



**2013 ANNUAL GROUNDWATER MONITORING REPORT**

**FOR**

**CAMP RIPLEY CLOSED  
MIXED MUNICIPAL LANDFILL  
Little Falls, Minnesota**

**Prepared for:**

**Mr. Mark Erickson  
Minnesota Department of Military Affairs  
Minnesota Army National Guard Facilities Management Office  
Little Falls, MN 56345**



**February 18, 2014**

***WSN No. 0283B0009.000***

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February 18, 2014

Mr. Neal Wilson, P.G.  
MPCA  
520 Lafayette Road North  
St. Paul, Minnesota 55155-4194

RE: Camp Ripley Closed Mixed Municipal Landfill  
2013 Annual Groundwater Monitoring Report  
WSN No. 0283B0009.000

Dear Mr. Wilson:

This report has been prepared in accordance with Minnesota Rule 7035.2585, item H and Minnesota Rule part 7035.2815, subpart 14, item Q. Item Q requires to report to identify recent and long term trends in water elevations and concentrations of monitored constituents. The report should also evaluate the effect the Camp Ripley Closed Mixed Municipal Landfill (closed landfill) is having on groundwater and surface water quality, and any recommendations for changes to the system.

The closed landfill occupies approximately 11 acres and is located within the Camp Ripley Training Facility. More specifically, the landfill is located in the Northeast  $\frac{1}{4}$  of the Northwest  $\frac{1}{4}$  of Section 5, Township 130 North, Range 29 West, Green Prairie Township, Morrison County, Minnesota. The location of the closed landfill is shown on the attached Figure 1.

The Minnesota Pollution Control Agency (MPCA) issued a Letter of Closure to the Camp Ripley Closed Mixed Municipal Landfill on January 29, 1988. Since closure, the landfill's groundwater monitoring network has been sampled and monitored as required. In 2009, the MPCA requested the installation of two new monitoring wells, one along the east border of the landfill and the other on the southeast border. Consequently, monitoring wells MMLF-7 and MMLF-8 were install during the fall of 2009. This report summarizes the sampling events and results for 2013.

The site is located within the central glacial drift region of Minnesota. The topography of the surrounding area consists of rolling hills and lowlands generally ranging in elevation from 1,140 ft above mean sea level (MSL) to 1,275 ft MSL. Original ground elevation across the landfill varies from approximately 1,160 ft MSL to 1,155 ft MSL from west to east.

In December 2006, J.J. Quinn of the Environmental Science Division of the Argonne National Laboratory published a paper titled Delineation of a Wellhead Protection Zone and Determination of Flow Paths from Potential Groundwater Contaminant Source Areas at Camp Ripley, Little Falls, Minnesota. The following glacial geological summary for the region is an excerpt from this paper:

“The geology and topography of the Camp Ripley property and its vicinity are the result of a complex glacial depositional history involving three ice lobes that deposited drifts of various characters and colors. These lobes were thought to have been concurrently active in central Minnesota; however, a detailed geologic characterization of the site by UMD (2002) suggests new, previously unrecognized possibilities for the juxtapositioning of the ice lobes and for the



nature of the St. Croix moraine at Camp Ripley. The lobes appear to have been present in the Camp Ripley vicinity concurrently, depositing well-sorted sands into an ice-bounded lacustrine basin. Occasional ice advances deposited discontinuous till units in the basin at various elevations.”

On site geological information has been collected during the installation of the various landfill monitoring wells. Well installation field logs indicate the soil profile consists primarily of fine sand. Previous reports document bedrock varies from 20 feet below ground surface (BGS) to over 100 feet BGS in the area of the closed landfill. Monitoring wells on the west side of the landfill were installed up to 53 feet BGS and did not encounter bedrock; however, monitoring well installations on the east side of the landfill encountered bedrock as shallow as 28 feet BGS.

The site is located within the Mississippi River watershed. Area waterways include the Mississippi River located approximately 2,000 feet east of the landfill, the Crow Wing River located approximately 13 miles north of the landfill, and the Little Elk River located approximately four miles southwest of the landfill. Green Prairie Fish Lake lies approximately three miles southwest of the landfill.

The groundwater table beneath the landfill is approximately 30 feet BGS. A regional groundwater model reported by Quinn (2006) describes the regional groundwater flow direction as southeast. Historically, groundwater elevation measurements from the landfill monitoring wells and the related flow maps document the local groundwater flow direction is also to the southeast.

Included in this report are the analytical results of the 2013 fall quarter sampling events for the closed landfill’s groundwater-monitoring network. The groundwater monitoring network consists of monitoring wells MW-3(MMLF-3), MW-7(MMLF-7), and MW-8(MMLF-8). The well locations are displayed on the groundwater contour map included as Figure 2. The fall sampling event was conducted by Widseth Smith Nolting’s (WSN) environmental technician, Mike Bogart, on October 25, 2013.

In 2013, the analytical schedule required samples from the three wells to be analyzed for the Minnesota Department of Health method 468 volatile organic compounds (VOCs). A complete list of the 468 VOCs is included in Table 1. The analytical results for the 2013 fall sampling event are summarized in Table 5 through Table 7. The tables include analytical data back to the October 2009 sampling event. Copies of the 2013 analytical reports are included in Appendix A. The results in the three tables indicate the only sample with detectable concentrations of VOCs was collected from MMLF-7. Cis-1,2-dichloroethylene and dichlorofluoromethane were identified in the sample at concentrations of 8.7 parts per billion (ppb) and 2.0 ppb, respectively. Ethyl ether was also found in the sample at a concentration of 14.8 ppb. It should be noted the three compounds have been in the samples from MMLF-7 at similar concentrations since the well was installed in 2009. The three compounds detected above their respective reporting limits did not exceed the published intervention limits.

We have also included Table 2 through Table 4 in this report. The tables summarize inorganic (metals and general chemistry parameters) results. Although the well samples were not required to be analyzed for inorganics in 2013, the tables are included to document the required field parameters.

Depths to water measurements from the three monitoring wells were recorded prior to sample collection. The fall groundwater elevations are listed in Table 8 and the associated groundwater flow map is attached as Figure 2. As shown, the groundwater flow direction is consistent with the historical flow direction, which is to the southeast.



Well stabilization parameters were measured and recorded prior to sample collection. A HydroLab Data Sonde 4A water quality multi-probe and a flow through cell were used to measure the stabilization parameters. The well stabilization forms are attached as Appendix B.

In 2014, the analysis schedule specifies samples from the groundwater monitoring network at the closed landfill be analyzed for all organic, inorganic, and general chemistry compounds listed in Table 1. Based on the analytical results for 2013 and past analytical results we do not believe it is necessary to make any changes to the landfill's groundwater monitoring network or the published analytical schedule for 2014. Please let me know if there is any other information that you might need. My direct telephone number is 218.316.3623 or you can send an email to [Greg.Smith@wsn.us.com](mailto:Greg.Smith@wsn.us.com).

Sincerely,

WIDSETH SMITH NOLTING

A handwritten signature in cursive script that reads "Gregory W. Smith".

Gregory W. Smith, P.G.

Cc: Mr. Mark Erickson, Facilities Management Office, Minnesota Army National Guard

## FIGURES

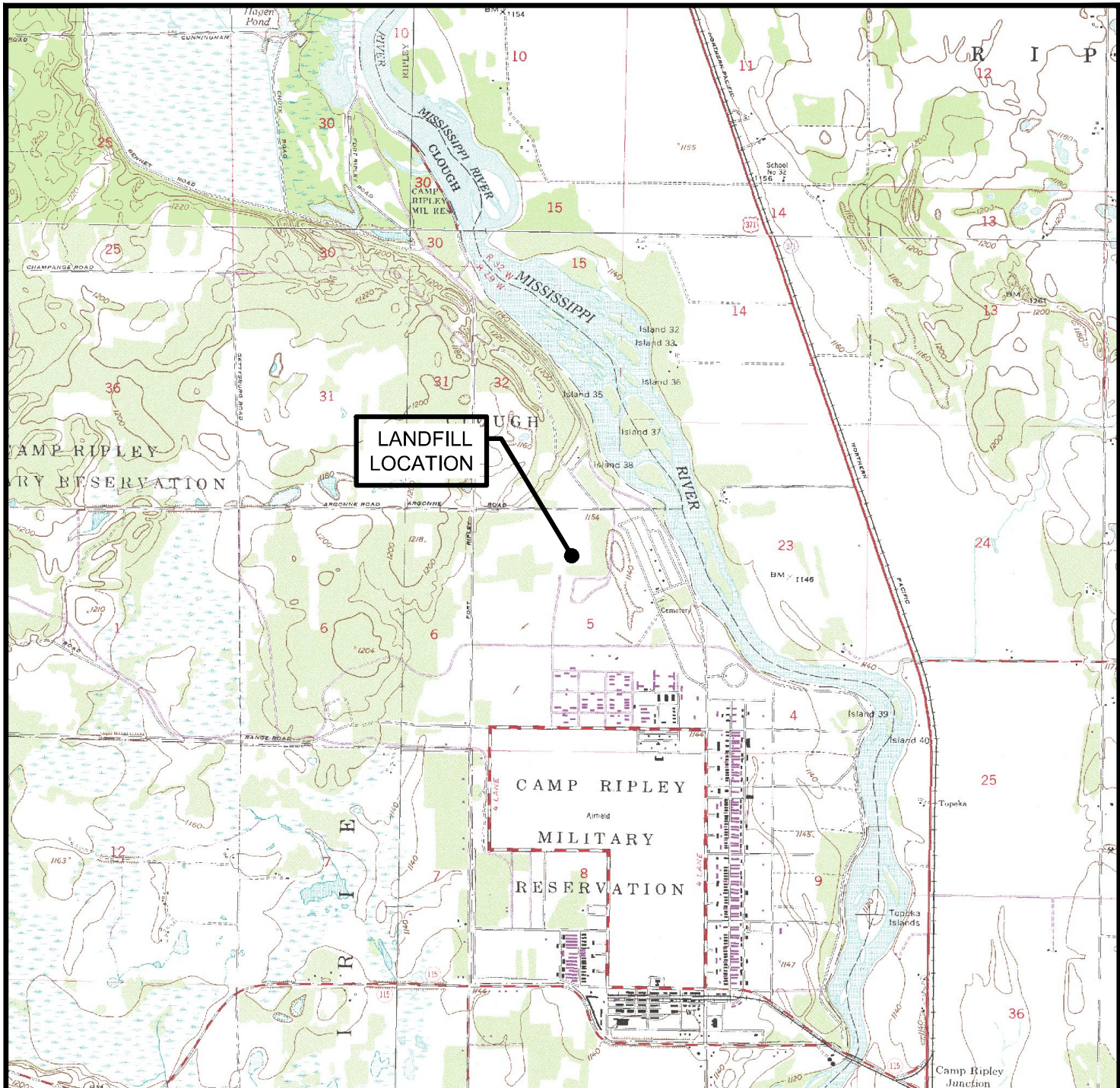
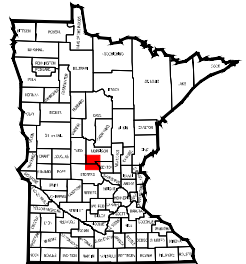


IMAGE: UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY

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AREA LOCATION



SCALE ( IN METERS)

U.S.G.S. QUADRANGLE MAPS:  
 BELLE PRAIRIE, BELL PRAIRIE NW, FORT RIPLEY, RANDALL EAST

PUBLISHED: 1956, 1956, 1956, 1956

PHOTOREVISED: 1979, 1979, NA, 1979

CLOSED MMSW LANDFILL - 2013 G.W. MONITORING

CAMP RIPLEY MILITARY RESERVATION

LITTLE FALLS, MN

DATE:

FEBRUARY 2014

JOB No.

FIGURE

0283B0009.000


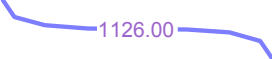
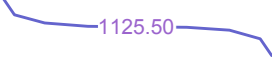


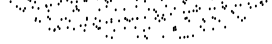
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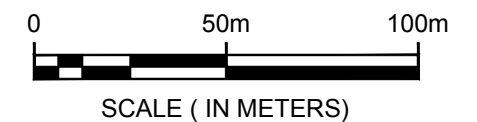
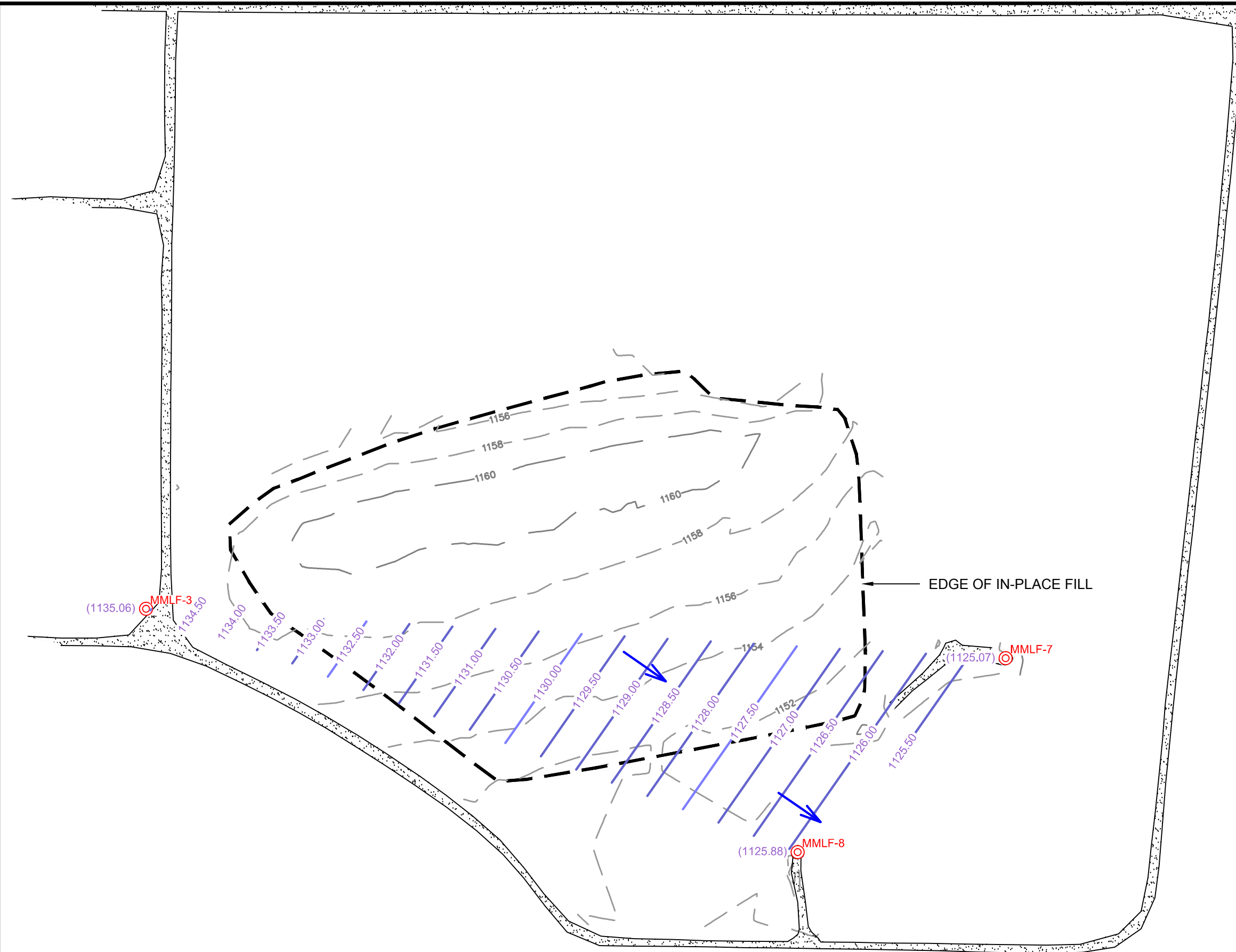


