JV TASK 109 – RISK ASSESSMENT AND FEASIBILITY OF REMEDIAL ALTERNATIVES FOR COAL SEAM AT GARRISON, NORTH DAKOTA

Final Report

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ABSTRACT

The Energy & Environmental Research Center (EERC) conducted an evaluation of alternative technologies for remediation of hydrocarbon-contaminated coal seam, including impacted soils and groundwater in Garrison, North Dakota. Geotechnical characteristics of the impacted fractured coal seam provide for rapid off-site contaminant transport, with the currently identified impacted zone covering an area of about 40 acres.

Regardless of the exposure mechanism (free, dissolved, or vapor phase), results of laboratory tests confirmed secondary release of gasoline-based compounds from contaminated coal to water reaching concentrations documented from the impacted areas. Coal laboratory tests confirmed low risks associated with spontaneous ignition of gasoline-contaminated coal.

High contaminant recovery efficiency for the vacuum-enhanced recovery pilot tests conducted at three selected locations confirmed its feasibility for full-scale remediation. A total of 3500 gallons (13.3 m^3) of contaminated groundwater and over 430,000 ft^3 (12,200 m^3) of soil vapor were extracted during vacuum-enhanced recovery testing conducted July 17–24, 2007, resulting in the removal of about 1330 lb (603 kg) of hydrocarbons, an equivalent of about 213 gallons of product.

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NOMENCLATURE

AS	air stripper
BTEX	benzene, toluene, ethylbenzene, and xylenes
COC	contaminants of concern
DO	dissolved oxygen
EC	electrical conductivity
EERC	Energy & Environmental Research Center
EPA	U.S. Environmental Protection Agency
FID	flame ionization detector
GAC	granular activated carbon
GC	gas chromatography
GRO	gasoline-range organics
ISCO	in situ chemical oxidation
LEL	lower explosion limit
MPE	multiphase extraction
NDDH	North Dakota Department of Health
O&M	operating and maintenance
OWS	oil–water separator
pDSC	pressure differential scanning calorimetry
PID	photoionization detector
QA/QC	quality assurance/quality control
SVE	soil vapor extraction
TGA	thermogravimetric analysis
TPH	total petroleum hydrocarbons
UEL	upper explosion limit
VER	vacuum-enhanced recovery
VLS	vapor–liquid separator
VOC	volatile organic compounds

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EXECUTIVE SUMMARY

Based on the results of a site investigation and vacuum-enhanced recovery pilot tests at three selected locations, the Energy & Environmental Research Center (EERC) conducted an evaluation of alternative technologies for remediation of a hydrocarbon-contaminated coal seam including impacted soils and groundwater in Garrison, North Dakota. A site investigation confirmed the presence of free product in abandoned mine cavities and high concentrations of residual gasoline-based contaminants with benzene concentrations in groundwater exceeding 70,000 µg/l. The confirmed impacted zone covers an area of about 40 acres, with hot spots being identified at the Cenex station (location of original release), the downgradient west corner of the Tesoro station, and in mining cavities intercepting the plume south of the release area.

The soil vapor extraction (SVE) and multiphase extraction (MPE) pilot tests confirmed high contaminant recovery efficiency at all three locations selected. A total of 3500 gallons (13.3 m^3) of contaminated groundwater and over 430,000 ft^3 (12,200 m^3) of soil vapor were extracted during MPE testing conducted July 17–24, 2007, resulting in the removal of about 1330 lb (603 kg) of hydrocarbons, an equivalent of about 213 gallons of product (Table ES-1).

Table ES-1. Hydrocarbon Recovery – Summary

Location	TPH_{vapor} (lb)	TPH_{water} (lb)	Total (lb)	Total (gal)
Cenex Corner	509.6	0.00	509.6	81.4
Tesoro Corner	773.2	0.24	773.4	123.6
Cavity	47.1	0.16	47.3	7.6
Total	1329.9	0.4	1330.3	212.6

Laboratory testing of coal samples focused on a contaminant retention and release mechanism that contributes to further contaminants of concern (COC) downgradient migration in the saturated coal seam. After exposure to both liquid- and vapor-phase gasoline, the results confirmed secondary release of volatile organic compounds to the groundwater. The results also confirmed the need for either gas flow or thermal application to remove the gasoline absorbed on coal.

With respect to complex geotechnical conditions—a high-permeability environment with contaminant transport bound to preferential pathways in the fractured coal seam and abandoned mining voids and cavities—the combination of remediation technologies suggested for the locations with highest documented impact must be capable of 1) efficiently removing residual free product from the saturated zone while providing for water-table control at desired levels, 2) extracting large volumes of contaminated vapors from the vadose and dewatered zones to accelerate in situ volatilization, and 3) stimulating in situ natural biodegradation processes by providing air to the oxygen-depleted target/smear zone.

The suggested remedial strategy is based on contaminant recovery and in situ degradation using a combination of 1) a thermally enhanced SVE in the source area,

2) MPE transitioned to SVE in saturated impacted areas, and 3) high-volume low-vacuum extraction from mining cavities using a pioneering concept of controlled “draft and channel” extraction technology.

With respect to the large size of the impacted area and in order to reduce costs associated with construction of multiple extraction units, the proposed stationary SVE systems should be designed as modular components to be combined with mobile, high-vacuum MPE systems to achieve high contaminant recovery efficiency while maintaining operational flexibility. Because of the critical importance of abandoned cavities controlling contaminant distribution within the impacted area, a supplemental delineation of mining cavities should be an integral part of the cleanup process.

The proactive remedial approach is suggested to eliminate long-term health risks associated with contaminant migration to water-bearing zones used for domestic water supply by reducing currently high COC concentrations in the source and impacted areas. The detailed cost proposal for the suggested remediation is provided separately.

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1.0 INTRODUCTION

At the request of the North Dakota Department of Health (NDDH), the Energy & Environmental Research Center (EERC) conducted a limited site investigation and vacuum-enhanced recovery (VER) pilot tests at three locations impacted by release from a Farmers Union Oil Company site in Garrison, North Dakota. The primary objectives of the proposed activities were to 1) conduct a supplemental site characterization to evaluate the contaminant distribution and geometry of the impacted area and 2) evaluate the feasibility of alternative technologies capable of reducing risks associated with volatile organic compounds (VOC) presence and migration in an impacted coal seam.

The summary of project activities is as follows:

- Groundwater and vapor monitoring for existing wells, including domestic wells, conducted on a monthly basis from December 12, 2006, to June 6, 2007. This monitoring activity conducted prior to initiation of the EERC field investigation was requested by NDDH in a letter dated December 1, 2006.

- Drilling of 20 soil borings, including installation of extraction and monitoring wells conducted April 30 – May 4 and May 14–18, 2007.

- Groundwater sampling and water-table monitoring conducted June 11–13, 2007.

- Evaluation of the feasibility of using a camera survey for delineation of mining voids conducted May 16 and September 10–11, 2007.

- Survey of all wells at the site.

- Laboratory testing of the coal samples conducted from August to October 2007.

- Vacuum-enhanced pilot tests at three locations: Cenex corner, Tesoro corner, and cavity area, conducted July 17–24, 2007.

- Verification of plume delineation for a full-scale design and installation of six monitoring wells September 10–13, 2007.

- Groundwater sampling and monitoring conducted September 11–12, September 26, and October 3, 2007.

- Feasibility evaluation of alternative technologies/strategies for the subject site.

2.0 EXPERIMENTAL

The unique contaminant transport mechanisms and geotechnical properties of the impacted fractured coal seam required detailed evaluation of coal retention and release mechanisms for gasoline-based volatile organics.

In order to simulate real-world transport and release mechanisms as identified by site conceptual models, a series of specifically designed tests using clean and contaminated coal samples were carried out to evaluate secondary contaminant (BTEX) release to the aqueous environment after resaturation. These tests simulated a scenario in which gasoline-exposed coal is periodically resaturated with groundwater, i.e., conditions occurring in poorly saturated coals after a recharge event. In addition, field monitoring and laboratory testing was carried out to verify vapor-phase transport of volatile organics and potential for secondary VOC release from coal that was exposed to vapor-phase VOC only. The results of tests confirmed secondary release of gasoline-based compounds to water reaching or exceeding concentrations documented from the impacted areas regardless of the exposure mechanism (free, dissolved, and vapor-phase VOC).

The next series of tests focused on potential risks/evaluation of spontaneous ignition of gasoline-contaminated lignite. These experiments were carried to verify if the naturally occurring tendency for spontaneous combustion of lignites can increase after its exposure to VOC.

Definition of the contaminated target zone, contaminant properties, and the results of the EERC pilot tests at three selected locations, including the results of experimental tests, indicated that remediation technology or a combination of technologies suitable for the subject site must be capable of:

- Efficiently removing contaminants from both the vadose and saturated zones in fractured coal seam.
- Creating a pneumatic impact that would allow for contaminant recovery from a discrete network of abandoned mining cavities.
- Being flexible enough to address water table fluctuation across the contaminant smear zone.
- Providing for accelerated nutrient supply to stimulate biodegradation.

Additional objectives and requirements for this demonstration were:

- A flexible design and operation of mobile extraction and injection systems to overcome site limitations associated with a large impacted area.
- Well field design that would not be disruptive to traffic and daily operation of facilities at the site.

3.0 SITE CHARACTERISTICS

3.1 Site Location and Contaminant Release History

The original source area at Farmers Union Oil Company, currently the Cenex station, 209 Southwest 4th Avenue, T148N R84W Section 8, McLean County, Garrison, North Dakota, was approximately 100 × 100 ft. Results of the site investigation conducted up to September 2007 confirmed groundwater contamination on about 40 acres downgradient from the source. The site layout, including the location of monitoring and domestic wells, is provided in Figure 1 and Appendix A.

The release of an estimated 30,000 gallons of premium gasoline was reported in September 2005. The site investigation and evaluation of the impacted area were initiated in November 2005.

3.2 Supplementary Site Investigation and Sediment Properties

Twenty soil borings were advanced in the source and impacted areas in preparation for pilot testing and plume delineation April 30–May 4 and May 14–18, 2007. Nine soil borings that confirmed high contaminants of concern (COC) levels were completed as monitoring wells, and one well was completed as a 4" multiphase extraction (MPE) well. Because of the size of the impacted areas and uncertainties associated with abandoned mining cavities, an additional 10 investigation boreholes were completed September 10–13, 2007, to delineate impact boundaries at the Cenex and Tesoro corners and to evaluate the continuity of the cavity documented from a previous drilling effort. Six of the 10 borings were then completed as monitoring wells.

An extraction well borehole was advanced by a 6-in.-i.d. (10-in.-o.d.) hollow-stem auger using a CME 75 drill rig. The well was completed with 4-in.-diameter flush-threaded PVC, Schedule 40 with a 0.020-in. slot screen and No. 30 red flint pack. Monitoring wells were advanced using 4-in.-i.d. by 8-in.-o.d. hollow-stem augers and completed as 2-in.-diameter flush-threaded PVC, Schedule 40 groundwater-monitoring wells. Soil boring and well locations, including a summary of technical parameters, are provided in Appendix A. Geologic logs are provided in Appendix B; well completion documentation for the second phase of drilling is in Appendix C, completion logs for first phase of drilling are summarized in a separate report [1]; and the site survey data are presented in Appendix E.

Soil samples for the photoionization detector (PID) screening level survey were collected using 2-in. split-barrel samplers, driven in accordance with ASTM International D-1586. All wells were immediately developed using a pneumatic pump and bailers. Contaminated groundwater recovered during well development was collected in a trailer-mounted plastic tank and processed in the EERC mobile water treatment system. With respect to the importance of abandoned mining cavities that provide for groundwater drainage within the impacted area, their further identification and delineation is suggested as an integral part of further remediation effort.

3.3 Geotechnical Characteristics

3.3.1 Geology

The sediment profile intercepted by exploratory drilling in source and impacted areas is dominated by a heterogeneous complex of silty, sandy clays interbedded with several layers of fractured lignite. Fractured coal layers ranging in thickness from inches to several feet provide hydraulic conduits for contaminant transport. The first and most distinguished layer of contaminated lignite is documented from the source area at a depth of 15–20 ft. This layer, plunging south–southwest, is continuously developed downgradient from the contaminant release across the entire impacted area (Appendix A). Because of its thickness, ranging

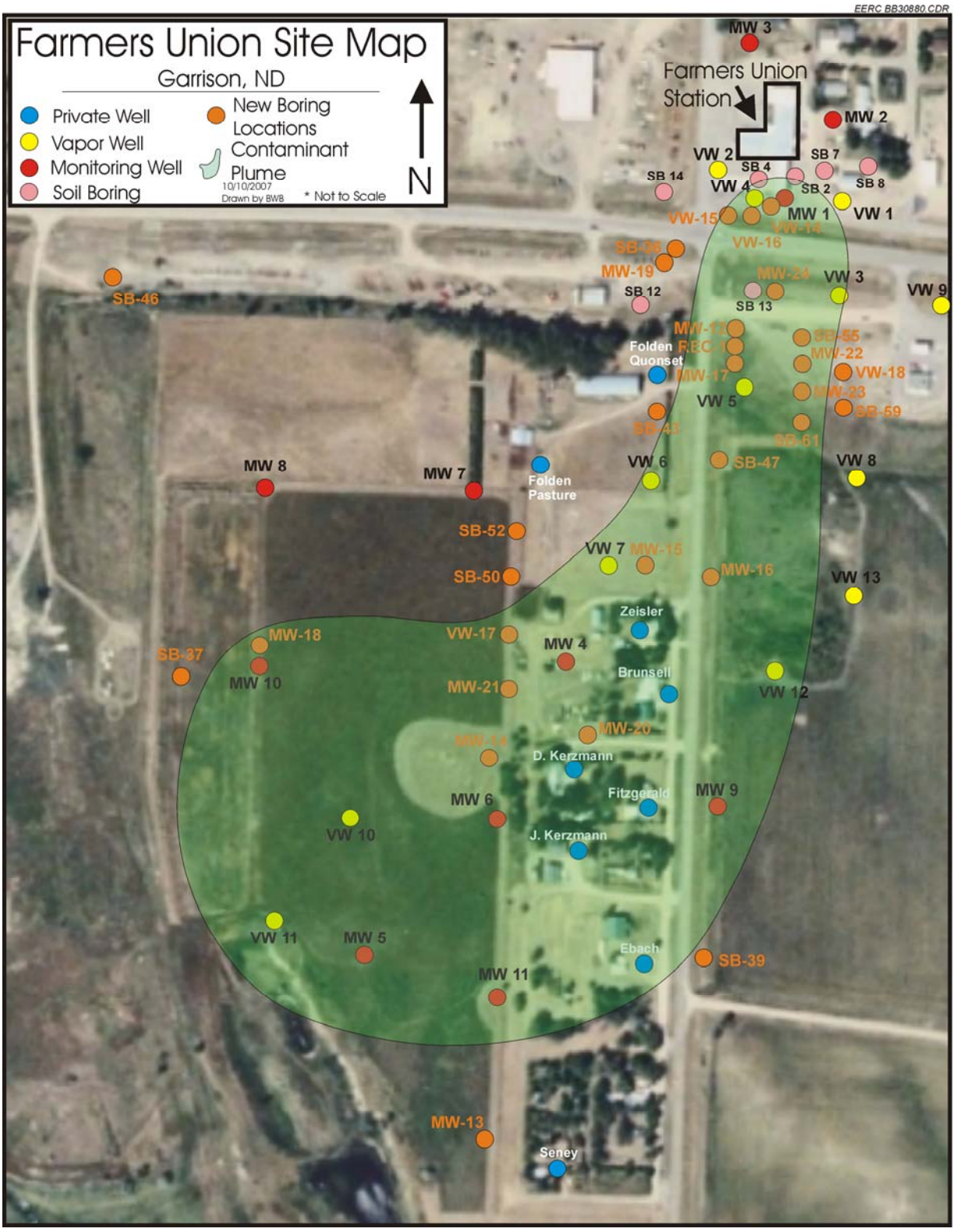


Figure 1. Site plan.

between 5 and 10 ft, the lignite was extensively mined from the beginning to middle of last century. The coal core samples and samples from outcrops indicate that slightly plastic lignite is intensively fractured and separates along tension and compression fractures as well as along thin peels/horizontal fissures, reflecting its sedimentary origin. Intensity and aperture of fractures increases in areas of coal exposure (outcrops) or disturbance, such as in cavities. Lignite properties are discussed in detail in Section 4.0.

The second continuously developed coal seam used as a primary water source for domestic wells is hydraulic, isolated by about 90 ft of silty clays interbedded with discontinuous thinner lignite seams or lenses. This deeper coal seam was not mined, and no contamination has been confirmed from domestic wells to date.

Formational instability and the absence of mining documentation prompted several stages of investigative drilling focused on delineation and stabilization of abandoned cavities by the state of North Dakota in 1992–1993. Two EERC boreholes intercepted the noted cavities (SB-41 and SB-42, completed as monitoring wells MW-15 and MW-16, respectively). A camera survey conducted in the open borehole before well completion revealed about a 4-ft-high a 4-ft-wide cavity with product sheen-coated water flowing at its bottom.

3.3.2 Hydrogeology and Contaminant Transport

Depth to groundwater across the source and impacted areas exhibits high temporal and spatial variability and reflects the occurrence of abandoned mining cavities that altered the natural gradient and provide for accelerated drainage. The groundwater table averaged from about 15 to 60 ft belowground between June 2006 and October 2007 (Appendix F). Primary groundwater occurrence is bound to the fractured coal aquifer, with the dominant flow direction to the south toward Lake Sakakawea.

The targeted sediment profile in the source/contaminant release area (Cenex corner) is not continuously saturated. The groundwater occurs only at the bottom of the coal seam (well MW-1), and its level is controlled by relatively quick transport to the south via fractured coal. Coal is more saturated at the Tesoro corner, with about 50% of the coal seam submerged under the water table during our testing (MW-12, MW-17, MW-22, and MW-23). Similarly to the release area, the properties of the coal provide for accelerated drainage further magnified by the presence of a discrete network of abandoned cavities. The cavity intercepted by wells MW-15 and MW-16 lies perpendicularly to flow (plume) direction and serves as a drain for contaminated groundwater descending through the coal seam from upgradient areas. The presence of cavities allowing for relatively unhindered groundwater flow to areas not controlled by natural gradient likely explains the COC occurrence in distant wells MW-10 and MW-18 far west of the dominant flow direction. In addition to aqueous-phase contaminant migration, cavities provide vapor flow channels that allow for migration of gaseous (vapor)-phase volatile organics in response to soil thermal gradients. In addition, our coal testing confirmed that soils and coal exposed to contaminated vapors can serve as a secondary source of contaminants after resaturation.

Contrary to flow acceleration, partial or full collapse of cavities, including structural fill injected during the stabilization effort by the state in 1992–1993, may form underground barriers that dam the flow within the cavities and result in mounding, formation of saturated pockets, or even partial aquifer confinement. Higher saturation of the coal seam is documented in the center of the impacted area around wells MW-6, 14, and 20, including the Kerzman well.

Considering all factors presented, the conceptual migration model is based on repeated saturation and drainage of the contaminated coal seam in the source/recharge area with relatively active COC migration downgradient (Appendix A). The primary factors contributing to off-source migration are highly permeable fractured coal, abandoned mining cavities, and vapor transport. While fast off-site migration would result in a relatively narrow plume (such as the geometry documented at the Cenex and Tesoro corners), the presence of perpendicularly intercepting cavities provides for fast lateral as well as downgradient spreading of COCs. Concentrations of COCs stabilized in the source area; however, slightly increasing trends are documented from some downgradient monitoring wells. Contamination observed at the municipal lift station west of the site early after release was likely associated with gasoline migration to the abandoned branch of the sanitary sewer.

Groundwater chemistry at the site is dominated by sodium, calcium, and sulfate ions, with a high concentration of iron (40 mg/l in well MW-20), hardness exceeding 1300 mg/l, and electrical conductivity (EC) over 2500 µS/cm. Biodegradation parameters exhibit trends typical of an anaerobic contaminant plume, with suppressed oxygen, nitrate, phosphorus, and sulfate concentrations and elevated concentrations of iron and manganese (Appendix I-3). While nitrogen–nitrate concentrations are exceeding the drinking water standard of 10 mg/l in upgradient wells (MW-2), analyses from wells within and downgradient of the impacted area indicate that nitrate is effectively consumed to below detection limit within the dissolved benzene, toluene, ethylbenzene, and xylenes (BTEX) plume.

Although elemental concentrations indicate that active biodegradation within the impacted area is an ongoing process, even under currently prevailing anaerobic conditions, its rate is limited by depletion of electron acceptors most favorable for BTEX reduction (i.e., oxygen and nitrogen). Low saturation and a relatively fast groundwater regime does not provided for sufficient residence time and delivery of “fresh” electron acceptors.

3.4 Soils and Groundwater Contamination

3.4.1 Soil Contamination

Soil samples collected during investigative drilling and monitoring well installation represent composites based on PID readings (Appendix F-1 and G-1). Concentrations exceeding North Dakota action levels in soils of 100 and 0.5 mg/kg for total petroleum hydrocarbons (TPH) and benzene, respectively, were confirmed in the source and impacted area. Maximum values of benzene in excess of 46,000 µg/kg and 1600 mg/kg for gasoline-range organics (GRO) indicate the presence of relatively fresh free product in the coal seam and ambient sediments (Table 1, Appendices I-1 and J-1).

