August 2, 2011

Ms. Yelena Saville
Municipal Light and Power
1200 E. First Avenue
Anchorage, Alaska 99501

Re: Spring 2011 Plant No. 1 Groundwater Monitoring

Dear Ms. Saville,

This report presents the results of the Spring 2011 groundwater monitoring activities at Municipal Light and Power's (ML&P) Hank Nikkels Plant No. 1, located at 821 E. First Avenue, Anchorage, Alaska. The sampling activities were conducted in accordance with the April 18, 2011 Work Plan approved by the Alaska Department of Environmental Conservation (ADEC), except as noted below. Sampling was conducted to characterize the site conditions and aid in planning and management.

SITE BACKGROUND

During the 1964 earthquake, an aboveground fuel tank southwest and upgradient of Plant No. 1 ruptured and released between 235,000 and 400,000 gallons of fuel oil. Investigations have identified petroleum hydrocarbons in the soil and groundwater at the site. In addition, the presence of polychlorinated biphenyls (PCBs) in the soil at the facility has been documented in some areas, particularly in the southeast portion of the facility.

Monitoring wells at Plant 1 have been sampled since 1991 for petroleum hydrocarbons. Wells B-3 and B-7 are located in the immediate vicinity of subsurface PCB-contaminated soil encountered during construction activities at Plant No. 1. Thin free product layers (<1 inch) and intermittent dense non-aqueous phase liquid (DNAPL) in the water have been historically observed in monitoring well B-3. Product recovery actions were conducted in the well in 2004 and 2007-2009, ceasing in 2009 due to lack of recovery or DNAPL. In addition, PCBs were detected in B-3 above the ADEC groundwater cleanup level (0.0005 mg/L, listed in 18 AAC 75.345, Table C) In June 2006; however, it is possible the sample contained a mixture of groundwater and free product. PCBs were non-detect in groundwater samples collected from monitoring wells at the facility in October 2006, the last time site-wide groundwater monitoring was conducted.

Tetrachloroethylene (PCE) and related degradation products have been detected in monitoring well MW-28 as the result of contaminant migration via groundwater transport from an upgradient source. A supplemental groundwater investigation performed for the EPA in 2008 delineated a groundwater plume of PCE contamination and degradation products trichloroethylene (TCE),

cis-1,2-dichloroethylene (cis-1,2 DCE) and vinyl chloride originating from a former drycleaner located at 4th and Gambell streets to the south of Plant 1 (CH2MHill 2008). The former drycleaner site is currently an active site in the ADEC contaminated sites database, referred to as the Alaska Real Estate Parking Lot (ADEC File No. 2100.38.434). There is no identified surface release of PCE in the area of MW-28.

SPRING 2011 GROUNDWATER SAMPLING

Groundwater samples were collected from six monitoring wells (B-3, MW-7 [B-7], MW-9, MW-12S, MW-13S, and MW-28 on April 25th and 26th and May 17th, 2011 (Figure 1). Monitoring well MW-7 was frozen during the April sampling event, and was sampled in May (the well was decommissioned on the following day, May 18th, prior to construction activities at the well's location). Sampling activities generally followed the 2010 ADEC Draft Field Sampling Guidance (ADEC, May 2010). The fieldwork effort was led by an ADEC-qualified sampler, SLR senior scientist Brent Veltkamp.

Prior to sampling, the water levels were measured using an electronic water level indicator with an oil-water interface probe. All monitoring wells except MW-28 were sampled using low-flow purging and sampling techniques, using a peristaltic pump equipped with disposable tubing (well MW-28 was sampled without purging). During the purging, the water quality parameters of temperature, pH, dissolved oxygen, conductivity and turbidity were measured at 5-minute intervals using a YSI 556 Multi-parameter instrument and a LaMotte 2020e turbidity meter. The water level data and the water quality parameters are presented in Table 1.

Once parameters were stable, water samples were collected for analysis of diesel range organics (DRO) by AK Method AK102; benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260B; and PCBs by EPA Method 8082. In addition, MW-28 was analyzed for Volatile Organic Compounds (VOCs) by EPA Method SW8260B. Laboratory analysis was conducted by SGS in Anchorage.

To avoid disposal issues for purge water from well MW-28, the well was sampled without prior purging, at a low-flow rate. Water quality parameters and the water level were measured before and after sampling. Samples were collected in the order of least volatile to most volatile to allow fresh groundwater to enter the well prior to VOC sample collection. In addition, the duplicate sample was collected at this well. Approximately 8 liters of PCB and DRO sample volume were removed from the well prior to VOC sample collection, a volume greater than three well casing volumes.