Engineering  
 Architecture  
 Surveying  
 Environmental

**SITE LOCATION MAP**

# LEGEND

-  DENOTES MONITORING WELL
-  DENOTES GROUNDWATER SURFACE MAJOR CONTOUR LINE
-  DENOTES GROUNDWATER SURFACE MINOR CONTOUR LINE
-  DENOTES GROUNDWATER ELEVATION AT LOCATION
-  DENOTES GROUNDWATER FLOW DIRECTION
-  DENOTES GRAVEL ROAD SURFACE





**REFERENCE NOTE:**

HORIZONTAL COORDINATES ARE SHOWN IN GRID METERS BASED ON UTM COORDINATES, ZONE 15 NORTH, NAD83 DATUM. VERTICAL CONTOURS AND ELEVATIONS ARE SHOWN IN FEET BASED ON NAVD.

BASE CONTROL POINT COORDINATES AND ELEVATIONS PROVIDED BY MN DEPT. OF MILITARY AFFAIRS.

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 <p><b>Engineering Architecture Surveying Environmental</b></p>	 <p>NORTH</p>	CLOSED MMSW LANDFILL - 2013 G.W. MONITORING CAMP RIPLEY MILITARY RESERVATION LITTLE FALLS, MN	DATE: <b>FEBRUARY 2014</b>
		<b>GROUNDWATER ELEVATIONS ON 10-25-13</b>	JOB No. 0283B0009.000 FIGURE <b>02</b>

# TABLES



Table 1

Parameters for Analysis

<b>Inorganics</b>
<b>Alkalinity</b> , total as calcium carbonate
<b>Ammonia Nitrogen</b>
<b>Arsenic</b> , dissolved
<b>Barium</b> , dissolved
<b>Boron</b> , dissolved
<b>Cadmium</b> , dissolved
<b>Chloride</b>
<b>Chromium</b> , total dissolved
<b>Copper</b> , dissolved
<b>Iron</b> , dissolved
<b>Lead</b> , dissolved
<b>Manganese</b> , dissolved
<b>Mercury</b> , dissolved
<b>Nitrate+Nitrite</b> as Nitrogen
<b>Sodium</b> , dissolved
<b>Sulfate</b>
<b>Suspended Solids</b> , total
<b>Appearance</b> (field and lab)
<b>Dissolved Oxygen</b> (field)
<b>pH</b> (field and lab)
<b>Specific Conductance</b> (field and lab)
<b>Temperature</b> (field and lab)
<b>Turbidity</b> (field)
<b>Static Water Elevation</b>

## 468 List

1,1,1,2-Tetrachloroethane
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1,2-Trichlorotrifluoroethane
1,1-Dichloroethane
1,1-Dichloroethylene (Vinylidene chloride)
1,2-Dichloropropane
trans-1,2-Dichloroethylene
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,2-Bromomethane; (Ethylene dibromide); EDB
1,2-Dichlorobenzene (ortho)
1,2-Dichloroethane
1,2-Dichloroethylene (cis)
1,2-Dichloropropane
1,3,5-Trimethylbenzene
1,3-Dichlorobenzene (meta-)
1,3-Dichloropropane
1,3-Dichloropropane ( cis + trans)
1,4-Dichlorobenzene (para)
2,2-Dichloropropane
2-Chlorotoluene (ortho-)
4-Chlorotoluene (para-)
Acetone
Allyl chloride; (3-Chloropropene)
Benzene
Bromobenzene
Bromochloromethane (Chlorobromomethane)
Bromodichloromethane (Dichlorobromomethane)
Bromoform
Bromomethane (Methyl chloride)
Carbon tetrachloride
Chlorobenzene (monochlorobenzene)
Chlorodibromomethane; (Dibromochloromethane)
Chloroethane
Chloroform
Chloromethane; (Methyl chloride)
Cumene; (Isopropylbenzene)
Dibromochloropropane; (DBCP)
Dibromomethane; Methylene bromide)

Dichlorodifluoromethane
Dichlorofluoromethane
Dichloromethane (methylene chloride)
Ethyl benzene
Ethyl ether
Hexachlorobutadiene
Methyl ethyl ketone (MEK)
Methyl isobutyl ketone; (4-Methyl-2-pentanone)
Methyl tertiary-butyl ether (MTBE)
Naphthalene
n-Butyl benzene
n-Propyl benzene
p-Isopropyltoluene
sec-Butyl benzene
Styrene
tert-Butyl benzene
Tetrachloroethylene; (Perchloroethylene)
Tetrahydrofuran
Toluene
Trichloroethylene; (TCE)
Trichlorofluoromethane
Vinyl Chloride
Xylenes (mixture of o, m, p)

## Table 2

### Summary of Inorganic Groundwater Quality - MMLF-3 Camp Ripley Closed Mixed Municipal Landfill State of Minnesota Department of Military Affairs

Parameter	Units	IL	MMLF-3*	MMLF-3*	MMLF-3*	MMLF-3*	MMLF-3*	MMLF-3
			10/26/2009	11/11/2009	12/10/2009	11/8/2010	11/1/2012	10/25/2013
Alkalinity	mg/L	NL	NA	NA	NA	120	128	NA
Ammonia Nitrogen	mg/L	NL	NA	NA	NA	<0.01	<0.1	NA
Arsenic (dissolved)	ug/L	2.5	NA	NA	NA	<1.6	<2.5	NA
Barium (dissolved)	mg/L	0.5	NA	NA	NA	0.027	0.0343	NA
Boron (dissolved)	ug/L	250	NA	0.23	0.39	0.17	0.26	NA
Cadmium (dissolved)	ug/L	1.0	NA	NA	NA	18	<1	NA
Calcium (dissolved)	mg/L	NL	NA	NA	NA	39	46.1	NA
Cation/Anion Balance	%	NL	NA	NA	NA	NA	1.6	NA
Chloride	mg/L	NL	NA	NA	NA	2	19.8	NA
Chromium	ug/L	25.0	NA	NA	NA	<5	<5	NA
Chromium, Trivalent	ug/L	NL	NA	NA	NA	NA	<10	NA
Chromium, Hexavalent	ug/L	NL	NA	NA	NA	<4	<10	NA
Conductance (Field)	umhos/cm	NL	NA	NA	NA	239	266.5	260
Conductance (Lab)	umhos/cm	NL	NA	NA	NA	260	360	NA
Copper (dissolved)	ug/L	250	NA	NA	NA	<10	<5	NA
Dissolved Oxygen (Field)	mg/L	NL	NA	NA	NA	NA	3.39	0.68
Eh (Lab)	mV	NL	NA	NA	NA	150	159	NA
Eh (Field)	mV	NL	NA	NA	NA	NA	532	61
Iron (dissolved)	mg/L	NL	NA	NA	NA	0.048	<0.05	NA
Lead (dissolved)	ug/L	1.25	NA	NA	NA	<0.4	<2.5	NA
Magnesium (dissolved)	mg/L	NL	NA	NA	NA	11	12.6	NA
Manganese (dissolved)	mg/L	75.0	NA	NA	NA	0.098	0.0825	NA
Mercury (dissolved)	ug/L	0.5	NA	NA	NA	<0.1	<0.20	NA
Nitrate/Nitrite as N	mg/L	2.5	NA	NA	NA	NA	NA	NA
Nitrate as N	mg/L	NL	NA	NA	NA	<0.05	0.15	NA
Nitrite as N	mg/L	NL	NA	NA	NA	<0.05	<0.1	NA
pH (Field)	Standard Units	NL	NA	NA	NA	7.91	8.17	9.2
pH (Lab)	Standard Units	NL	NA	NA	NA	8	7.7	NA
Potassium (dissolved)	mg/L	NL	NA	NA	NA	1	1	NA
Sodium (dissolved)	mg/L	NL	NA	NA	NA	3.4	NA	NA
Sulfate	mg/L	NL	NA	NA	NA	13	15.9	NA
Temp (Field)	oC	NL	NA	NA	NA	9.3	8.95	9.62
Total Dissolved Solids (TDS)	mg/L	NL	NA	NA	NA	160	195	NA
Total Suspended Solids (TSS)	mg/L	NL	NA	NA	NA	30	404	NA
Turbidity	NTU	NL	NA	NA	NA	24	38	83
Zinc (dissolved)	ug/L	500	NA	NA	NA	<5	<10	NA

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

**Table 3**

**Summary of Inorganic Groundwater Quality - MMLF-7  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

<b>Parameter</b>	<b>Units</b>	<b>HRL</b>	<b>MMLF-7* 10/26/2009</b>	<b>MMLF-7* 11/11/2009</b>	<b>MMLF-7* 12/10/2009</b>	<b>MMLF-7* 11/8/2010</b>	<b>MMLF-7* 11/1/2012</b>	<b>MMLF-7 10/25/2013</b>
Alkalinity	mg/L	NL	360	280	330	340	416	NA
Ammonia Nitrogen	mg/L	NL	0.83	0.52	0.33	0.42	1.1	NA
Arsenic (dissolved)	ug/L	2.5	<1	<1	<1	<1.6	<2.5	NA
Barium (dissolved)	mg/L	0.5	72	<40	64	NA	NA	NA
Boron (dissolved)	ug/L	250	0.23	0.39	0.17	0.26	0.44	NA
Cadmium (dissolved)	ug/L	1.0	<0.2	<0.2	<0.2	<2	<1	NA
Calcium (dissolved)	mg/L	NL	120	86	100	98	128	NA
Cation/Anion Balance	%	NL	NA	NA	NA	NA	1.3	NA
Chloride	mg/L	NL	19	19	20	24	21	NA
Chromium	ug/L	25.0	<5	4	<5	<5	<5	NA
Chromium, Trivalent	ug/L	NL	NA	NA	NA	NA	<10	NA
Chromium, Hexavalent	ug/L	NL	<3	<3	<3	<4	<10	NA
Conductance (Field)	umhos/cm	NL	624	490	574	599	802	850
Conductance (Lab)	umhos/cm	NL	750	580	690	690	900	NA
Copper (dissolved)	ug/L	250	<10	<10	<10	<10	<5	NA
Dissolved Oxygen (Field)	mg/L	NL	140	130	130	140	0.88	3.72
Eh (Lab)	mV	NL	NA	NA	NA	NA	165	NA
Eh (Field)	mV	NL	NA	NA	NA	NA	584	144
Iron (dissolved)	mg/L	NL	0.02	<0.01	0.04	0.038	0.051	NA
Lead (dissolved)	ug/L	1.25	<0.4	<0.4	<0.4	<0.4	<2.5	NA
Magnesium (dissolved)	mg/L	NL	28	23	24	25	28.7	NA
Manganese (dissolved)	mg/L	75.0	3.4	2.6	2.2	2.3	2.24	NA
Mercury (dissolved)	ug/L	0.5	<0.1	<0.1	<0.1	<0.1	<0.20	NA
Nitrate/Nitrite as N	mg/L	2.5	NA	0.64	NA	NA	NA	NA
Nitrate as N	mg/L	NL	0.76	NA	0.43	0.38	<0.1	NA
Nitrite as N	mg/L	NL	<0.05	NA	<0.05	<0.05	<0.1	NA
pH (Field)	Standard Units	NL	6.83	6.83	6.9	7.07	7.19	8.16
pH (Lab)	Standard Units	NL	7.2	7.1	7.2	7.1	7	NA
Potassium (dissolved)	mg/L	NL	2.1	1.6	1.8	2.2	2.9	NA
Sodium (dissolved)	mg/L	NL	16	11	15	13	NA	NA
Sulfate	mg/L	NL	12	7.8	9.6	9.7	6.3	NA
Temp (Field)	oC	NL	8.3	8.7	7.1	10.6	9.27	8.28
Total Dissolved Solids (TDS)	mg/L	NL	440	340	400	400	501	NA
Total Suspended Solids (TSS)	mg/L	NL	6	8	2	16	4	NA
Turbidity	NTU	NL	8.2	4	2	2	0.8	40.1
Zinc (dissolved)	ug/L	500	8	<5	<5	8	<10	NA