3.4.2 Groundwater Contamination

The groundwater-monitoring program under this project was initiated in December 2006 and consisted of monthly monitoring of existing monitoring and domestic wells until June 2007. The first complete background sampling for the expanded monitoring network was conducted by

Table 1. BTEX in Soils and Coal Samples

	Date	Interval[1] (ft)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes Total (ppb)	GRO (mg/kg)
SB-32/17	05/01/07	17-19	27,050	7862	<1000	<3000	260
SB-32/20	05/01/07	20-22	46,050	7661	10,100	51,150	560
SB-33/15	05/01/07	15-17	315.3	<100	<100	<300	35
SB-34/15	05/01/07	15-17	18,170	26,880	3204	13,690	270
SB-34/20	05/01/07	20-22	27,060	28,400	6624	38,770	290
SB-35/18	05/01/07	18-20	15,480	16,770	1640	4701	130
SB-35/23	05/01/07	23-25	8071	3922	4455	24,950	350
SB-38/53	05/02/07	53-55	<1	<1	<1	<3	<0.2
SB-41/38	05/01/07	38-40	504.2	219.1	<50	<150	15
SB-41/43	05/03/07	43-45	1879	366.8	52.6	559.4	6.1
SB-42/33	05/04/07	33-35	2901	1378	2147	14,560	140
SB-43/19	05/04/07	19-21	14,370	10,400	8564	31,600	270
SB-45/20	05/15/07	20-22	23,890	46,360	24,380	137,500	1600
SB-44/18	05/14/07	18-20	11,790	10,850	1007	2910	120
SB-44/23	05/14/07	23-25	14,570	25940	7653	43,270	290
SB-46/14	05/15/07	14-16	28	40.3	13.5	77.8	<1
SB-48/33	05/15/07	33-35	9334	28,680	10,530	71,680	500
SB-47/21	08/10/07	21-23	523.5	312.8	<50	<150	<10
SB-47/23	05/15/07	23-25	39.6	10.5	<5	<15	1.2
SB-51/52	05/16/07	52-54	268.7	11.4	13.6	<30	<2
SB-53/48	09/11/07	48-50	15,400	4831	665.3	1455	120
SB-54/57	09/11/07	57-59	1875	1.7	4.5	14.2	0.78
SB-55/22	09/11/07	22-24	5020	8028	1139	9033	85
SB-55/23	09/11/07	23-25	20,680	39,910	5016	92,520	560
SB-56/22	09/12/07	22-24	9804	12,660	2559	18,250	180
SB-56/24	09/12/07	24-26	5616	4582	1962	9740	62
SB-57/22	09/12/07	22-24	1061	1140	460.4	3212	35
SB-58/23	09/12/07	23-25	2914	4659	1534	6790	74
SB-59/18	09/12/07	18-20	7.2	5.8	1.2	3.7	<0.2
SB-60/20	09/12/07	20-22	5441	15,010	3561	16,540	170
SB-60/23	09/12/07	23-25	3540	4139	1589	7932	77
SB-61/15	09/12/07	15-17	109.1	<50	<50	<150	<10

[1] Samples represent a composite from 1.5–2 ft core.

the EERC in June 2007, followed by a second sampling event in September and October 2007. Groundwater samples for BTEX and GRO were collected from all wells at the site; samples for biodegradation indicators were collected from nine selected monitoring wells. Samples were collected using disposable PVC bailers, preserved on-site, and stored on ice. All analyses were conducted by MVTL in Bismarck, North Dakota, and New Ulm, Minnesota. Quality assurance/quality control (QA/QC) samples included field, trip, and equipment blanks and duplicates. Field-measured parameters including temperature, dissolved oxygen (DO), EC, pH, and ox–redox potential were recorded during sampling. Table 2 provides a summary of analytical results for targeted compounds; a complete summary is presented in Appendix I, and analytical documentation is in Appendix J. In addition to EERC sampling, COC trends and previous analysis were evaluated based on documentation provided by NDDH.

Table 2. Groundwater Analyses – Monitoring Wells

Well ID	Date	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (total ppb)	GRO (TPH) (mg/l)	BTEX (ppb)	BTEX Trend
Monitoring Wells								
MW-1	12/12/06	49,580	40,210	3104	16,770	250.0	109,664	
MW-1	01/17/07	53,880	55,280	5888	33,300	420.5	148,348	
MW-1	02/21/07	63,150	60,710	4308	24,070	320.7	152,238	
MW-1	03/28/07	Dry						–
MW-1	04/25/07	72,200	67,500	5196	30,510	348.4	175,406	
MW-1	05/15/07	59,610	66,580	10,420	62,580	551.4	199,741	
MW-1	06/13/07	52,880	51,040	4026	25,020	288.2	133,254	
MW-1	09/11/07	56,510	51,880	3737	22,820	237.3	135,184	
MW-2	12/12/06	<1	<1	<1	<3	<0.2	0	
MW-2	01/17/07	<1	<1	<1	<3	<0.2	0	
MW-2	02/21/07	<1	<1	<1	<3	<0.2	0	
MW-2	03/28/07	Frozen						–
MW-2	04/25/07	<1	<1	<1	<3	<0.2	0	
MW-2	05/15/07	<1	<1	<1	<3	<0.2	0	
MW-2	06/12/07	<1	<1	<1	<3	<0.2	0	
MW-2	09/11/07	<1	<1	<1	<3	<0.2	0	
MW-3	12/12/06	<1	<1	<1	<3	<0.2	0	
MW-3	01/17/07	<1	<1	<1	<3	<0.2	0	
MW-3	02/21/07	<1	<1	<1	<3	<0.2	0	
MW-3	03/28/07	<1	<1	<1	<3	<0.2	0	–
MW-3	04/25/07	<1	<1	<1	<3	<0.2	0	
MW-3	05/15/07	<1	<1	<1	<3	<0.2	0	
MW-3	06/12/06	<1	<1	<1	<3	<0.2	0	
MW-3	09/11/07	<1	<1	<1	<3	<0.2	0	
MW-4	12/12/06	1784	1.1	21.1	44.1	3.47	1850	
MW-4	01/17/07	1339	1.1	18.4	18.3	1.50	1378	
MW-4	02/21/07	2728	<20	85.2	85.1	6.28	2905	
MW-4	03/28/07	3349	42.1	121.5	160.4	7.17	3680	
MW-4	04/25/07	4689	59.2	248.9	462.7	9.65	5469	▲
MW-4	05/15/07	6732	497.8	719	1962	18.89	9930	
MW-4	06/13/07	3598	35.8	363.9	828	10.84	4826	
MW-4	09/11/07	4120	<10	423	782.7	10.44	5326	
MW-5	12/12/06	91.8	<1	1.9	<3	0.21	94	
MW-5	01/17/07	67.8	1.7	2.8	4.1	0.21	76	
MW-5	02/21/07	56.8	12.2	7.4	16.6	0.40	93	
MW-5	03/28/07	123.1	454.9	248	1305	6.69	2138	
MW-5	04/25/07	107.7	166.1	217.3	1084	6.00	1581	▲
MW-5	05/15/07	127.8	199.4	185.8	920.5	6.81	1440	
MW-5	06/13/07	226.5	115.2	113.2	554.8	5.10	1015	
MW-5	09/11/07	684.9	15.2	103.9	349.9	6.11	1160	
MW-6	12/12/06	665.2	<1	<1	3.1	0.957	668	
MW-6	01/17/07	460.2	<1	<1	<3	0.803	460	
MW-6	02/21/07	442.7	<1	<1	<3	0.760	443	▲
MW-6	03/28/07	669.6	2.9	1.1	3.3	0.944	677	

Continued . . .

Table 2. Groundwater Analyses – Monitoring Wells (continued)

Well ID	Date	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (total ppb)	GRO (TPH) (mg/l)	BTEX (ppb)	BTEX Trend
Monitoring Wells								
MW-6	04/25/07	1118	38.9	27.1	77.2	2.553	1264	
MW-6	05/15/07	1833	97.6	115.4	329.1	4.389	2379	▲
MW-6	06/13/07	1109	14.4	89.3	206.3	3.170	1422	
MW-6	09/12/07	1176	<10	51.8	63.2	2.640	1294	
MW-7	12/12/06	8.3	<1	<1	<3	0.786	8	
MW-7	01/17/07	6.5	<1	<1	<3	0.761	7	
MW-7	02/21/07	5.9	<1	<1	<3	0.785	6	
MW-7	03/28/07	8.2	<1	<1	<3	1.156	8	–
MW-7	04/25/07	11.5	<1	<1	<3	1.096	12	
MW-7	05/15/07	12.1	<1	<1	<3	1.259	12	
MW-7	06/13/07	10.1	<1	<1	<3	1.110	11	
MW-7	09/11/07	9.5	<1	<1	<3	0.852	10	
MW-8	12/12/06	<1	<1	<1	<3	<0.2	0	
MW-8	01/17/07	<1	<1	<1	<3	<0.2	0	
MW-8	02/21/07	<1	<1	<1	<3	<0.2	0	
MW-8	03/28/07	<1	<1	<1	<3	<0.2	0	–
MW-8	04/25/07	<1	<1	<1	<3	<0.2	0	
MW-8	05/15/07	<1	<1	<1	<3	<0.2	0	
MW-8	06/13/07	<1	<1	<1	<3	<0.2	0	
MW-8	09/11/07	<1	<1	<1	<3	<0.2	0	
MW-9	12/12/06	3547	12.5	282.6	410.7	9.616	4253	
MW-9	01/17/07	4166	22.0	298.4	501.2	10.30	4998	
MW-9	02/21/07	2933	19.1	254.9	522.7	9.23	3739	
MW-9	03/28/07	3836	31.7	332.6	747.1	10.01	4957	–
MW-9	04/25/07	4034	122.5	602.6	1975	15.93	6750	
MW-9	05/15/07	3760	169.1	1135	5112	30.67	10,207	
MW-9	06/13/07	3819	410.2	703.3	2590	21.67	7544	
MW-9	09/11/07	3302	<50	836	2524	21.55	6684	
MW-10	12/12/06	0.10 ft						
MW-10	01/17/07	0.20 ft						
MW-10	02/21/07	0.19 ft						
MW-10	03/28/07	0.19 ft						▼
MW-10	04/25/07	0.03 ft						
MW-10	05/15/07	10,610	22,310	4199	30,660	140.6	67,920	
MW-10	06/13/07	7941	13,160	2823	23,930	118.5	47,973	
MW-10	09/11/07	7468	3673	3810	23,730	90.32	38,771	
MW-11	12/12/06	194.6	<1	<1	<3	0.338	195	
MW-11	01/17/07	188.0	<1	<1	<3	0.383	188	
MW-11	02/21/07	159.5	<1	<1	<3	0.319	160	▲
MW-11	03/28/07	166.1	<1	<1	<3	0.274	166	
MW-11	04/25/07	170.3	<1	<1	<3	0.285	170	
MW-11	05/15/07	182.9	<1	<1	<3	0.275	183	

Continued . . .

Table 2. Groundwater Analyses – Monitoring Wells (continued)

Well ID	Date	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (total ppb)	GRO (TPH) (mg/l)	BTEX (ppb)	BTEX Trend
Monitoring Wells								
MW-11	06/13/07	419.5	<1	<1	<3	0.653	420	▲
MW-11	09/12/07	704.2	<1	10	6.6	1.135	722	
MW-12	06/13/07	3730	3357	1271	7145	39.35	15,542	
MW-12	09/11/07	2132	293.2	760.8	3755	22.47	6963	
MW-13	06/13/07	<1	<1	<1	<3	<0.2	0	
MW-13	09/12/07	<1	<1	<1	<3	<0.2	0	
MW-14	06/13/07	<1	<1	<1	<3	<0.2	0	
MW-14	09/12/07	<1	<1	<1	<3	<0.2	0	
MW-15	06/13/07	4976	704.6	808.3	3966	27.25	10,482	
MW-15	0/11/06	3384	<50	228.9	468.6	7.966	4089	
MW-16	06/13/07	2615	1756	795.1	5110	27.88	10,304	
MW-16	09/11/07	2737	716.6	756.1	4587	24.48	8821	
MW-17	06/13/07	4323	5374	1620	8815	48	20,180	
MW-17	09/11/07	2126	470.8	769	4049	22.63	7437	
MW-18	06/13/07	7620	7792	2913	17030	76.84	35,432	
MW-18	09/11/07	5926	572.7	2527	12570	51.55	21,647	
MW-19	06/13/07	<1	<1	<1	<3	<0.2	0	
MW-19	09/11/07	<1	<1	<1	<3	<0.2	0	
MW-20	06/13/07	2170	71.8	79.9	231.1	4.56	2557	
MW-20	09/12/07	1377	<10	37.3	42.7	2.716	1460	
MW-21	09/26/07	1866	<10	76.5	91.4	3.69	2038	
MW-22	09/26/07	364.6	49.6	42.7	259.3	3.089	719	
MW-23	09/26/07	567.6	<10	234.4	1027	5.78	1835	
MW-24	09/26/07	2609	1954	330.2	1675	12.81	6581	

Concentrations of target contaminants, namely BTEX, considerably exceed North Dakota and U.S. Environmental Protection Agency (EPA) regulatory levels of 5, 1000, 700, and 10,000 ppb, respectively, in most monitoring wells completed at the site (Table 2). With the exception of the D. Kerzman well, which uses water from a shallower impacted coal aquifer, none of the domestic wells completed in the deeper coal seam aquifer indicates contamination to date (Appendix I-2). Reflecting on a migration model discussed previously, secondary release from resaturated contaminated coal and further downgradient migration of soils vapor and product itself result in increasing COC concentrations in downgradient wells (MW-4, MW-5, MW-6, and MW-11).

3.4.3 Vapor Monitoring

A vapor survey was conducted on a monthly basis for the first 6 months and during each sampling event. All vapor monitoring wells were equipped with a specifically designed well seal and sampling port to allow for representative screening without mixing with ambient air. The screening was conducted using PID and a flame ionization detector (FID). The results of PID screening provided in Table 3 indicate relatively high concentrations of gasoline vapors in individual wellheads. High FID and PID readings (Appendix I-4) indicate the presence of highly

Table 3. Vapor Monitoring (PID screening levels in ppm)

Well ID	12/12/06	01/17/07	02/20/07	03/28/07	04/24/07	05/14/07	06/12/07	09/10/07
VW-1	213	379	527	604	678	643	582	516
VW-2	450	389.0	704.0	678.0	309	562	274	347
VW-3	615	604.0	498.0	445.0	441	491	485	457
VW-4	1147	646.0	417.0	212.0	543	562	540	737
VW-5	916	833.0	798.0	704.0	688	843	854	832
VW-6	829	681.0	680.0	661.0	608	787	636	514
VW-7	22.7	91.4	660.0	673.0	703	914	715	690
VW-8	78.4	0.0	22.8	35.1	31.9	52.1	29.4	24.3
VW-9	294	20.6	22.7	68.4	67.8	84.7	53.7	32.4
VW-10	1151	585.0	566.0	511.0	473	583	452	385
VW-11	422	181.0	580.0	373.0	365	450	367	276
VW-12	852	335.0	358.0	365.0	327	262	202	152
VW-13	208	69.7	32.5	44.3	41.7	45.7	23.8	28.3
VW-14							626	825
VW-15							446	662
VW-16							603	483
VW-17								434
VW-18								445

volatile fresh gasoline. Initial sampling and analyses for methane conducted to date did not confirm its significant contribution to high FID values. Results of offgas monitoring conducted during extraction tests confirmed low oxygen levels in the target coal seam and cavities.

4.0 EVALUATION OF PILOT TEST

4.1 Equipment and Setup

Based on site investigation data, three locations, the Cenex corner, Tesoro corner, and cavity area around well MW-16, were selected for a VER pilot test. Extraction and monitoring wells were sealed and equipped with pressure- and water-table-monitoring ports, with a ¾-in. drop tube extending to 1 ft from the bottom of the well to allow for both vacuum pressure- and water-table monitoring. Extraction and monitoring well field details and distances are provided in Appendix H-2.

The EERC mobile contaminant recovery system used for VER tests consists of a CoVac-300 4-stage, 15-hp, oil-free regenerative blower with a maximum rating of 135 cfm @ 24.5-in. Hg. The extraction system has three 2-in. inlets that allow for easy modification of the inlet manifold for recovery from either a single- or multiple-well extraction field. Recovered water and air pass through the 60-gal vapor–liquid separator (VLS) to the oil–water separator (OWS) with a 60-gal product storage tank. Water from the OWS overflows to a 60-gal equalization tank, is charged in a Freije Series S treatment unit, and then pumped to a 4-stage air stripper (AS). Water from the air stripper is finally filtered and treated by GAC (granular activated carbon) prior to discharge. The extraction and treatment system is equipped with a NEMA 4 electric controller and a programmable logic controller, allowing for system control and data acquisition. The entire system is mounted on a 6- × 15-ft trailer platform. The process flow diagram for the extraction and treatment system is provided in Appendix H-1.

4.2 Operational Parameters and Monitoring

Based on initial formation response, the step-up tests were conducted for three inlet vacuums, if applicable. Vacuum was controlled by a blower dilution valve. Airflow was measured at the blower exhaust equipped with a pitot tube (DS-300 flow sensor), Magnehelic® differential pressure gauge and Dwyer FM 470-3 manometer, and temperature gauge. Volume of recovered groundwater was monitored with two totalizing flowmeters.

High volumes of recovered vapor achieved at relatively low vacuums at all three locations tested, with no or minimal hydraulic and pneumatic responses to vacuum-enhanced extraction, provide further evidence for extremely high fracture-based hydraulic and pneumatic conductivity. Despite the minimal response to applied vacuum, high contaminant recovery efficiency was achieved at all thee locations. A summary of operational parameters is provided in Table 4; detailed test data, including system design and response data, are in Appendix H.

Because of the absence of a saturated smear zone at the Cenex corner, the pilot test was conducted as a soil vapor extraction (SVE), with total recovery of 190,000 ft^3 of contaminated vapors. The test at the Tesoro corner was conducted as a MPE test, resulting in recovery of about 1000 gal of groundwater and 157,000 ft^3 of contaminated soil vapor over a 24-hour period. The pilot test at well MW-16 (cavity) was conducted as a MPE for 21 hours, followed by a 4-hour SVE test when the suction head was positioned above the water in the cavity. A total of 2500 gal of groundwater and 83,500 ft^3 of contaminated vapor were recovered over the period of 26 hours. The contaminant recovery estimates are summarized in Section 4.5 Table 9 with mass balance worksheets provided in Appendix H-6..

Pilot test data confirmed geotechnical conditions that are acceptable for application of the vacuum-based extraction technology. The final design needs to address specific physical and chemical properties of the targeted coal seam and its high fracture-based permeability. This will require extraction and exchange of larger air volumes with provisions for potential thermal enhancement. The sediments overlying the target coal exhibit relatively low permeability and will provide sufficient seal to prevent short-circuiting to the surface. It is expected that formation vacuum and response to the extraction system will increase with increasing duration of system operation.

4.3 Water Quality

The results of water analyses for system units and effluent are summarized in Tables 5–7; a summary of complete analyses is provided in Appendices H-4 and J-4.

Table 4. Operational Parameters

Location	Cenex	Tesoro	MW-16/Cavity
Extraction Well	MW-14, MW-15, MW-16	MPE-1, MW-12 and 17	MW-16
Monitoring Wells	MW-14, MW-15, MW-16	MW-12, MW-17, MPE-1	MW-15
Inlet Vacuum (in. Hg)	8.5–20.5	6–20	15.5–21.0
Wellhead Vacuum (in. H_2O)	29–252	34–175	0.0
Groundwater Flow (gpm)	No flow, SVE	0.3–0.8	0.0–1.7
Airflow (scfm)	28–143	42–127	46–75
Date	7/23–24/07	7/17–18/07	7/18–19/07
Test Duration (h)	23.7	24.5	25.8

With respect to high hydraulic conductivity of fractured coal and relatively fast groundwater regime, relatively high contaminant load in extracted groundwater, even after intensive volatilization typical for VLS, is indicative of free product presence or a scenario when free product is the only wetting fluid in poorly saturated coal seam. Analyses for selected parameters that affect the recovery and treatment system performance confirmed extremely high concentrations of iron, manganese, carbonate hardness, and high EC in extracted groundwater (Tables 6 and 7, Appendices H-4 and I-3) that will have to be addressed in design and the operating and maintenance (O&M) schedule for the extraction system. Effluent water analyses are provided in Table 5.