Purge water generated during sampling activities was placed in a clean steel drum and stored on site pending analysis. After review of the laboratory results from the wells, the purge water was disposed of by Emerald Alaska, Inc.

LABORATORY ANALYSIS AND RESULTS

The analytical data was reviewed for consistency with ADEC Technical Memorandum 06-002, Environmental Laboratory Data and Quality Assurance (ADEC 2009) requirements. An ADEC Laboratory Data Review Checklist was completed for each analytical work order and are included on the Attachments compact disc to this letter. The data was considered of good quality, and was 100% complete and usable for the project. Several MW-28 VOC analytes were outside of the 30% laboratory control limit for duplicate relative percent difference (RPD); these sample results were flagged "J" on Table 2 and are considered estimates. For PCB analysis, Aroclor-1260 matrix spike recovery for MW-13S was slightly below acceptance limits at 62%, and is considered an estimate with a potential low bias (flagged M- on Table 2). The impact to data quality of these two anomalies is considered minimal.

Groundwater elevations and sample results are included on the Figure 1. The groundwater flow direction based on the water level measurements continues to be from east to west across the site, as depicted on the figure. Analytical results are summarized in Table 2, along with historical sample results for comparison. The table includes sample results from ML&P groundwater monitoring conducted in October and November 2006 for wells B-3, MW-9, MW-12S, and MW-13S; June 2008 sampling of monitoring wells MW-7 and MW-28 was conducted for the U.S. Environmental Protection Agency by CH2MHill. The full laboratory report for the Spring 2011 sampling event is provided on the attached compact disc.

Monitoring well MW-28, located outside of Plant 1, was the only well with analytes above the ADEC cleanup levels (18 AAC 75.345, Table C). Sample results for all wells inside the Plant 1 facility were within ADEC cleanup levels. DRO was detected in four of the six wells; however, three of these results (MW-9, MW-12S, and MW-28) were estimated values below the laboratory Limit of Quantitation (LOQ). Monitoring well B-3 contained DRO at 0.824 mg/L, a similar concentration as was reported in 2006 (0.820 mg/L). A comparison of historical results indicates that DRO concentrations have generally decreased since 2006.

Benzene was detected in monitoring wells B-3, MW-12S, and MW-13S at concentrations well below groundwater cleanup levels. Concentrations at these three wells were slightly higher than was observed in 2006. Benzene concentrations decreased compared to historical concentrations in MW-7, MW-9, and MW-28.

PCBs (specifically Aroclor 1260) were detected in groundwater from MW-7 at an estimated concentration of 0.0000796 mg/L. This concentration is well below the LOQ and well below the groundwater cleanup standard of 0.0005 mg/L. Turbidity in the well was higher than optimal during groundwater sampling, above the goal of 10 NTU (nephelometric turbidity units). It is possible that soil particles (suspended sediment) with PCBs were contained in the groundwater sample. Soil sampling conducted during the subsequent excavation of the MW-7 area indicated PCBs were present in soil up to 181 mg/Kg. PCBs are generally insoluble in water. Therefore, the most plausible explanation for the low level detection of PCBs at MW-7 is that compounds were adhered to soil particles suspended in the groundwater, rather than present in the

dissolved phase. PCBs were not detected in groundwater samples from the other wells, indicating the detection is localized and PCBs are not migrating in the groundwater.

Eleven VOC compounds were detected in groundwater samples collected from MW-28. Four compounds; PCE, and degradation products cis-1,2-DCE, TCE, and vinyl chloride were present above ADEC groundwater cleanup levels. Of the cleanup level exceedances, PCE was the most prominent exceedance, at 0.377 mg/L in the duplicate sample, compared to the cleanup level of 0.005 mg/L. Concentrations of all four chlorinated analytes in MW-28 were higher in April 2011 than June 2008, with the greatest proportional increase observed in PCE concentration, an approximate 10-fold increase.

In summary, ADEC groundwater cleanup levels were not exceeded for any compounds in the groundwater within the Plant 1 facility. DRO concentrations have generally decreased at the facility since 2006. Very low concentrations of PCBs were detected in groundwater from MW-7. This detection is attributed to elevated turbidity in the well. To the southwest of the facility, the chlorinated solvent PCE and three degradation products exceeded ADEC cleanup levels in groundwater in MW-28; analyte concentrations appear to be increasing in this well.

Please feel free to contact us at (907)-222-1112 if you have any further questions.