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

## Table 4

**Summary of Inorganic Groundwater Quality - MMLF-8  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

Parameter	Units	IL	MMLF-8*	MMLF-8*	MMLF-8*	MMLF-8*	MMLF-8*	MMLF-8
			10/26/2009	11/11/2009	12/10/2009	11/8/2010	11/1/2012	10/25/2013
Alkalinity	mg/L	NL	160	150	170	170	163	NA
Ammonia Nitrogen	mg/L	NL	<0.01	<0.01	<0.01	<0.01	<0.1	NA
Arsenic (dissolved)	ug/L	2.5	<1	<1	<1	<1.6	<2.5	NA
Barium (dissolved)	mg/L	0.5	0.072	<0.04	0.064	NA	NA	NA
Boron (dissolved)	ug/L	250	0.044	0.035	0.029	0.023	0.03	NA
Cadmium (dissolved)	ug/L	1.0	<0.2	<0.2	<0.2	<2	<1	NA
Calcium (dissolved)	mg/L	NL	54	53	49	52	55.3	NA
Cation/Anion Balance	%	NL	NA	NA	NA	NA	0.58	NA
Chloride	mg/L	NL	13	21	17	17	20.6	NA
Chromium	ug/L	25.0	<5	5.2	<5	<5	<5	NA
Chromium, Trivalent	ug/L	NL	NA	NA	NA	NA	<10	NA
Chromium, Hexavalent	ug/L	NL	<3	<3	<3	<4	<10	NA
Conductance (Field)	umhos/cm	NL	308	326	316	339	384	310
Conductance (Lab)	umhos/cm	NL	350	370	380	370	410	NA
Copper (dissolved)	ug/L	250	<10	<10	<10	<10	<5	NA
Dissolved Oxygen (Field)	mg/L	NL	NA	NA	NA	NA	8.75	NA
Eh (Lab)	mV	NL	150	140	190	140	154	NA
Eh (Field)	mV	NL	NA	NA	NA	NA	514	155
Iron (dissolved)	mg/L	NL	<0.01	<0.01	<0.01	<0.01	<0.05	NA
Lead (dissolved)	ug/L	1.25	<0.4	<0.4	<0.4	<0.4	<2.5	NA
Magnesium (dissolved)	mg/L	NL	13	14	12	13	14.2	NA
Manganese (dissolved)	mg/L	75.0	0.081	0.03	0.006	<0.005	<0.01	NA
Mercury (dissolved)	ug/L	0.5	<0.1	<0.1	<0.1	<0.1	<0.20	NA
Nitrate/Nitrite as N	mg/L	2.5	NA	1.1	NA	NA	NA	NA
Nitrate as N	mg/L	NL	0.65	NA	0.73	0.67	0.48	NA
Nitrite as N	mg/L	NL	<0.05	NA	<0.05	<0.05	<0.1	NA
pH (Field)	Standard Units	NL	7.51	7.05	7.08	7.84	8.44	9.09
pH (Lab)	Standard Units	NL	7.9	7.8	7.9	7.8	7.7	NA
Potassium (dissolved)	mg/L	NL	0.6	0.8	0.4	0.75	0.64	NA
Sodium (dissolved)	mg/L	NL	2.6	3.1	2.5	2.8	NA	NA
Sulfate	mg/L	NL	7.4	7.6	7.4	7.4	6.9	NA
Temp (Field)	oC	NL	8.3	8.7	7.1	10.6	7.97	8.34
Total Dissolved Solids (TDS)	mg/L	NL	200	200	220	390	235	NA
Total Suspended Solids (TSS)	mg/L	NL	4	4	8	6	5.5	NA
Turbidity	NTU	NL	6.8	2.7	10	3.8	1.4	46.7
Zinc (dissolved)	ug/L	500	<5	<5	<5	<5	10.1	NA

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

## Table 5

**Summary of Organic Groundwater Quality Data - MMLF-3  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

Parameter	Units	IL	MMLF-3* 10/26/2009	MMLF-3* 11/11/2009	MMLF-3* 12/10/2009	MMLF-3* 11/8/2010	MMLF-3* 11/1/2012	MMLF-3 10/25/2013
Acetone	(ug/l)	175	NA	NA	NA	<4	<25.0	<20.0
Allylchloride	(ug/l)	7.5	NA	NA	NA	<0.16	<4.0	<4.0
Benzene	(ug/l)	2.5	NA	NA	NA	<0.2	<1.0	<1.0
Bromobenzene	(ug/l)	NL	NA	NA	NA	<0.12	<1.0	<1.0
Bromochloromethane	(ug/l)	NL	NA	NA	NA	<0.18	<1.0	<1.0
Bromodichloromethane	(ug/l)	2	NA	NA	NA	<0.12	<1.0	<1.0
Bromoform	(ug/l)	10	NA	NA	NA	<0.13	<4.0	<4.0
Bromomethane	(ug/l)	3	NA	NA	NA	<0.16	<4.0	<4.0
Methyl Ethyl Ketone (MEK)	(ug/l)	1000	NA	NA	NA	<1.0	<4.0	<5.0
n-Butylbenzene	(ug/l)	NL	NA	NA	NA	<0.18	<1.0	<1.0
sec-Butylbenzene	(ug/l)	NL	NA	NA	NA	<0.17	<1.0	<1.0
tert-Butylbenzene	(ug/l)	NL	NA	NA	NA	<0.16	<1.0	<1.0
Carbontetrachloride	(ug/l)	0.75	NA	NA	NA	<0.28	<1.0	<1.0
Chlorobenzene	(ug/l)	25	NA	NA	NA	<0.20	<1.0	<1.0
Chloroethane	(ug/l)	NL	NA	NA	NA	<0.24	<1.0	<4.0
Chloroform	(ug/l)	15	NA	NA	NA	<0.20	<1.0	<1.0
Chloromethane	(ug/l)	NL	NA	NA	NA	<0.20	<4.0	<4.0
2-Chlorotoluene	(ug/l)	NL	NA	NA	NA	<0.13	<1.0	<1.0
4-Chlorotoluene	(ug/l)	NL	NA	NA	NA	<0.13	<1.0	<1.0
Dibromochloropropane	(ug/l)	NL	NA	NA	NA	<0.23	<4.0	<4.0
Dibromochloromethane	(ug/l)	13	NA	NA	NA	<0.13	<1.0	<1.0
1,2-Dibromoethane (EDB)	(ug/l)	0.001	NA	NA	NA	<0.11	<1.0	<1.0
Dibromomethane	(ug/l)	--	NA	NA	NA	<0.10	<4.0	<4.0
1,2-Dichlorobenzene	(ug/l)	150	NA	NA	NA	<0.096	<1.0	<1.0
1,3-Dichlorobenzene	(ug/l)	150	NA	NA	NA	<0.17	<1.0	<1.0
1,4-Dichlorobenzene	(ug/l)	2.5	NA	NA	NA	<0.084	<1.0	<1.0
Dichlorodifluoromethane	(ug/l)	250	NA	NA	NA	<0.23	<1.0	<1.0
1,1-Dichloroethane	(ug/l)	17.5	NA	NA	NA	<0.20	<1.0	<1.0
1,2-Dichloroethane	(ug/l)	1	NA	NA	NA	<0.17	<1.0	<1.0
1,1-Dichloroethylene	(ug/l)	1.5	NA	NA	NA	<0.17	<1.0	<1.0
cis-1,2-Dichloroethylene	(ug/l)	17.5	NA	NA	NA	<0.10	<1.0	<1.0
trans-1,2-Dichloroethylene	(ug/l)	1.5	NA	NA	NA	<0.23	<1.0	<1.0
Dichlorofluoromethane	(ug/l)	NL	NA	NA	NA	<0.17	<1.0	<1.0
1,2-Dichloropropane	(ug/l)	1.25	NA	NA	NA	<0.19	<4.0	<4.0
p1,3-Dichloropropane	(ug/l)	NL	NA	NA	NA	<0.14	<1.0	<1.0
2,2-Dichloropropane	(ug/l)	NL	NA	NA	NA	<0.36	<4.0	<4.0
1,1-Dichloropropene	(ug/l)	NL	NA	NA	NA	<0.21	<1.0	<1.0

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

**Table 5 (con't)**

**Summary of Organic Groundwater Quality Data - MMLF-3  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

Parameter	Units	IL	MMLF-3*	MMLF-3*	MMLF-3*	MMLF-3*	MMLF-3*	MMLF-3
			10/26/2009	11/11/2009	12/10/2009	11/8/2010	11/1/2012	10/25/2013
cis-1,3-Dichloropopene	(ug/l)	0.5	NA	NA	NA	<0.21	<4.0	<4.0
trans-1,3-Dichloropropene	(ug/l)	0.5	NA	NA	NA	<0.16	<4.0	<4.0
Diethyl Ether (Ethyl Ether)	(ug/l)	250	NA	NA	NA	<0.14	<4.0	<4.0
Ethyl Benzene	(ug/l)	175	NA	NA	NA	<0.15	<1.0	<1.0
Hexachloro-1,3-butadiene	(ug/l)	NL	NA	NA	NA	<0.20	<5.0	<1.0
Isopropylbenzene (Cumene)	(ug/l)	NL	NA	NA	NA	<0.20	<1.0	<1.0
p-Isopropyltoluene	(ug/l)	NL	NA	NA	NA	<0.17	<1.0	<1.0
Methylene Chloride	(ug/l)	0.25	NA	NA	NA	<0.20	<4.0	<4.0
4-Methyl-2-Pentanone(MIBK)	(ug/l)	75	NA	NA	NA	<0.18	<4.0	<5.0
Methyl-tert-butyl-ether	(ug/l)	NL	NA	NA	NA	<0.13	<1.0	<1.0
Naphthalene	(ug/l)	75	NA	NA	NA	<0.20	<4.0	<4.0
n-Propylbenzene	(ug/l)	NL	NA	NA	NA	<0.17	<1.0	<1.0
Styrene	(ug/l)	25	NA	NA	NA	<0.15	<1.0	<1.0
1,1,1,2-Tetrachloroethane	(ug/l)	17.5	NA	NA	NA	<0.13	<1.0	<1.0
1,1,2,2-Tetrachloroethane	(ug/l)	0.5	NA	NA	NA	<0.10	<1.0	<1.0
Tetrachloroethylene	(ug/l)	7	NA	NA	NA	<0.29	<1.0	<1.0
Tetrahydrofuran	(ug/l)	25	NA	NA	NA	<1.0	<10.0	<10.0
Toluene	(ug/l)	250	NA	NA	NA	<0.20	<1.0	<1.0
1,2,3-Trichlorobenzene	(ug/l)	NL	NA	NA	NA	<0.12	<1.0	<1.0
1,2,4-Trichlorobenzene	(ug/l)	10	NA	NA	NA	<0.15	<1.0	<1.0
1,1,1-Trichloroethane	(ug/l)	150	NA	NA	NA	<0.17	<1.0	<1.0
1,1,2-Trichloroethane	(ug/l)	0.75	NA	NA	NA	<0.11	<1.0	<1.0
Trichloroethylene	(ug/l)	NL	NA	NA	NA	<0.19	<1.0	<0.40
Trichlorofluoromethane	(ug/l)	500	NA	NA	NA	<0.19	<1.0	<1.0
1,2,3-Trichloropropane	(ug/l)	10	NA	NA	NA	<0.17	<4.0	<4.0
1,1,2-Trichlorotrifluoroethane	(ug/l)	50	NA	NA	NA	<0.27	<1.0	<1.0
1,2,4-Trimethylbenzene	(ug/l)	NL	NA	NA	NA	<0.18	<1.0	<1.0
1,3,5-Trimethylbenzene	(ug/l)	NL	NA	NA	NA	<0.17	<1.0	<1.0
Vinyl Chloride	(ug/l)	0.5	NA	NA	NA	<0.20	<0.40	<0.40
m,p&o-Xylene (Xylene Total)	(ug/l)	75	NA	NA	NA	<0.32	<3.0	<3.0
m&p-Xylene	(ug/l)	NL	NA	NA	NA	NA	<2.0	<2.0
o-Xylene	(ug/l)	NL	NA	NA	NA	NA	<1.0	<1.0

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed



**Table 6**

**Summary of Organic Groundwater Quality Data - MMLF-7  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

Parameter	Units	IL	MMLF-7* 10/26/2009	MMLF-7* 11/11/2009	MMLF-7* 12/10/2009	MMLF-7* 11/8/2010	MMLF-7* 11/1/2012	MMLF-7 10/25/2013
Acetone	(ug/l)	175	<4	<4	<4	<4	<25.0	<20.0
Allylchloride	(ug/l)	7.5	<0.042	<0.042	<0.042	<0.16	<4.0	<4.0
Benzene	(ug/l)	2.5	0.36	0.43	0.47	0.33	<1.0	<1.0
Bromobenzene	(ug/l)	NL	<0.17	<0.17	<0.17	<0.12	<1.0	<1.0
Bromochloromethane	(ug/l)	NL	<0.082	<0.082	<0.082	<0.18	<1.0	<1.0
Bromodichloromethane	(ug/l)	2	<0.086	<0.086	<0.086	<0.12	<1.0	<1.0
Bromoform	(ug/l)	10	<0.16	<0.16	<0.16	<0.13	<4.0	<4.0
Bromomethane	(ug/l)	3	<0.060	<0.060	<0.060	<0.16	<4.0	<4.0
Methyl Ethyl Ketone (MEK)	(ug/l)	1000	<1.0	<1.0	<1.0	<1.0	<4.0	<5.0
n-Butylbenzene	(ug/l)	NL	<0.10	<0.10	<0.10	<0.18	<1.0	<1.0
sec-Butylbenzene	(ug/l)	NL	<0.087	<0.087	<0.087	<0.17	<1.0	<1.0
tert-Butylbenzene	(ug/l)	NL	<0.15	<0.15	<0.15	<0.16	<1.0	<1.0
Carbontetrachloride	(ug/l)	0.75	<0.074	<0.074	<0.074	<0.28	<1.0	<1.0
Chlorobenzene	(ug/l)	25	0.58	<0.14	0.56	0.63	<1.0	<1.0
Chloroethane	(ug/l)	NL	<0.089	<0.089	<0.089	<0.24	<1.0	<4.0
Chloroform	(ug/l)	15	<0.20	<0.20	<0.20	<0.20	<1.0	<1.0
Chloromethane	(ug/l)	NL	<0.068	<0.068	<0.068	<0.20	<4.0	<4.0
2-Chlorotoluene	(ug/l)	NL	<0.080	<0.080	<0.080	<0.13	<1.0	<1.0
4-Chlorotoluene	(ug/l)	NL	<0.11	<0.11	<0.11	<0.13	<1.0	<1.0
Dibromochloropropane	(ug/l)	NL	<0.12	<0.12	<0.12	<0.23	<4.0	<4.0
Dibromochloromethane	(ug/l)	13	<0.12	<0.12	<0.12	<0.13	<1.0	<1.0
1,2-Dibromoethane (EDB)	(ug/l)	0.001	<0.12	<0.12	<0.12	<0.11	<1.0	<1.0
Dibromomethane	(ug/l)	--	<0.15	<0.15	<0.15	<0.10	<4.0	<4.0
1,2-Dichlorobenzene	(ug/l)	150	<0.10	<0.10	<0.10	<0.096	<1.0	<1.0
1,3-Dichlorobenzene	(ug/l)	150	<0.13	<0.13	<0.13	<0.17	<1.0	<1.0
1,4-Dichlorobenzene	(ug/l)	2.5	0.61	<0.10	0.53	0.54	<1.0	<1.0
Dichlorodifluoromethane	(ug/l)	250	2	0.56	2.6	2	<1.0	<1.0
1,1-Dichloroethane	(ug/l)	17.5	0.12	0.2	0.19	<0.20	<1.0	<1.0
1,2-Dichloroethane	(ug/l)	1	<0.10	<0.10	<0.10	<0.17	<1.0	<1.0
1,1-Dichloroethylene	(ug/l)	1.5	<0.12	<0.12	<0.12	<0.17	<1.0	<1.0
cis-1,2-Dichloroethylene	(ug/l)	17.5	6.1	7	8.1	7.2	6.2	8.7
trans-1,2-Dichloroethylene	(ug/l)	1.5	<0.053	0.068	<0.053	<0.23	<1.0	<1.0
Dichlorofluoromethane	(ug/l)	NL	1.3	1.4	2.1	1.1	2.5	2.0
1,2-Dichloropropane	(ug/l)	1.25	<0.055	<0.055	<0.055	<0.19	<4.0	<4.0
p1,3-Dichloropropane	(ug/l)	NL	<0.091	<0.091	<0.091	<0.14	<1.0	<1.0
2,2-Dichloropropane	(ug/l)	NL	<0.063	<0.063	<0.063	<0.36	<4.0	<4.0
1,1-Dichloropropene	(ug/l)	NL	<0.081	<0.081	<0.081	<0.081	<1.0	<1.0

