/2/2012		MW-7 11/9/2011		MW-7 12/12/2011 N	MW-7 1/24/2012 N	MW-7 2/15/2012 N	MW-7 3/7/2012 N	MW-7 4/23/2012		MW-7 5/30/2012		MW-8D 12/21/2011		MW-8D 1/9/2012 N	MW-8D 2/3/2012 N
			N	FD		N	FD		N	FD	N	FD	N	FD	N	FD			
			Fraction	Analysis Location															
General Parameters																			
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	80.7 mg/l	76.8 mg/l	76.6 mg/l	36.5 mg/l	36.5 mg/l	39.2 mg/l	35.7 mg/l	35.2 mg/l	35.6 mg/l	39.0 mg/l	39.1 mg/l	35.7 mg/l	35.3 mg/l	120 mg/l	120 mg/l	118 mg/l	
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon, dissolved organic	NA	Lab	2.4 mg/l	2.0 mg/l	2.0 mg/l	2.6 mg/l	2.6 mg/l	3.4 mg/l	2.5 mg/l	2.54 mg/l	2.7 b mg/l	2.1 mg/l	2.6 mg/l	2.1 mg/l	2.0 mg/l	5.5 mg/l	5.5 mg/l	4.6 mg/l	
Carbon, total organic	NA	Lab	2.0 mg/l	1.7 mg/l	1.6 mg/l	2.2 mg/l	2.3 mg/l	2.4 mg/l	2.1 mg/l	1.79 mg/l	1.8 mg/l	2.6 mg/l	2.2 mg/l	1.6 mg/l	1.7 mg/l	4.6 mg/l	4.5 mg/l	4.3 mg/l	
Chemical Oxygen Demand	NA	Lab	< 10.0 mg/l	< 10.0 mg/l	< 10.0 mg/l	11.4 mg/l	10.4 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	13.0 mg/l	< 10.0 h mg/l	10.0 mg/l	10.5 mg/l	16.6 mg/l	17.3 mg/l	11.6 mg/l	< 10 mg/l	
Chloride	NA	Lab	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	0.63 mg/l	0.63 mg/l	0.67 mg/l	0.79 mg/l	0.61 mg/l	0.58 mg/l	< 0.50 mg/l	< 0.50 mg/l	0.70 mg/l	0.70 mg/l	0.8 mg/l	0.82 mg/l	0.88 mg/l	< 0.5 mg/l
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved oxygen	NA	Field	6.33 mg/l	2.83 mg/l	--	5.86 mg/l	--	4 mg/l	2.02 mg/l	9.64 mg/l	2.23 mg/l	2.1 mg/l	--	1.6 mg/l	--	1.02 mg/l	--	1.84 mg/l	
Fluoride	NA	Lab	< 0.10 mg/l	0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	0.10 mg/l	0.17 mg/l	0.17 mg/l	0.16 mg/l	0.15 mg/l	
Hardness, total, as CaCO ₃	NA	Lab	88.2 mg/l	84.2 mg/l	83.1 mg/l	44 mg/l	43.2 mg/l	47.4 mg/l	39.6 mg/l	47.8 mg/l	40.5 mg/l	43.3 mg/l	43.5 mg/l	39.3 mg/l	39.9 mg/l	125 mg/l	125 mg/l	129 mg/l	
Nitrate + Nitrite, as N	NA	Lab	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	
Nitrogen, ammonia (NH ₃), as N	NA	Lab	< 0.050 mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.13 b mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
pH	NA	Field	6.89 pH units	7.2 pH units	--	7.08 pH units	--	7.01 pH units	7.08 pH units	7.26 pH units	7.49 pH units	6.99 pH units	--	7.28 pH units	--	7.32 pH units	--	7.41 pH units	
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Redox (oxidation potential)	NA	Field	464 mV	335 mV	--	155 mV	--	296 mV	292 mV	352 mV	419 mV	624 mV	--	274 mV	--	140 mV	--	123 mV	
Solids, total dissolved	NA	Lab	134 mg/l	134 mg/l	132 mg/l	110 mg/l	107 mg/l	72 mg/l	< 10 mg/l	72 mg/l	97 mg/l	89.0 mg/l	91.0 mg/l	75.0 mg/l	63.0 mg/l	173 mg/l	169 mg/l	150 mg/l	
Specific Conductance @ 25oC	NA	Field	0.1 umhos/cm	132.8 umhos/cm	--	96.9 umhos/cm	--	102.2 umhos/cm	89.8 umhos/cm	90.5 umhos/cm	90.3 umhos/cm	97.4 umhos/cm	--	48.1 umhos/cm	--	253.4 umhos/cm	--	258.4 umhos/cm	
Sulfate	NA	Lab	10.8 mg/l	10.9 mg/l	10.8 mg/l	9.89 mg/l	9.88 mg/l	9.54 mg/l	10.4 mg/l	9.98 mg/l	9.3 mg/l	7.8 mg/l	7.7 mg/l	9.7 mg/l	9.726 mg/l	7.24 mg/l	7 mg/l	6.82 mg/l	
Temperature, degrees C	NA	Field	14.18 deg C	9.68 deg C	--	7.42 deg C	--	7.85 deg C	9.14 deg C	11.34 deg C	7.87 deg C	6.6 deg C	--	5.59 deg C	--	6.05 deg C	--	6.6 deg C	
Turbidity	NA	Field	1.9 NTU	0 NTU	--	5.1 NTU	--	7.7 NTU	2.7 NTU	16.5 NTU	0 NTU	0 NTU	--	0.2 NTU	--	4.5 NTU	--	0.6 NTU	
Water Elevation, ft/MSL	NA	Field	1570.37	1572.59	--	1538.95	--	1538.53	1539.54	1537.23	1537.11	1540.31	--	1541.2	--	1604.12	--	1603.91	
Metals																			
Aluminum	Dissolved	Lab	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	63.5 ug/l	68.1 ug/l	< 25 ug/l	< 25 ug/l	< 25.0 ug/l	< 25 ug/l	24.1 ug/l	25.9 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Antimony	Dissolved	Lab	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	Dissolved	Lab	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	1.2 ug/l	1.23 ug/l	0.54 ug/l	0.58 ug/l	0.67 ug/l	0.63 ug/l	< 0.50 ug/l	0.51 ug/l	0.84 ug/l	0.98 ug/l	1.76 ug/l	1.82 ug/l	2.2 ug/l	
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	18.8 ug/l	18.8 ug/l	18.9 ug/l	16 ug/l	15.8 ug/l	15.7 ug/l	11.4 ug/l	24.8 ug/l	9.6 ug/l	10.7 ug/l	10.9 ug/l	8.5 ug/l	8.7 ug/l	25.4 ug/l	25.3 ug/l	23.6 ug/l	