Table 5a. Treatment System Analyses – VLS

		Tesoro Corner			MW-16/Cavity	
VLS		07/17/07	07/17/07	07/18/07	07/18/07	07/19/07
MBTE	ppb	<10	<50	<100	<20	<10
Benzene	ppb	921	3079	2912	985.9	827.7
Toluene	ppb	951.3	3367	3631	487.1	375.4
Ethylbenzene	ppb	166.9	619.4	726.7	138.5	68.5
Xylenes (Total)	ppb	951.6	3548	4327	1415	1089
GRO (TPH)	mg/l	7.42	28.94	34.35	9.12	6.16

Table 5b. Effluent Analyses

		Tesoro Corner		MW-16/Cavity	
Effluent		07/17/07	07/18/07	07/18/07	07/19/07
MBTE	ppb	<1	<20	<1	<1
Benzene	ppb	2.1	<20	4.8	1.7
Toluene	ppb	2.8	<20	6.9	2.3
Ethylbenzene	ppb	2.2	37	1.9	<1
Xylenes (Total)	ppb	7.3	<60	9.8	5.1
Phenols (Total)	ppb	36.7	19.5	18	14.1
GRO (TPH)	mg/l	0.39	6.01	<0.2	<0.2

Table 6. Effluent Analyses – Selected Parameters

		Tesoro Corner		MW-16/Cavity	
Selected Parameters		07/17/07	07/18/07	07/18/07	07/19/07
Fe (total)	mg/l	12.8	13.6	14.4	14.4
Mn (total)	mg/l	1.5	1.2	1.6	1.7
TSS	mg/l	67	6	17	6
pH		8.0	7.9	7.8	7.6
EC	µS/cm	1833	2071	1855	1803
T	^{o}C	24.1	20.0	18.7	14.6

Table 7. Additional Design Basis Parameters

Selected Parameters		REC-1 6/13/07	VLS 7/17/07	Effluent
TSS	mg/l			6–67
Alkalinity	mg/l	429	229	
Carbonate	mg/l	<4	<4	
Hardness ($CaCO_3$)	mg/l	1320	791	
EC	µS/cm	2103–3177	2172	1800–2070
Ca	mg/l	261	154	
Mg	mg/l	163	99	
Fe total	mg/l	9.82	20.2	13–14
Mn (total)	mg/l	7.68	2.51	1.2–1.7

4.4 Offgas Quality

Offgas quality from combined exhaust was monitored using charcoal tubes and real-time monitoring of hydrocarbon, CO_2, and O_2 using a Summit analyzer, PID, and FID. Offgas was sampled using the charcoal tubes with on-site flow calibration and analyzed by gas chromatography (GC)/FID. To overcome fluctuating airflow velocities typical for VER systems, offgas samples were collected in a 1-l Tedlar bag filled for 60 seconds. Charcoal tube samples were subsequently collected directly from the Tedlar bag using an SKC pump with flow regulated at 0.28 l/min and a sample interval of 60 seconds. Offgas temperature during extraction at individual locations ranged between 170° and 280°F. High VOC concentrations documented from both laboratory analyses and field monitoring indicate the presence of considerable amounts of residual free product trapped in microfractures and coal matrix within the vadose and dewatered smear zone. Offgas sampling results are summarized in Table 8, with details provided in Appendices H-5 and J-5.

Oxygen content in extracted vapors exhibited sharp decline during all three tests from initial values of 15%–19% to as low as 5% (Appendix H-5). This indicates strong oxygen deficiency within the coal and cavities. The oxygen-deficient atmosphere confirms limited communication with overlying sediments and is typical for lignites that tend to absorb available oxygen. Peak emission loads for VOC (as TPH) during the VER pilot tests were approximately 40 lb/h at the Tesoro corner, 26 lb/h at the Cenex corner, and 3.5 lb/h at the MW-16/cavity. Maximum BTEX and benzene loads at the Tesoro corner were estimated at 11.6 and 3.4 lb/hr, respectively. BTEX and benzene load at the Cenex corner and cavity area corner ranged from 0.1 to 1.2 lb/hr and 0.06 to 0.6 lb/hr, respectively. It is expected that high emission loads at the Tesoro corner represent the worst-case scenario, reflecting on the presence of the residual free product within the target zone. Air treatment or modified operational strategy should be considered for early stages of the full-scale operation of the extraction systems. Considerable decline of the offgas VOC concentrations is typical during the first weeks of the continuing site remediation effort.

Table 8. Offgas Analyses

Date/Time	GRO (mg/m^3)	TPH (mg/m^3)	Benzene (mg/m^3)	Toluene (mg/m^3)	Ethylbenzene (mg/m^3)	Xylenes (mg/m^3)	BTEX (mg/m^3)
Tesoro Corner							
MPE-1							
07/17/07 09:45	41,100	78,900	368	493	72	260	1193
07/17/07 09:50	40,700	82,500	361	450	68	252	1131
07/17/07 17:30	41,800	82,500	511	668	102	436	1717
07/17/07 17:35	44,600	86,800	518	675	115	417	1725
MW-12, MW-17							
07/18/07 08:00	40,400	77,500	468	654	ND	407	1529
07/18/07 08:05	46,100	68,200	504	704	115	522	1845
Cavity							
MW-16							
07/18/07 13:05	3790	8000	110	55	14	105	284
07/18/07 13:10	3640	7570	110	54	18	115	297
07/19/07 09:00	3860	8210	123	54	10	106	293
07/19/07 09:05	3710	8320	121	54	10	108	293
07/19/07 13:30	5680	11,400	193	92	12	151	448
07/19/07 13:35	6890	13,900	190	91	12	163	456
Cenex Corner							
VW-14							
07/23/07 13:05	38,200	57,900	1660	1660	124	452	3896
07/23/07 13:10	40,000	61,100	1480	1620	167	580	3847
VW-16							
07/23/07 14:00	21,200	40,400	188	129	15	58	390
07/23/07 14:05	20,800	38,600	210	149	17	62	438
VW-15							
07/23/07 15:15	9710	18,800	ND	ND	ND	ND	
07/23/07 15:20	9360	18,400	ND	ND	ND	ND	
VW-14,VW-15,VW-16							
07/23/07 16:25	27,600	48,900	786	907	76	284	2053
07/23/07 16:30	27,000	49,300	764	875	78	290	2007
07/24/07 10:40	22,900	37,500	854	1060	81	298	2293
07/24/07 10:45	24,300	35,700	921	1250	104	389	2664

4.5 Mass Removal Estimates

The contaminant mass removal estimates were determined using the volumes for extracted groundwater and vapor and average VOC concentration obtained between two consecutive sampling events. A total of 3505 gallons (13,265 l) of contaminated groundwater and over 430,000 ft^3 (12,200 m^3) of soil vapor was extracted during VER testing at three locations, resulting in removal of 1330 lb (603 kg) of hydrocarbons, an equivalent of about 213 gallons of product, assuming a specific gravity for gasoline of 0.75 g/cm^3. Mass balance summary is presented in Table 9; complete mass balance worksheets for each location are

provided in Appendix H-6. Considering duration of each test, presented mass recovery estimates indicate high contaminant recovery efficiency and confirm the feasibility of vacuum-enhanced recovery for site cleanup.

Table 9. Contaminant Recovery Estimate

Locality	TPH_{vapor} (lb)	TPH_{water} (lb)	Total (lb)	Total (gal)
Cenex Corner	509.6	0.00	509.6	81.4
Tesoro Corner	773.2	0.24	773.4	123.6
Cavity	47.1	0.16	47.3	7.6
Total	1329.9	0.4	1330.3	212.6

5.0 COAL TESTING

5.1 Methodology and Procedures

Evaluation of the coal infiltrated with gasoline required adaptation of standard techniques otherwise used for analysis of similar materials. To apply the techniques some test procedures had to be modified slightly so that, on data reduction, changes in the characteristics of the coal caused by introduction of the gasoline could be evaluated. Coals vary significantly. Comparing coals from different mines or even the same mine between seams usually provides different analytical results. Since coal normally contains some oils and light organic compounds, analyses of coal from the same deposit as that of the gasoline-contaminated coal were required for comparison between “pristine” coal samples and contaminated coal samples.

Four types of testing were applied to the coal to evaluate the presence of gasoline in the coal and its effect on the properties of the coal. The tests were as follows:

1. Retention and release tests to evaluate potential for secondary COC release from coal exposed to free-phase product, dissolved, and vapor-phase volatile organics. An adsorption isotherm of the coal which gave a measure of the ability of the coal to attract and hold gasoline vapor on contact.

2. Thermogravimetric analysis (TGA) which provided a bulk estimate of the gasoline contained in the coal.

3. GC which provided a measure of the components of gasoline that vaporized from the coal on its exposure to atmospheric pressure and air.

4. Calorimetry which provided a measure of potential explosion hazard in the presence of air and in the presence of an ignition source. Two modified methods were applied under an air atmosphere. The first was pressure differential scanning calorimetry (pDSC) which relied on subjecting the sample to ignition temperature to determine whether instantaneous combustion (explosion) would occur. The second was bomb calorimetry in which a heated wire and spark cause instantaneous combustion (explosion) to occur.

5.2 Retention/Release – Adsorption Test

A series of simple tests using clean and contaminated coal samples was carried out to evaluate secondary contaminant (BTEX) release to the aqueous environment after resaturation. Coal samples were fully submerged in distilled water that was then sampled and analyzed at selected time intervals for BTEX and GRO. These simple tests simulate a scenario in which gasoline-exposed coal is periodically resaturated with groundwater, i.e., conditions occurring in poorly saturated coals after a recharge event. Regardless of the exposure mechanism (free, dissolved, and vapor phase) the results of tests confirmed secondary release of gasoline-based compounds to water reaching concentrations documented from the impacted areas. Test results are summarized in Table 10.

Gasoline vapor adsorption was carried out using laboratory equipment consisting of a sealed 5-gallon vessel containing 1 gallon of water in one test and 1 gallon of gasoline in the other test. Coal (SB-52, depth 50 ft, clean coal) was suspended for 72 hours above the liquid level in each test during which only vapors from the liquid were allowed to contact the coal. The weight of the coal before and after 72-hour exposure to the vapor was used to determine adsorption of water vapor in the first test and gasoline in the second test.

The substantial weight gain of the coal (10.4%) contacted by gasoline vapors indicates the affinity for hydrocarbons and their adsorption and absorption, illustrating the need for either gas flow or thermal application to remove the retained gasoline. Tables 10 and 11 provide BTEX analyses and the results of the adsorption test, respectively. The lower vapor pressure of water and its lower molecular weight account for some of the difference between masses of gasoline and water sorbed during the duration of the test, but water also has lower affinity for coal surfaces than the hydrocarbons. Laboratory documentation for coal experiment analyses is provided in Appendix G.

5.3 Thermogravimetric Analysis

The TGA testing was carried out on a TA, Inc., simultaneous TGA-DSC QA 600 instrument. The procedure is designed to determine loss of sample weight with increasing temperature. Data from this analysis were used to determine the quantities of moisture, organic volatile material, products of decomposition, combustion or gasification rate, distillation temperature range, and composition by weight.

The TGA data in Table 12 show differences in weight loss between contaminated and clean samples over the temperature ranging from ambient to the boiling point of gasoline. The second derivative of the weight loss and the DSC curves confirm expected differences.

Several gasoline components are clearly evident in the contaminated samples whereas they are much lower or absent in the clean samples. Benzene and n-pentane were chosen to calculate concentrations (mg/m^3) to illustrate the obvious differences (Table 13). n-butane and iso-pentane are also useful to this extent. Benzene appeared in both clean and contaminated samples but was clearly enriched in the contaminated samples.

Table 10. Retention and Release Test Summary

Sample ID	Date/Time			Coal[1]	Water[2]	Notes
SB33-15'	8/2/07 8:00	**MTBE**	ppb	<100	<1	Soaked in water for 24 h
		Benzene	ppb	315.3	56.3	
		Toluene	ppb	<100	8.8	
		Ethylbenzene	ppb	<100	<1	
		Xylenes (Total)	ppb	<300	<3	
		GRO (TPH)	ppm	35	0.907	
SB34-20'	8/1/07 8:00	**MTBE**	ppb	<1000	<10	Soaked in water for 30+ days
		Benzene	ppb	27060	1512	
		Toluene	ppb	28400	348.1	
		Ethylbenzene	ppb	6624	24.4	
		Xylenes (Total)	ppb	38770	135.7	
		GRO (TPH)	ppm	290	3.98	
SB39-60'	8/1/07 8:30	**MTBE**	ppb	*No lab analysis	<1	Soaked in water for 24 h
		Benzene	ppb	Clean	<1	
		Toluene	ppb		<1	
		Ethylbenzene	ppb		<1	
		Xylenes (Total)	ppb		<3	
		GRO (TPH)	ppm		<0.2	
	9/4/07 8:00	**MTBE**	ppb	*No lab analysis	<1	Soaked in water for 30 days
		Benzene	ppb	Clean	<1	
		Toluene	ppb		<1	
		Ethylbenzene	ppb		<1	
		Xylenes (Total)	ppb		<3	
		GRO (TPH)	ppm		<0.2	
SB47-21'	8/7/07 8:00	**MTBE**	ppb	<50	<1	Soaked in water for 24 h
		Benzene	ppb	532.5	4.2	
		Toluene	ppb	312.8	4	
		Ethylbenzene	ppb	<50	<1	
		Xylenes (Total)	ppb	<150	4.7	
		GRO (TPH)	ppm	<10	<0.2	
SB47-21'	8/8/07 8:00	**MTBE**	ppb	<50	<5000	Soaked in gas for 24 h, drained, then soaked in water for 24h
		Benzene	ppb	532.5	53,450	
		Toluene	ppb	312.8	144,400	
		Ethylbenzene	ppb	<50	22,910	
		Xylenes (Total)	ppb	<150	123,200	
		GRO (TPH)	ppm	<10	1139	

Continued . . .

Table 10. Retention and Release Test Summary (continued)

Sample ID	Date/Time			Coal[1]	Water[2]	Notes
SB47-25'	8/7/07 8:30	**MTBE**	ppb	<5	<1	Soaked in water for 24 h
		Benzene	ppb	39.6	5.6	
		Toluene	ppb	10.5	1.4	
		Ethylbenzene	ppb	<5	<1	
		Xylenes (Total)	ppb	<15	<3	
		GRO (TPH)	ppm	1.2	<0.2	
SB47-25'	8/8/07 8:30	**MTBE**	ppb	<5	<1000	Soaked in gas for 24 h, drained, then soaked in water for 24 h
		Benzene	ppb	39.6	45,640	
		Toluene	ppb	10.5	89,820	
		Ethylbenzene	ppb	<5	15,400	
		Xylenes (Total)	ppb	<15	82,260	
		GRO (TPH)	ppm	1.2	720.6	
SB52-50'	9/25/07 8:00	**MTBE**	ppb	*No lab analysis	<1	Exposed to clean water vapors for 72 h, placed in DI water for 24 h
		Benzene	ppb	Clean	2.9	
		Toluene	ppb		1.7	
		Ethylbenzene	ppb		<1	
		Xylenes (Total)	ppb		<3	
		GRO (TPH)	ppm		<0.2	
SB52-50'	9/25/07 8:00	**MTBE**	ppb	*No lab analysis	<100	Exposed to Gasoline vapors for 72 h, placed in DI water for 24 h
		Benzene	ppb	Clean	9523	
		Toluene	ppb		18,730	
		Ethylbenzene	ppb		1622	
		Xylenes (Total)	ppb		8809	
		GRO (TPH)	ppm		72.43	

[1] Coal analyses prior to test.
[2] Water analyses after test was complete.

Table 11. VOC Mass Retention

Sorbate	Water Vapors	Gasoline Vapors
Liquid Volume (gal)	1	1
Sorption Time (h)	72	72
Temperature (°F)	70	70
Coal Mass In (g)	306.68	300.73
Coal Mass Out (g)	307.59	332.08
Change in Mass (g)	0.91	31.35
Sorption (wt%)	0.30	10.42

Table 12. Sample Weight Loss by TGA

	Clean			Contaminated		
	SB-39	SB-41	SB-42	SB-33	SB-34	SB-43
Depth (ft)	30	13	25	17-20	18-20	17
Wt. Loss (%)	27.67	33.26	33.84	50.23	50.33	32.43

Table 13. Analysis of Gaseous Headspace (including void volume in coal)

	SB-42	SB-34
Benzene (mg/m^3)	348	2088
Pentane (mg/m^3)	0	11832

5.4 Gas Chromatography Analyses

The analyses of organic vapors released from “clean” and gasoline-contaminated coal samples were carried using a Hewlett Packard 5880 gas chromatograph configured as a refinery gas analyzer. Hydrocarbon gases atypical of coal emissions but typical components of gasoline were quantified.

The summary of GC analyses is provided in Table 14. Selected gasoline “indicator” components include benzene, n-butane, iso-pentane, and n-pentane. The heating values of the gas samples are calculated based on all components found in each sample. Again, a clear difference between the clean and contaminated samples is obvious.

Table 14. GC Analysis – Selected Parameters

		Clean (mol%)			Contaminated (mol%)		
Component	Sample	SB-39	SB-41	SB-42	SB-33	SB-34	SB-43
Benzene		0.01	0.01	0.01	0.04	0.06	0.03
iso-Butane		0	0	0	0.02	0.01	0
n-Butane		0	0	0	0.11	0.09	0.02
iso-Pentane		0	0	0	0.59	0.61	0.18
n-Pentane		0	0	0	0.31	0.34	0.12
Calc. Btu/scf	Saturated	1.2	0.4	0.6	41.7	43.3	13.7
	Dry	1.3	0.4	0.6	42.5	44.0	13.9

5.5 Explosive Levels and Ignitability

The pDSC used in determining the potential for explosion was a DuPont 910 differential scanning calorimeter interfaced with a DuPont 2100 controller–processor. Accurately weighed samples of "clean" coal and gasoline-contaminated coal were tested in an atmosphere containing sufficient air to meet lower explosion limit (LEL), upper explosion limit (UEL), and gasoline–air concentration in between LEL and UEL. LEL and UEL were calculated using the assumption that the gasoline content of the contaminated samples would desorb (vaporize) completely from the coal sample. The temperature of the reaction chamber was increased at 10°C/min to 325°C (gasoline autoignition occurs at or before 280°C) and heat flow, time and temperature are computer logged for analysis. The bomb calorimeter used in the ignitability testing was a laboratory Paar bomb calorimeter using hot-wire ignition.

Attempts to determine the potential for explosion were carried out on samples of SB-42 (clean) and SB-43 (contaminated) coals. pDSC indicated potential for explosion for SB-43 at what was calculated to be near the UEL (7.6% gasoline in air, using an ignition source) and also the LEL (1.4% gasoline in air, using an ignition source). SB-42 did not show the explosion potential. An attempt was made to confirm these results using a modified procedure for bomb calorimetry, i.e., air supplied the oxygen for ignition in ratios equal to LEL and UEL of gasoline. Two sets of tests were carried out using the bomb calorimeter. These tests did not supply data that would support a definite potential for explosion.

Further examination of the pDSC data indicated that the heavier hydrocarbons predominated in the thermally desorbed hydrocarbons (gasoline components). The lighter-weight hydrocarbons are not as strongly adsorbed to the coal as the larger molecules. Since the smaller molecules are not as plentiful in the gasoline vapor produced from the contaminated coal as they were in the original gasoline, to meet LEL (1.4%) the hydrocarbon gases must be supplied by larger molecules which volatilize more slowly. Thus the LEL for the gasoline is reached more slowly and could be prevented from being achieved. Explosion is prevented by eliminating the ignition source or by ensuring the gasoline vapor concentration in air is below LEL or above UEL.

6.0 RESULTS AND DISCUSSION

6.1 Risk Evaluation

6.1.1 Human Health and Environmental Factors

Preliminary risk assessment focused on evaluation of exposure pathways and potentials for direct exposure to contaminated soil, vapor, and groundwater. The primary exposure factors were evaluated in accordance with ASTM Standard Guide for Risk-Based Corrective Action [2]. The exposure assessment is based on evaluation of the magnitude, frequency, duration, and route of exposure between a source/impacted area and a receptor.

6.1.1.1 Exposure Pathways

With the exception of the source area, the contaminated soil and groundwater, including preferential migration pathways, are bound to the coal seam and cavities 20–60 ft belowground, and the only identifiable direct exposure pathway is at the source and via drilled water wells. Well contamination confirmed at the Kerzman property prompted residents to be supplied from

the municipal water distribution system. Because of confirmed contamination of the first coal seam downgradient from the source area, no water supply wells should target the impacted groundwater source from this seam.

The second continuously developed coal seam used as a primary water source for domestic wells is hydraulically isolated, and no contamination has been confirmed from domestic wells to date. As a precautionary measure, periodic monitoring of these wells is recommended.

6.1.1.2 Exposure Routes and Receptors

The only identified direct exposure pathway at the Kerzman property was eliminated by water source replacement. Providing the site is excavated (corrective action, construction, etc.), additional exposure routes would be inhalation of VOCs and dermal contact with contaminated soil.

6.1.2 Technological Risks

Technologies considered for site remediation are based on extraction of contaminated vapors and groundwater using COC volatilization in controlled airflow channels and vacuum and thermal enhancement to allow for flow exchange within the target area. Groundwater is treated in an integrated water treatment system. Large volumes of recovered vapor-phase contaminant may require offgas treatment during initial stages of extraction. The primary technology concern associated with contaminant release and introduction of air/oxygen to gasoline-contaminated coal and cavities is the potential for in situ spontaneous ignition/explosion. Results of field monitoring and laboratory tests indicate that in the absence of an ignition source, the probability of a combination of primary risk factors (oxygen levels within explosive limits, ignition, and heat source) is extremely low. None of technologies considered for full-scale site remediation creates conditions that would increase risks for ignition and reduction of COC levels in the target zones which logically translates into further reduction of environmental and technological risks.

Occupational and residential hazards are minimal because of intercepted exposure pathways (below the surface location of impacted soils and groundwater) and the open field area. In the case of excavation of contaminated soils, a short-term exposure to volatile contaminants would have to be addressed by proper material handling and appropriate personal protective equipment. With respect to high vapor pressure (high volatilization rates for primary carcinogens), the potential exposure would be short term.

6.2 Technical Feasibility and Suggested Approach

Results of vacuum-enhanced recovery pilot tests confirmed high contaminant recovery efficiency and the feasibility of VER for site cleanup. With respect to complex geotechnical conditions, a high-permeability environment with contaminant transport bound to preferential pathways in the fractured coal seam and abandoned mining cavities, the combination of remediation technologies suggested for the locations with the highest documented impact have to be capable of 1) efficiently removing residual free product from the saturated zone while providing for water-table control at desired levels, 2) extracting large volumes of contaminated vapors from the vadose and dewatered zones to accelerate in situ volatilization, and 3) stimulating insitu natural biodegradation processes by providing air to the oxygen-depleted target/smear zone.