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

**Table 6 (con't)**

**Summary of Organic Groundwater Quality Data - MMLF-7  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

Parameter	Units	HRL	MMLF-7*	MMLF-7*	MMLF-7*	MMLF-7*	MMLF-7*	MMLF-7
			10/26/2009	11/11/2009	12/10/2009	11/8/2010	11/1/2012	10/25/2013
cis-1,3-Dichloropopene	(ug/l)	0.5	<0.089	<0.089	<0.089	<0.21	<4.0	<4.0
trans-1,3-Dichloropropene	(ug/l)	0.5	<0.098	<0.098	<0.098	<0.16	<4.0	<4.0
Diethyl Ether (Ethyl Ether)	(ug/l)	250	12	15	17	18	14.7	14.8
Ethyl Benzene	(ug/l)	175	<0.079	<0.079	<0.079	<0.15	<1.0	<1.0
Hexachloro-1,3-butadiene	(ug/l)	NL	<0.12	<0.12	<0.12	<0.20	<5.0	<1.0
Isopropylbenzene (Cumene)	(ug/l)	NL	<0.096	<0.096	<0.096	<0.20	<1.0	<1.0
p-Isopropyltoluene	(ug/l)	NL	<0.055	<0.055	<0.055	<0.17	<1.0	<1.0
Methylene Chloride	(ug/l)	0.25	<0.20	<0.20	<0.20	<0.20	<4.0	<4.0
4-Methyl-2-Pentanone(MIBK)	(ug/l)	75	<0.13	<0.13	<0.13	<0.18	<4.0	<5.0
Methyl tertbutylether	(ug/l)	NL	0.11	0.12	0.15	<0.13	<1.0	<1.0
Naphthalene	(ug/l)	75	<0.13	<0.13	<0.13	<0.20	<4.0	<4.0
n-Propylbenzene	(ug/l)	NL	<0.13	<0.13	<0.13	<0.17	<1.0	<1.0
Styrene	(ug/l)	25	<0.079	<0.079	<0.079	<0.15	<1.0	<1.0
1,1,1,2-Tetrachloroethane	(ug/l)	17.5	<0.099	<0.099	<0.099	<0.13	<1.0	<1.0
1,1,2,2-Tetrachloroethane	(ug/l)	0.5	<0.094	<0.094	<0.094	<0.10	<1.0	<1.0
Tetrachloroethylene	(ug/l)	7	<0.12	<0.12	<0.12	<0.29	<1.0	<1.0
Tetrahydrofuran	(ug/l)	25	<1.0	<1.0	<1.0	<1.0	<10.0	<10.0
Toluene	(ug/l)	250	<0.20	<0.20	<0.20	<0.20	<1.0	<1.0
1,2,3-Trichlorobenzene	(ug/l)	NL	<0.12	<0.12	<0.12	<0.12	<1.0	<1.0
1,2,4-Trichlorobenzene	(ug/l)	10	<0.073	<0.073	<0.073	<0.15	<1.0	<1.0
1,1,1-Trichloroethane	(ug/l)	150	<0.076	<0.076	<0.076	<0.17	<1.0	<1.0
1,1,2-Trichloroethane	(ug/l)	0.75	<0.11	<0.11	<0.11	<0.11	<1.0	<1.0
Trichloroethylene	(ug/l)	NL	<0.16	<0.16	<0.16	<0.19	<1.0	<0.40
Trichlorofluoromethane	(ug/l)	500	<0.095	<0.095	<0.095	<0.19	<1.0	<1.0
1,2,3-Trichloropropane	(ug/l)	10	<0.092	<0.092	<0.092	<0.17	<4.0	<4.0
1,1,2-Trichlorotrifluoroethane	(ug/l)	50	<0.074	<0.074	<0.074	<0.27	<1.0	<1.0
1,2,4-Trimethylbenzene	(ug/l)	NL	<0.042	<0.042	<0.042	<0.18	<1.0	<1.0
1,3,5-Trimethylbenzene	(ug/l)	NL	<0.10	<0.10	<0.10	<0.17	<1.0	<1.0
Vinyl Chloride	(ug/l)	0.5	0.18	0.27	0.59	<0.20	<0.40	<0.40
m,p&o-Xylene (Xylene Total)	(ug/l)	75	<0.20	<0.20	<0.20	<0.32	<3.0	<3.0
m&p-Xylene	(ug/l)	NL	NA	NA	NA	NA	<2.0	<2.0
o-Xylene	(ug/l)	NL	NA	NA	NA	NA	<1.0	<1.0

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

**Table 7**

**Summary of Organic Groundwater Quality Data - MMLF-8  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

Parameter	Units	IL	MMLF-8* 10/26/2009	MMLF-8* 11/11/2009	MMLF-8* 12/10/2009	MMLF-8* 11/8/2010	MMLF-8* 11/1/2012	MMLF-8 10/25/2013
Acetone	(ug/l)	175	<4	<4	<4	<4	<25.0	<20.0
Allylchloride	(ug/l)	7.5	<0.042	<0.042	<0.042	<0.16	<4.0	<4.0
Benzene	(ug/l)	2.5	<0.069	<0.069	<0.069	<0.2	<1.0	<1.0
Bromobenzene	(ug/l)	NL	<0.17	<0.17	<0.17	<0.12	<1.0	<1.0
Bromochloromethane	(ug/l)	NL	<0.082	<0.082	<0.082	<0.18	<1.0	<1.0
Bromodichloromethane	(ug/l)	2	<0.086	<0.086	<0.086	<0.12	<1.0	<1.0
Bromoform	(ug/l)	10	<0.16	<0.16	<0.16	<0.13	<4.0	<4.0
Bromomethane	(ug/l)	3	<0.060	<0.060	<0.060	<0.16	<4.0	<4.0
Methyl Ethyl Ketone (MEK)	(ug/l)	1000	<1.0	<1.0	<1.0	<1.0	<4.0	<5.0
n-Butylbenzene	(ug/l)	NL	<0.10	<0.10	<0.10	<0.18	<1.0	<1.0
sec-Butylbenzene	(ug/l)	NL	<0.087	<0.087	<0.087	<0.17	<1.0	<1.0
tert-Butylbenzene	(ug/l)	NL	<0.15	<0.15	<0.15	<0.16	<1.0	<1.0
Carbontetrachloride	(ug/l)	0.75	<0.074	<0.074	<0.074	<0.28	<1.0	<1.0
Chlorobenzene	(ug/l)	25	<0.14	<0.14	<0.14	<0.20	<1.0	<1.0
Chloroethane	(ug/l)	NL	<0.089	<0.089	<0.089	<0.24	<1.0	<4.0
Chloroform	(ug/l)	15	<0.20	<0.20	<0.20	<0.20	<1.0	<1.0
Chloromethane	(ug/l)	NL	<0.068	<0.068	<0.068	<0.20	<4.0	<4.0
2-Chlorotoluene	(ug/l)	NL	<0.080	<0.080	<0.080	<0.13	<1.0	<1.0
4-Chlorotoluene	(ug/l)	NL	<0.11	<0.11	<0.11	<0.13	<1.0	<1.0
Dibromochloropropane	(ug/l)	NL	<0.12	<0.12	<0.12	<0.23	<4.0	<4.0
Dibromochloromethane	(ug/l)	13	<0.12	<0.12	<0.12	<0.13	<1.0	<1.0
1,2-Dibromoethane (EDB)	(ug/l)	0.001	<0.12	<0.12	<0.12	<0.11	<1.0	<1.0
Dibromomethane	(ug/l)	--	<0.15	<0.15	<0.15	<0.10	<4.0	<4.0
1,2-Dichlorobenzene	(ug/l)	150	<0.10	<0.10	<0.10	<0.096	<1.0	<1.0
1,3-Dichlorobenzene	(ug/l)	150	<0.13	<0.13	<0.13	<0.17	<1.0	<1.0
1,4-Dichlorobenzene	(ug/l)	2.5	<0.10	<0.10	<0.10	<0.084	<1.0	<1.0
Dichlorodifluoromethane	(ug/l)	250	<0.084	<0.084	<0.084	<0.23	<1.0	<1.0
1,1-Dichloroethane	(ug/l)	17.5	<0.077	<0.077	<0.077	<0.20	<1.0	<1.0
1,2-Dichloroethane	(ug/l)	1	<0.10	<0.10	<0.10	<0.17	<1.0	<1.0
1,1-Dichloroethylene	(ug/l)	1.5	<0.12	<0.12	<0.12	<0.17	<1.0	<1.0
cis-1,2-Dichloroethylene	(ug/l)	17.5	<0.081	<0.081	<0.081	<0.10	<1.0	<1.0
trans-1,2-Dichloroethylene	(ug/l)	1.5	<0.053	<0.053	<0.053	<0.23	<1.0	<1.0
Dichlorofluoromethane	(ug/l)	NL	<0.097	<0.097	<0.097	<0.17	<1.0	<1.0
1,2-Dichloropropane	(ug/l)	1.25	<0.055	<0.055	<0.055	<0.19	<4.0	<4.0
p1,3-Dichloropropane	(ug/l)	NL	<0.091	<0.091	<0.091	<0.14	<1.0	<1.0
2,2-Dichloropropane	(ug/l)	NL	<0.063	<0.063	<0.063	<0.36	<4.0	<4.0
1,1-Dichloropropene	(ug/l)	NL	<0.081	<0.081	<0.081	<0.081	<1.0	<1.0

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

**Table 7 (con't)**

**Summary of Organic Groundwater Quality Data - MMLF-8  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

Parameter	Units	IL	MMLF-8*	MMLF-8*	MMLF-8*	MMLF-8*	MMLF-8*	MMLF-8
			10/26/2009	11/11/2009	12/10/2009	11/8/2010	11/1/2012	10/25/2013
cis-1,3-Dichloropropene	(ug/l)	0.5	<0.089	<0.089	<0.089	<0.21	<4.0	<4.0
trans-1,3-Dichloropropene	(ug/l)	0.5	<0.098	<0.098	<0.098	<0.16	<4.0	<4.0
Diethyl Ether (Ethyl Ether)	(ug/l)	250	<0.041	<0.041	<0.041	<0.14	<4.0	<4.0
Ethyl Benzene	(ug/l)	175	<0.079	<0.079	<0.079	<0.15	<1.0	<1.0
Hexachloro-1,3-butadiene	(ug/l)	NL	<0.12	<0.12	<0.12	<0.20	<5.0	<1.0
Isopropylbenzene (Cumene)	(ug/l)	NL	<0.096	<0.096	<0.096	<0.20	<1.0	<1.0
p-Isopropyltoluene	(ug/l)	NL	<0.055	<0.055	<0.055	<0.17	<1.0	<1.0
Methylene Chloride	(ug/l)	0.25	<0.20	<0.20	<0.20	<0.20	<4.0	<4.0
4-Methyl-2-Pentanone(MIBK)	(ug/l)	75	<0.13	<0.13	<0.13	<0.18	<4.0	<5.0
Methyl tertbutylether	(ug/l)	NL	<0.044	<0.044	<0.044	<0.13	<1.0	<1.0
Naphthalene	(ug/l)	75	<0.13	<0.13	<0.13	<0.20	<4.0	<4.0
n-Propylbenzene	(ug/l)	NL	<0.13	<0.13	<0.13	<0.17	<1.0	<1.0
Styrene	(ug/l)	25	<0.079	<0.079	<0.079	<0.15	<1.0	<1.0
1,1,1,2-Tetrachloroethane	(ug/l)	17.5	<0.099	<0.099	<0.099	<0.13	<1.0	<1.0
1,1,2,2-Tetrachloroethane	(ug/l)	0.5	<0.094	<0.094	<0.094	<0.10	<1.0	<1.0
Tetrachloroethylene	(ug/l)	7	<0.12	<0.12	<0.12	<0.29	<1.0	<1.0
Tetrahydrofuran	(ug/l)	25	<1.0	<1.0	<1.0	<1.0	<10.0	<10.0
Toluene	(ug/l)	250	<0.20	<0.20	<0.20	<0.20	<1.0	<1.0
1,2,3-Trichlorobenzene	(ug/l)	NL	<0.12	<0.12	<0.12	<0.12	<1.0	<1.0
1,2,4-Trichlorobenzene	(ug/l)	10	<0.073	<0.073	<0.073	<0.15	<1.0	<1.0
1,1,1-Trichloroethane	(ug/l)	150	<0.076	<0.076	<0.076	<0.17	<1.0	<1.0
1,1,2-Trichloroethane	(ug/l)	0.75	<0.11	<0.11	<0.11	<0.11	<1.0	<1.0
Trichloroethylene	(ug/l)	NL	<0.16	<0.16	<0.16	<0.19	<1.0	<0.40
Trichlorofluoromethane	(ug/l)	500	<0.095	<0.095	<0.095	<0.19	<1.0	<1.0
1,2,3-Trichloropropane	(ug/l)	10	<0.092	<0.092	<0.092	<0.17	<4.0	<4.0
1,1,2-Trichlorotrifluoroethane	(ug/l)	50	<0.074	<0.074	<0.074	<0.27	<1.0	<1.0
1,2,4-Trimethylbenzene	(ug/l)	NL	<0.042	<0.042	<0.042	<0.18	<1.0	<1.0
1,3,5-Trimethylbenzene	(ug/l)	NL	<0.10	<0.10	<0.10	<0.17	<1.0	<1.0
Vinyl Chloride	(ug/l)	0.5	<0.10	<0.10	<0.10	<0.20	<0.40	<0.40
m,p&o-Xylene (Xylene Total)	(ug/l)	75	<0.20	<0.20	<0.20	<0.32	<3.0	<3.0
m&p-Xylene	(ug/l)	NL	NA	NA	NA	NA	<2.0	<2.0
o-Xylene	(ug/l)	NL	NA	NA	NA	NA	<1.0	<1.0