Beryllium	Total	Lab	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	
Cadmium	Dissolved	Lab	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	
Cadmium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium	Total	Lab	18400 ug/l	17700 ug/l	17500 ug/l	9760 ug/l	9480 ug/l	10200 ug/l	8080 ug/l	9800 ug/l	8010 ug/l	8800 ug/l	8900 ug/l	7700 ug/l	7900 ug/l	29800 ug/l	29800 ug/l	31000 ug/l	
Chromium	Dissolved	Lab	1.0 ug/l	1.1 ug/l	1.1 ug/l	< 1.0 ug/l	< 1.5 ug/l	< 1.5 ug/l	1.55 ug/l	< 1 ug/l	< 1.0 ug/l	1.83 b ug/l	< 1.0 ug/l	< 1.0 ug/l	< 1.0 ug/l	< 1 ug/l	< 1 ug/l	< 1 ug/l	
Chromium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Cobalt	Dissolved	Lab	0.33 ug/l	0.20 ug/l	< 0.20 ug/l	0.96 ug/l	1.02 ug/l	0.72 ug/l	0.32 ug/l	0.20 j ug/l	< 0.2 ug/l	0.43 ug/l	0.42 ug/l	0.26					

Table 1
Water Analytical Data Summary
Polymet Mining Company

Location		MW-8D		MW-8D		MW-8D		MW-8S		MW-8S		MW-8S 1/9/2012	MW-8S		MW-8S 3/16/2012	MW-8S 4/27/2012	MW-8S 5/24/2012	MW-9 12/20/2011	
		Date	3/16/2012	FD	N	FD	N	FD	N	FD	N	FD	N	FD					
Sample Type		Fraction	Analysis Location																
General Parameters																			
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	121 mg/l	123 mg/l	126 mg/l	125 mg/l	123 mg/l	119 mg/l	69.3 mg/l	69.1 mg/l	76.7 mg/l	76.8 mg/l	86.5 mg/l	74.2 mg/l	73.2 mg/l	76.2 mg/l	120 mg/l	99.2 mg/l	50.4 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon, dissolved organic	NA	Lab	4.7 mg/l	5.3 mg/l	4.4 mg/l	4.6 mg/l	4.2 mg/l	4.2 mg/l	2.0 mg/l	2.5 mg/l	2.6 mg/l	2.4 mg/l	2.2 mg/l	2.72 b mg/l	2.80 b mg/l	2.5 mg/l	3.9 mg/l	2.9 mg/l	24.3 mg/l
Carbon, total organic	NA	Lab	4.4 mg/l	4.5 mg/l	4.3 mg/l	4.6 mg/l	3.8 mg/l	3.9 mg/l	1.8 mg/l	2.1 mg/l	2.4 mg/l	1.9 mg/l	1.7 mg/l	1.63 b mg/l	1.72 b mg/l	2.1 mg/l	3.0 mg/l	2.5 mg/l	23.2 mg/l
Chemical Oxygen Demand	NA	Lab	17.6 mg/l	12 mg/l	< 10.0 mg/l	< 10.0 mg/l	16.3 mg/l	14.4 mg/l	12.6 mg/l	11.6 mg/l	10.5 mg/l	12.2 mg/l	< 10 mg/l	< 10 mg/l	10.8 mg/l	< 10 mg/l	< 10.0 mg/l	12.1 mg/l	74.5 mg/l
Chloride	NA	Lab	< 0.5 mg/l	< 0.5 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	0.77 mg/l	0.77 mg/l	0.9 mg/l	0.9 mg/l	0.86 mg/l	0.58 mg/l	0.58 mg/l	0.61 mg/l	< 0.50 mg/l	< 0.50 mg/l	0.9 mg/l
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved oxygen	NA	Field	1.48 mg/l	--	1.72 mg/l	--	1.48 mg/l	--	2.78 mg/l	--	6.48 mg/l	--	3.55 mg/l	3.78 mg/l	--	2.97 mg/l	1.87 mg/l	1.61 mg/l	1.51 mg/l
Fluoride	NA	Lab	0.16 mg/l	0.17 mg/l	0.16 mg/l	0.16 mg/l	0.10 mg/l	0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.14 mg/l	0.14 mg/l	0.11 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.11 mg/l	0.25 mg/l	0.20 mg/l	< 0.1 mg/l
Hardness, total, as CaCO ₃	NA	Lab	130 mg/l	129 mg/l	134 mg/l	137 mg/l	125 mg/l	124 mg/l	77.5 mg/l	78.7 mg/l	87.2 mg/l	87 mg/l	78.4 mg/l	80.2 mg/l	75.2 mg/l	79.1 mg/l	89.4 mg/l	94.8 mg/l	58.1 mg/l
Nitrate + Nitrite, as N	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	0.23 mg/l	0.22 mg/l	0.18 mg/l	0.2 mg/l	0.22 mg/l	0.26 mg/l	0.25 mg/l	0.22 mg/l	< 0.10 mg/l	0.11 mg/l	< 0.1 mg/l
Nitrogen, ammonia (NH ₃), as N	NA	Lab	< 0.1 mg/l	< 0.050 mg/l	0.090 b mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.060 b mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
pH	NA	Field	7.1 pH units	--	7.74 pH units	--	7.57 pH units	--	6.10 pH units	--	6.77 pH units	--	6.7 pH units	6.71 pH units	--	6.46 pH units	10.36 pH units	10.41 pH units	6.37 pH units
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Redox (oxidation potential)	NA	Field	123 mV	--	335 mV	--	136 mV	--	712 mV	--	357 mV	--	240 mV	336 mV	--	255 mV	308 mV	112 mV	141 mV
Solids, total dissolved	NA	Lab	190 mg/l	183 mg/l	201 mg/l	196 mg/l	180 mg/l	183 mg/l	153 mg/l	142 mg/l	133 mg/l	145 mg/l	99 mg/l	134 mg/l	132 mg/l	141 mg/l	179 mg/l	161 mg/l	183 mg/l
Specific Conductance @ 25°C	NA	Field	247.5 umhos/cm	--	219 umhos/cm	--	212.6 umhos/cm	--	166 umhos/cm	--	196.7 umhos/cm	--	178.8 umhos/cm	161 umhos/cm	--	165.7 umhos/cm	209.3 umhos/cm	212.2 umhos/cm	143.7 umhos/cm
Sulfate	NA	Lab	6.2 mg/l	6.32 mg/l	6.4 mg/l	6.3 mg/l	6.7 mg/l	6.6 mg/l	11.7 mg/l	11.7 mg/l	19.6 mg/l	19.6 mg/l	9.91 mg/l	7.99 mg/l	7.99 mg/l	8.74 mg/l	9.9 mg/l	9.1 mg/l	6.98 mg/l
Temperature, degrees C	NA	Field	9.42 deg C	--	7.73 deg C	--	8.49 deg C	--	7.23 deg C	--	9.49 deg C	--	6.07 deg C	4.93 deg C	--	10.03 deg C	8.75 deg C	7.86 deg C	8.61 deg C