The suggested remedial strategy is based on contaminant recovery and in situ degradation using a combination of 1) thermally enhanced SVE in the source area, 2) MPE transitioned to SVE in the saturated impacted areas, and 3) high-volume low-vacuum extraction from mining cavities using the pioneering concept of controlled “draft and channel” extraction technology. The principles of controlled draft and channel benefit from high permeability and the presence of cavities using both natural and induced thermal and pneumatic gradients to create a draft between the air inlet and outlet wells/shafts (controlled by extraction vacuum or passive vents). The induced draft results in acceleration of insitu COC volatilization and stripping with a large volume of air carried to controlled extraction wells. The success of cleanup in the larger impacted area is preconditioned by better definition of the cavity distribution and long-term deployment of the extraction system. Once the active (pneumatically enhanced) vapor extraction is completed, the extraction well field can be operated as a passive soil-venting system using only natural thermal gradient.

In order to address the large size of the impacted area and reduce costs associated with construction of multiple extraction units, the proposed stationary VER systems should be designed as modular components to be combined with mobile high-vacuum MPE systems. This approach will provide for high contaminant recovery efficiency while maintaining operational flexibility. Because of the critical importance of abandoned cavities controlling contaminant distribution within the impacted area, a supplemental delineation of mining cavities should be an integral part of the cleanup process.

6.3 Economic Considerations

The source area and contaminated hot spots can be economically cleaned to regulatorily acceptable limits within a reasonable time frame (18–24 months of continuous operation); however, the large size of the impacted area and its geotechnical complexity do not provide for too many options in selecting alternative remediation technology. The recommended strategy and modular system construction are suggested to reduce costs associated with acquisition of high-capacity equipment. After cleanup in hot spots, individual units would be moved to the desired location, and their parallel integration with the existing system in the cavity area would provide for capacity scale-up and increased airflow extraction.

Passive cavity venting using only natural thermal gradient represents a more economical solution; however, its lower efficiency would translate into a longer time required for cleanup. Based on the progress of active systems, this option is considered as a transition step before natural attenuation.

With respect to high fracture-based conductivity, uncertainties pertaining to cavity distribution and the high cost of chemicals and nutrients, including expected poor control and high injection losses, in situ chemical oxidation (ISCO) or nutrient injection, would be prohibitively expensive and ineffective.

No action, monitoring, and institutional control would be the least expensive option. With respect to plume instability, increasing downgradient trends and confirmed potential for secondary COC release, the no-action approach does not provide any solution to mitigate the environmental, health, and socioeconomic risks associated with the occurrence of residual contamination. Plume/COC reduction by natural attenuation within a “reasonable” time is unlikely.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The Energy & Environmental Research Center (EERC) conducted an evaluation of alternative technologies for remediation of a hydrocarbon-contaminated coal seam including impacted soils and groundwater in Garrison, North Dakota. The site investigation confirmed the presence of free product in abandoned mine cavities and high concentrations of residual gasoline-based contaminants, with benzene concentrations in groundwater exceeding 70,000 µg/l. The confirmed impacted zone covers the area of about 40 acres.

Contaminated groundwater descends from the source area at the Farmers Union Oil Station (Cenex) to the south in the partially saturated coal seam with high fracture-based hydraulic conductivity. Natural gradient and flow directions are altered by the presence of a discrete network of open, partially filled, and collapsed abandoned mining cavities that serve as preferential pathways for liquid- and vapor-based contaminant migration. Secondary release from resaturated contaminated coal and further downgradient migration of soil vapor and product itself result in slightly increasing COC concentrations in downgradient wells.

Results of laboratory tests confirmed secondary release of gasoline-based compounds from contaminated coal to water reaching concentrations documented from the impacted areas. Regardless of the exposure mechanism (free, dissolved, or vapor phase), the contaminated coal seam provides for long-term secondary release of contaminant to groundwater. Coal laboratory tests confirmed low risks associated with spontaneous ignition of gasoline-contaminated coal.

No contamination has been confirmed from domestic wells completed in the deeper coal seam to date; however, periodic monitoring of these wells is recommended as a precautionary measure.

The VER pilot tests were conducted at the Cenex station (location of original release), the downgradient west corner of the Tesoro station, and in mining cavities intercepting the plume south of the release area. Pilot tests confirmed high contaminant recovery efficiency at all three locations. A total of 3500 gallons (13.3 m^3) of contaminated groundwater and over 430,000 ft^3 (12,200 m^3) of soil vapor were extracted during VER testing conducted July 17–24, 2007, resulting in removal of about 1330 lb (603 kg) of hydrocarbons, an equivalent of about 213 gallons of product.

The proactive remedial approach is suggested to eliminate long-term health risks associated with contaminant migration to water-bearing zones used for domestic water supply by reducing currently high COC concentrations in the source and impacted areas. The detailed cost proposal for the suggested remediation is provided separately.

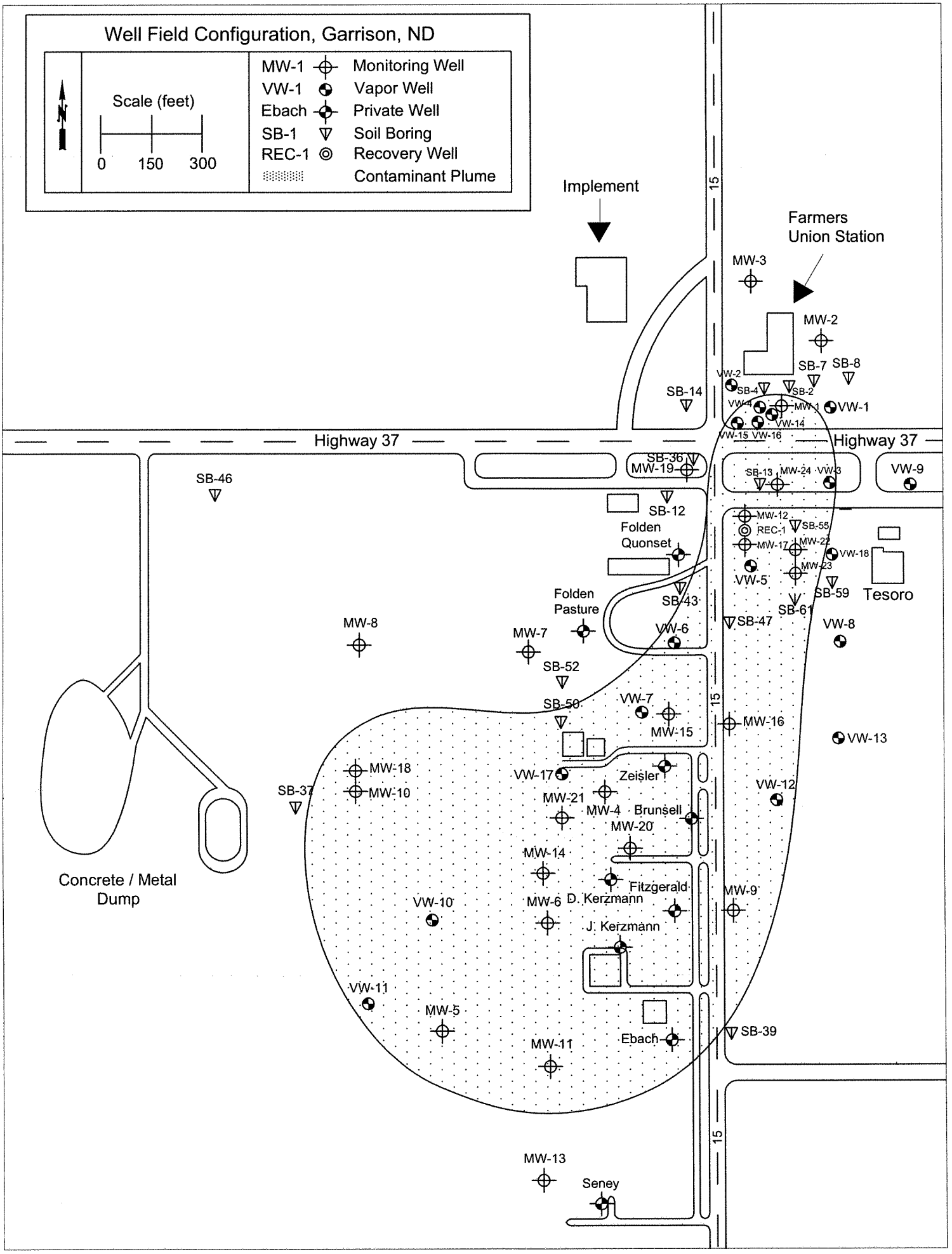
8.0 REFERENCES

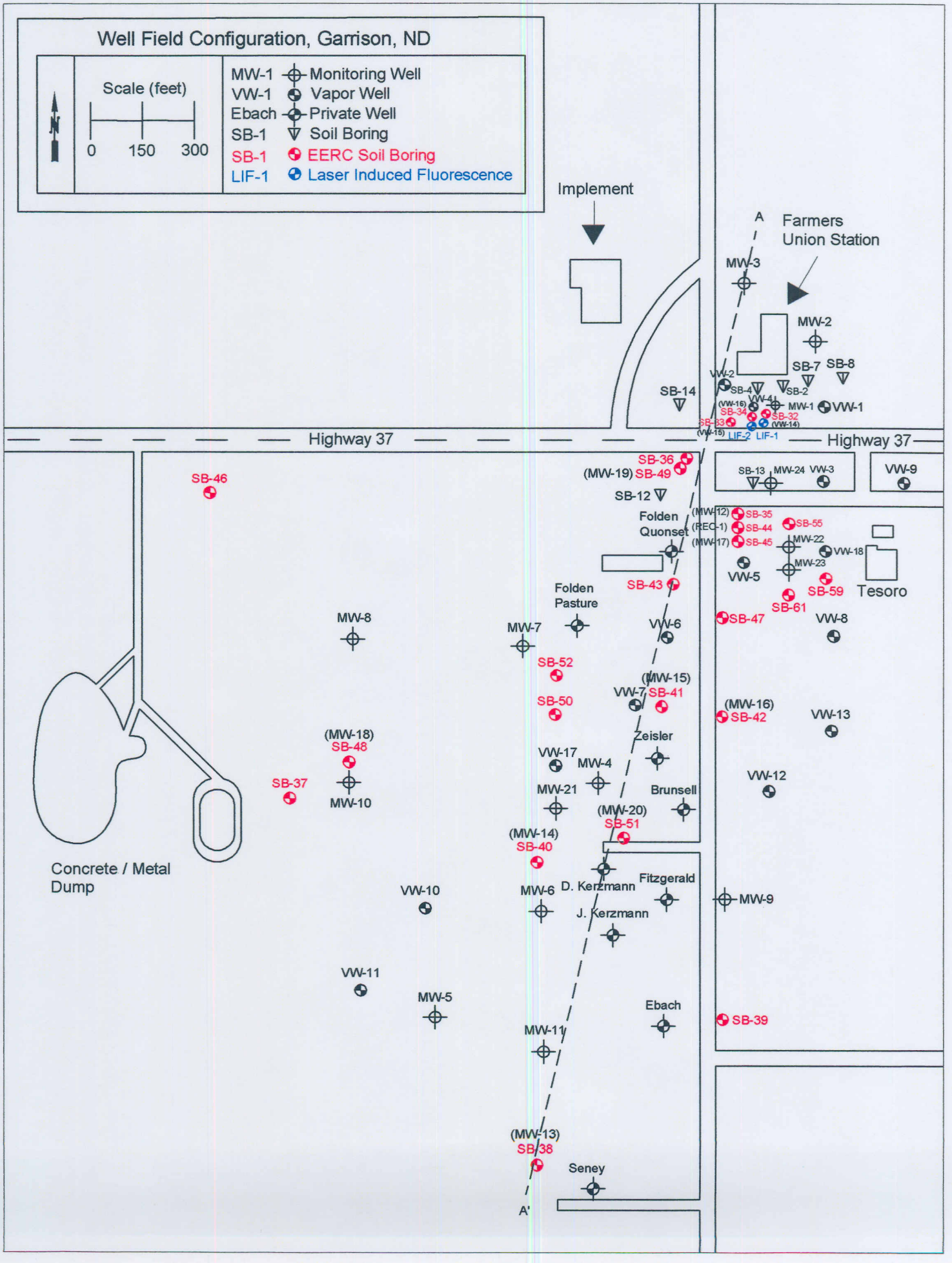
1. Solc J.; Botnen B., Risk Assessment and Feasibility of Remedial Alternatives for Coal Seam at Garrison, North Dakota; Technical Progress Report (Dec 2006–March 2007); Energy & Environmental Research Center, Grand Forks, ND; 2007.

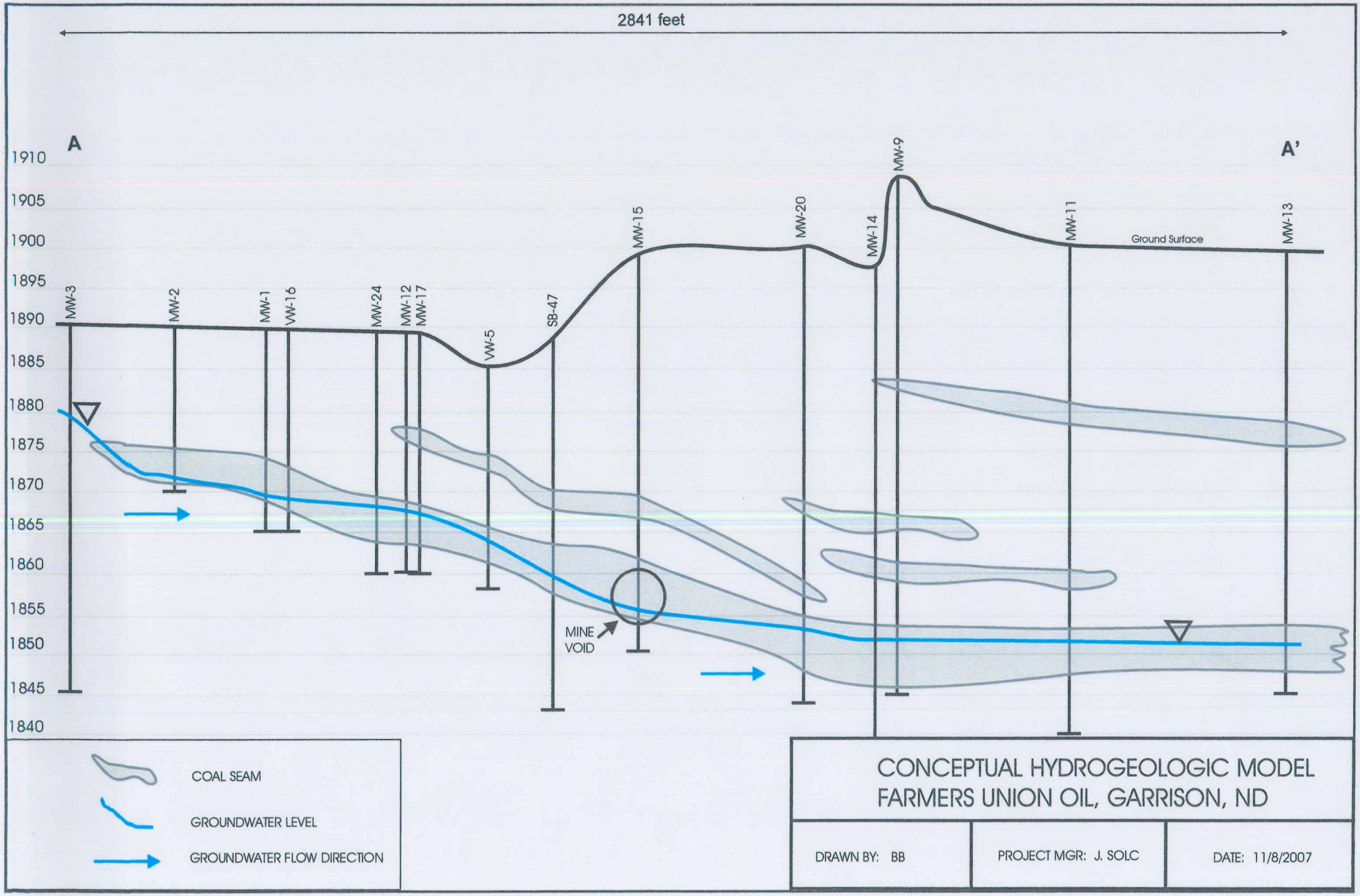
2. ASTM International. *Standard Guide for Risk-Based Corrective Action*; E 2081-00, Nov 2000.

APPENDIX A

SITE PLAN AND CONCEPTUAL HYDROGEOLOGICAL CROSS SECTION


Well Field Configuration, Garrison, ND
Scale (feet)
0
150
300
MW-1 Monitoring Well
VW-1 Vapor Well
Ebach Private Well
SB-1 Soil Boring
REC-1 Recovery Well
Contaminant Plume
Implement
Farmers Union Station
Highway 37
Highway 37
15
MW-3
MW-2
SB-7
SB-8
VW-2
SB-4
SB-2
VW-4
MW-1
VW-1
VW-14
VW-15
VW-16
SB-14
SB-36
MW-19
SB-13
MW-24
VW-3
VW-9
SB-46
SB-12
Folden Quonset
MW-12
REC-1
SB-55
MW-17
MW-22
VW-18
MW-23
VW-5
SB-59
Tesoro
SB-61
SB-43
Folden Pasture
SB-47
MW-8
MW-7
VW-6
VW-8
SB-52
SB-50
VW-7
MW-15
MW-16
VW-13
MW-18
MW-10
SB-37
VW-17
Zeisler
VW-12
MW-21
MW-4
Brunsell
MW-20
MW-14
Fitzgerald
D. Kerzmann
MW-9
VW-10
MW-6
J. Kerzmann
VW-11
MW-5
MW-11
Ebach
SB-39
Concrete / Metal Dump
MW-13
Seney


Well Field Configuration, Garrison, ND
Scale (feet)
0
150
300
MW-1 Monitoring Well
VW-1 Vapor Well
Ebach Private Well
SB-1 Soil Boring
SB-1 EERC Soil Boring
LIF-1 Laser Induced Fluorescence
Implement
A
Farmers Union Station
MW-3
MW-2
SB-7
SB-8
SB-14
VW-2
SB-4
SB-2
VW-4
(VW-16)
MW-1
VW-1
SB-34
SB-32
SB-33
(VW-15)
(VW-14)
LIF-2
LIF-1
Highway 37
Highway 37
SB-36
(MW-19) SB-49
SB-12
SB-13
MW-24
VW-3
VW-9
(MW-12)
(REC-1)
(MW-17)
SB-35
SB-44
SB-45
SB-55
MW-22
VW-18
MW-23
VW-5
SB-59
Tesoro
SB-61
SB-47
VW-8
Folden Quonset
SB-43
Folden Pasture
SB-46
MW-8
MW-7
VW-6
SB-52
SB-50
(MW-15)
VW-7
SB-41
(MW-16)
SB-42
VW-13
(MW-18)
SB-48
Zeisler
VW-17
MW-4
SB-37
MW-10
VW-12
MW-21
Brunsell
(MW-20)
SB-51
(MW-14)
SB-40
Concrete / Metal Dump
VW-10
MW-6
D. Kerzmann
Fitzgerald
MW-9
J. Kerzmann
VW-11
MW-5
Ebach
SB-39
MW-11
(MW-13)
SB-38
Seney
A'


2841 feet
A
A'
1910
1905
1900
1895
1890
1885
1880
1875
1870
1865
1860
1855
1850
1845
1840
MW-3
MW-2
MW-1
VW-16
MW-24
MW-12
MW-17
VW-5
SB-47
MW-15
MW-20
MW-14
MW-9
MW-11
Ground Surface
MW-13
MINE
VOID
COAL SEAM
GROUNDWATER LEVEL
GROUNDWATER FLOW DIRECTION
CONCEPTUAL HYDROGEOLOGIC MODEL
FARMERS UNION OIL, GARRISON, ND
DRAWN BY: BB
PROJECT MGR: J. SOLC
DATE: 11/8/2007

APPENDIX B

GEOLOGIC WELL DOCUMENTATION AND BORING LOGS

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-32/VW-14

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 237314.051/1741784.204

DATE COMPLETED: 5/1/07
TOTAL BOREHOLE DEPTH: 30 FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1889.77
GROUND ELEVATION: 1890.18

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL
	10.3		
	38.1	SM	
4/4/10	8.2		
5/10/14	23.1		
9/10/7		CH	
10/19/22	25		
3/4/5	2412		
4/9/14	1350		
5/15/20	1.3	CH	
6/14/20			
8/16/22	1.2		

SAMPLES | GRAPHIC WELL DETAILS | LITHO-LOGIC COLUMN

LITHOLOGIC DESCRIPTION

- Parking lot fill. Sandy Gravel w/Silt.
- Sandy Silt, black, moist, no odor
- Silty Clay, 2.5Y 4/1, moist, no odor
- Grades to Fat Clay @12 feet, 2.5Y 5/1, moist, no odor
- Coal seam at 17 feet, dry to moist, Strong H/C odor
- Fat Clay, 2.5Y 4/2, wood fragments, moist, very dense, slight H/C odor in upper 2", then no odor
- Fat Clay w/ Silt, 2.5Y 5/1, moist, no odor
- EOB @ 30'

Bentonite Chips

Gravel Pack

SAMPLE ID AND ANALYTICAL RESULTS

Collected lab sample: SB32-17 at 17 feet.