Sincerely,

Brent Veltkamp
Senior Scientist

Reviewed by:

Bret Berglund
Project Manager

cc Bill O'Connell, Alaska Department of Environmental Conservation

Enc Table 1. Monitoring Well Sampling Information and Water Quality Parameters
Table 2. Groundwater Sample Results, Spring 2011 and Historical Comparisons
Figure 1. 2011 Groundwater Sample Results

Attachments on Compact Disc
- SGS Analytical Laboratory Data Packages
- ADEC Laboratory Data Review Checklists
- Data Quality Assessment
- Groundwater Sampling Forms

TABLE 1. Municipal Light and Power
Monitoring Well Sampling Information and Water Quality Parameters

Well Number	B-3	MW-7 (B-7)	MW-9	MW-12S	MW-13S	MW-28
Water Level & Well Purging Data						
Date Sampled	4/26/2011	5/17/2011	4/25/2011	4/25/2011	4/25/2011	4/26/2011
Elevation of Top-of Casing MP, ft[1]	33.22	33.61	33.54	31.89	33.00	34.19
Depth to Water Below MP, ft	5.92	4.39	6.25	6.92	7.57	9.40
Depth to Product Below MP, ft	n/a	n/a	n/a	n/a	n/a	n/a
Depth of Well Below Top of Casing, ft	18.91	15.35	13.38	9.38	9.23	12.16
Spring 2011 Water Level Elevation, ft	27.30	29.22	27.29	24.97	25.43	24.79
Fall 2006 Water Level Elevation, ft	27.21	29.09	27.52	25.36	25.81	n/a
Water Column in Well, ft	12.99	10.96	7.13	2.46	1.66	2.76
Gallons in Well	2.12	1.79	1.16	0.40	0.27	0.45
Total Gallons Purged, Low-Flow Sampling	2.4	5.5	2.4	3.8	3.6	0
Sampling/Water Parameters						
Sample Time	10:55	15:00	11:55	14:05	15:20	9:30
Temperature, °C	2.64	4.96	3.84	2.85	2.16	4.29
Specific Conductance, µS/cm	445	367	307	323	473	681
pH	6.86	6.23	6.44	6.39	6.28	6.50
Dissolved Oxygen, mg/L	0.75	0.56	0.74	0.65	0.57	6.82
Turbidity, NTU	1.59	17.8	5.08	0.94	0.37	7.48
Laboratory Analyses	DRO, PCB, BTEX	DRO, PCB, BTEX	DRO, PCB, BTEX	DRO, PCB, BTEX	DRO, PCB, BTEX	DRO, PCB, VOC

Notes:

1. Well Top-of-Casing elevation data from CH2MHill June 2008, except MW-13S (from 2006 data). Data in feet Above Mean Sea Level
   MP - Measuring Point

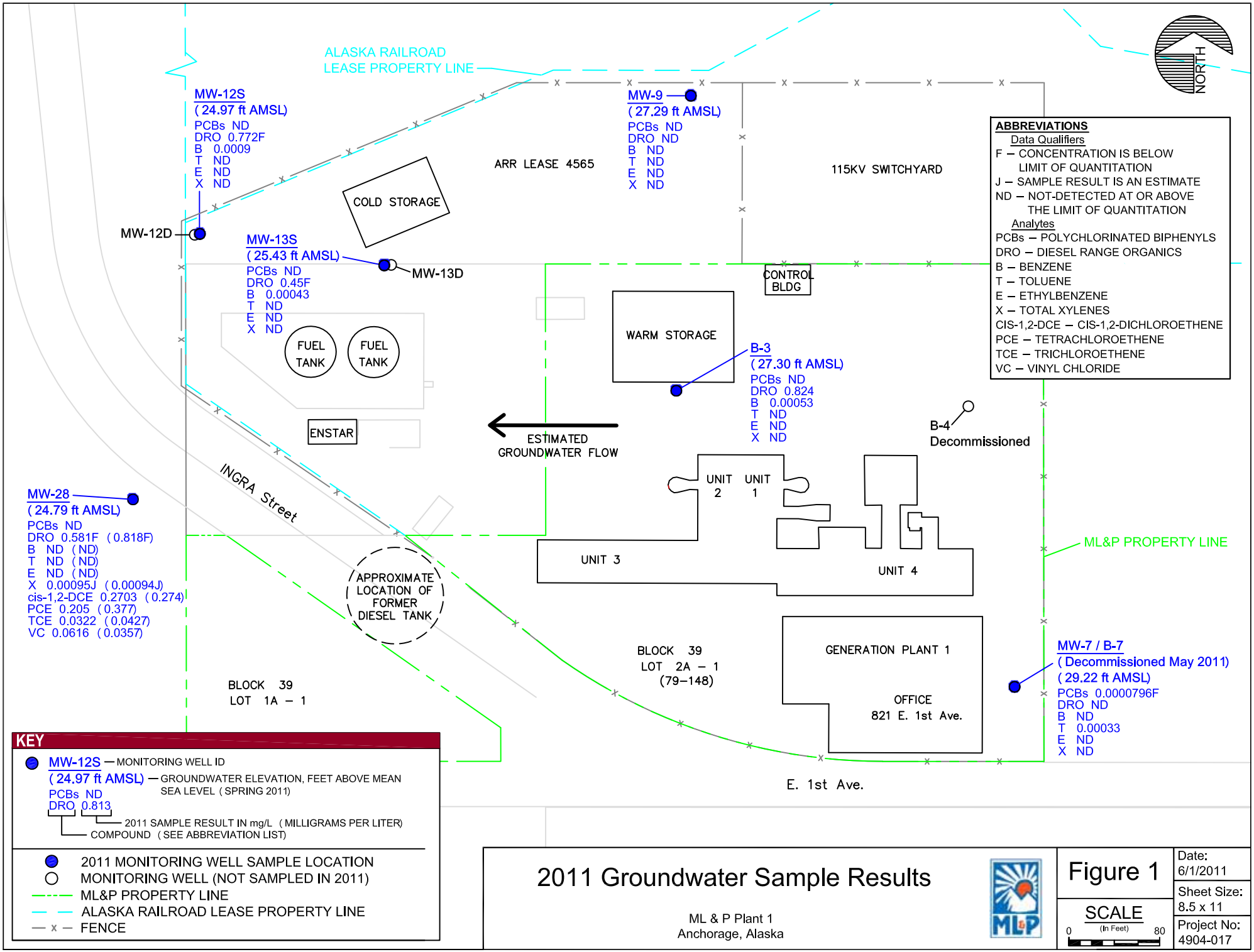
Purging and Sampling Method: Peristaltic Pump