Turbidity	NA	Field	1.4 NTU	--	0.7 NTU	--	0 NTU	--	10.3 NTU	--	1.2 NTU	--	1.5 NTU	0 NTU	--	21.1 NTU	12 NTU	0 NTU	31.1 NTU
Water Elevation, ft/MSL	NA	Field	1604.77	--	1606.03	--	1607.05	--	1604.63	--	1604.51	--	1604.19	1603.75	--	1604.33	1666.23	1606.76	1592.11
Metals																			
Aluminum	Dissolved	Lab	< 20 ug/l	< 20 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	30.2 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25.0 ug/l	< 20 ug/l	59.8 ug/l	128 ug/l	617 ug/l
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Antimony	Dissolved	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	Dissolved	Lab	2.18 ug/l	2.16 ug/l	2.5 ug/l	2.4 ug/l	2.1 ug/l	1.9 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	4.0 ug/l	3.5 ug/l	3.34 ug/l
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	19.6 ug/l	19.9 ug/l	17.8 ug/l	17.7 ug/l	16.5 ug/l	16.7 ug/l	20.3 ug/l	23.6 ug/l	21.3 ug/l	21.5 ug/l	19.7 ug/l	18.3 ug/l	17.4 ug/l	21.7 ug/l	18.1 ug/l	15.9 ug/l	70.3 ug/l
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	0.23 ug/l
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l
Cadmium	Dissolved	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	0.21 ug/l	< 0.2 ug/l</td									

Table 1
Water Analytical Data Summary
Polymet Mining Company

Location Date Sample Type			MW-9 1/23/2012	MW-9 2/2/2012		MW-9 3/19/2012		MW-9 4/20/2012		MW-9 5/16/2012		MW-10D 12/19/2011		MW-10D 1/16/2012	MW-10D 2/1/2012	MW-10D 3/2/2012	MW-10D 4/17/2012	MW-10D 5/9/2012	
			N	FD	N	FD	N	FD	N	FD	N	FD	N				N	FD	
General Parameters	Fraction	Analysis Location																	
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	55.8 mg/l	56.7 mg/l	56.5 mg/l	56.1 mg/l	54.9 mg/l	37.4 mg/l	36.9 mg/l	38.3 mg/l	37.4 mg/l	48.6 mg/l	48.4 mg/l	47.2 mg/l	46.8 mg/l	46.6 mg/l	48.5 mg/l	49.5 mg/l	49.4 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon, dissolved organic	NA	Lab	25.8 mg/l	22.9 mg/l	22.8 mg/l	22.7 mg/l	22.4 mg/l	12.6 mg/l	12.6 mg/l	13.1 mg/l	4.0 mg/l	4.1 mg/l	4.1 mg/l	2.29 mg/l	2.41 mg/l	2.4 mg/l	2.6 mg/l	2.5 mg/l	
Carbon, total organic	NA	Lab	25.1 mg/l	22.6 mg/l	22.7 mg/l	22.9 mg/l	22.6 mg/l	12.6 mg/l	12.6 mg/l	12.8 mg/l	3.9 mg/l	3.5 mg/l	2.0 mg/l	1.96 mg/l	1.76 mg/l	1.9 mg/l	2.2 mg/l	1.8 mg/l	
Chemical Oxygen Demand	NA	Lab	65.2 mg/l	59.8 mg/l	64 mg/l	72 mg/l	67 mg/l	43.8 mg/l	43.6 mg/l	45.4 mg/l	49.5 mg/l	12.3 mg/l	17.7 mg/l	< 10 mg/l	< 10 mg/l	15.4 mg/l	23.2 mg/l	< 10.0 mg/l	< 10.0 mg/l
Chloride	NA	Lab	0.72 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	0.74 mg/l	0.73 mg/l	0.76 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved oxygen	NA	Field	2.58 mg/l	--	--	1.99 mg/l	--	1.63 mg/l	--	1.93 mg/l	--	6.97 mg/l	--	1.52 mg/l	2.48 mg/l	1.78 mg/l	1.48 mg/l	1.74 mg/l	--
Fluoride	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	0.1 mg/l	0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l
Hardness, total, as CaCO ₃	NA	Lab	55.5 mg/l	58.4 mg/l	57.8 mg/l	56.8 mg/l	56.8 mg/l	41.5 mg/l	41.8 mg/l	41.1 mg/l	40.0 mg/l	60.8 mg/l	60.6 mg/l	56.5 mg/l	55.1 mg/l	55.2 mg/l	55.0 mg/l	59.3 mg/l	58.6 mg/l
Nitrate + Nitrite, as N	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.11 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	1.6 mg/l	1.59 mg/l	1.32 mg/l	1.33 mg/l	1.32 mg/l	1.2 mg/l	0.91 mg/l	0.91 mg/l	
Nitrogen, ammonia (NH ₃), as N	NA	Lab	0.14 mg/l	0.11 mg/l	0.14 mg/l	0.19 mg/l	0.14 mg/l	0.31 mg/l	0.23 mg/l	0.17 mg/l	0.19 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.060 mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.050 mg/l
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
pH	NA	Field	6.49 pH units	--	--	6.51 pH units	--	6.96 pH units	--	6.81 pH units	--	7.22 pH units	--	6.87 pH units	6.79 pH units	6.72 pH units	6.87 pH units	6.77 pH units	--
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Redox (oxidation potential)	NA	Field	201 mV	--	--	134 mV	--	303 mV	--	75 mV	--	202 mV	--	92 mV	170 mV	258 mV	-67 mV	132 mV	--
Solids, total dissolved	NA	Lab	60 mg/l	75 * mg/l	156 * mg/l	121 mg/l	108 mg/l	96.0 mg/l	103 mg/l	139 mg/l	136 mg/l	102 mg/l	114 mg/l	111 mg/l	30 mg/l	123 h mg/l	131 mg/l	110 mg/l	100 mg/l