MTBE	ppb	<1000
Benzene	ppb	27050
Toluene	ppb	7862
Ethyl Benzene	ppb	<1000
Xylenes (Total)	ppb	<3000
GRO (TPH)	mg/Kg	260

Collected lab sample: SB32-20 at at 20 feet

MTBE	ppb	<1000
Benzene	ppb	46050
Toluene	ppb	7661
Ethyl Benzene	ppb	10100
Xylenes (Total)	ppb	51150
GRO (TPH)	mg/Kg	560

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-33/VW-15

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 237298.474/1741690.915

DATE COMPLETED: 5/1/07
TOTAL BOREHOLE DEPTH: 22 FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1889.67
GROUND ELEVATION: 1889.96

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL
	1.2		
6/7/10	5.6	CH	
11/15/15	1.3		
5/5/5			
16/20/22	393		
	594		
9/11/14	2.9	CH	

SAMPLES | GRAPHIC WELL DETAILS | LITHO-LOGIC COLUMN

LITHOLOGIC DESCRIPTION
Parking lot fill. Sandy Gravel w/Silt.
Clay w/Silt, 2.5Y 5/2, Iron deposits, moist, no odor
Grades to Fat Clay @11 feet, 2.5Y 5/1, moist, no odor
Coal seam at 15 feet, dry to moist, Strong H/C odor
Fat Clay, 2.5Y 5/1,moist, no odor
EOB @ 22'

5 10 15 20 25 30 35 40 45 50

Bentonite Chips

Gravel Pack

SAMPLE ID AND ANALYTICAL RESULTS

Collected lab sample: SB-33-15 at 15 feet.

MTBE	ppb	<100
Benzene	ppb	315.3
Toluene	ppb	<100
Ethyl Benzene	ppb	<100
Xylenes (Total)	ppb	<300
GRO (TPH)	mg/Kg	35

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

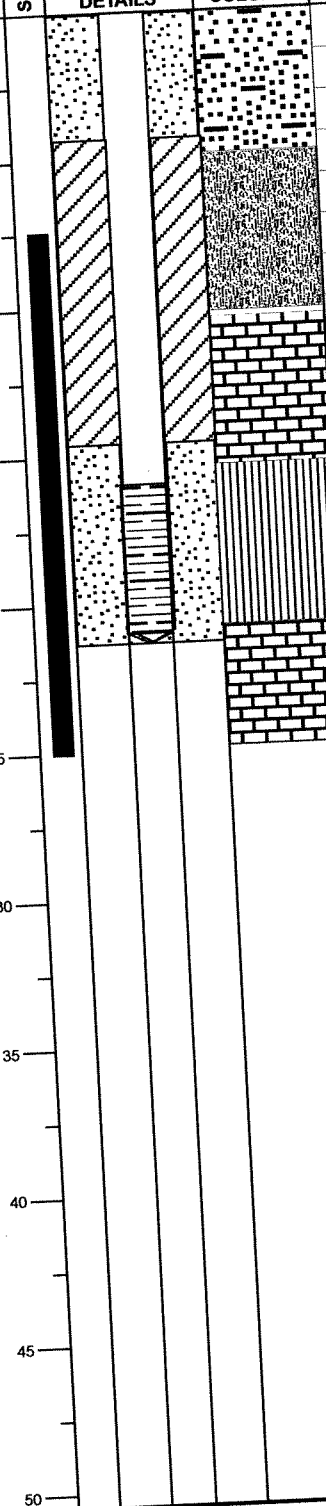
LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-34/VW-16

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 237292.085/1741742.708

DATE COMPLETED: 5/1/07
TOTAL BOREHOLE DEPTH: 25 FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1889.64
GROUND ELEVATION: 1890.02

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES
	11.3			
	6.1			
5/10/7		CH		
2/3/12	10.5			
8/9/11				
8/8/8	547			
	390			
10/8/24				
	1082	CH		
7/11/17	10.6			

GRAPHIC WELL DETAILS / LITHO-LOGIC COLUMN



LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
Parking lot fill. Sandy Gravel w/Silt.	
Silty Clay w/iron deposits, 2.5Y 5/2, moist, no odor,	
Organic layer @10' (2")	
Grades to Fat Clay @10.5 feet, 2.5Y 5/1, moist,	Collected lab sample: SB-34-15 at 15 feet.
no odor	MTBE ppb <1000 Benzene ppb 18170 Toluene ppb 26880 Ethyl Benzene ppb 3204 Xylenes (Total) ppb 13690 GRO (TPH) mg/Kg 270
Coal seam at 15.5 feet, dry to moist,	
Strong H/C odor	
Fat Clay, 2.5Y 5/1,moist, no odor	Collected lab sample: SB-34-20 at 20 feet.
EOB @ 25'	MTBE ppb <1000 Benzene ppb 27060 Toluene ppb 28400 Ethyl Benzene ppb 6624 Xylenes (Total) ppb 38770 GRO (TPH) mg/Kg 290

Bentonite Chips

Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-35/MW-12

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236996.772/1741720.768

DATE COMPLETED: 5/1/07
TOTAL BOREHOLE DEPTH: 30FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1888.63
GROUND ELEVATION: 1888.93

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
	1.2	CL					Silty Clay w/iron deposits, 2.5Y 5/4, dry to moist, fractured, no odor	
3/7/12	100.2							Collected lab sample: SB-35-18 at 18 feet. MTBE ppb <500; Benzene ppb 15480; Toluene ppb 16770; Ethyl Benzene ppb 1640; Xylenes (Total) ppb 4701; GRO (TPH) mg/Kg 130
3/5/8							Coal seam (3-4") @15 feet, dry, no odor	
5/19/20	1.2						Back to Silty Clay 2.5Y-5/4, fractured w/ woody debris and iron concentrations, no odor	
15/20	397						Coal seam at 18 feet, dry to moist, Strong H/C odor, saturated @23' H/C sheen on sampler.	Collected lab sample: SB-35-23 at 23 feet. MTBE ppb <1000; Benzene ppb 8071; Toluene ppb 3922; Ethyl Benzene ppb 4455; Xylenes (Total) ppb 24950; GRO (TPH) mg/Kg 350
30/35	301	CH					Fat Clay, 2.5Y 5/1, wet, slight H/C, odor	
							EOB @ 27'	

Bentonite Chips
Bentonite Grout
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-36

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 237156.063/1741526.321

DATE COMPLETED: 5/2/07
TOTAL BOREHOLE DEPTH: 25FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1885.01

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
							Sandy Silt, 2.5Y 4/2, w/ clay&Gravel, dry to moist, no odor	
		ML						
3/7/15	1.2						Same as above w/flecks of coal & gravel, low plasticity, no odor	
15/15	1.8						Clay w/ Silt, gley 1 3/5G, moist, high plasticity, no odor	
5/11/17	0.1	CH						
5/19/23	0.8						EOB @ 25'	

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Bentonite Chips
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-37

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236058.004/1740349.551

DATE COMPLETED: 5/2/07
TOTAL BOREHOLE DEPTH: 45FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1876.52

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass/Topsoil	
							Sandy Silt, 2.5Y 4/2, dry to moist, no odor	
	1.2	ML					Sandy Silt, 5Y-3/2 w/ trace gravel, moist to damp, low plasticity, no odor	
	3.6						Coal seam from 18.5 to 20', dry, no odor	
7/7/17	4.5						Silty Clay w/coal flecks, 5Y 5/1 grading to Clay w/Silt 5Y 5/2, dry to moist, very tight, high plasticity, no odor	
15/28/20	1.2	OL						
10/15/26	1.9							
10/25	3.1						Clayey Silt w/ fine Sand, gley 2 4/5BG, trace iron streaking, increasing silt concentrations, damp, no odor	
10/17/24	4.1	CL						
10/30	0.5	CH					Fat Clay, 2.5Y 5/1, high plasticity, damp, no odor	
15/25	1.9						EOB @ 45'	

5 10 15 20 25 30 35 40 45 50

Bentonite Chips

Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-38/MW-13

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 234919.894/1741155.070

DATE COMPLETED: 5/2/07
TOTAL BOREHOLE DEPTH: 55FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1900.35
GROUND ELEVATION: 1900.70

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
	1.3						Sandy Silt w/Gravel, 2.5Y 5/4, dry to moist,	
			7.5				no odor	
		ML						
	4.1							
			15					
8/15/23	10.0						Coal seam (6") @20 feet, dry, no odor	
			22.5				Back to Sandy Silt 2.5Y-5/4, moist, no odor	
		ML						
	7.3		30				Silty Clay, 2.5Y 5/1, wet, no odor	
		CL						
	8.1		37.5				Fat Clay, gley 1 4/10GY, very dense w/ coal fragments	
							moist, no odor	
		CH						
6/16/22	6.4		45				Shale w/ iron deposits	
9/12/14	3.2		▽				Coal, saturated, no odor	
4/18/30	1.9		52.5					
6/7/29	81	CH					Back to silty clay @ 53' (same as above)	
							EOB @ 55'	
			60					
			67.5					
			75					

Bentonite Chips
Bentonite Grout
Gravel Pack

Collected lab sample: SB38-53 at 53 feet.

MTBE	ppb	<1
Benzene	ppb	<1
Toluene	ppb	<1
Ethyl Benzene	ppb	<1
Xylenes (Total)	ppb	<3
GRO (TPH)	mg/Kg	<0.2

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-39

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 235441.194/1741630.84

DATE COMPLETED: 5/2/07
TOTAL BOREHOLE DEPTH: 70FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1909.67

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass/Topsoil	
							Sandy Silt, 2.5Y 4/2, dry to moist,	
			7.5				no odor	
		ML						
	1.8		15					
							Sandy Silt, 2.5Y 4/2, moist, no odor	
	2.1		22.5					
	1.3		30				Coal seam from 30 to 31', dry, no odor	
10/25	4.6							
			37.5				Silty w/fine sand, gley 2 5/5B, dry, flakey, fractured,	
		ML					no odor	
50	1.3		45					
15/30	2.9						Silt to Shale @ 49', dry, no odor, shale coal interface	
			52.5					
50	3.1	CH					Fat Clay, 2.5Y 4/1, med/high plasticity, moist, no odor	
25/29/30	1.9		60				Coal seam from 58 to 64', dry, no odor	
16/39	6.8						Sandy Silt, 2.5Y 6/1, moist to damp, no odor	
			67.5					
		ML					EOB @ 70'	
16/42	9.2							
			75					

Bentonite Chips
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-40/MW-14

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 235959.923/1741169.839

DATE COMPLETED: 5/3/07
TOTAL BOREHOLE DEPTH: 65FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1896.9
GROUND ELEVATION: 1897.63

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
				Grass.	
		SW		Sand, medium grained, 2.5Y 5/6, dry to damp,	
	3.8		7.5	subangular, well sorted, no odor	
				Sandy Silt, 2.5Y 4/3, dry to moist,	
				no odor	
	4.9	ML	15		
	1.3		22.5		
6/18/24	6.1	ML		Grades to silt w/sand, moist, no odor	
			30	Saturated Sandy Silt layer @ 32', no odor (1' thick)	
4/3/18	7.2		▽		
				Saturated Sandy Silt layer @ 36', no odor (1' thick)	
12/15/26	1.9		37.5		
		CH		Fat Clay, 2.5Y 6/1, very dense w/ coal fragments	
18/29	6.7		45	moist, no odor	
				Shale w/ iron deposits	
26/28	9.1			Coal, saturated, no odor	
			52.5		
14/12/39	11.2	CH		Back to Fat Clay @54.5', no odor,(same as above)	
16/19/17	39.6		60		
6/31/39	14.1			EOB @ 65'	
			67.5		
			75		

Bentonite Chips
Bentonite Grout
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-41/MW-15

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236435.305/1741502.879

DATE COMPLETED: 5/3/07
TOTAL BOREHOLE DEPTH: 47FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1899.23
GROUND ELEVATION: 1899.41

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
		SM					Silty Sand (Loam), 2.5Y 6/6, very dry	
	0.6		7.5				Silty Clay, 2.5Y 5/4, trace of gravel, dry to moist, no odor	
		OL						
8/7/19	1.2		15				Coal seam, (13-15'), no odor	
							Silty Clay as above	
		OL						
			22.5					
6/9/32	1.1						Sandy Silt 2.5Y-4/4, moist, no odor	
	1.0	ML						
14/17/23	2.9						Intermittent 1-3"coal seams interbedded in sandy	
			30				silt layer. Dry, no odor	
14/13/27	5.1							
18/27/22	13.6						Silty Clay, 2.5Y 5/1, wet, no odor	
		ML						
16/19/25	248		37.5				Coal seam above mine shaft, Slight H/C odor	
			Shale Trap →					
			▽				Abandoned Mine Shaft	
						Mine Shaft	Sample from floor of shaft has strong H/C odor	
	212		45					
							Fat Clay, gley 1 4/10GY, very dense w/ coal fragments	
12/16/29		CH					moist, no odor	
			52.5				EOB @ 47'	
			60					
			67.5					
			75					

Bentonite Chips

Gravel Pack

Collected lab sample: SB41-38 at 38 feet.

MTBE	ppb	<50
Benzene	ppb	504.2
Toluene	ppb	219.1
Ethyl Benzene	ppb	<50
Xylenes (Total)	ppb	<150
GRO (TPH)	mg/Kg	15

Collected lab sample: SB41-43 at 43 feet.

MTBE	ppb	<10
Benzene	ppb	1879
Toluene	ppb	366.8
Ethyl Benzene	ppb	52.6
Xylenes (Total)	ppb	559.4
GRO (TPH)	mg/Kg	6.1

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-42/MW-16

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236400.670/1741646.944

DATE COMPLETED: 5/4/07
TOTAL BOREHOLE DEPTH: 40FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1895.83
GROUND ELEVATION: 1895.94

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
	0.8	ML					Sandy Silt, 5Y 5/4, moist, no odor	
	1.0						Sandy Silt, 5Y 3/1, moist, no odor	
	3.6						Silt w/Clay, 5Y3/2, damp, no odor	
	1.9	ML						
							Coal seam 25.5-27', dry, no odor	
6/17/22	13.2						Alternating Coal seams (1-1.5" thick) and Silty clay, 2,5Y 5/1, moist, no odor	
			Shale Trap →				Coal seam on top of void (6-10" thick), dry, slight H/c odor.	
9/27/30	181.1						Abandoned mine shaft	Collected lab sample: SB-42-33 at 33 feet.
						Mine Shaft		MTBE ppb <100 Benzene ppb 2901 Toluene ppb 1378 Ethyl Benzene ppb 2147 Xylenes (Total) ppb 14560 GRO (TPH) mg/Kg 140
							Coal, saturated, strong H/C odor (4"thick)	
14/25/27	414	CH					Fat Clay, 2.5Y 5/1, wet, slight H/C, odor	
							EOB @ 40'	

Bentonite Chips
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-43

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236818.925/1741523.815

DATE COMPLETED: 5/4/07
TOTAL BOREHOLE DEPTH: 25FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1885.24

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
							Sandy Silt, 2.5Y 4/4, very dense, moist, no odor	
6/18/22	3.6	ML						
							Silty Clay, 2.5Y 5/2, w/ coal flecks and trace gravels, no odor	
11/17/24	1.2	CH					Coal seam from 17 - 21', 1" saturated layer @ 20', H/C odor.	
6/9/17	793						Sandy Silt w/Clay, 2.5Y4/2, medium plasticity, no odor	Collected lab sample: SB-43-19 at 19 feet.
7/12/34	1.9	ML					EOB @ 25'	MTBE ppb <500 Benzene ppb 14370 Toluene ppb 10400 Ethyl Benzene ppb 8564 Xylenes (Total) ppb 31600 GRO (TPH) mg/Kg 270

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Bentonite Chips
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

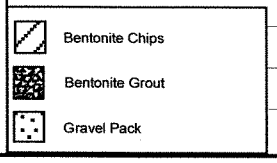
SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-44/REC1

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236989.647/1741719.934

DATE COMPLETED: 5/14/07
TOTAL BOREHOLE DEPTH: 28FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1888.25
GROUND ELEVATION: 1888.47

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
				Grass.	
	0.8		5	Silty Clay , 2.5Y 5/4, dry to moist,	
		CL		fractured, no odor	
	1.2		10	Coal seam (2-4") @13 feet, dry, no odor	
			15	Back to Silty Clay (increasing clay content)	
		CL		2.5Y-5/1, moist, no odor	
9/16/28	150.2				Collected lab sample: SB-44-18 at 18 feet.
14/29/7	900		20 ▽	Coal seam at 18 feet, dry to moist,	MTBE ppb <200 Benzene ppb 11790 Toluene ppb 10850 Ethyl Benzene ppb 1007 Xylenes (Total) ppb 2910 GRO (TPH) mg/Kg 120
11/18/38	748			Strong H/C odor, saturated @ 21' strong H/C odor.	
			25	Fat Clay, 2.5Y 5/1, wet, slight H/C, odor	Collected lab sample: SB-44-23 at 23 feet.
		CH		EOB @ 27'	MTBE ppb <1000 Benzene ppb 14570 Toluene ppb 25940 Ethyl Benzene ppb 7653 Xylenes (Total) ppb 43270 GRO (TPH) mg/Kg 290
			30		
			35		
			40		
			45		
			50		



DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
6" I.D. Auger Flights
4" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-45/MW-17

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236967.446/1741719.243

DATE COMPLETED: 5/15/07
TOTAL BOREHOLE DEPTH: 26FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1887.81
GROUND ELEVATION: 1888.12

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
	1.1						Grass.	
			5				Silty Clay , 2.5Y 5/4, dry to moist,	
		CL					fractured, no odor	
	1.3							
			10					
	0.1							
			15				Back to Silty Clay (increasing clay content)	
		CL					2.5Y-5/1, moist, no odor	
	1.9						Coal seam (2-4") @18.5-19 feet, dry, no odor	
			20					
4/6/25	841		▽				Coal seam at 20 feet, saturated, strong H/C odor,	Collected lab sample: SB-45-20 at 20 feet.
							H/C sheen on water.	MTBE ppb <1000 Benzene ppb 23890 Toluene ppb 46360 Ethyl Benzene ppb 24380 Xylenes (Total) ppb 137500 GRO (TPH) mg/Kg 1600
			25					
		CH					Fat Clay, 2.5Y 5/1, wet, slight H/C, odor	
							EOB @ 26'	
			30					
			35					
			40					
			45					
			50					

Bentonite Chips
Bentonite Grout
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-46

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 237085.532/1740176.288

DATE COMPLETED: 5/15/07
TOTAL BOREHOLE DEPTH: 17 FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1881.06

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
							Sandy Gravel Fill to 8', high oil content (pipe trench fill)	
3/6/15	46.9						Sandy Silt w/Clay, 2.5Y 5/4, shale fragments, fractured, dry to moist, no odor	
		OL						
5/7/9	61.2						Coal seam from 14-16', dry, no odor	Collected lab sample: SB46-14 at 14 feet.
		CL					Clay w/Silt, 2.5Y5/2, moist, high plasticity, no odor	
							EOB @ 17'	

MTBE ppb <5
Benzene ppb 28
Toluene ppb 40.3
Ethyl Benzene ppb 13.5
Xylenes (Total) ppb 77.8
GRO (TPH) mg/Kg <1

Bentonite Chips
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-47

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236703.175/1741650.7

DATE COMPLETED: 5/15/07
TOTAL BOREHOLE DEPTH: 45FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1888.81

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass/Topsoil	
	1.2							
			5				Silty Clay, 2.5Y 5/3, damp, no odor	
		ML						
	3.6		10				Sandy Silt, 5Y-3/2 w/ trace gravel, moist to damp, low plasticity, no odor	
			15					
	4.5							
			20				Coal seam from 20 - 21", dry, no odor	
50	16.2						Shale to coal @23', slight H/C odor, dry to moist	Collected lab sample: SB47-23 at 23 feet.
40	168		25					MTBE ppb <5 Benzene ppb 39.6 Toluene ppb 10.5 Ethyl Benzene ppb <5 Xylenes (Total) ppb <15 GRO (TPH) mg/Kg 1.2
10/17/23	10.7		30					
							Sandy Silt w/Clay, 2.5Y 6/1,moist, no odor	
10/19/21	10.1	OL	35					
13/21/30	9.6		40				Sandy Silt w/Clay, 2.5Y 6/1,moist, no odor	
16/24/27	4.2		45				EOB @ 45'	
			50				Bentonite Chips Gravel Pack	

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-48/MW-18

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236111.234/1740547.333

DATE COMPLETED: 5/15/07
TOTAL BOREHOLE DEPTH: 37FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1887.95
GROUND ELEVATION: 1888.41

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
	4.6	ML					Sandy Silt, , 2.5Y 5/3, dry, no odor	
	1.3							
		ML					Same as above but moist	
25/25	6.1						Hit very resistant layer from 20-22' at silt clay interface	
		OL					Silty Clay w/trace gravel, 2.5Y 4/3, iron and limestone inclusions, dry, no odor	Collected lab sample: SB-48-33 at 33 feet.
15/25/28	3.1							MTBE ppb <1000 Benzene ppb 9334 Toluene ppb 28680 Ethyl Benzene ppb 10530 Xylenes (Total) ppb 71680 GRO (TPH) mg/Kg 500
	2.9							
7/19/34	469						Coal seam at 31 feet, saturated, strong H/C odor.	
14/25/17	612						Back to Silty Clay as above, slight H/C odor	
							EOB @ 37'	