Sampled By: Brent Veltkamp, Brandi Tolsma

Table 2. Municipal Light and Power Plant 1
Groundwater Sample Results, Spring 2011 and Historical Comparisons

Compound: milligrams per liter (mg/L)	ADEC Cleanup Level[1] (mg/L)	Sample Locations[2]																									
		MW-7 (B-7)				B-3				MW-9				MW-12S				MW-13S				MW-28						Trip Blank	
		MW-7 10-June-08 08G12109GW[3]		MW-7 17-May-11 1111955001		B-3 01-Nov-06 1066615006		B-3 26-Apr-11 1111555007		MW-9 31-Oct-06 1066615001		MW-9 25-Apr-11 1111555001		MW-12S 31-Oct-06 1066615002		MW-12S 25-Apr-11 1111555002		MW-13S 01-Nov-06 1066615009		MW-13S 25-Apr-11 1111555003		MW-28 11-June-08 08G12808GW[3]		**Primary** MW-28 26-Apr-11 1111555006		**Replicate** MW-928 26-Apr-11 1111555008		Trip Blank 26-Apr-11 1111555009	
		Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Fuels (methods AK 102 and 103)																													
Diesel Range Organics	1.5	[0.21]	ND	[0.305]	ND	0.820	=	0.824	=	0.151	F	[0.284]	ND	0.813	=	0.772	F	0.591	=	0.45	F	0.41	=	0.581	F	0.818	F	--	--
Polychlorinated Biphenyls (method SW8082)																													
Aroclor-1016	--	--	--	[0.000033]	ND	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Aroclor-1221	--	--	--	[0.000033]	ND	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Aroclor-1232	--	--	--	[0.000033]	ND	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Aroclor-1242	--	--	--	[0.000033]	ND	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Aroclor-1248	--	--	--	[0.000033]	ND	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Aroclor-1254	--	--	--	[0.000033]	ND	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Aroclor-1260	--	--	--	0.0000796	F	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND,M-	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Total PCBs[4]	0.0005	--	--	0.0000796	F	[0.0000325]	ND	[0.0000323]	ND	[0.0000326]	ND	[0.0000333]	ND	[0.0000344]	ND	[0.0000326]	ND	[0.0000310]	ND	[0.000033]	ND,M-	--	--	[0.0000333]	ND	[0.0000323]	ND	--	--
Benzene, Toluene, Ethylbenzene, and Xylene (method SW8021B [2006 data] and SW8260B)																													
Benzene	0.005	0.00047	JQ	[0.00024]	ND	0.000776	=	0.00053	=	0.000487	F	[0.00012]	ND	0.000566	=	0.0009	=	0.00134		0.00043	=	0.00019	JQ	[0.00012]	ND	[0.00012]	ND	[0.00012]	ND
Toluene	1	[0.0005]	ND	0.000330	F	[0.000620]	ND	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	0.00018	JQ	[0.00031]	ND	[0.00031]	ND	[0.00031]	ND
Ethylbenzene	0.7	[0.0005]	ND	[0.000620]	ND	[0.000620]	ND	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	0.00015	JQ	[0.00031]	ND	[0.00031]	ND	[0.00031]	ND
o-Xylene	--	[0.0005]	ND	[0.000620]	ND	0.000854	F	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	[0.000620]	ND	[0.00031]	ND	0.00194	F	[0.00031]	ND	0.0014	=	0.00095	F	0.00055	F	[0.00031]	ND
P & M -Xylene	--	[0.0005]	ND	[0.00124]	ND	0.000772	F	[0.00062]	ND	[0.000620]	ND	[0.00062]	ND	[0.000620]	ND	[0.00062]	ND	[0.00062]	ND	[0.00062]	ND	[0.0005]	ND	[0.00062]	ND	[0.00124]	ND	[0.00062]	ND
Total Xylene[4]	10	[0.0005]	ND	[0.00124]	ND	0.001626	F	[0.00062]	ND	[0.000620]	ND	[0.00062]	ND	[0.000620]	ND	[0.00062]	ND	0.00194	F	[0.00062]	ND	0.0014	=	0.00095	F	0.00055	F	[0.00094]	ND
Volatile Organic Compounds (method SW8260B)[5]																													