Specific Conductance @ 25oC	NA	Field	143.2 umhos/cm	--	--	142.9 umhos/cm	--	118.1 umhos/cm	--	77.9 umhos/cm	--	145.1 umhos/cm	--	135.4 umhos/cm	127 umhos/cm	134.7 umhos/cm	129.7 umhos/cm	99.1 umhos/cm	--
Sulfate	NA	Lab	1.28 mg/l	1.44 mg/l	1.45 mg/l	1.97 mg/l	2.03 mg/l	6.7 mg/l	6.8 mg/l	4.9 mg/l	5.0 mg/l	13 mg/l	13.4 mg/l	12.2 mg/l	10.7 mg/l	11.2 mg/l	12.4 mg/l	12.5 mg/l	
Temperature, degrees C	NA	Field	6.36 deg C	--	--	7.2 deg C	--	4.36 deg C	--	5.24 deg C	--	11.51 deg C	--	8.48 deg C	8.33 deg C	8.51 deg C	6.85 deg C	10.16 deg C	--
Turbidity	NA	Field	1.9 NTU	--	--	0 NTU	--	0 NTU	--	0 NTU	--	2.6 NTU	--	0 NTU	7.1 NTU	0 NTU	0 NTU	1.7 NTU	--
Water Elevation, ft/MSL	NA	Field	1591.84	1591.77	--	1592.39	--	1594.11	--	1593.77	--	1537.37	--	1536.99	1536.69	1536.41	1536.75	1537.57	--
Metals																			
Aluminum	Dissolved	Lab	175 ug/l	145 ug/l	164 ug/l	110 ug/l	111 ug/l	65.0 ug/l	65.2 ug/l	73.1 ug/l	74.8 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Antimony	Dissolved	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	Dissolved	Lab	3.94 ug/l	3.99 ug/l	3.96 ug/l	5.09 ug/l	5.14 ug/l	5.6 ug/l	5.7 ug/l	5.2 ug/l	5.1 ug/l	< 0.5 ug/l	< 0.5 ug/l	0.51 ug/l	0.6 ug/l	0.82 ug/l	0.70 ug/l	< 0.50 ug/l	< 0.50 ug/l
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	29 ug/l	28.2 ug/l	28 ug/l	26.4 ug/l	26.5 ug/l	18.6 ug/l	18.6 ug/l	17.8 ug/l	18.0 ug/l	22.7 ug/l	22.6 ug/l	22.2 ug/l	19.4 ug/l	18.9 ug/l	18.7 ug/l	19.7 ug/l	19.4 ug/l
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	
Cadmium	Dissolved	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	
Cadmium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium	Total	Lab	11900 ug/l	12400 ug/l	12300 ug/l	12200 ug/l	12200 ug/l	8300 ug/l	8400 ug/l	8200 ug/l	8000 ug/l	15500 ug/l	15400 ug/l	13800 ug/l	13200 ug/l	13500 ug/l	13200 ug/l	14000 ug/l	13800 ug/l
Chromium	Dissolved	Lab	1.16 ug/l	< 1 ug/l	< 1 ug/l	1.14 ug/l	1.1 ug/l	< 1.0 ug/l	< 1.0 ug/l	< 1.0 ug/l	< 1.0 ug/l	1.29 ug/l	1.22 ug/l	< 1 ug/l	< 1 ug/l	< 1 ug/l	< 1.0 ug/l	1.1 ug/l	1.1 ug/l
Chromium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Cobalt	Dissolved	Lab	3.71 ug/l	3.54 ug/l	3.51 ug/l	3.52 ug/l	3.59 ug/l	1.7 ug/l	1.8 ug/l	1.7 ug/l	1.7 ug/l	1.12 ug/l	0.98 ug/l	0.97 ug/l	1.08 ug/l	0.93 ug/l	0.70 ug/l	0.76 ug/l	0.75 ug/l
Cobalt	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Copper	Dissolved	Lab	8.44 ug/l	6.41 ug/l	6.44 ug/l	2.84 ug/l	2.9 ug/l												

Table 1
Water Analytical Data Summary
Polymet Mining Company

Sample Type	Location	Date	MW-10S	MW-10S	MW-11		MW-11		MW-11	MW-11		MW-11		MW-11	MW-12	MW-12		MW-12	MW-12
			12/19/2011	1/4/2012	12/20/2011		1/16/2012		2/2/2012	3/7/2012		4/17/2012		5/9/2012	2/22/2012	3/14/2012		4/18/2012	5/21/2012
			N	N	N	FD	N	FD	N	N	FD	N	N	FD	N	N	FD	N	
General Parameters	Fraction	Analysis Location																	
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	69.5 mg/l	49.9 mg/l	58.8 mg/l	60.1 mg/l	58.5 mg/l	59.3 mg/l	62 mg/l	59.6 mg/l	59.9 mg/l	59.8 mg/l	60.1 mg/l	61.5 mg/l	26.5 mg/l	26.3 mg/l	26.5 mg/l	26.1 mg/l	26.7 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon, dissolved organic	NA	Lab	44.6 mg/l	8.5 mg/l	3.4 mg/l	2.0 mg/l	2.0 mg/l	1.84 mg/l	2.0 b mg/l	2.3 b mg/l	1.6 mg/l	1.6 mg/l	1.8 mg/l	2.93 mg/l	2.0 mg/l	2.3 mg/l	1.7 mg/l	1.7 mg/l	1.7 mg/l
Carbon, total organic	NA	Lab	40.2 mg/l	7.7 mg/l	2.0 mg/l	1.5 mg/l	1.7 mg/l	1.43 mg/l	1.5 mg/l	1.6 mg/l	1.4 mg/l	1.4 mg/l	1.4 mg/l	1.81 mg/l	1.8 mg/l	2.2 mg/l	1.3 mg/l	1.2 mg/l	1.2 mg/l
Chemical Oxygen Demand	NA	Lab	133 mg/l	25.1 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	16.5 mg/l	15.0 mg/l	< 10.0 mg/l	< 10 mg/l	10.7 mg/l	< 10 mg/l	19.9 mg/l	< 10.0 mg/l	< 10.0 mg/l	< 10.0 mg/l
Chloride	NA	Lab	9.33 mg/l	3.68 mg/l	1.02 mg/l	1.04 mg/l	1.02 mg/l	0.75 mg/l	0.7 mg/l	0.7 mg/l	0.69 mg/l	0.69 mg/l	0.74 mg/l	0.6 mg/l	0.58 mg/l	0.61 mg/l	0.50 mg/l	0.50 mg/l	0.50 mg/l
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved oxygen	NA	Field	11.3 mg/l	11.23 mg/l	4.57 mg/l	--	4.5 mg/l	--	4.48 mg/l	4.84 mg/l	--	4.62 mg/l	--	4.83 mg/l	3.78 mg/l	3.76 mg/l	--	3.52 mg/l	3.92 mg/l
Fluoride	NA	Lab	0.25 mg/l	0.11 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l
Hardness, total, as CaCO ₃	NA	Lab	136 mg/l	65.1 mg/l	67.5 mg/l	66.1 mg/l	64.9 mg/l	65.3 mg/l	67.9 mg/l	68.2 mg/l	68.1 mg/l	65.1 mg/l	65.9 mg/l	67.7 mg/l	31.1 mg/l	29 mg/l	28.5 mg/l	27.8 mg/l	26.7 mg/l