Bentonite Chips
Bentonite Grout
Gravel Pack

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

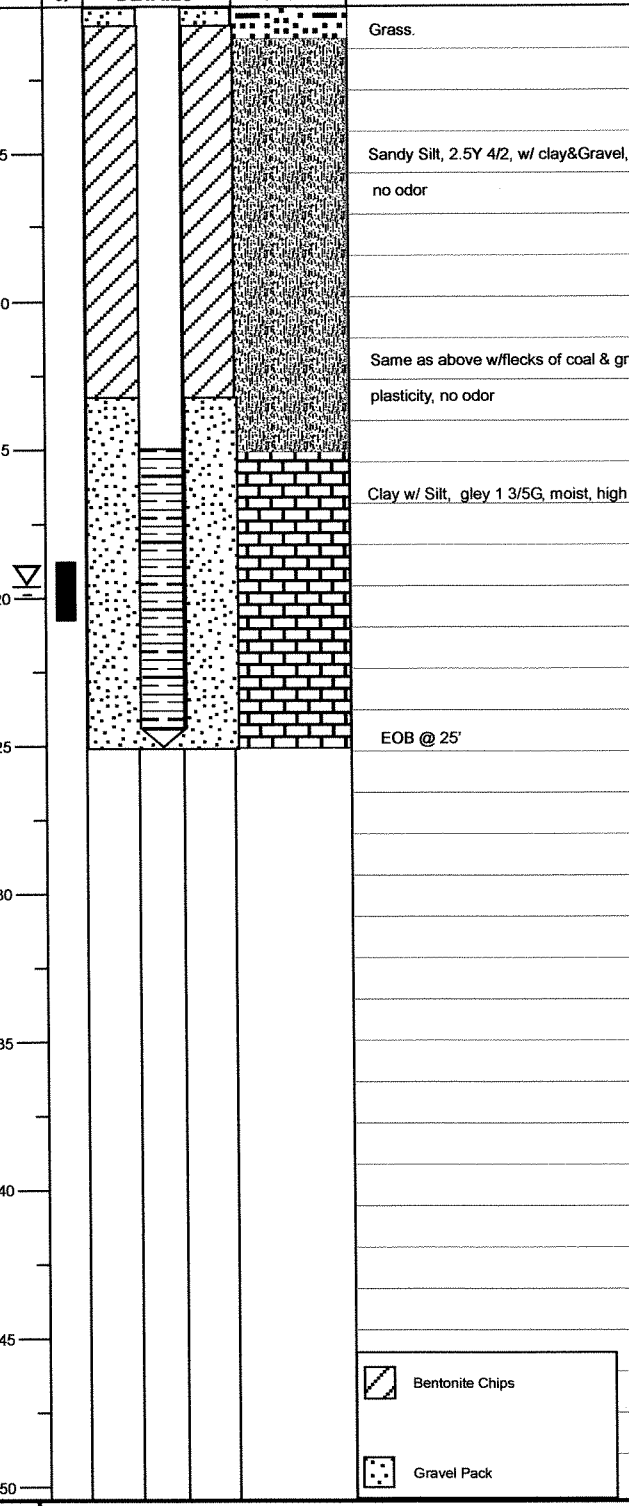
SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-49 MW-19

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 237149.335/1741526.551

DATE COMPLETED: 5/16/07
TOTAL BOREHOLE DEPTH: 25FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1885.15
GROUND ELEVATION: 1885.24

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass.	
		ML					Sandy Silt, 2.5Y 4/2, w/ clay&Gravel, dry to moist, no odor	
							Same as above w/flecks of coal & gravel, low plasticity, no odor	
12/25/27	1.2	CH					Clay w/ Silt, gley 1 3/5G, moist, high plasticity, no odor	
							EOB @ 25'	



DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-50

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236357.475/1741179.683

DATE COMPLETED: 5/16/07
TOTAL BOREHOLE DEPTH: 70FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1909.40

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
	1.0						Grass/Topsoil	
	6.7	ML	7.5				Sandy Silt, 2.5Y 5/3, moist, no odor	
	3.2		15				Grading to Sandy Silt w/Clay, 2.5Y 4/3, moist, no odor	
	2.9		22.5					
	4.6	OL	30				Silty Clay, 2.5Y 5/2, moist, no odor	
14/35	41.6						Coal seam from 32 to 33.5', dry, no odor	
6/14/39	17.1	ML	37.5				Sandy Silt, gley 2 5/5B, dry, flakey, fractured,	
10/12	13.7		45				no odor	
							Siltstone laye, sampler refusal	
14/30	16.3	CH	52.5				Fat Clay, 5Y 4/1, med/high plasticity, moist, no odor	
50	9.1						Coal seam from 53 to 57', dry, no odor	
4/12/30	12.3		60				Sandy Silt, 2.5Y 6/1, moist to damp, no odor	
10/27/33	14.7	ML	67.5				EOB @ 65'	
			75				Bentonite Chips Gravel Pack	

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-51/MW-20

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 235986.137/1741328.213

DATE COMPLETED: 5/16/07
TOTAL BOREHOLE DEPTH: 65FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1899.45
GROUND ELEVATION: 1899.92

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	LITHOLOGIC DESCRIPTION
	1.2	SW		Grass.
				Sand, medium grained, 2.5Y 5/6, damp,
				subangular, well sorted, no odor
			7.5	
	3.6			
				Sandy Silt, 2.5Y 4/4, dry to moist,
				no odor
	2.9	ML	15	
				Silty Clay, 2.5Y 4/2
	36.2	CH		
			22.5	Coal seam from 24-26', dry, no odor
8/13/17	10.1	CH		Fat Clay, 2.5Y5/1, moist, no odor
			30	
10/37	4.8			Sandy Silt, 2.5Y5/2, damp to moist, no odor
		ML		
			37.5	
4/14/19	1.9			Shale to Coal @ 41.5 to 44', dry, no odor
22/31	9.6		▽ 45	
		CH		Fat Clay, 2.5Y 5/1, very dense w/ coal fragments
14/27	15.7			moist, no odor
50	65.2		52.5	Coal seam @51-55, saturated, no odor
40	36.3			
15/17/29	14.9	CH		Back to Fat Clay @ 56', no odor,(same as above)
			60	EOB @ 56'
			67.5	
			75	

SAMPLES | GRAPHIC WELL DETAILS | LITHO-LOGIC COLUMN

Bentonite Chips
Bentonite Grout
Gravel Pack

SAMPLE ID AND ANALYTICAL RESULTS

Collected lab sample: SB51-52 at 52 feet.

MTBE	ppb	<10
Benzene	ppb	268.7
Toluene	ppb	11.4
Ethyl Benzene	ppb	13.6
Xylenes (Total)	ppb	<30
GRO (TPH)	mg/Kg	<2

DATE: 5/23/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-52

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236478.137/1741184.317

DATE COMPLETED: 9/10/07
TOTAL BOREHOLE DEPTH: 65 FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1905.218

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
	0.9						Grass/Topsoil	
			7.5				Sandy Silt, 2.5Y 4/3, moist, no odor	
		ML						
	3.2		15				Same as above w/ trace gravel (to 15 feet)	
							Coal seam from 20.5 to 22.5', dry, no odor	
7/23/29	5.1		22.5				Coal seam from 23 to 23.5', dry, no odor	
16/28/35	41.6	OL					Silt w/Clay, 2.5Y 4/1, moist, iron streaking & gypsum crystals, no odor	
			30				Sandy Silt, 5Y 4/3, iron streaking, coal fragments,	
14/27/39	19.9	ML					no odor	
							Coal seam from 34 to 34.3 feet, dry, no odor	
16/30	5.1		37.5					
							Silty Clay 2.5Y 5/1, moist, no odor,	
18/39	4.6	OL						
28/50	6.1		45					
30/50	9.7						Coal seam from 48 to 53', dry, no odor	
			52.5					
6/15/27	3.6							
							Sandy Silt, 5Y 5/1, moist to damp, no odor	
9/7/3/14	2.1	ML	60					
							EOB @ 63'	
6/12/18	1.9							
			67.5					
							Bentonite Chips	
							Gravel Pack	
			75					

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-53/VW-17

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236236.602/1741164.890

DATE COMPLETED: 9/11/07
TOTAL BOREHOLE DEPTH: 55FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1911.52
GROUND ELEVATION: 1911.77

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	LITHOLOGIC DESCRIPTION
	1.6			Grass/Topsoil
		SW		Silty Sand, medium grained, 2.5Y 4/4, moist,
	5.1			subangular, well sorted, no odor
			7.5	
	8.1			
				Sandy Silt, 2.5Y 4/3, dry to moist,
				no odor
	0.1	ML	15	
	3.2			
			22.5	
				Grades to Silt w/Clay @ 28 feet, 2.5Y 4/3,
				w/ iron streaking, damp to moist, no odor
20/20/21	5.8		30	
				Silty Sand @ 32 feet, 2.5Y 5/2, fine, sub-angular,
46/50	0.0	SW		iron streaking, moist, no odor,
			37.5	
13/24	1.6			Clay w/Silt, 2.5Y 5/1, very dense w/ coal fragments
		OL		moist, no odor
6/14/26	139		45	
				Coal seam @ 46-51, dry to moist, H/C odor
25/39	236			
			52.5	
28/50	39.1	OL		Back to Clay w/Silt as above coal seam
			60	EOB @ 53'
			67.5	
			75	

Bentonite Chips
Bentonite Grout
Gravel Pack

SAMPLE ID AND ANALYTICAL RESULTS

Collected lab sample: Sb53 48-50 at 48 feet.

MTBE	ppb	< 50
Benzene	ppb	15400
Toluene	ppb	4831
Ethyl Benzene	ppb	665.3
Xylenes (Total)	ppb	1455
GRO (TPH)	mg/Kg	120

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-54/MW-21

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236129.016/1741170.958

DATE COMPLETED: 9/11/07
TOTAL BOREHOLE DEPTH: 59FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1906.45
GROUND ELEVATION: 1906.76

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass/Topsoil	
	5.1							
			7.5					
	1.2						Sandy Silt, 2.5Y 4/3, dry to moist,	
							no odor	
	0.9	ML	15					
	1.7							
			22.5					
	0.0							
			30					
							Shale to coal @32.1 feet (1.5 feet thick) dry, no odor	
50	0.0						Sandy Silt w/Clay, 2.5Y 3/1, moist, no odor,	
3/6/16	0.0		37.5				Sandy Silt, 2.5Y 5/1, moist, no odor,	
		ML						
6/16/28	3.2							
			45					
50	188						Coal seam @ 46-58, dry then 2" saturated lens @	
							54 feet, no odor	
			52.5					Collected lab sample: Sb54 57-59 at 57 feet.
26/30	39						Coal seam saturated @ 56 feet, no odor	MTBE ppb < 1 Benzene ppb 1875 Toluene ppb 1.7 Ethyl Benzene ppb 4.5 Xylenes (Total) ppb 14.2 GRO (TPH) mg/Kg 0.78
30/50	36.9	ML	60				Back to Sandy Silt (very dense) as above coal seam	
							EOB @ 59'	
			67.5					
							Bentonite Chips	
							Bentonite Grout	
			75				Gravel Pack	

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-55

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236911.705/1741847.322

DATE COMPLETED: 9/11/07
TOTAL BOREHOLE DEPTH: 29FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1891.43

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
	0.0						Grass/Topsoil	
		ML					Sandy Silt, 2.5Y 4/3, dry to moist, no odor	
	3.1							
	63.1						Coal @ 11 feet, dry, no odor (1 foot thick)	
6/13/20	1.2						Silty Clay, 2.5Y 4/1 w/ iron streaking and coal flecks, moist, medium plasticity, no odor	
8/15/19	1.0							
50	0.1	CH					Coal @ 20 feet, H/C impacted, dry	Collected lab sample: SB55-22 at 22 feet MTBE ppb <100 Benzene ppb 5020 Toluene ppb 8028 Ethyl Benzene ppb 1139 Xylenes (Total) ppb 9033 GRO (TPH) mg/Kg 85
50	384							
	409							
26/30	214							Collected lab sample: SB55-23 at 23 feet MTBE ppb <500 Benzene ppb 20680 Toluene ppb 39910 Ethyl Benzene ppb 5016 Xylenes (Total) ppb 92520 GRO (TPH) mg/Kg 560
6/16/18	407	CH					Fat Clay, 5Y 6/1, high plasticity, moist, no odor	
							EOB @ 29'	

5 10 15 20 25 30 35 40 45 50

Bentonite Chips
Gravel Pack

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

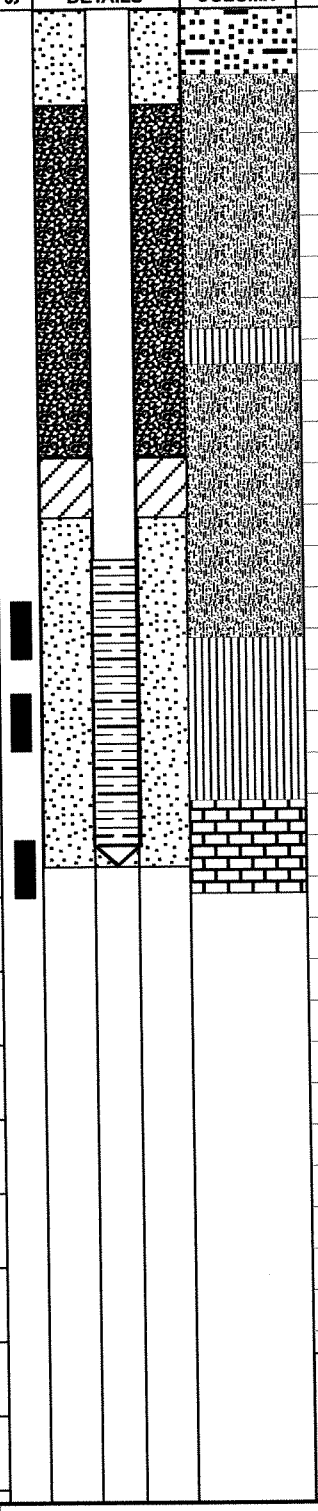
LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-56/MW-22

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236896.176/1741831.325

DATE COMPLETED: 9/12/07
TOTAL BOREHOLE DEPTH: 30FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1890.49
GROUND ELEVATION: 1890.76

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL
	1.2	ML	
	0.0		
	1.4	ML	
18/46	954		
7/26	136		
10/23/27	141	OL	

SAMPLES | GRAPHIC WELL DETAILS | LITHO-LOGIC COLUMN



LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
Grass/Topsoil	
Sandy Silt 2.5Y 5/4, dry to moist, no odor	
Coal seam (1 foot thick) @11.5 feet, dry, no odor	
Clayey Silt w/ iron streaking 2.5Y-5/4, moist, no odor	
Coal seam at 21 feet, dry to moist,	Collected lab sample: SB56-22 at 22 feet
Slight H/C odor, saturated @ 24'	MTBE ppb <200 Benzene ppb 9804 Toluene ppb 12660 Ethyl Benzene ppb 2559 Xylenes (Total) ppb 18250 GRO (TPH) mg/Kg 180
Silty Clay w/ coal fragments, 2.5Y 5/1, moist,	Collected lab sample: SB56-24 at 24 feet
slight H/C, odor	MTBE ppb <50 Benzene ppb 5616 Toluene ppb 4582 Ethyl Benzene ppb 1962 Xylenes (Total) ppb 9740 GRO (TPH) mg/Kg 62
EOB @ 28'	

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

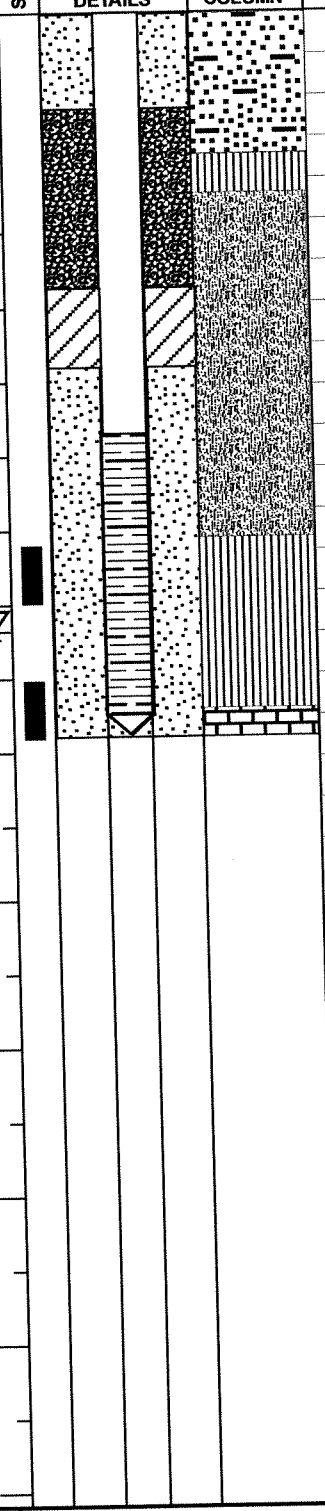
LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-57/MW-23

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236810.895/1741825.860

DATE COMPLETED: 9/12/07
TOTAL BOREHOLE DEPTH: 24FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1886.63
GROUND ELEVATION: 1886.76

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL
	1.1		
	1.3	ML	
	0.1	ML	
20/50	244		
6/8/20/36	317	OL	

SAMPLES | GRAPHIC WELL DETAILS | LITHO-LOGIC COLUMN



LITHOLOGIC DESCRIPTION

Parking lot fill

Coal seam (1 foot thick) @ 5 feet, dry, no odor

Sandy Silt 2.5Y 3/3, dry to moist, no odor

Grades to Sandy Silt 2.5Y-5/2, moist, no odor

Shale to Coal at 18 feet, dry to moist,

Slight H/C odor, saturated @ 21'

Silty Clay w/ coal fragments, 2.5Y 5/1, moist,

slight H/C, odor

EOB @ 24'

SAMPLE ID AND ANALYTICAL RESULTS

Collected lab sample: SB57-22 at 22 feet

MTBE	ppb	<50
Benzene	ppb	1061
Toluene	ppb	1140
Ethyl Benzene	ppb	460.4
Xylenes (Total)	ppb	3212
GRO (TPH)	mg/Kg	35

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

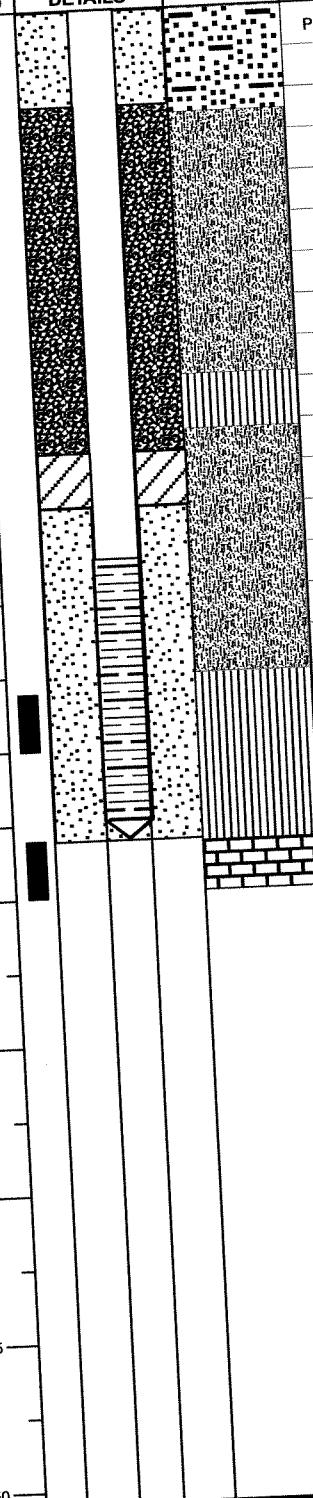
LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-58/VW-18

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236883.462/1741951.184

DATE COMPLETED: 9/12/07
TOTAL BOREHOLE DEPTH: 28FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1892.76
GROUND ELEVATION: 1893.01

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES
	0.0			
	1.3	ML		
	1.2			
	3.0	ML		
11/21	139			
7/21/23	1.3	OL		

GRAPHIC WELL DETAILS / LITHO-LOGIC COLUMN



LITHOLOGIC DESCRIPTION

- Parking lot fill
- Sandy Silt 2.5Y 5/4, dry to moist, no odor
- Coal seam from 12-14 feet, dry, no odor
- Sandy Silt 2.5Y-5/2, moist, no odor
- Shale to Coal at 18 feet, dry to moist, slight H/C odor
- Silty Clay w/ coal fragments, 2.5Y 5/1, moist, no odor
- EOB @ 28'

SAMPLE ID AND ANALYTICAL RESULTS

Collected lab sample: SB58-23 at 23 feet

MTBE	ppb	< 50
Benzene	ppb	2914
Toluene	ppb	4659
Ethyl Benzene	ppb	1534
Xylenes (Total)	ppb	6790
GRO (TPH)	mg/Kg	74

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-59

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236789.538/1741933.338

DATE COMPLETED: 9/12/07
TOTAL BOREHOLE DEPTH: 25 FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1889.04

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
	0.0	ML					Grass/Topsoil Sandy Silt, 2.5Y 4/3, dry to moist, no odor	
	1.3	ML					Coal @ 7 feet, dry, no odor (0.5 foot thick) Sandy Silt w/Clay, 2.5Y 4/1, moist, no odor	
	0.0						Coal @ 17 feet, dry, no odor	
14/21	17.1							Collected lab sample: SB59-18 at 18 feet MTBE ppb <1 Benzene ppb 7.2 Toluene ppb 5.8 Ethyl Benzene ppb 1.2 Xylenes (Total) ppb 3.7 GRO (TPH) mg/Kg <0.2
10/21/30	0.0	CH					Fat Clay, 5Y 6/1, w/ coal fragments and iron streaking, high plasticity, moist, no odor EOB @ 23'	