4-Isopropyltoluene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00037	F	[0.00031]	ND	[0.00031]	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	0.07	0.00029	J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.180**	=	**0.273**	=	**0.274**	=	[0.00031]	ND
Isopropylbenzene (Cumene)	3.7	[0.0005]	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00081	=	0.00082	F	0.00045	F	[0.00031]	ND
Methylene chloride	0.005	[0.0005]	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00048	F	[0.001]	ND	[0.001]	ND	0.00155	F
Naphthalene	0.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00334	J	0.00213	J	[0.00062]	ND
n-Butylbenzene	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00103	=	0.00064	F	[0.00031]	ND
n-Propylbenzene	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00057	F	0.00036	F	[0.00031]	ND
sec-Butylbenzene	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00415	J	0.00282	J	[0.00031]	ND
Tetrachloroethene (PCE)	0.005	0.00081	=	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.023**	=	**0.205**	J	**0.377**	J	[0.00031]	ND
trans-1,2-Dichloroethene	0.10	[0.0005]	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.003		0.00213	=	0.0019	=	[0.00031]	ND
Trichloroethene (TCE)	0.005	0.00042	JQ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.018**	=	**0.0322**	=	**0.0427**	=	[0.00031]	ND
Vinyl chloride	0.002	[0.0005]	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.022**	=	**0.0616**	J	**0.0357**	J	[0.00031]	ND

KEY	DESCRIPTION
[0.000033]	The detection limit is 0.000033
J	The quantitation is an estimate. A "+" or "-" was used to indicate potential positive or negative bias, if applicable.
F	Compound was positively identified. Concentration is above the Detection Limit but below the Limit of Quantitation (LOQ).
M	The quantitation is an estimate. An matrix spike or matrix spike duplicate recovered outside acceptance criteria. A "+" or "-" was used to indicate potential positive or negative bias, if applicable.
Q	The result is estimated because the concentration is below the Contract Required Quantitation Limits (CRQLs).
1	Cleanup levels listed in 18 AAC 75.345, Table C - Groundwater Cleanup Levels
2	The sample identification number (well identification), sample collection date, and laboratory sample identification number are provided.
3	Groundwater samples collected by CH2MHill, June 2008.
4	Total PCBs is the sum of all detected Aroclors. The highest detection limit is shown if no Aroclors were detected. Total Xylene is the sum of o-xylene and m,p-xylene. The highest detection limit is shown if no xylenes were detected.
5	Only detected VOC analytes are shown. For additional non-detect data, please refer to the full laboratory report.
BOLD and shaded	The result is above the cleanup level, 18 AAC 75.345 Table C - Groundwater Cleanup Level



2011 Groundwater Sample Results

ML & P Plant 1
Anchorage, Alaska

Figure 1

SCALE (In Feet) 0 80

Date: 6/1/2011
Sheet Size: 8.5 x 11
Project No: 4904-017

N:\Anchorage-Minnesota Drive\Projects\4904 - ML & P\4904-017-150-60s Contaminated Site Support\Groundwater Monitoring\-153 GW Mon PCBs - Plant 1\(821 E 1st)\2011 Sampling Event\Work Plan\Figure 1.dwg, 6/10/2011 3:25:29 PM, Adobe PDF (temporary)3168.pc3