Nitrate + Nitrite, as N	NA	Lab	2.66 mg/l	1 mg/l	0.17 mg/l	0.15 mg/l	0.14 mg/l	0.12 mg/l	0.14 mg/l	0.14 mg/l	0.16 mg/l	0.16 mg/l	0.14 mg/l	0.1 mg/l	< 0.1 mg/l	0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l
Nitrogen, ammonia (NH ₃), as N	NA	Lab	0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.090 mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.080 b mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.050 mg/l
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
pH	NA	Field	7.23 pH units	7.7 pH units	8 pH units	--	8.11 pH units	--	7.79 pH units	8.01 pH units	--	8.4 pH units	--	8.21 pH units	6.69 pH units	6.44 pH units	--	6.75 pH units	6.56 pH units
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Redox (oxidation potential)	NA	Field	261 mV	428 mV	210 mV	--	234 mV	--	273 mV	414 mV	--	214 mV	--	145 mV	221 mV	194 mV	--	122 mV	342 mV
Solids, total dissolved	NA	Lab	228 mg/l	131 mg/l	101 mg/l	101 mg/l	110 mg/l	104 mg/l	125 mg/l	119 mg/l	124 mg/l	122 mg/l	100 mg/l	18 mg/l	66 mg/l	73 mg/l	78.0 mg/l	79.0 mg/l	65.3 umhos/cm
Specific Conductance @ 25°C	NA	Field	308.1 umhos/cm	163.2 umhos/cm	142.5 umhos/cm	--	142.6 umhos/cm	--	141 umhos/cm	143.1 umhos/cm	--	138.1 umhos/cm	--	100.1 umhos/cm	70.4 umhos/cm	68.6 umhos/cm	--	65.3 umhos/cm	19.9 umhos/cm
Sulfate, total	NA	Lab	42.9 mg/l	17.3 mg/l	9.22 mg/l	9.21 mg/l	9.82 mg/l	9.9 mg/l	9.69 mg/l	9.16 mg/l	9.1 mg/l	9.2 mg/l	9.5 mg/l	8.79 mg/l	7.37 mg/l	7.33 mg/l	6.1 mg/l	6.1 mg/l	6.1 mg/l
Temperature, degrees C	NA	Field	11.4 deg C	11.08 deg C	8.79 deg C	--	8.43 deg C	--	5.65 deg C	5.59 deg C	--	4.8 deg C	--	6.56 deg C	7.24 deg C	5.93 deg C	--	3.46 deg C	5.87 deg C
Turbidity	NA	Field	52.6 NTU	43 NTU	0 NTU	--	0 NTU	--	0 NTU	0 NTU	--	0 NTU	--	20.1 NTU	4.4 NTU	0 NTU	--	0 NTU	0 NTU
Water Elevation, ft/MSL	NA	Field	1537.99	1537.84	1573.68	--	1573.19	--	1572.71	1572.42	--	1575.57	--	1575.74	1597.93	1598.1	--	1599.77	1600.05
Metals																			
Aluminum	Dissolved	Lab	63.7 ug/l	35.6 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 25 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 25 ug/l	< 20 ug/l	< 20 ug/l	< 20 ug/l	< 20 ug/l	< 20 ug/l	< 20 ug/l	
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Antimony	Dissolved	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	Dissolved	Lab	1.05 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	0.66 ug/l	0.61 ug/l	0.6 ug/l	0.51 ug/l	0.76 ug/l	0.66 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	0.54 ug/l	< 0.50 ug/l
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	67.3 ug/l	45.7 ug/l	12.4 ug/l	12.2 ug/l	10.5 ug/l	10.8 ug/l	11.1 ug/l	9.3 ug/l	9.24 ug/l	8.5 ug/l	8.3 ug/l	7.5 ug/l	16.6 ug/l	10.3 ug/l	10 ug/l	8.7 ug/l	9.2 ug/l
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l
Cadmium	Dissolved	Lab																	

Table 1
Water Analytical Data Summary
Polymet Mining Company

Location	Date	MW-13 2/22/2012		MW-13 3/14/2012 N	MW-13 4/20/2012 N	MW-13 5/16/2012 N	MW-14 2/23/2012		MW-14 3/26/2012 N	MW-14 4/30/2012		MW-14 5/14/2012		MW-15 3/29/2012 N	MW-15 4/30/2012 N	MW-15 5/30/2012 N	MW-16 2/24/2012 N	
		N	FD				N	FD		N	FD	N	FD					
	Fraction	Analysis Location																
General Parameters																		
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total	NA	Lab	39.9 mg/l	39.1 mg/l	59.6 mg/l	68.1 mg/l	64.9 mg/l	62.3 mg/l	59.4 mg/l	50 mg/l	49.2 mg/l	49.6 mg/l	46.7 mg/l	46.6 mg/l	87.9 mg/l	79.6 mg/l	78.1 mg/l	71.1 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Carbon, dissolved organic	NA	Lab	10.9 mg/l	11.1 mg/l	12.9 mg/l	23.7 mg/l	21.6 mg/l	3.57 mg/l	2.66 mg/l	1.8 mg/l	2.1 b mg/l	1.7 b mg/l	2.1 mg/l	1.5 mg/l	13.2 mg/l	15.0 mg/l	15.4 mg/l	3.49 mg/l
Carbon, total organic	NA	Lab	10.6 mg/l	10.3 mg/l	11.8 mg/l	23.5 mg/l	21.6 mg/l	1.87 mg/l	2.03 mg/l	1.8 mg/l	1.7 mg/l	1.7 mg/l	1.8 mg/l	1.9 mg/l	13.2 mg/l	14.4 mg/l	15.4 mg/l	2.73 mg/l
Chemical Oxygen Demand	NA	Lab	34.2 mg/l	36.9 mg/l	38.6 mg/l	72.7 mg/l	65.5 mg/l	< 10 mg/l	< 10 mg/l	< 10 mg/l	< 10.0 mg/l	< 10.0 mg/l	< 10.0 mg/l	< 10.0 mg/l	36.5 mg/l	38.9 mg/l	48.2 mg/l	< 10 mg/l
Chloride	NA	Lab	0.74 mg/l	0.71 mg/l	0.62 mg/l	0.73 mg/l	0.69 mg/l	< 0.5 mg/l	< 0.5 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	< 0.50 mg/l	1.01 mg/l