NA = Not Analyzed

\*Data obtained from previous reports

IL = Intervention Limit

mg/L = milligrams per liter = parts per million

ug/L = micrograms per liter = parts per billion

NL = Not listed

## Table 8

**Groundwater Elevations  
Camp Ripley Closed Mixed Municipal Landfill  
State of Minnesota Department of Military Affairs**

	<b>MMLF-3</b>	<b>MMLF-7</b>	<b>MMLF-8</b>
Unique Well Number	250125	774333	773250
Top of Casing Elevation (ft MSL)*	1158.24	1153.51	1156.39
Well Depth (ft)	47	37	40

<b>Date of Data Collection</b>	<b>MMLF-3</b>	<b>MMLF-7</b>	<b>MMLF-8</b>
1982-2007*	1127.96-1136-65	NA	NA
11/1/2012	1133.08 ft.	1122.9 ft.	1122.86 ft.
10/25/2013	1135.06 ft.	1125.07 ft.	1125.88 ft.

\*Data from Camp Ripley

NA = Not Available

**APPENDIX A**  
**ANALYTICAL REPORTS**

November 07, 2013

Mr. Greg Smith  
Widseth Smith Nolting  
7804 Industrial Park Rd.  
Baxter, MN 56425

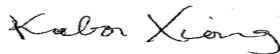
RE: Project: 0283B0009.000 Camp Ripley  
Pace Project No.: 10247486

Dear Mr. Smith:

Enclosed are the analytical results for sample(s) received by the laboratory on October 29, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,



Kabor Xiong

kabor.xiong@pacelabs.com  
Project Manager

Enclosures



## REPORT OF LABORATORY ANALYSIS

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## CERTIFICATIONS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

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### Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

A2LA Certification #: 2926.01

Alaska Certification #: UST-078

Alaska Certification #MN00064

Arizona Certification #: AZ-0014

Arkansas Certification #: 88-0680

California Certification #: 01155CA

Colorado Certification #Pace

Connecticut Certification #: PH-0256

EPA Region 8 Certification #: Pace

Florida/NELAP Certification #: E87605

Georgia Certification #: 959

Hawaii Certification #Pace

Idaho Certification #: MN00064

Illinois Certification #: 200011

Kansas Certification #: E-10167

Louisiana Certification #: 03086

Louisiana Certification #: LA080009

Maine Certification #: 2007029

Maryland Certification #: 322

Michigan DEQ Certification #: 9909

Minnesota Certification #: 027-053-137

Mississippi Certification #: Pace

Montana Certification #: MT CERT0092

Nevada Certification #: MN\_00064

Nebraska Certification #: Pace

New Jersey Certification #: MN-002

New York Certification #: 11647

North Carolina Certification #: 530

North Dakota Certification #: R-036

Ohio VAP Certification #: CL101

Oklahoma Certification #: 9507

Oregon Certification #: MN200001

Oregon Certification #: MN300001

Pennsylvania Certification #: 68-00563

Puerto Rico Certification

Tennessee Certification #: 02818

Texas Certification #: T104704192

Utah Certification #: MN00064

Virginia/DCLS Certification #: 002521

Virginia/VELAP Certification #: 460163

Washington Certification #: C754

West Virginia Certification #: 382

Wisconsin Certification #: 999407970

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## SAMPLE SUMMARY

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

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Lab ID	Sample ID	Matrix	Date Collected	Date Received
10247486001	MW-3	Water	10/25/13 14:48	10/29/13 13:33
10247486002	MW-7	Water	10/25/13 11:48	10/29/13 13:33
10247486003	MW-8	Water	10/25/13 12:16	10/29/13 13:33

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### SAMPLE ANALYTE COUNT

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

---

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10247486001	MW-3	EPA 8260	LPM	72
10247486002	MW-7	EPA 8260	LPM	72
10247486003	MW-8	EPA 8260	LPM	72

### REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

Sample: MW-3		Lab ID: 10247486001	Collected: 10/25/13 14:48	Received: 10/29/13 13:33	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 VOC</b>		Analytical Method: EPA 8260						
Acetone	ND ug/L		20.0	1		11/01/13 08:05	67-64-1	
Allyl chloride	ND ug/L		4.0	1		11/01/13 08:05	107-05-1	
Benzene	ND ug/L		1.0	1		11/01/13 08:05	71-43-2	
Bromobenzene	ND ug/L		1.0	1		11/01/13 08:05	108-86-1	
Bromochloromethane	ND ug/L		1.0	1		11/01/13 08:05	74-97-5	
Bromodichloromethane	ND ug/L		1.0	1		11/01/13 08:05	75-27-4	
Bromoform	ND ug/L		4.0	1		11/01/13 08:05	75-25-2	
Bromomethane	ND ug/L		4.0	1		11/01/13 08:05	74-83-9	
2-Butanone (MEK)	ND ug/L		5.0	1		11/01/13 08:05	78-93-3	
n-Butylbenzene	ND ug/L		1.0	1		11/01/13 08:05	104-51-8	
sec-Butylbenzene	ND ug/L		1.0	1		11/01/13 08:05	135-98-8	
tert-Butylbenzene	ND ug/L		1.0	1		11/01/13 08:05	98-06-6	
Carbon tetrachloride	ND ug/L		1.0	1		11/01/13 08:05	56-23-5	
Chlorobenzene	ND ug/L		1.0	1		11/01/13 08:05	108-90-7	
Chloroethane	ND ug/L		4.0	1		11/01/13 08:05	75-00-3	
Chloroform	ND ug/L		1.0	1		11/01/13 08:05	67-66-3	
Chloromethane	ND ug/L		4.0	1		11/01/13 08:05	74-87-3	
2-Chlorotoluene	ND ug/L		1.0	1		11/01/13 08:05	95-49-8	
4-Chlorotoluene	ND ug/L		1.0	1		11/01/13 08:05	106-43-4	
1,2-Dibromo-3-chloropropane	ND ug/L		4.0	1		11/01/13 08:05	96-12-8	
Dibromochloromethane	ND ug/L		1.0	1		11/01/13 08:05	124-48-1	
1,2-Dibromoethane (EDB)	ND ug/L		1.0	1		11/01/13 08:05	106-93-4	
Dibromomethane	ND ug/L		4.0	1		11/01/13 08:05	74-95-3	
1,2-Dichlorobenzene	ND ug/L		1.0	1		11/01/13 08:05	95-50-1	
1,3-Dichlorobenzene	ND ug/L		1.0	1		11/01/13 08:05	541-73-1	
1,4-Dichlorobenzene	ND ug/L		1.0	1		11/01/13 08:05	106-46-7	
Dichlorodifluoromethane	ND ug/L		1.0	1		11/01/13 08:05	75-71-8	M1
1,1-Dichloroethane	ND ug/L		1.0	1		11/01/13 08:05	75-34-3	
1,2-Dichloroethane	ND ug/L		1.0	1		11/01/13 08:05	107-06-2	
1,1-Dichloroethene	ND ug/L		1.0	1		11/01/13 08:05	75-35-4	
cis-1,2-Dichloroethene	ND ug/L		1.0	1		11/01/13 08:05	156-59-2	
trans-1,2-Dichloroethene	ND ug/L		1.0	1		11/01/13 08:05	156-60-5	
Dichlorofluoromethane	ND ug/L		1.0	1		11/01/13 08:05	75-43-4	
1,2-Dichloropropane	ND ug/L		4.0	1		11/01/13 08:05	78-87-5	
1,3-Dichloropropane	ND ug/L		1.0	1		11/01/13 08:05	142-28-9	
2,2-Dichloropropane	ND ug/L		4.0	1		11/01/13 08:05	594-20-7	
1,1-Dichloropropene	ND ug/L		1.0	1		11/01/13 08:05	563-58-6	
cis-1,3-Dichloropropene	ND ug/L		4.0	1		11/01/13 08:05	10061-01-5	
trans-1,3-Dichloropropene	ND ug/L		4.0	1		11/01/13 08:05	10061-02-6	
Diethyl ether (Ethyl ether)	ND ug/L		4.0	1		11/01/13 08:05	60-29-7	
Ethylbenzene	ND ug/L		1.0	1		11/01/13 08:05	100-41-4	
Hexachloro-1,3-butadiene	ND ug/L		1.0	1		11/01/13 08:05	87-68-3	
Isopropylbenzene (Cumene)	ND ug/L		1.0	1		11/01/13 08:05	98-82-8	
p-Isopropyltoluene	ND ug/L		1.0	1		11/01/13 08:05	99-87-6	
Methylene Chloride	ND ug/L		4.0	1		11/01/13 08:05	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND ug/L		5.0	1		11/01/13 08:05	108-10-1	
Methyl-tert-butyl ether	ND ug/L		1.0	1		11/01/13 08:05	1634-04-4	

### REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

Sample: MW-3		Lab ID: 10247486001	Collected: 10/25/13 14:48	Received: 10/29/13 13:33	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 VOC</b>		Analytical Method: EPA 8260						
Naphthalene	ND	ug/L	4.0	1		11/01/13 08:05	91-20-3	
n-Propylbenzene	ND	ug/L	1.0	1		11/01/13 08:05	103-65-1	
Styrene	ND	ug/L	1.0	1		11/01/13 08:05	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/L	1.0	1		11/01/13 08:05	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		11/01/13 08:05	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		11/01/13 08:05	127-18-4	
Tetrahydrofuran	ND	ug/L	10.0	1		11/01/13 08:05	109-99-9	
Toluene	ND	ug/L	1.0	1		11/01/13 08:05	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:05	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:05	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		11/01/13 08:05	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		11/01/13 08:05	79-00-5	
Trichloroethene	ND	ug/L	0.40	1		11/01/13 08:05	79-01-6	
Trichlorofluoromethane	ND	ug/L	1.0	1		11/01/13 08:05	75-69-4	
1,2,3-Trichloropropane	ND	ug/L	4.0	1		11/01/13 08:05	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/L	1.0	1		11/01/13 08:05	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/L	1.0	1		11/01/13 08:05	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/L	1.0	1		11/01/13 08:05	108-67-8	
Vinyl chloride	ND	ug/L	0.40	1		11/01/13 08:05	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		11/01/13 08:05	1330-20-7	
m&p-Xylene	ND	ug/L	2.0	1		11/01/13 08:05	179601-23-1	
o-Xylene	ND	ug/L	1.0	1		11/01/13 08:05	95-47-6	
<b>Surrogates</b>								
1,2-Dichloroethane-d4 (S)	105 %		75-125	1		11/01/13 08:05	17060-07-0	
Toluene-d8 (S)	100 %		75-125	1		11/01/13 08:05	2037-26-5	
4-Bromofluorobenzene (S)	101 %		75-125	1		11/01/13 08:05	460-00-4	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