5 10 15 20 25 30 35 40 45 50

Bentonite Chips
Gravel Pack

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-60/MW-24

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 237060.708/1741784.267

DATE COMPLETED: 9/12/07
TOTAL BOREHOLE DEPTH: 30FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
TOC ELEVATION: 1889.31
GROUND ELEVATION: 1889.71

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
							Grass/Topsoil	
	1.2	ML					Sandy Silt 2.5Y 5/2, dry to moist, no odor	
	1.7	ML					Same as above	
	1282						Coal seam at 20 feet, dry to moist, H/C odor, saturated @ 23'	Collected lab sample: SB60-20 at 20 feet MTBE ppb < 200 Benzene ppb 5441 Toluene ppb 15010 Ethyl Benzene ppb 3561 Xylenes (Total) ppb 16540 GRO (TPH) mg/Kg 170
10/25	712						Sandy Silt (very dense), 2.5Y 5/1, moist, slight H/C, odor	
7/21/22	56.3	ML					EOB @ 28'	Collected lab sample: SB60-23 at 23 feet MTBE ppb < 50 Benzene ppb 3540 Toluene ppb 4139 Ethyl Benzene ppb 1589 Xylenes (Total) ppb 7932 GRO (TPH) mg/Kg 77

5 10 15 20 25 30 35 40 45 50

Bentonite Chips
Bentonite Grout
Gravel Pack

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

SHEET 1 OF 1

LOG OF EXPLORATORY BOREHOLE / WELL DETAILS
Borehole / Well Designation: SB-61

PROJECT NAME: FARMERS UNION OIL COMPANY
LOCATION: GARRISON, ND
PROJECT MANAGER: JARDA SOLC
LOGGED BY: BARRY BOTNEN
NORTHING & EASTING: 236707.823/1741817.177

DATE COMPLETED: 9/12/07
TOTAL BOREHOLE DEPTH: 25 FEET
DRILLING CONTRACTOR: AQUA-PLUS, INC.
SAMPLING METHOD: 24"SPLIT SPOON SAMPLER
GROUND ELEVATION: 1884.74

DRIVEN/ RECOVERED (INCHES) BLOW COUNTS	PID (ppm)	USCS CODE	NOTES: GROUNDWATER LEVEL, WELL DETAIL	SAMPLES	GRAPHIC WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION	SAMPLE ID AND ANALYTICAL RESULTS
	1.2	ML					Grass/Topsoil Sandy Silt, 2.5Y 3/2, dry to moist, no odor	
	0.1	ML					Silt w/ Sand, 2.5Y 6/1, moist, no odor	
	96.1						Coal @ 15 feet, dry, no odor	
18/46	91.0							Collected lab sample: SB61-15 at 15 feet MTBE ppb < 50 Benzene ppb 109.1 Toluene ppb <50 Ethyl Benzene ppb <50 Xylenes (Total) ppb <150 GRO (TPH) mg/Kg <10
4/11/20	13.6	CH					Fat Clay, 5Y 6/1, w/ coal fragments and iron streaking, high plasticity, moist, no odor EOB @ 23'	

5 10 15 20 25 30 35 40 45 50

Bentonite Chips
Gravel Pack

DATE: 10/1/07
DRAWN: BWB
PROJECT: Garrison

COMMENTS: FLUSH MOUNT COMPLETIONS
Hollow Stem Auger Rig
4" I.D. Auger Flights
2" PVC Wells

APPENDIX C

DRILLING DOCUMENTATION AND WELL CONSTRUCTION

Garrison Well Completion Summary

Well ID	Northing	Easting	Elevation		Drilled	Screen	Gravel Pack	Seal	Grout	Dia.
			TOC (ft)	Ground (ft)	Depth (ft)	Interval (ft)	Interval (ft)	Interval (ft)	Interval (ft)	(in)
MPE-1	236989.647	1741719.934	1888.25	1888.47	27	15.5-25.5	13.5-25.5	11.5-13.5	2-11.5	4
MW-1	237316.354	1741805.862	1889.58	1889.74	24	11-21	9-21	0-9	0-9	2
MW-2	237500.003	1741925.243	1890.36	1890.65	22	12-22	10-22	0-10	0-10	2
MW-3	237709.498	1741692.850	1893.63	1891.66	44	18-28	16-28	0-16	0-16	2
MW-4	236161.684	1741296.915	1913.73	1911.36	68	55-65	52-65	0-52	0-52	2
MW-5	235413.380	1740810.516	1902.26	1899.13	56	42-52	40-52	0-40	0-40	2
MW-6	235745.761	1741161.491	1907.61	1905.10	65	53-63	51-63	0-51	0-51	2
MW-7	236589.138	1741044.362	1901.30	1898.81	47	33-43	31-43	0-31	0-31	2
MW-8	236593.871	1740547.248	1899.29	1896.28	48	38-48	36-48	0-36	0-36	2
MW-9	235819.623	1741640.334	1907.19	1907.37	62	48-58	46-58	0-46	0-46	2
MW-10	236106.168	1740547.856	1891.06	1888.03	40	26-36	24-36	0-24	0-24	2
MW-11	235386.152	1741166.377	1905.89	1902.74	61	47-57	45-47	0-45	0-45	2
MW-12	236996.772	1741720.768	1888.63	1888.93	27	17-27	15-27	13-15	3-13	2
MW-13	234919.894	1741155.070	1900.35	1900.70	55	44-54	42-54	40-42	3-40	2
MW-14	235959.923	1741169.839	1896.90	1897.63	65	30-60	28-60	26-28	3-28	2
MW-15	236435.305	1741502.879	1899.23	1899.41	47	37-47	Mine Void	3-38	3-38	2
MW-16	236400.670	1741646.944	1895.83	1895.94	40	28-38	Mine Void	3-30	3-30	2
MW-17	236967.446	1741719.243	1887.81	1888.12	26	16-26	14-26	12-14	2-12	2
MW-18	236111.234	1740547.333	1887.95	1888.41	37	27-37	25-37	23-25	2-23	2
MW-19	237149.335	1741526.551	1885.15	1885.24	25	15-25	13-25	11-13	2-11	2
MW-20	235986.137	1741328.213	1899.45	1899.92	56	41-56	39-56	37-39	3-37	2
MW-21	236129.016	1741170.958	1906.45	1906.76	59	44-59	42-59	40-42	3-40	2
MW-22	236896.176	1741831.325	1890.49	1890.76	28	18-28	16-28	14-16	3-14	2
MW-23	236810.895	1741825.860	1886.63	1886.76	24	14-24	12-24	10-12	3-10	2
MW-24	237060.708	1741784.267	1889.31	1889.71	28	18-28	16-18	14-16	3-14	2
VW-1	237332.253	1741938.075	1893.69	1891.87	24	15-22	NA	NA	NA	2
VW-2	237380.599	1741672.448	1890.78	1890.99	28	15-22	NA	NA	NA	2
VW-3	237069.332	1741935.460	1894.04	1891.75	31	NA	NA	NA	NA	2
VW-4	237323.305	1741763.966	1889.74	1890.10	24	16-22	14-22	0-14	0-14	2
VW-5	236842.277	1741744.644	1888.27	1885.61	26	16-22	14-22	0-14	0-14	2
VW-6	236613.824	1741490.499	1902.88	1900.70	45	33-43	20-43	0-20	0-20	2
VW-7	236427.525	1741401.760	1904.72	1902.40	51	42-47	20-47	0-20	0-20	2
VW-8	236609.421	1742018.146	1891.32	1887.97	27	NA	NA	NA	NA	2
VW-9	237043.826	1742231.467	1896.22	1893.54	28	13-23	11-23	0-11	0-11	2
VW-10	235786.514	1740763.496	1896.41	1893.76	58	33-43	31-43	0-31	0-31	2
VW-11	235547.209	1740597.291	1882.14	1879.62	36	22-27	20-27	0-20	0-20	2
VW-12	236180.106	1741806.040	1906.63	1904.18	55	26-36	24-36	0-24	0-24	2
VW-13	236338.648	1741978.122	1901.82	1899.33	36	22-32	20-32	0-20	0-20	2
VW-14	237314.051	1741784.204	1889.77	1890.18	30	16.5-21.5	15-21.5	4.5-15	4.5-15	2
VW-15	237298.474	1741690.915	1889.67	1889.96	22	15.5-20.5	14-20.5	4-14	4-14	2
VW-16	237292.085	1741742.708	1889.64	1890.02	25	15.5-20.5	14-20.5	4-14	4-14	2
VW-17	236236.602	1741164.890	1911.52	1911.77	53	43-53	41-53	39-41	4-39	2
VW-18	236883.462	1741951.184	1892.76	1893.01	26	16-26	14-26	12-14	3-12	2

NA - information not available due to incomplete bore logs (from previous consultant)

AQUA-PLUS,INC

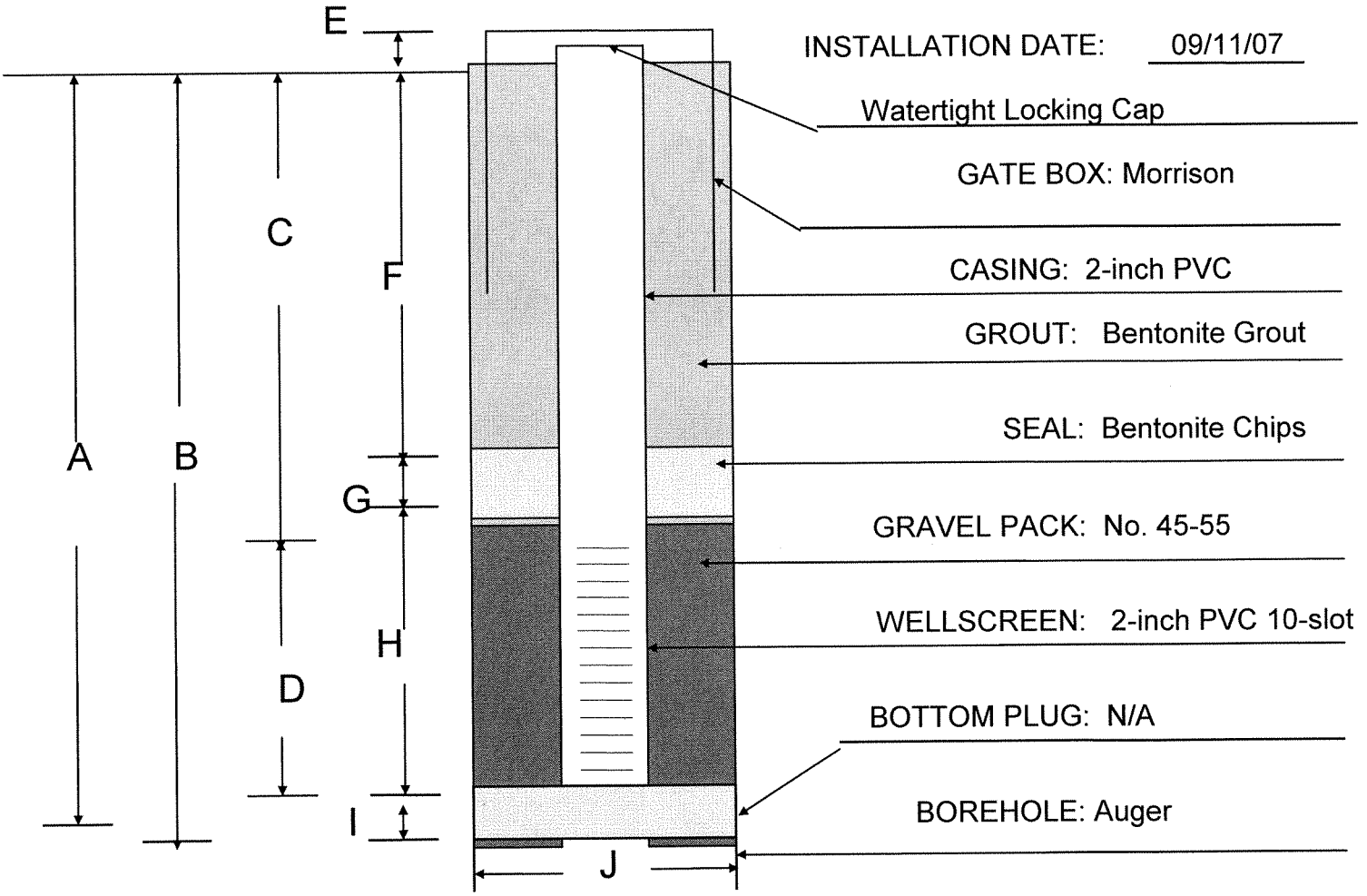
SB-53

AT-GRADE MONITORING WELL CONSTRUCTION DETAIL

UNIQUE NUMBER: VW-17

PROJECT: Garrison, ND

INSTALLATION DATE: 09/11/07



A:	TOTAL WELL DEPTH:	53-feet
B:	BOREHOLE DEPTH:	53-feet
C:	DEPTH OF CASING:	43-feet
D:	SCREEN LENGTH:	10-feet
E:	STICK-UP:	2-inches
F:	BOREHOLE GROUT:	41-feet
G:	GRAVEL PACK SEAL:	2-foot
H:	GRAVEL PACK:	12-feet
I:	BOTTOM SEAL:	N/A
J:	BOREHOLE SIZE:	8-inch

SB-54

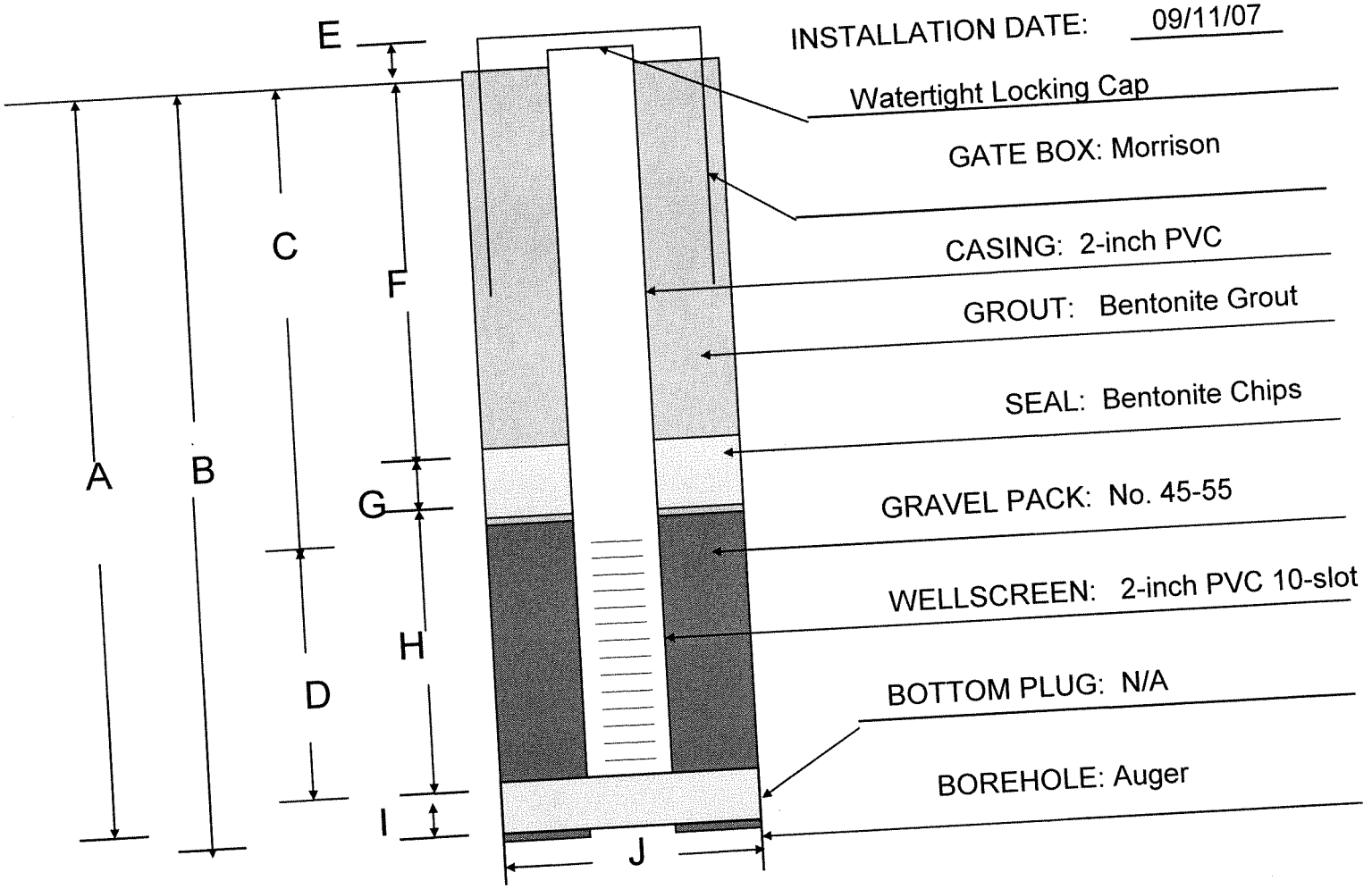
AQUA-PLUS,INC

AT-GRADE MONITORING WELL CONSTRUCTION DETAIL

UNIQUE NUMBER: MW-21

PROJECT: Garrison, ND

INSTALLATION DATE: 09/11/07



A:	TOTAL WELL DEPTH:	59-feet
B:	BOREHOLE DEPTH:	59-feet
C:	DEPTH OF CASING:	44-feet
D:	SCREEN LENGTH:	15-feet
E:	STICK-UP:	2-inches
F:	BOREHOLE GROUT:	38.5-feet
G:	GRAVEL PACK SEAL:	2-foot
H:	GRAVEL PACK:	17-feet
I:	BOTTOM SEAL:	N/A
J:	BOREHOLE SIZE:	8-inch

SB-56

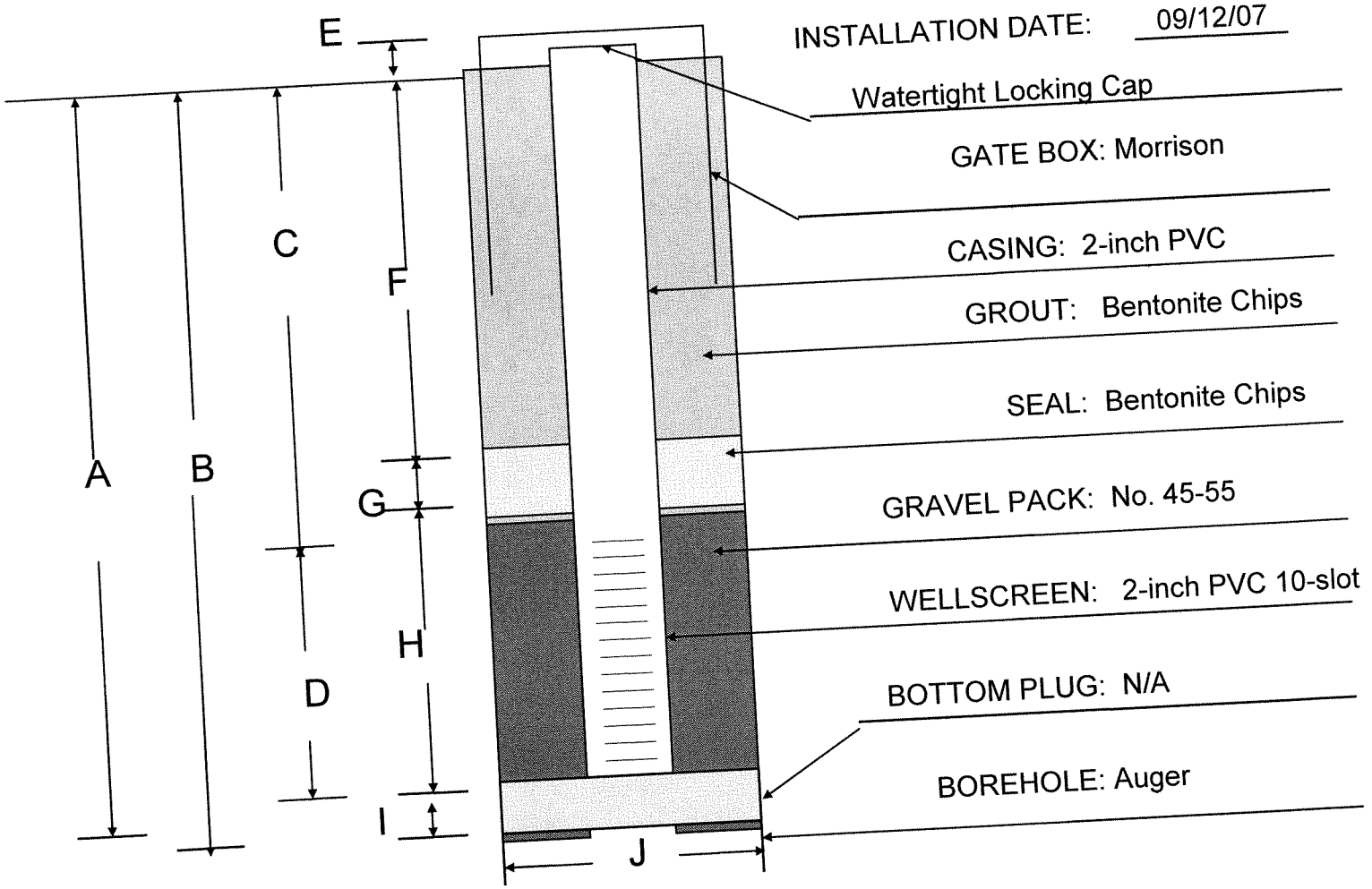
AQUA-PLUS,INC

AT-GRADE MONITORING WELL CONSTRUCTION DETAIL

UNIQUE NUMBER: MW-22

PROJECT: Garrison, ND

INSTALLATION DATE: 09/12/07



A:	TOTAL WELL DEPTH:	28-feet
B:	BOREHOLE DEPTH:	28-feet
C:	DEPTH OF CASING:	18-feet
D:	SCREEN LENGTH:	10-feet
E:	STICK-UP:	2-inches
F:	BOREHOLE GROUT:	14-feet
G:	GRAVEL PACK SEAL:	2-foot
H:	GRAVEL PACK:	12-feet
I:	BOTTOM SEAL:	N/A
J:	BOREHOLE SIZE:	8-inch