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved oxygen	NA	Field	2.79 mg/l	--	1.35 mg/l	1.75 mg/l	3.07 mg/l	10.16 mg/l	--	9.64 mg/l	9.85 mg/l	--	9.72 mg/l	--	2.38 mg/l	1.44 mg/l	1.66 mg/l	2.82 mg/l
Fluoride	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l
Hardness, total, as CaCO ₃	NA	Lab	61 mg/l	62.1 mg/l	71.8 mg/l	72.8 mg/l	68.3 mg/l	67 mg/l	64.8 mg/l	54.8 mg/l	57.1 mg/l	56.0 mg/l	49.5 mg/l	49.0 mg/l	74.8 mg/l	70.3 mg/l	66.5 mg/l	61.2 mg/l
Nitrate + Nitrite, as N	NA	Lab	0.11 mg/l	0.12 mg/l	< 0.1 mg/l	< 0.10 mg/l	0.33 mg/l	0.33 mg/l	0.32 mg/l	0.31 mg/l	0.32 mg/l	0.35 mg/l	0.34 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	0.12 mg/l
Nitrogen, ammonia (NH ₃), as N	NA	Lab	0.41 mg/l	0.38 mg/l	0.58 mg/l	1.4 mg/l	1.4 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.070 mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.050 mg/l	< 0.050 mg/l	3.3 mg/l	3.3 mg/l	< 0.1 mg/l	< 0.1 mg/l
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
pH	NA	Field	6.27 pH units	--	6.07 pH units	6.33 pH units	6.15 pH units	8.57 pH units	--	7.17 pH units	7.31 pH units	--	6.85 pH units	--	6.17 pH units	6.18 pH units	6.05 pH units	7.01 pH units
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Redox (oxidation potential)	NA	Field	254 mV	--	249 mV	368 mV	199 mV	364 mV	--	464 mV	623 mV	--	363 mV	--	436 mV	543 mV	255 mV	186 mV
Solids, total dissolved	NA	Lab	91 mg/l	106 mg/l	161 mg/l	238 mg/l	201 mg/l	99 * mg/l	58 * mg/l	93 mg/l	108 mg/l	112 mg/l	129 mg/l	106 mg/l	135 mg/l	133 mg/l	134 mg/l	78 mg/l
Specific Conductance @ 25oC	NA	Field	154.5 umhos/cm	--	178.1 umhos/cm	190.8 umhos/cm	0 umhos/cm	135.3 umhos/cm	--	121.6 umhos/cm	73.8 umhos/cm	--	65.7 umhos/cm	--	180 umhos/cm	127.3 umhos/cm	132 umhos/cm	167.3 umhos/cm
Sulfate	NA	Lab	23.3 mg/l	23.4 mg/l	13.8 mg/l	12.6 mg/l	16.8 mg/l	7.7 mg/l	7.73 mg/l	7.24 mg/l	7.0 mg/l	7.0 mg/l	6.9 mg/l	6.9 mg/l	< 1.0 mg/l	< 1.0 mg/l	< 1.0 mg/l	10.7 mg/l
Temperature, degrees C	NA	Field	3 deg C	--	8.29 deg C	6.23 deg C	16.71 deg C	4.25 deg C	--	4.37 deg C	5.96 deg C	--	6.93 deg C	--	5.1 deg C	7.19 deg C	8.1 deg C	8.3 deg C
Turbidity	NA	Field	7.1 NTU	--	2.3 NTU	0 NTU	3.8 NTU	0 NTU	--	0 NTU	0 NTU	--	0 NTU	--	7.9 NTU	0 NTU	0.2 NTU	5.5 NTU
Water Elevation, ft/MSL	NA	Field	1581.31	--	1581.77	1583.25	1583.06	1612.05	--	1613.06	1613.48	--	1613.49	--	1604.06	1604.16	1604.33	1543.95
Metals																		
Aluminum	Dissolved	Lab	118 ug/l	126 ug/l	108 ug/l	161 ug/l	146 ug/l	43.2 ug/l	44.7 ug/l	32.4 ug/l	35.1 ug/l	34.8 ug/l	< 20.0 ug/l	< 20.0 ug/l	25.1 ug/l	33.1 ug/l	863 ug/l	
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Antimony	Dissolved	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	Dissolved	Lab	0.84 ug/l	0.85 ug/l	0.85 ug/l	0.86 ug/l	0.77 ug/l	0.71 ug/l	< 0.5 ug/l	< 0.5 ug/l	0.68 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	0.55 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	Total	Lab	45.1 ug/l	44.4 ug/l	56.6 ug/l	72.8 ug/l	67.3 ug/l	11.3 ug/l	10.7 ug/l	9.4 ug/l	9.9 ug/l	9.7 ug/l	8.9 ug/l	9.0 ug/l	58.1 ug/l	49.7 ug/l	44.5 ug/l	17.8 ug/l
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Boron	Total	Lab	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	
Cadmium	Dissolved	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	
Cadmium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Calcium	Total	Lab	13600 ug/l	13900 ug/l	16000 ug/l	16900 ug/l	15300 ug/l	21100 ug/l	20200 ug/l	16400 ug/l	16800 ug/l	16400 ug/l	14100 ug/l	14000 ug/l	17900 ug/l	16300 ug/l	15400 ug/l	12700 ug/l
Chromium	Dissolved	Lab	1.42 ug/l	1.22 ug/l	< 1 ug/l	< 1.0 ug/l	1.0 ug/l	5.66 ug/l	5.77 ug/l	5.12 ug/l	3.6 ug/l	3.4 ug/l	2.3 ug/l	2.3 ug/l	< 1.0 ug/l	< 1.0 ug/l	< 1.0 ug/l	< 1 ug/l
Chromium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Cobalt	Dissolved	Lab	3.42 ug/l	3.63 ug/l	6.21 ug/l	8.6 ug/l	8.3 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	3.2 ug/l	3.2 ug/l	2.6 ug/l	0.82 ug/l
Cobalt	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Copper	Dissolved	Lab	5.09 ug/l	5.29 ug/l	3.84 ug/l	2.0 ug/l	1.8 ug/l	1.85 ug/l	1.92 ug/l	0.98 ug/l	0.82 ug/l	1.1 ug/l	2.7 ug/l	0.80 ug/l	< 0.50 ug/l	0.63 ug/l	0.75 ug/l	1.89 ug/l