Sample: MW-7	Lab ID: 10247486002	Collected: 10/25/13 11:48	Received: 10/29/13 13:33	Matrix: Water				
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 VOC</b>		Analytical Method: EPA 8260						
Acetone	ND	ug/L	20.0	1		11/01/13 08:21	67-64-1	
Allyl chloride	ND	ug/L	4.0	1		11/01/13 08:21	107-05-1	
Benzene	ND	ug/L	1.0	1		11/01/13 08:21	71-43-2	
Bromobenzene	ND	ug/L	1.0	1		11/01/13 08:21	108-86-1	
Bromochloromethane	ND	ug/L	1.0	1		11/01/13 08:21	74-97-5	
Bromodichloromethane	ND	ug/L	1.0	1		11/01/13 08:21	75-27-4	
Bromoform	ND	ug/L	4.0	1		11/01/13 08:21	75-25-2	
Bromomethane	ND	ug/L	4.0	1		11/01/13 08:21	74-83-9	
2-Butanone (MEK)	ND	ug/L	5.0	1		11/01/13 08:21	78-93-3	
n-Butylbenzene	ND	ug/L	1.0	1		11/01/13 08:21	104-51-8	
sec-Butylbenzene	ND	ug/L	1.0	1		11/01/13 08:21	135-98-8	
tert-Butylbenzene	ND	ug/L	1.0	1		11/01/13 08:21	98-06-6	
Carbon tetrachloride	ND	ug/L	1.0	1		11/01/13 08:21	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		11/01/13 08:21	108-90-7	
Chloroethane	ND	ug/L	4.0	1		11/01/13 08:21	75-00-3	
Chloroform	ND	ug/L	1.0	1		11/01/13 08:21	67-66-3	
Chloromethane	ND	ug/L	4.0	1		11/01/13 08:21	74-87-3	
2-Chlorotoluene	ND	ug/L	1.0	1		11/01/13 08:21	95-49-8	
4-Chlorotoluene	ND	ug/L	1.0	1		11/01/13 08:21	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/L	4.0	1		11/01/13 08:21	96-12-8	
Dibromochloromethane	ND	ug/L	1.0	1		11/01/13 08:21	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/L	1.0	1		11/01/13 08:21	106-93-4	
Dibromomethane	ND	ug/L	4.0	1		11/01/13 08:21	74-95-3	
1,2-Dichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:21	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:21	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:21	106-46-7	
Dichlorodifluoromethane	ND	ug/L	1.0	1		11/01/13 08:21	75-71-8	
1,1-Dichloroethane	ND	ug/L	1.0	1		11/01/13 08:21	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		11/01/13 08:21	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	1		11/01/13 08:21	75-35-4	
cis-1,2-Dichloroethene	8.7	ug/L	1.0	1		11/01/13 08:21	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		11/01/13 08:21	156-60-5	
Dichlorofluoromethane	2.0	ug/L	1.0	1		11/01/13 08:21	75-43-4	
1,2-Dichloropropane	ND	ug/L	4.0	1		11/01/13 08:21	78-87-5	
1,3-Dichloropropane	ND	ug/L	1.0	1		11/01/13 08:21	142-28-9	
2,2-Dichloropropane	ND	ug/L	4.0	1		11/01/13 08:21	594-20-7	
1,1-Dichloropropene	ND	ug/L	1.0	1		11/01/13 08:21	563-58-6	
cis-1,3-Dichloropropene	ND	ug/L	4.0	1		11/01/13 08:21	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	4.0	1		11/01/13 08:21	10061-02-6	
Diethyl ether (Ethyl ether)	14.8	ug/L	4.0	1		11/01/13 08:21	60-29-7	
Ethylbenzene	ND	ug/L	1.0	1		11/01/13 08:21	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/L	1.0	1		11/01/13 08:21	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/L	1.0	1		11/01/13 08:21	98-82-8	
p-Isopropyltoluene	ND	ug/L	1.0	1		11/01/13 08:21	99-87-6	
Methylene Chloride	ND	ug/L	4.0	1		11/01/13 08:21	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	1		11/01/13 08:21	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		11/01/13 08:21	1634-04-4	

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## ANALYTICAL RESULTS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

Sample: MW-7		Lab ID: 10247486002	Collected: 10/25/13 11:48	Received: 10/29/13 13:33	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 VOC</b>		Analytical Method: EPA 8260						
Naphthalene	ND	ug/L	4.0	1		11/01/13 08:21	91-20-3	
n-Propylbenzene	ND	ug/L	1.0	1		11/01/13 08:21	103-65-1	
Styrene	ND	ug/L	1.0	1		11/01/13 08:21	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/L	1.0	1		11/01/13 08:21	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		11/01/13 08:21	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		11/01/13 08:21	127-18-4	
Tetrahydrofuran	ND	ug/L	10.0	1		11/01/13 08:21	109-99-9	
Toluene	ND	ug/L	1.0	1		11/01/13 08:21	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:21	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:21	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		11/01/13 08:21	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		11/01/13 08:21	79-00-5	
Trichloroethene	ND	ug/L	0.40	1		11/01/13 08:21	79-01-6	
Trichlorofluoromethane	ND	ug/L	1.0	1		11/01/13 08:21	75-69-4	
1,2,3-Trichloropropane	ND	ug/L	4.0	1		11/01/13 08:21	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/L	1.0	1		11/01/13 08:21	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/L	1.0	1		11/01/13 08:21	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/L	1.0	1		11/01/13 08:21	108-67-8	
Vinyl chloride	ND	ug/L	0.40	1		11/01/13 08:21	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		11/01/13 08:21	1330-20-7	
m&p-Xylene	ND	ug/L	2.0	1		11/01/13 08:21	179601-23-1	
o-Xylene	ND	ug/L	1.0	1		11/01/13 08:21	95-47-6	
<b>Surrogates</b>								
1,2-Dichloroethane-d4 (S)	114	%	75-125	1		11/01/13 08:21	17060-07-0	
Toluene-d8 (S)	101	%	75-125	1		11/01/13 08:21	2037-26-5	
4-Bromofluorobenzene (S)	105	%	75-125	1		11/01/13 08:21	460-00-4	

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## ANALYTICAL RESULTS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

Sample: MW-8		Lab ID: 10247486003	Collected: 10/25/13 12:16	Received: 10/29/13 13:33	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 VOC</b>		Analytical Method: EPA 8260						
Acetone	ND	ug/L	20.0	1		11/01/13 08:52	67-64-1	
Allyl chloride	ND	ug/L	4.0	1		11/01/13 08:52	107-05-1	
Benzene	ND	ug/L	1.0	1		11/01/13 08:52	71-43-2	
Bromobenzene	ND	ug/L	1.0	1		11/01/13 08:52	108-86-1	
Bromochloromethane	ND	ug/L	1.0	1		11/01/13 08:52	74-97-5	
Bromodichloromethane	ND	ug/L	1.0	1		11/01/13 08:52	75-27-4	
Bromoform	ND	ug/L	4.0	1		11/01/13 08:52	75-25-2	
Bromomethane	ND	ug/L	4.0	1		11/01/13 08:52	74-83-9	
2-Butanone (MEK)	ND	ug/L	5.0	1		11/01/13 08:52	78-93-3	
n-Butylbenzene	ND	ug/L	1.0	1		11/01/13 08:52	104-51-8	
sec-Butylbenzene	ND	ug/L	1.0	1		11/01/13 08:52	135-98-8	
tert-Butylbenzene	ND	ug/L	1.0	1		11/01/13 08:52	98-06-6	
Carbon tetrachloride	ND	ug/L	1.0	1		11/01/13 08:52	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		11/01/13 08:52	108-90-7	
Chloroethane	ND	ug/L	4.0	1		11/01/13 08:52	75-00-3	
Chloroform	ND	ug/L	1.0	1		11/01/13 08:52	67-66-3	
Chloromethane	ND	ug/L	4.0	1		11/01/13 08:52	74-87-3	
2-Chlorotoluene	ND	ug/L	1.0	1		11/01/13 08:52	95-49-8	
4-Chlorotoluene	ND	ug/L	1.0	1		11/01/13 08:52	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/L	4.0	1		11/01/13 08:52	96-12-8	
Dibromochloromethane	ND	ug/L	1.0	1		11/01/13 08:52	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/L	1.0	1		11/01/13 08:52	106-93-4	
Dibromomethane	ND	ug/L	4.0	1		11/01/13 08:52	74-95-3	
1,2-Dichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:52	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:52	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1.0	1		11/01/13 08:52	106-46-7	
Dichlorodifluoromethane	ND	ug/L	1.0	1		11/01/13 08:52	75-71-8	
1,1-Dichloroethane	ND	ug/L	1.0	1		11/01/13 08:52	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		11/01/13 08:52	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	1		11/01/13 08:52	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	1		11/01/13 08:52	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		11/01/13 08:52	156-60-5	
Dichlorofluoromethane	ND	ug/L	1.0	1		11/01/13 08:52	75-43-4	
1,2-Dichloropropane	ND	ug/L	4.0	1		11/01/13 08:52	78-87-5	
1,3-Dichloropropane	ND	ug/L	1.0	1		11/01/13 08:52	142-28-9	
2,2-Dichloropropane	ND	ug/L	4.0	1		11/01/13 08:52	594-20-7	
1,1-Dichloropropene	ND	ug/L	1.0	1		11/01/13 08:52	563-58-6	
cis-1,3-Dichloropropene	ND	ug/L	4.0	1		11/01/13 08:52	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	4.0	1		11/01/13 08:52	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/L	4.0	1		11/01/13 08:52	60-29-7	
Ethylbenzene	ND	ug/L	1.0	1		11/01/13 08:52	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/L	1.0	1		11/01/13 08:52	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/L	1.0	1		11/01/13 08:52	98-82-8	
p-Isopropyltoluene	ND	ug/L	1.0	1		11/01/13 08:52	99-87-6	
Methylene Chloride	ND	ug/L	4.0	1		11/01/13 08:52	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	1		11/01/13 08:52	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		11/01/13 08:52	1634-04-4	

### REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

Sample: MW-8		Lab ID: 10247486003	Collected: 10/25/13 12:16	Received: 10/29/13 13:33	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 VOC</b>		Analytical Method: EPA 8260						
Naphthalene	ND ug/L		4.0	1		11/01/13 08:52	91-20-3	
n-Propylbenzene	ND ug/L		1.0	1		11/01/13 08:52	103-65-1	
Styrene	ND ug/L		1.0	1		11/01/13 08:52	100-42-5	
1,1,1,2-Tetrachloroethane	ND ug/L		1.0	1		11/01/13 08:52	630-20-6	
1,1,2,2-Tetrachloroethane	ND ug/L		1.0	1		11/01/13 08:52	79-34-5	
Tetrachloroethene	ND ug/L		1.0	1		11/01/13 08:52	127-18-4	
Tetrahydrofuran	ND ug/L		10.0	1		11/01/13 08:52	109-99-9	
Toluene	ND ug/L		1.0	1		11/01/13 08:52	108-88-3	
1,2,3-Trichlorobenzene	ND ug/L		1.0	1		11/01/13 08:52	87-61-6	
1,2,4-Trichlorobenzene	ND ug/L		1.0	1		11/01/13 08:52	120-82-1	
1,1,1-Trichloroethane	ND ug/L		1.0	1		11/01/13 08:52	71-55-6	
1,1,2-Trichloroethane	ND ug/L		1.0	1		11/01/13 08:52	79-00-5	
Trichloroethene	ND ug/L		0.40	1		11/01/13 08:52	79-01-6	
Trichlorofluoromethane	ND ug/L		1.0	1		11/01/13 08:52	75-69-4	
1,2,3-Trichloropropane	ND ug/L		4.0	1		11/01/13 08:52	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND ug/L		1.0	1		11/01/13 08:52	76-13-1	
1,2,4-Trimethylbenzene	ND ug/L		1.0	1		11/01/13 08:52	95-63-6	
1,3,5-Trimethylbenzene	ND ug/L		1.0	1		11/01/13 08:52	108-67-8	
Vinyl chloride	ND ug/L		0.40	1		11/01/13 08:52	75-01-4	
Xylene (Total)	ND ug/L		3.0	1		11/01/13 08:52	1330-20-7	
m&p-Xylene	ND ug/L		2.0	1		11/01/13 08:52	179601-23-1	
o-Xylene	ND ug/L		1.0	1		11/01/13 08:52	95-47-6	
<b>Surrogates</b>								
1,2-Dichloroethane-d4 (S)	108 %		75-125	1		11/01/13 08:52	17060-07-0	
Toluene-d8 (S)	100 %		75-125	1		11/01/13 08:52	2037-26-5	
4-Bromofluorobenzene (S)	100 %		75-125	1		11/01/13 08:52	460-00-4	

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### QUALITY CONTROL DATA

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

QC Batch: MSV/25470 Analysis Method: EPA 8260  
QC Batch Method: EPA 8260 Analysis Description: 8260 MSV 465 W  
Associated Lab Samples: 10247486001, 10247486002, 10247486003

METHOD BLANK: 1565670 Matrix: Water

Associated Lab Samples: 10247486001, 10247486002, 10247486003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	1.0	11/01/13 07:18	
1,1,1-Trichloroethane	ug/L	ND	1.0	11/01/13 07:18	
1,1,2,2-Tetrachloroethane	ug/L	ND	1.0	11/01/13 07:18	
1,1,2-Trichloroethane	ug/L	ND	1.0	11/01/13 07:18	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	1.0	11/01/13 07:18	
1,1-Dichloroethane	ug/L	ND	1.0	11/01/13 07:18	
1,1-Dichloroethene	ug/L	ND	1.0	11/01/13 07:18	
1,1-Dichloropropene	ug/L	ND	1.0	11/01/13 07:18	
1,2,3-Trichlorobenzene	ug/L	ND	1.0	11/01/13 07:18	
1,2,3-Trichloropropane	ug/L	ND	4.0	11/01/13 07:18	
1,2,4-Trichlorobenzene	ug/L	ND	1.0	11/01/13 07:18	
1,2,4-Trimethylbenzene	ug/L	ND	1.0	11/01/13 07:18	
1,2-Dibromo-3-chloropropane	ug/L	ND	4.0	11/01/13 07:18	
1,2-Dibromoethane (EDB)	ug/L	ND	1.0	11/01/13 07:18	
1,2-Dichlorobenzene	ug/L	ND	1.0	11/01/13 07:18	
1,2-Dichloroethane	ug/L	ND	1.0	11/01/13 07:18	
1,2-Dichloropropane	ug/L	ND	4.0	11/01/13 07:18	
1,3,5-Trimethylbenzene	ug/L	ND	1.0	11/01/13 07:18	
1,3-Dichlorobenzene	ug/L	ND	1.0	11/01/13 07:18	
1,3-Dichloropropane	ug/L	ND	1.0	11/01/13 07:18	
1,4-Dichlorobenzene	ug/L	ND	1.0	11/01/13 07:18	
2,2-Dichloropropane	ug/L	ND	4.0	11/01/13 07:18	
2-Butanone (MEK)	ug/L	ND	5.0	11/01/13 07:18	
2-Chlorotoluene	ug/L	ND	1.0	11/01/13 07:18	
4-Chlorotoluene	ug/L	ND	1.0	11/01/13 07:18	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	11/01/13 07:18	
Acetone	ug/L	ND	20.0	11/01/13 07:18	
Allyl chloride	ug/L	ND	4.0	11/01/13 07:18	
Benzene	ug/L	ND	1.0	11/01/13 07:18	
Bromobenzene	ug/L	ND	1.0	11/01/13 07:18	
Bromochloromethane	ug/L	ND	1.0	11/01/13 07:18	
Bromodichloromethane	ug/L	ND	1.0	11/01/13 07:18	
Bromoform	ug/L	ND	4.0	11/01/13 07:18	
Bromomethane	ug/L	ND	4.0	11/01/13 07:18	
Carbon tetrachloride	ug/L	ND	1.0	11/01/13 07:18	
Chlorobenzene	ug/L	ND	1.0	11/01/13 07:18	
Chloroethane	ug/L	ND	4.0	11/01/13 07:18	
Chloroform	ug/L	ND	1.0	11/01/13 07:18	
Chloromethane	ug/L	ND	4.0	11/01/13 07:18	
cis-1,2-Dichloroethene	ug/L	ND	1.0	11/01/13 07:18	
cis-1,3-Dichloropropene	ug/L	ND	4.0	11/01/13 07:18	
Dibromochloromethane	ug/L	ND	1.0	11/01/13 07:18	
Dibromomethane	ug/L	ND	4.0	11/01/13 07:18	