Copper	Total	Lab	--	--	--	--	--</											

Table 1
Water Analytical Data Summary
PolyMet Mining Company

Location Date Sample Type	MW-16 3/20/2012		MW-16 4/24/2012 N	MW-16 5/15/2012		MW-17 2/23/2012 N	MW-17 3/20/2012 N	MW-17 4/23/2012 N	MW-17 5/15/2012 N	MW-18 2/23/2012 N	MW-18 3/27/2012		MW-18 4/9/2012 N	MW-18 5/14/2012 N	
	N	FD		N	FD						N	FD			
	Fraction	Analysis Location													
General Parameters															
Alkalinity, bicarbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate, as CaCO ₃	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total	NA	Lab	73.6 mg/l	86.3 mg/l	55.3 mg/l	48.2 mg/l	48.4 mg/l	118 mg/l	124 mg/l	129 mg/l	124 mg/l	84.5 mg/l	126 mg/l	122 mg/l	119 mg/l
Biochemical Oxygen Demand (5-day)	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon, dissolved organic	NA	Lab	3.59 b mg/l	3.16 b mg/l	2.1 mg/l	2.0 mg/l	2.4 mg/l	13.8 mg/l	45.8 mg/l	29.6 mg/l	28.5 mg/l	14.0 mg/l	8.6 mg/l	9.1 mg/l	9.2 mg/l
Carbon, total organic	NA	Lab	2.24 mg/l	2.64 mg/l	1.8 mg/l	2.1 mg/l	2.0 mg/l	14.1 mg/l	42.7 mg/l	29.0 mg/l	28.5 mg/l	13.3 mg/l	8.0 mg/l	7.8 mg/l	8.4 mg/l
Chemical Oxygen Demand	NA	Lab	< 10 mg/l	< 10 mg/l	< 10.0 mg/l	< 10.0 mg/l	< 10.0 mg/l	62.3 mg/l	433 mg/l	96.4 mg/l	79.9 mg/l	82.1 mg/l	22.1 mg/l	25.4 mg/l	28.1 mg/l
Chloride	NA	Lab	1.13 mg/l	1.14 mg/l	< 0.50 mg/l	< 0.50 mg/l	1.64 mg/l	1.08 mg/l	0.67 mg/l	0.63 mg/l	74.9 mg/l	27 mg/l	27 mg/l	8.1 mg/l	2.9 mg/l
Cyanide	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved oxygen	NA	Field	1.61 mg/l	--	3.82 mg/l	3.8 mg/l	--	4.71 mg/l	1.52 mg/l	1.56 mg/l	1.97 mg/l	10.68 mg/l	6.85 mg/l	--	9.78 mg/l
Fluoride	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	< 0.10 mg/l	< 0.1 mg/l	0.12 mg/l	< 0.10 mg/l	0.11 mg/l
Hardness, total, as CaCO ₃	NA	Lab	67.6 mg/l	68.4 mg/l	51.6 mg/l	52.2 mg/l	52.1 mg/l	112 mg/l	120 mg/l	121 mg/l	122 mg/l	223 mg/l	131 mg/l	125 mg/l	129 mg/l
Nitrate + Nitrite, as N	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	0.14 mg/l	0.16 mg/l	0.16 mg/l	< 0.1 mg/l	< 0.1 mg/l	< 0.10 mg/l	1.19 mg/l	< 0.1 mg/l	< 0.1 mg/l	0.29 mg/l	< 0.10 mg/l
Nitrogen, ammonia (NH ₃), as N	NA	Lab	< 0.1 mg/l	< 0.1 mg/l	0.10 b mg/l	< 0.050 mg/l	0.56 mg/l	1.18 mg/l	1.2 mg/l	1.2 mg/l	0.14 mg/l	0.1 mg/l	0.057 mg/l	< 0.050 mg/l	--
pH	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
pH	NA	Field	6.99 pH units	--	7.06 pH units	6.89 pH units	--	6.58 pH units	6.51 pH units	6.67 pH units	6.54 pH units	6.84 pH units	6.84 pH units	--	7.44 pH units
Phosphorus, total	NA	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Redox (oxidation potential)	NA	Field	150 mV	--	417 mV	368 mV	--	161 mV	136 mV	21 mV	77 mV	185 mV	527 mV	--	435 mV
Solids, total dissolved	NA	Lab	74 mg/l	91 mg/l	94.0 mg/l	111 mg/l	110 mg/l	195 mg/l	213 mg/l	247 mg/l	256 mg/l	212 mg/l	239 mg/l	219 mg/l	190 mg/l
Specific Conductance @ 25oC	NA	Field	165.1 umhos/cm	--	118.2 umhos/cm	71 umhos/cm	--	264 umhos/cm	290 umhos/cm	290.1 umhos/cm	238.9 umhos/cm	494.2 umhos/cm	371 umhos/cm	--	283.7 umhos/cm
Sulfate	NA	Lab	10.3 mg/l	10.3 mg/l	8.1 mg/l	8.2 mg/l	8.3 mg/l	2.69 mg/l	8.86 mg/l	1.8 mg/l	1.6 mg/l	30.2 mg/l	19.6 mg/l	19.5 mg/l	13.8 mg/l
Temperature, degrees C	NA	Field	7.38 deg C	--	7.46 deg C	7.7 deg C	--	6.03 deg C	7.93 deg C	6.62 deg C	7.87 deg C	6.66 deg C	8.96 deg C	--	9.03 deg C
Turbidity	NA	Field	7.9 NTU	--	2 NTU	0 NTU	--	24.9 NTU	11.7 NTU	0 NTU	11.11 NTU	90.7 NTU	106.9 NTU	--	25.1 NTU
Water Elevation, ft/MSL	NA	Field	1545.71	--	1545.96	1545.24	--	1577.93	1579.6	1581.1	1580.83	1621.76	1624.81	--	1624.93
Metals															
Aluminum	Dissolved	Lab	< 20 ug/l	< 20 ug/l	< 20.0 ug/l	< 20.0 ug/l	< 20.0 ug/l	98.3 ug/l	117 ug/l	128 ug/l	117 ug/l	45.6 ug/l	< 20 ug/l	< 20 ug/l	< 20.0 ug/l
Aluminum	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Antimony	Dissolved	Lab	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	0.54 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l
Antimony	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	Dissolved	Lab	0.59 ug/l	< 0.5 ug/l	< 0.50 ug/l	< 0.50 ug/l	< 0.50 ug/l	0.97 ug/l	1.09 ug/l	0.87 ug/l	1.1 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.5 ug/l	< 0.50 ug/l
Arsenic	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	Total	Lab	18.2 ug/l	18.6 ug/l	10.9 ug/l	11.2 ug/l	10.9 ug/l	58.4 ug/l	66.6 ug/l	60.4 ug/l	60.4 ug/l	247 ug/l	77.9 ug/l	73.6 ug/l	72.2 ug/l
Beryllium	Total	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	0.57 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l
Boron	Dissolved	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Boron	Total	Lab	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50.0 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50 ug/l	< 50.0 ug/l	< 50.0 ug/l
Cadmium	Dissolved	Lab	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.2 ug/l	< 0.20 ug/l	< 0.20 ug/l
Cadmium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	Total	Lab	14200 ug/l	14300 ug/l	10400 ug/l	10300 ug/l	10300 ug/l	21900 ug/l	25600 ug/l	25000 ug/l	25100 ug/l	47100 ug/l	31000 ug/l	29500 ug/l	29900 ug/l
Chromium	Dissolved	Lab	< 1 ug/l	< 1 ug/l	1.1 ug/l	< 1.0 ug/l	< 1.0 ug/l	3.83 ug/l	3.77 ug/l	3.5 ug/l	2.8 ug/l	< 1 ug/l	< 1 ug/l	< 1 ug/l	< 1.0 ug/l
Chromium	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	Dissolved	Lab	1.29 ug/l	1.32 ug/l	1.0 ug/l	0.63 ug/l	0.64 ug/l	3.92 ug/l	5.47 ug/l	3.6 ug/l	3.8 ug/l	0.79 ug/l	0.76 ug/l	0.78 ug/l	0.65 ug/l
Cobalt	Total	Lab	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	Dissolved	Lab	0.94 ug/l	0.93 ug/l	1.8 ug/l	2.8 ug/l	1.8 ug/l	49 ug/l	12.8 ug/l	7.1 ug/l	6.0 ug/l	4.8 ug/l			

Data Qualifiers/Footnotes

Qualifier	Definition
--	Not analyzed/not available.
a	Estimated value, calculated using some or all values that are estimates.
b	Potential false positive value based on blank data validation procedures.
c	Coeluting compound.
e	Estimated value, exceeded the instrument calibration range.
f	Sample was collected at a flowrate exceeding the recommended rate of 200 mL/minute.
h	EPA recommended sample preservation, extraction or analysis holding time was exceeded.
i	Indeterminate value based on failure of blind duplicate data to meet quality assurance criteria.
j	Reported value is less than the stated laboratory quantitation limit and is considered an estimated value.
p	Relative percent difference is >40% (25% CLP pesticides) between primary and confirmation GC columns.
pp	Small peak in chromatogram below method detection limit.
r	The presence of the compound is suspect based on the ID criteria of the retention time and relative retention time obtained from the examination of the chromatograms.
s	Potential false positive value based on statistical analysis of blank sample data.
v	Sample was collected under a vacuum of greater than XX inches of mercury.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
N	Sample Type: Normal
FD	Sample Type: Field Duplicate
AT	Sample chromatogram is noted to be atypical of a petroleum product.
DLND	Not detected, detection limit not determined.
DF	Did not flash
EMPC	Estimated maximum possible concentration.
NA – (Not applicable)	NA indicates that a fractional portion of the sample is not part of the analytical testing or field collection procedures.
ND	Not detected.
TIC	Tentatively identified compound
BQA	Barr-applied project specific qualifier: extraction and/or analyses conducted using an alternative method and/or procedure.
BQC	Barr-applied project specific qualifier: plant shut down.
BQD	Barr-applied project specific qualifier: equipment malfunction.
BQE	Barr-applied project specific qualifier: equipment adjustment.
BQM	Barr-applied project specific qualifier: manual measurement.
BQN	Barr-applied project specific qualifier: unable to be sampled or measured due to various reasons.
BQP	Barr-applied project specific qualifier: atypical chromatographic pattern.
BQQ	Barr-applied project specific qualifier: some aspect of QA/QC was not met.
BQR	Barr-applied project specific qualifier: location was re-sampled.
BQS	Barr-applied project specific qualifier: data is considered suspect.
BQT	Barr-applied project specific qualifier: summed value not displayed due to insufficient field length.
BQU	Barr-applied project specific qualifier: historical qualifier - definition unknown.
BQV	Barr-applied project specific qualifier: estimated value.
BQX	Barr-applied project specific qualifier: see notes for qualifier definition.
BQZ	Barr-applied project specific qualifier: data is considered unusable.