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### QUALITY CONTROL DATA

Project: 0283B0009.000 Camp Ripley

Project No.: 10247486

METHOD BLANK: 1565670

Matrix: Water

Associated Lab Samples: 10247486001, 10247486002, 10247486003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dichlorodifluoromethane	ug/L	ND	1.0	11/01/13 07:18	
Dichlorofluoromethane	ug/L	ND	1.0	11/01/13 07:18	
Diethyl ether (Ethyl ether)	ug/L	ND	4.0	11/01/13 07:18	
Ethylbenzene	ug/L	ND	1.0	11/01/13 07:18	
Hexachloro-1,3-butadiene	ug/L	ND	1.0	11/01/13 07:18	
Isopropylbenzene (Cumene)	ug/L	ND	1.0	11/01/13 07:18	
m&p-Xylene	ug/L	ND	2.0	11/01/13 07:18	
Methyl-tert-butyl ether	ug/L	ND	1.0	11/01/13 07:18	
Methylene Chloride	ug/L	ND	4.0	11/01/13 07:18	
n-Butylbenzene	ug/L	ND	1.0	11/01/13 07:18	
n-Propylbenzene	ug/L	ND	1.0	11/01/13 07:18	
Naphthalene	ug/L	ND	4.0	11/01/13 07:18	
o-Xylene	ug/L	ND	1.0	11/01/13 07:18	
p-Isopropyltoluene	ug/L	ND	1.0	11/01/13 07:18	
sec-Butylbenzene	ug/L	ND	1.0	11/01/13 07:18	
Styrene	ug/L	ND	1.0	11/01/13 07:18	
tert-Butylbenzene	ug/L	ND	1.0	11/01/13 07:18	
Tetrachloroethene	ug/L	ND	1.0	11/01/13 07:18	
Tetrahydrofuran	ug/L	ND	10.0	11/01/13 07:18	
Toluene	ug/L	ND	1.0	11/01/13 07:18	
trans-1,2-Dichloroethene	ug/L	ND	1.0	11/01/13 07:18	
trans-1,3-Dichloropropene	ug/L	ND	4.0	11/01/13 07:18	
Trichloroethene	ug/L	ND	0.40	11/01/13 07:18	
Trichlorofluoromethane	ug/L	ND	1.0	11/01/13 07:18	
Vinyl chloride	ug/L	ND	0.40	11/01/13 07:18	
Xylene (Total)	ug/L	ND	3.0	11/01/13 07:18	
1,2-Dichloroethane-d4 (S)	%	105	75-125	11/01/13 07:18	
4-Bromofluorobenzene (S)	%	101	75-125	11/01/13 07:18	
Toluene-d8 (S)	%	100	75-125	11/01/13 07:18	

LABORATORY CONTROL SAMPLE: 1565671

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	20	19.8	99	75-125	
1,1,1-Trichloroethane	ug/L	20	20.0	100	75-126	
1,1,2,2-Tetrachloroethane	ug/L	20	18.9	94	75-125	
1,1,2-Trichloroethane	ug/L	20	20.3	102	75-125	
1,1,2-Trichlorotrifluoroethane	ug/L	20	19.6	98	51-139	
1,1-Dichloroethane	ug/L	20	21.4	107	75-125	
1,1-Dichloroethene	ug/L	20	22.1	110	71-126	
1,1-Dichloropropene	ug/L	20	21.5	108	74-125	
1,2,3-Trichlorobenzene	ug/L	20	20.3	101	75-125	
1,2,3-Trichloropropane	ug/L	20	18.9	95	75-125	
1,2,4-Trichlorobenzene	ug/L	20	20.8	104	75-125	
1,2,4-Trimethylbenzene	ug/L	20	19.5	98	75-125	

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### QUALITY CONTROL DATA

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

LABORATORY CONTROL SAMPLE: 1565671

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2-Dibromo-3-chloropropane	ug/L	50	46.1	92	73-125	
1,2-Dibromoethane (EDB)	ug/L	20	20.3	101	75-125	
1,2-Dichlorobenzene	ug/L	20	19.0	95	75-125	
1,2-Dichloroethane	ug/L	20	21.8	109	74-125	
1,2-Dichloropropane	ug/L	20	20.1	101	75-125	
1,3,5-Trimethylbenzene	ug/L	20	19.9	100	75-125	
1,3-Dichlorobenzene	ug/L	20	19.1	96	75-125	
1,3-Dichloropropane	ug/L	20	19.5	98	75-125	
1,4-Dichlorobenzene	ug/L	20	18.9	94	75-125	
2,2-Dichloropropane	ug/L	20	15.2	76	67-132	
2-Butanone (MEK)	ug/L	100	101	101	68-126	
2-Chlorotoluene	ug/L	20	18.5	92	74-125	
4-Chlorotoluene	ug/L	20	18.4	92	74-125	
4-Methyl-2-pentanone (MIBK)	ug/L	100	104	104	72-125	
Acetone	ug/L	100	103	103	69-132	
Allyl chloride	ug/L	20	20.3	102	74-125	
Benzene	ug/L	20	20.3	101	75-125	
Bromobenzene	ug/L	20	19.5	98	75-125	
Bromochloromethane	ug/L	20	20.1	101	75-125	
Bromodichloromethane	ug/L	20	20.2	101	75-125	
Bromoform	ug/L	20	18.1	90	75-126	
Bromomethane	ug/L	20	20.1	101	30-150	
Carbon tetrachloride	ug/L	20	20.0	100	74-127	
Chlorobenzene	ug/L	20	19.1	95	75-125	
Chloroethane	ug/L	20	20.4	102	68-132	
Chloroform	ug/L	20	20.7	103	75-125	
Chloromethane	ug/L	20	22.4	112	61-129	
cis-1,2-Dichloroethene	ug/L	20	20.5	102	75-125	
cis-1,3-Dichloropropene	ug/L	20	19.9	99	75-125	
Dibromochloromethane	ug/L	20	19.2	96	75-125	
Dibromomethane	ug/L	20	20.6	103	75-125	
Dichlorodifluoromethane	ug/L	20	24.8	124	49-137	
Dichlorofluoromethane	ug/L	20	20.4	102	66-133	
Diethyl ether (Ethyl ether)	ug/L	20	19.1	95	75-125	
Ethylbenzene	ug/L	20	19.9	99	75-125	
Hexachloro-1,3-butadiene	ug/L	20	20.2	101	69-127	
Isopropylbenzene (Cumene)	ug/L	20	18.9	94	75-125	
m&p-Xylene	ug/L	40	37.6	94	75-125	
Methyl-tert-butyl ether	ug/L	20	20.6	103	74-126	
Methylene Chloride	ug/L	20	20.3	102	75-125	
n-Butylbenzene	ug/L	20	20.2	101	72-126	
n-Propylbenzene	ug/L	20	19.0	95	73-125	
Naphthalene	ug/L	20	20.6	103	75-125	
o-Xylene	ug/L	20	19.0	95	75-125	
p-Isopropyltoluene	ug/L	20	19.0	95	74-125	
sec-Butylbenzene	ug/L	20	19.3	96	73-125	
Styrene	ug/L	20	20.0	100	75-125	
tert-Butylbenzene	ug/L	20	19.2	96	73-125	

### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

LABORATORY CONTROL SAMPLE: 1565671

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Tetrachloroethene	ug/L	20	19.0	95	75-125	
Tetrahydrofuran	ug/L	200	207	104	71-125	
Toluene	ug/L	20	19.6	98	75-125	
trans-1,2-Dichloroethene	ug/L	20	20.6	103	74-125	
trans-1,3-Dichloropropene	ug/L	20	17.1	86	75-125	
Trichloroethene	ug/L	20	21.7	109	75-125	
Trichlorofluoromethane	ug/L	20	20.4	102	69-129	
Vinyl chloride	ug/L	20	22.1	110	70-128	
Xylene (Total)	ug/L	60	56.6	94	75-125	
1,2-Dichloroethane-d4 (S)	%			106	75-125	
4-Bromofluorobenzene (S)	%			101	75-125	
Toluene-d8 (S)	%			99	75-125	

MATRIX SPIKE SAMPLE: 1567430

Parameter	Units	10247486001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	20	22.4	112	75-125	
1,1,1-Trichloroethane	ug/L	ND	20	23.7	118	75-136	
1,1,2,2-Tetrachloroethane	ug/L	ND	20	22.3	111	66-131	
1,1,2-Trichloroethane	ug/L	ND	20	23.0	115	75-125	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	20	30.0	150	75-150	
1,1-Dichloroethane	ug/L	ND	20	24.7	124	75-131	
1,1-Dichloroethene	ug/L	ND	20	25.3	127	75-138	
1,1-Dichloropropene	ug/L	ND	20	25.3	126	75-136	
1,2,3-Trichlorobenzene	ug/L	ND	20	21.4	107	75-125	
1,2,3-Trichloropropane	ug/L	ND	20	21.1	105	71-126	
1,2,4-Trichlorobenzene	ug/L	ND	20	21.6	108	75-125	
1,2,4-Trimethylbenzene	ug/L	ND	20	20.8	104	70-126	
1,2-Dibromo-3-chloropropane	ug/L	ND	50	49.2	98	69-127	
1,2-Dibromoethane (EDB)	ug/L	ND	20	23.0	115	75-125	
1,2-Dichlorobenzene	ug/L	ND	20	20.5	102	75-125	
1,2-Dichloroethane	ug/L	ND	20	24.5	123	74-128	
1,2-Dichloropropane	ug/L	ND	20	23.5	117	75-125	
1,3,5-Trimethylbenzene	ug/L	ND	20	21.3	107	72-126	
1,3-Dichlorobenzene	ug/L	ND	20	20.6	103	75-125	
1,3-Dichloropropane	ug/L	ND	20	22.0	110	75-125	
1,4-Dichlorobenzene	ug/L	ND	20	20.3	101	75-125	
2,2-Dichloropropane	ug/L	ND	20	17.6	88	71-143	
2-Butanone (MEK)	ug/L	ND	100	105	105	64-125	
2-Chlorotoluene	ug/L	ND	20	20.1	101	74-125	
4-Chlorotoluene	ug/L	ND	20	20.1	101	75-125	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	100	113	113	69-125	
Acetone	ug/L	ND	100	121	116	57-135	
Allyl chloride	ug/L	ND	20	24.4	122	73-134	
Benzene	ug/L	ND	20	23.4	117	70-135	
Bromobenzene	ug/L	ND	20	21.7	109	75-125	
Bromochloromethane	ug/L	ND	20	23.2	116	75-125	

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### QUALITY CONTROL DATA

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

MATRIX SPIKE SAMPLE: 1567430		10247486001	Spike	MS	MS	% Rec	
Parameter	Units	Result	Conc.	Result	% Rec	Limits	Qualifiers
Bromodichloromethane	ug/L	ND	20	22.9	115	75-125	
Bromoform	ug/L	ND	20	20.5	103	68-133	
Bromomethane	ug/L	ND	20	23.1	116	56-150	
Carbon tetrachloride	ug/L	ND	20	23.0	115	75-137	
Chlorobenzene	ug/L	ND	20	21.5	108	75-125	
Chloroethane	ug/L	ND	20	22.0	110	64-150	
Chloroform	ug/L	ND	20	23.9	119	75-127	
Chloromethane	ug/L	ND	20	24.7	124	65-140	
cis-1,2-Dichloroethene	ug/L	ND	20	23.8	119	75-129	
cis-1,3-Dichloropropene	ug/L	ND	20	22.9	114	75-125	
Dibromochloromethane	ug/L	ND	20	21.7	108	75-125	
Dibromomethane	ug/L	ND	20	23.2	116	75-125	
Dichlorodifluoromethane	ug/L	ND	20	36.2	181	70-150	M1
Dichlorofluoromethane	ug/L	ND	20	22.2	111	69-142	
Diethyl ether (Ethyl ether)	ug/L	ND	20	21.5	108	75-125	
Ethylbenzene	ug/L	ND	20	21.8	109	75-125	
Hexachloro-1,3-butadiene	ug/L	ND	20	20.2	101	75-135	
Isopropylbenzene (Cumene)	ug/L	ND	20	20.6	103	75-125	
m&p-Xylene	ug/L	ND	40	41.4	103	75-125	
Methyl-tert-butyl ether	ug/L	ND	20	23.2	116	70-132	
Methylene Chloride	ug/L	ND	20	23.1	115	73-125	
n-Butylbenzene	ug/L	ND	20	20.8	104	75-130	
n-Propylbenzene	ug/L	ND	20	20.4	102	75-128	
Naphthalene	ug/L	ND	20	21.6	108	73-126	
o-Xylene	ug/L	ND	20	21.1	105	75-125	
p-Isopropyltoluene	ug/L	ND	20	20.0	100	75-125	
sec-Butylbenzene	ug/L	ND	20	20.5	102	75-126	
Styrene	ug/L	ND	20	22.0	110	52-137	
tert-Butylbenzene	ug/L	ND	20	20.6	103	75-125	
Tetrachloroethene	ug/L	ND	20	21.0	105	75-130	
Tetrahydrofuran	ug/L	ND	200	244	122	69-125	
Toluene	ug/L	ND	20	22.4	112	75-125	
trans-1,2-Dichloroethene	ug/L	ND	20	25.7	128	75-135	
trans-1,3-Dichloropropene	ug/L	ND	20	19.5	98	75-125	
Trichloroethene	ug/L	ND	20	23.6	118	75-129	
Trichlorofluoromethane	ug/L	ND	20	24.3	122	75-150	
Vinyl chloride	ug/L	ND	20	24.7	123	75-147	
Xylene (Total)	ug/L	ND	60	62.5	104	75-125	
1,2-Dichloroethane-d4 (S)	%				107	75-125	
4-Bromofluorobenzene (S)	%				100	75-125	
Toluene-d8 (S)	%				100	75-125	

SAMPLE DUPLICATE: 1567431

Parameter	Units	10247486002	Dup	RPD	Max	Qualifiers
		Result	Result		RPD	
1,1,1,2-Tetrachloroethane	ug/L	ND	ND		30	
1,1,1-Trichloroethane	ug/L	ND	ND		30	

### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

SAMPLE DUPLICATE: 1567431

Parameter	Units	10247486002 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,2,2-Tetrachloroethane	ug/L	ND	ND		30	
1,1,2-Trichloroethane	ug/L	ND	ND		30	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	ND		30	
1,1-Dichloroethane	ug/L	ND	.53J		30	
1,1-Dichloroethene	ug/L	ND	ND		30	
1,1-Dichloropropene	ug/L	ND	ND		30	
1,2,3-Trichlorobenzene	ug/L	ND	ND		30	
1,2,3-Trichloropropane	ug/L	ND	ND		30	
1,2,4-Trichlorobenzene	ug/L	ND	ND		30	
1,2,4-Trimethylbenzene	ug/L	ND	ND		30	
1,2-Dibromo-3-chloropropane	ug/L	ND	ND		30	
1,2-Dibromoethane (EDB)	ug/L	ND	ND		30	
1,2-Dichlorobenzene	ug/L	ND	ND		30	
1,2-Dichloroethane	ug/L	ND	ND		30	
1,2-Dichloropropane	ug/L	ND	ND		30	
1,3,5-Trimethylbenzene	ug/L	ND	ND		30	
1,3-Dichlorobenzene	ug/L	ND	ND		30	
1,3-Dichloropropane	ug/L	ND	ND		30	
1,4-Dichlorobenzene	ug/L	ND	.67J		30	
2,2-Dichloropropane	ug/L	ND	ND		30	
2-Butanone (MEK)	ug/L	ND	ND		30	
2-Chlorotoluene	ug/L	ND	ND		30	
4-Chlorotoluene	ug/L	ND	ND		30	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	ND		30	
Acetone	ug/L	ND	ND		30	
Allyl chloride	ug/L	ND	ND		30	
Benzene	ug/L	ND	.36J		30	
Bromobenzene	ug/L	ND	ND		30	
Bromochloromethane	ug/L	ND	ND		30	
Bromodichloromethane	ug/L	ND	ND		30	
Bromoform	ug/L	ND	ND		30	
Bromomethane	ug/L	ND	ND		30	
Carbon tetrachloride	ug/L	ND	ND		30	
Chlorobenzene	ug/L	ND	ND		30	
Chloroethane	ug/L	ND	ND		30	
Chloroform	ug/L	ND	ND		30	
Chloromethane	ug/L	ND	ND		30	
cis-1,2-Dichloroethene	ug/L	8.7	8.3	4	30	
cis-1,3-Dichloropropene	ug/L	ND	ND		30	
Dibromochloromethane	ug/L	ND	ND		30	
Dibromomethane	ug/L	ND	ND		30	
Dichlorodifluoromethane	ug/L	ND	ND		30	
Dichlorofluoromethane	ug/L	2.0	2.0	.6	30	
Diethyl ether (Ethyl ether)	ug/L	14.8	15.6	5	30	
Ethylbenzene	ug/L	ND	ND		30	
Hexachloro-1,3-butadiene	ug/L	ND	ND		30	
Isopropylbenzene (Cumene)	ug/L	ND	ND		30	
m&p-Xylene	ug/L	ND	ND		30	

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### QUALITY CONTROL DATA

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

SAMPLE DUPLICATE: 1567431

Parameter	Units	10247486002 Result	Dup Result	RPD	Max RPD	Qualifiers
Methyl-tert-butyl ether	ug/L	ND	ND		30	
Methylene Chloride	ug/L	ND	ND		30	
n-Butylbenzene	ug/L	ND	ND		30	
n-Propylbenzene	ug/L	ND	ND		30	
Naphthalene	ug/L	ND	ND		30	
o-Xylene	ug/L	ND	ND		30	
p-Isopropyltoluene	ug/L	ND	ND		30	
sec-Butylbenzene	ug/L	ND	ND		30	
Styrene	ug/L	ND	ND		30	
tert-Butylbenzene	ug/L	ND	ND		30	
Tetrachloroethene	ug/L	ND	ND		30	
Tetrahydrofuran	ug/L	ND	ND		30	
Toluene	ug/L	ND	ND		30	
trans-1,2-Dichloroethene	ug/L	ND	ND		30	
trans-1,3-Dichloropropene	ug/L	ND	ND		30	
Trichloroethene	ug/L	ND	ND		30	
Trichlorofluoromethane	ug/L	ND	ND		30	
Vinyl chloride	ug/L	ND	ND		30	
Xylene (Total)	ug/L	ND	ND		30	
1,2-Dichloroethane-d4 (S)	%	114	108	5		
4-Bromofluorobenzene (S)	%	105	100	5		
Toluene-d8 (S)	%	101	100	.4		

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## QUALIFIERS

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

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### DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

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

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### ANALYTE QUALIFIERS

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0283B0009.000 Camp Ripley

Pace Project No.: 10247486

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<b>Lab ID</b>	<b>Sample ID</b>	<b>QC Batch Method</b>	<b>QC Batch</b>	<b>Analytical Method</b>	<b>Analytical Batch</b>
10247486001	MW-3	EPA 8260	MSV/25470		
10247486002	MW-7	EPA 8260	MSV/25470		
10247486003	MW-8	EPA 8260	MSV/25470		

## REPORT OF LABORATORY ANALYSIS

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- Hydrology;
- Geology;
- Hydrogeology;
- Geochemistry.
- Description of historical and current groundwater flow directions;
- Discussion of the analysis performed (including field parameters);
- Discussion of any exceedances of performance standards;
- Discussion of trends (if any);
- Description of any problems that may have been encountered;
- Summary;
- Conclusions;
- Recommendations;
- Figures (including survey information described in Sections 2.1 through 2.4);
- Attachments:
  - Laboratory analytical results;
  - Field data sheets;
- Tables:
  - Required analytes and sampling frequency;
  - Measured field parameters;
  - Static water elevations (in MSL);
  - Summary of monitoring well information.

Additionally, the Contractor will complete and provide to DMA for submittal, the MPCA's Solid Waste Land Disposal Facility Annual Report (W-SW7-02). One MPCA Solid Waste Land Disposal Annual Report shall be completed for the MMLF and on MPCA Solid Waste Land Disposal Annual Report shall be completed for the DDLF for each reporting year; they are to be submitted to DMA no later than 15 January of the year proceeding the reporting year.

#### **2.4 Groundwater Scope of Work**

Groundwater sampling, laboratory analysis and groundwater reporting work described under Section 2 "Groundwater Sampling/Analysis and Annual Report" is to be completed in Calendar Year 2013, Calendar Year 2014, Calendar Year 2015 and Calendar Year 2016 with deliverables being submitted concurrent with survey work in the calendar year immediately proceeding the sample event.

### **Parameter Lists for Sampling of Ground Water Monitoring Network**

#### **MDH 468 List (Organics)**

##### **Analytes**

1,1,1,2-Tetrachloroethane  
 1,1,1-Trichloroethane  
 1,1,2,2-Tetrachloroethane

1,2,3-Trichlorobenzene  
 1,2,3-Trichloropropane  
 1,2,4-Trichlorobenzene

1,1,2-Trichloroethane  
1,1,2-Trichlorotrifluoroethane  
1,1-Dichloroethane  
1,1-Dichloroethylene (Vinylidene chloride)  
1,1-Dichloropropene  
1,2-Dichloroethylene (trans)  
**Organics (con't.)**  
1,2-Dichloropropane  
1,3,5-Trimethylbenzene  
1,3-Dichlorobenzene (meta-)  
1,3-Dichloropropane  
1,3-Dichloropropene (cis + trans)  
1,4-Dichlorobenzene (para-)  
2,2-Dichloropropane  
2-Chlorotoluene (ortho-)  
4-Chlorotoluene (para-)  
Acetone ✓  
Allyl chloride (3 chloropropene) ✓  
Benzene ✓  
Bromobenzene ✓  
Bromochloromethane (Chlorobromomethane)  
Bromodichloromethane (Dichlorobromomethane)  
Bromoform ✓  
Bromomethane (Methyl bromide)  
Carbon tetrachloride ✓  
Chlorobenzene (monochlorobenzene)  
Chlorodibromomethane (Dibromochloromethane)  
Chloroethane ✓  
Chloroform ✓  
Chloromethane (Methyl chloride)  
Cumene (Isopropylbenzene)  
Dibromochloropropane (DBCP)  
Dibromomethane (Methylene bromide)  
Dichlorodifluoromethane  
Dichlorofluoromethane  
Dichloromethane (Methylene chloride)  
Ethyl benzene  
Ethyl ether  
Hexachlorobutadiene  
Methyl ethyl ketone (MEK)  
Methyl isobutyl ketone (4-Methyl-2-pentanone)  
Methyl tertiary-butyl ether (MTBE)  
Naphthalene

1,2,4-Trimethylbenzene  
1,2-Dibromoethane (Ethylene dibromide or EDB)  
1,2-Dichlorobenzene (ortho-)  
1,2-Dichloroethane  
1,2-Dichloroethylene (cis-)  
n-Butyl benzene ✓  
n-Propyl benzene  
p-Isopropyltoluene  
sec-Butyl benzene ✓  
Styrene  
tert-Butyl benzene ✓  
Tetrachloroethylene (Perchloroethylene)  
Tetrahydrofuran  
Toluene  
Trichloroethylene (TCE)  
Trichlorofluoromethane  
Vinyl chloride (chloroethene)  
Xylenes (mixture of o, m, p)

### Inorganics

Alkalinity, total as calcium carbonate  
Ammonia Nitrogen  
Arsenic, dissolved  
Barium, dissolved  
Boron, dissolved  
Cadmium, dissolved  
Chloride  
Chromium, total dissolved  
Copper, dissolved  
Iron, dissolved  
Lead, dissolved  
Manganese, dissolved  
Mercury, dissolved  
Nitrate + Nitrite, as N  
Sodium, dissolved  
Sulfate  
Suspended Solids, total  
Appearance (b);  
Dissolved Oxygen, field  
pH (a)  
Specific Conductance (a)  
Temperature (a)  
Turbidity, field  
Water Elevation



Document Name:  
Sample Condition Upon Receipt Form

Document Revised: 19Sep2013  
Page 1 of 1


Document No.:  
F-MN-L-213-rev.07

Issuing Authority:  
Pace Minnesota Quality Office

Sample Condition  
Upon Receipt

Client Name: WSN

Project #: **WO# : 10247486**



Courier:  Fed Ex  UPS  USPS  Client  
 Commercial  Pace  Other: \_\_\_\_\_

Tracking Number: \_\_\_\_\_

Custody Seal on Cooler/Box Present?  Yes  No      Seals Intact?  Yes  No      Optional: Proj. Due Date: \_\_\_\_\_ Proj. Name: \_\_\_\_\_

Packing Material:  Bubble Wrap  Bubble Bags  None  Other: \_\_\_\_\_      Temp Blank?  Yes  No

Thermom. Used:  80512447  B88A912167504  B88A9132521491      Type of Ice:  Wet  Blue  None  Samples on ice, cooling process has begun  
 72337080

Cooler Temp Read (°C): 04      Cooler Temp Corrected (°C): 0.9      Biological Tissue Frozen?  Yes  No  
 Temp should be above freezing to 6°C      Correction Factor: +1.4      Date and Initials of Person Examining Contents: 10/29-13/JS

Comments: \_\_\_\_\_

Chain of Custody Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name and/or Signature on COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
Correct Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9.
-Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10.
Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Sample Labels Match COC?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
-Includes Date/Time/ID/Analysis Matrix: <u>WT</u>		
All containers needing acid/base preservation have been checked? Noncompliances are noted in 13.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , HCl<2; NaOH>12)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Sample #
Exceptions: VOA, Coliform, TOC, Oil and Grease, WI-DRO (water)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Initial when completed: <u>JS</u> Lot # of added preservative: _____
Headspace in VOA Vials (>6mm)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	14.
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	15.
Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):		

CLIENT NOTIFICATION/RESOLUTION

Field Data Required?  Yes  No

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/Resolution: \_\_\_\_\_

Project Manager Review: Kelvin Xiang

Date: 10/30/13

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

## APPENDIX B

### WELL STABILIZATION FORMS



ALEXANDRIA  
Phone & Fax  
320-762-8149  
320-762-0263

BEMIDJI  
Phone & Fax  
218-444-1859  
218-444-1860

BRAINERD/BAXTER  
Phone & Fax  
218-829-5117  
218-829-2517

CROOKSTON  
Phone & Fax  
218-281-6522  
218-281-6545

GRAND FORKS  
Phone & Fax  
701-795-1975  
701-795-1978

RED WING  
Phone & Fax  
651-388-2443  
651-388-5236

ROCHESTER  
Phone & Fax  
507-292-8743  
507-292-8746

ENGINEERING ARCHITECTURE LAND SURVEYING ENVIRONMENTAL SERVICES

DATE: 10/25/13

PROJECT NAME: Camp Ripley Sampling PROJECT NUMBER: 0283B0009.000

LOCATION: Randall MN WEATHER: Mostly Sunny

TEMP. MIN. 44°F TEMP. MAX. 54°F ENGINEER PERSONNEL: Boyer

CONTRACTOR(S): -

SUBCONTRACTOR WORKING: -

WORK DONE BY ENGINEER: Sampled MW.

DAILY PROGRESS (Contractors & Subcontractors): On site @ 10:00. Had site specific  
training and signed on for range pass. Sampled MW-7, MW-8, ADLF-4,  
ADLF-5, MW-3 in that order. Checked SWL on ADLF-2 = 20.63  
ADLF-1 = 29.84  
ADLF-3 = 28.61

MW-7 was FLD DUP. Equip Blm<sup>2</sup> was taken @ 15:00.

Trip Blm<sup>2</sup> was also sent in.

Samples will be sent to Pecc on Monday by Cleg.

SCANNED

REMARKS: \_\_\_\_\_

SIGNED: [Signature] DATE SIGNED: 10/25/13

(If more space is required, use other side)