SB-57

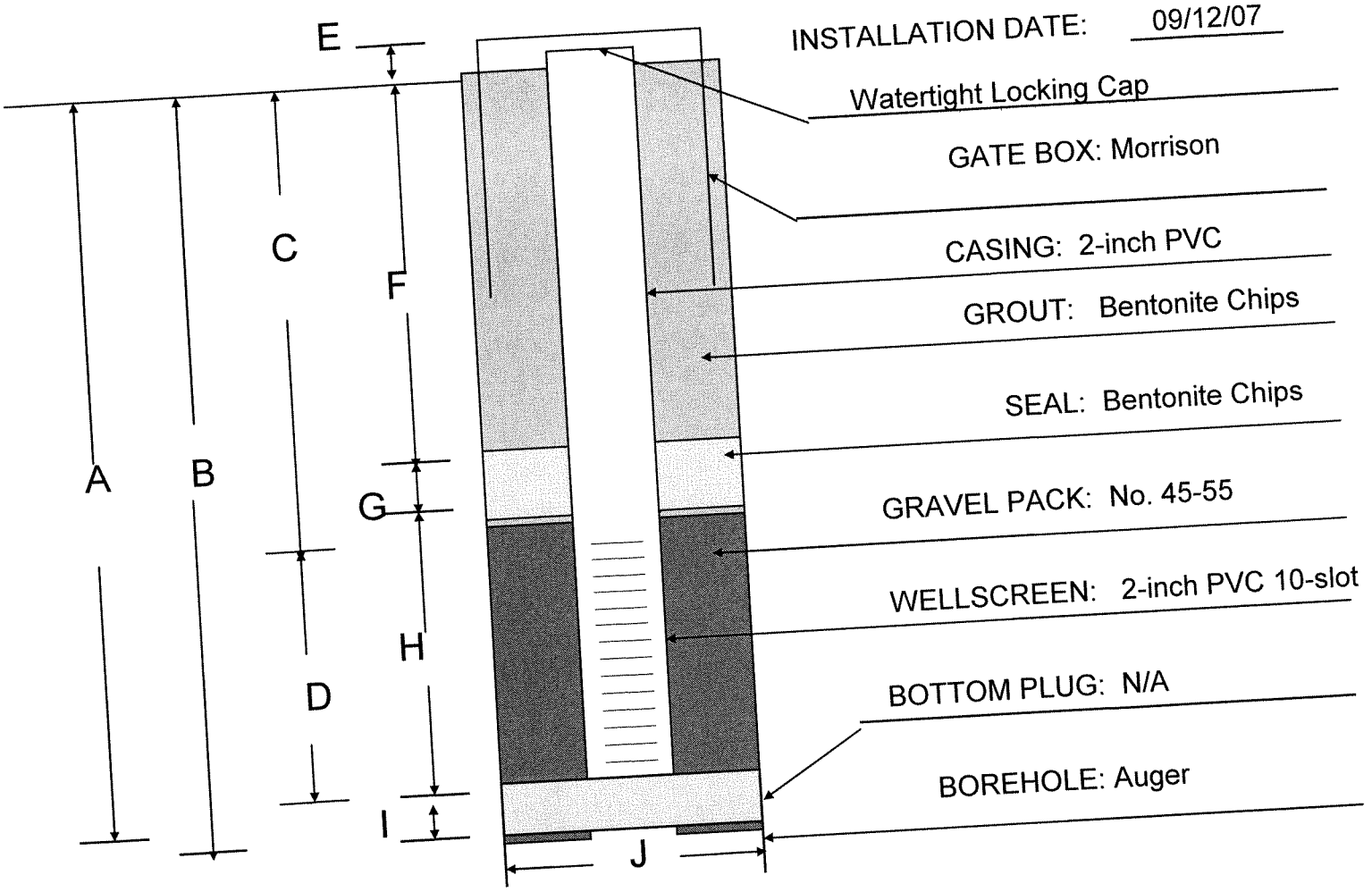
AQUA-PLUS,INC

AT-GRADE MONITORING WELL CONSTRUCTION DETAIL

UNIQUE NUMBER: MW-23

PROJECT: Garrison, ND

INSTALLATION DATE: 09/12/07



A:	TOTAL WELL DEPTH:	24-feet
B:	BOREHOLE DEPTH:	24-feet
C:	DEPTH OF CASING:	14-feet
D:	SCREEN LENGTH:	10-feet
E:	STICK-UP:	2-inches
F:	BOREHOLE GROUT:	10-feet
G:	GRAVEL PACK SEAL:	2-foot
H:	GRAVEL PACK:	12-feet
I:	BOTTOM SEAL:	N/A
J:	BOREHOLE SIZE:	8-inch

AQUA-PLUS,INC

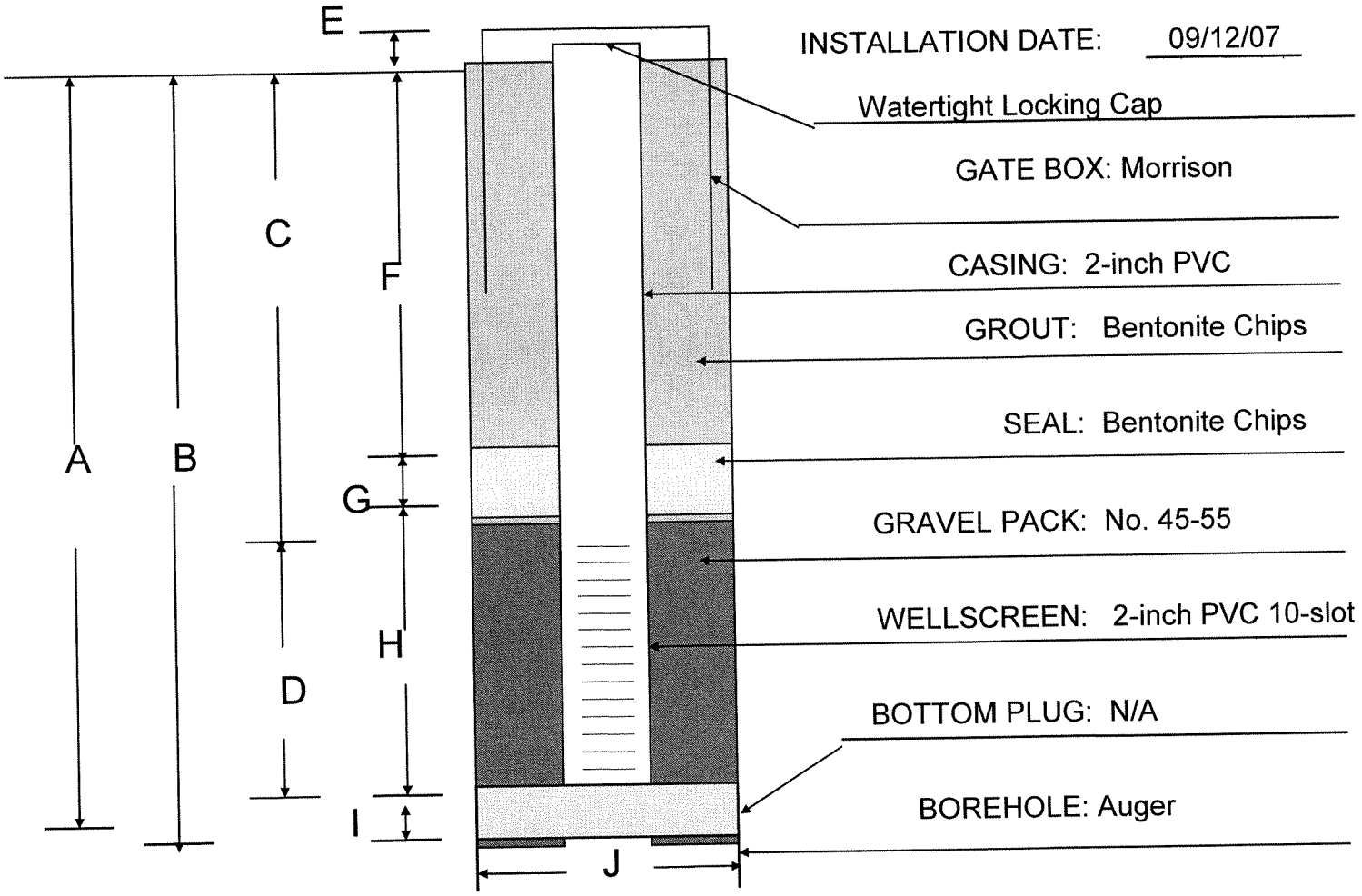
SB-58

AT-GRADE MONITORING WELL CONSTRUCTION DETAIL

UNIQUE NUMBER: VW-18

PROJECT: Garrison, ND

INSTALLATION DATE: 09/12/07



A:	TOTAL WELL DEPTH:	28-feet
B:	BOREHOLE DEPTH:	28-feet
C:	DEPTH OF CASING:	18-feet
D:	SCREEN LENGTH:	10-feet
E:	STICK-UP:	2-inches
F:	BOREHOLE GROUT:	14-feet
G:	GRAVEL PACK SEAL:	2-foot
H:	GRAVEL PACK:	12-feet
I:	BOTTOM SEAL:	N/A
J:	BOREHOLE SIZE:	8-inch

SB-60

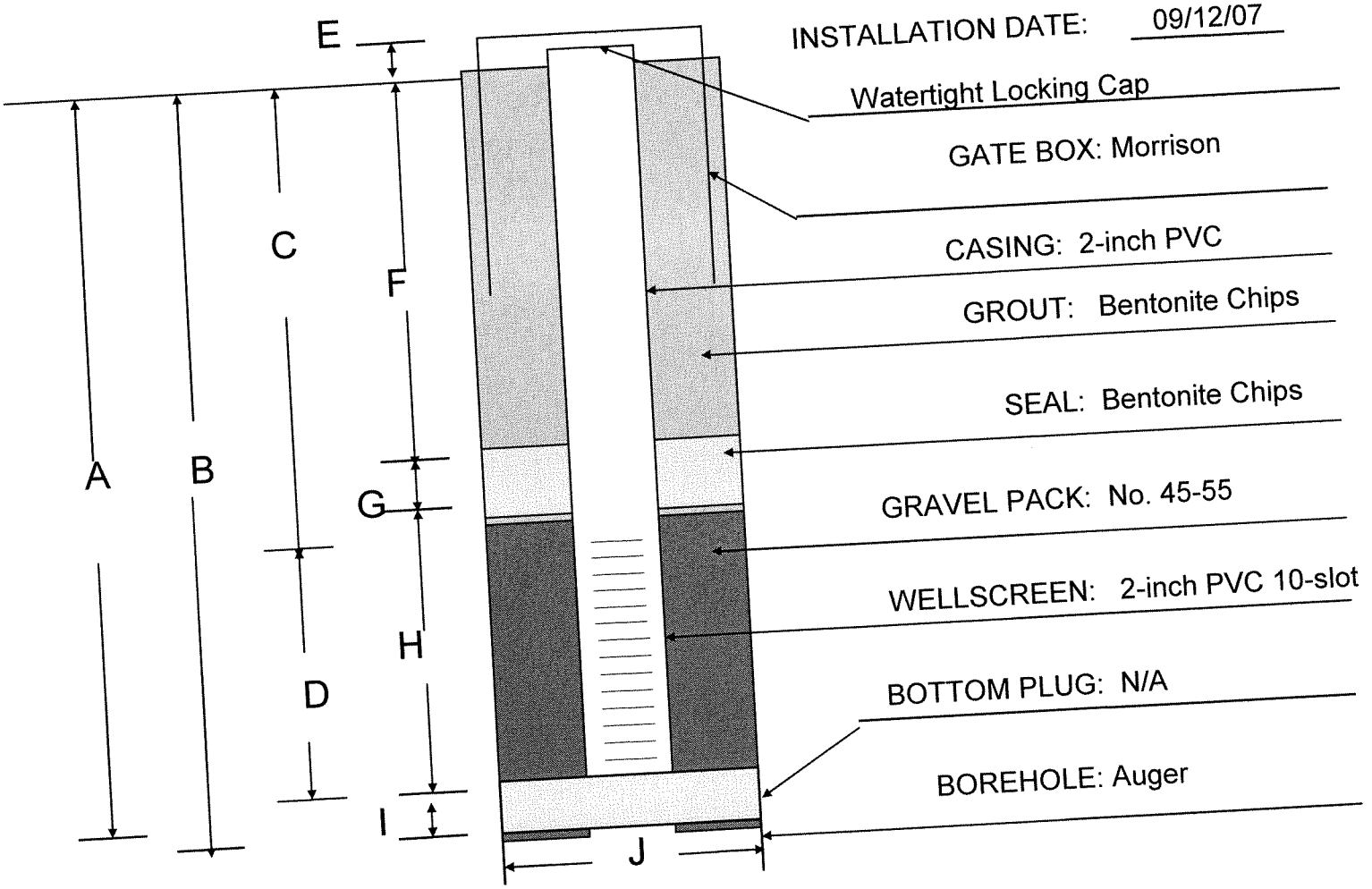
AQUA-PLUS,INC

AT-GRADE MONITORING WELL CONSTRUCTION DETAIL

UNIQUE NUMBER: MW-24

PROJECT: Garrison, ND

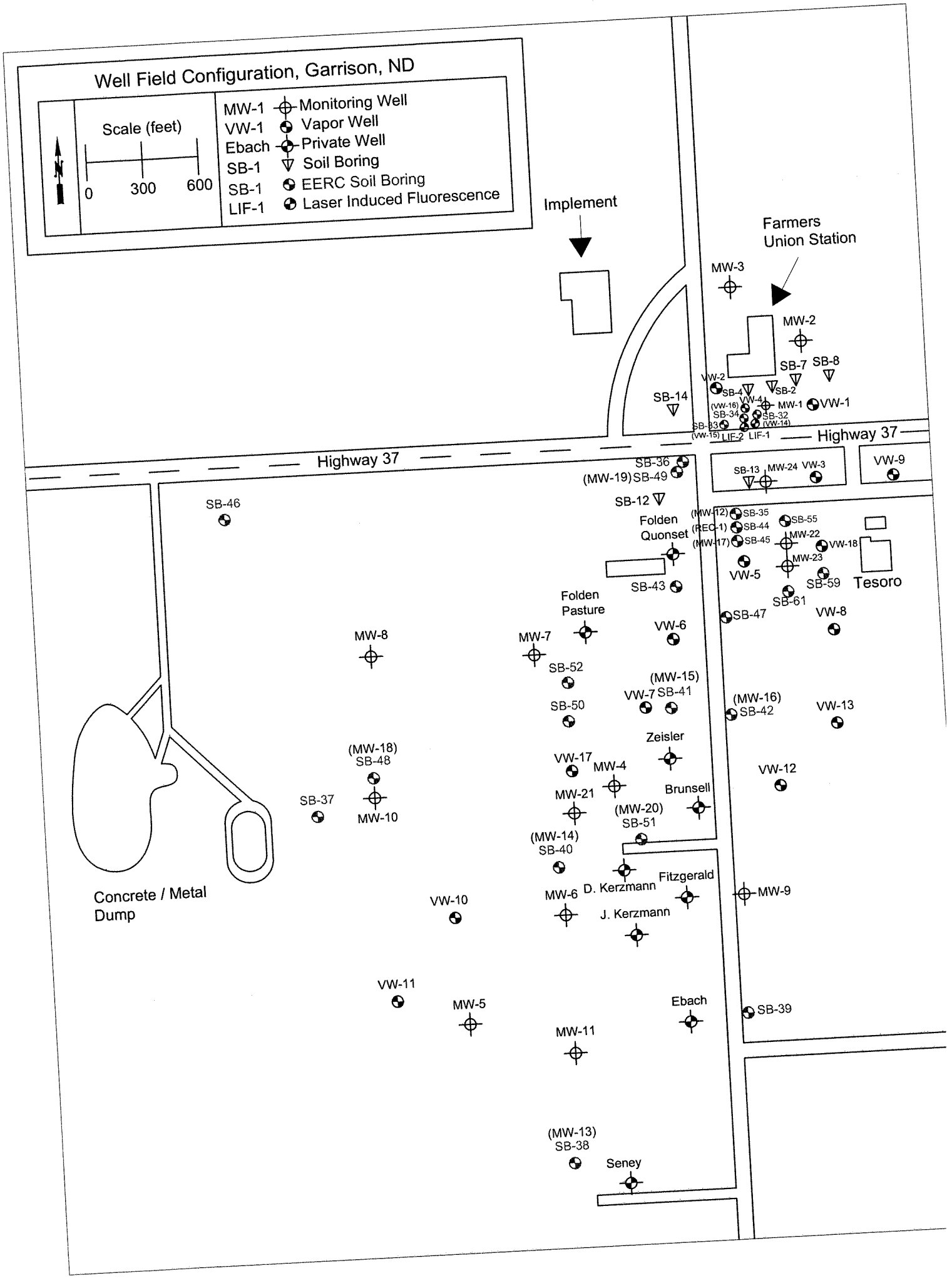
INSTALLATION DATE: 09/12/07

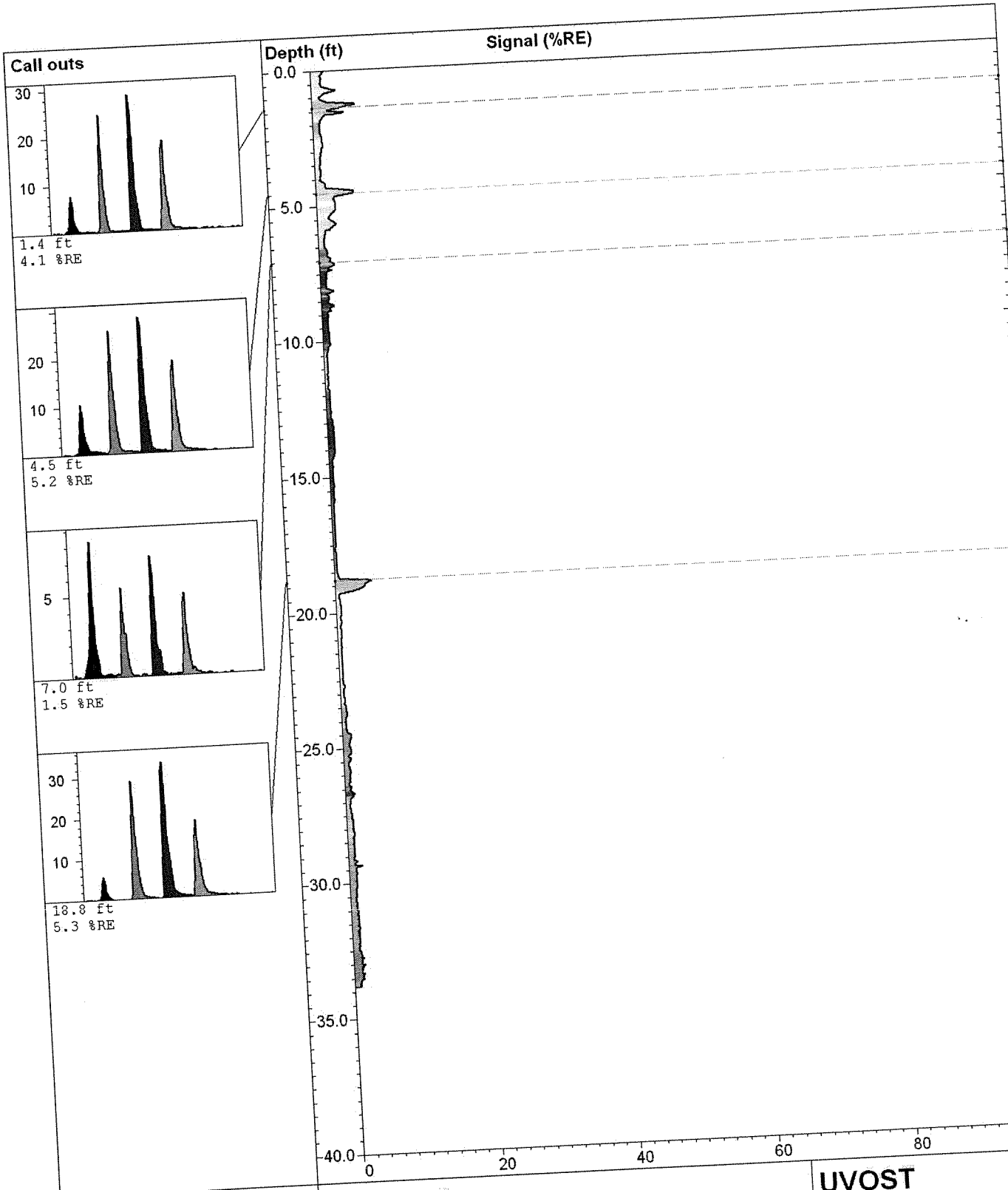


A:	TOTAL WELL DEPTH:	28-feet
B:	BOREHOLE DEPTH:	28-feet
C:	DEPTH OF CASING:	18-feet
D:	SCREEN LENGTH:	10-feet
E:	STICK-UP:	2-inches
F:	BOREHOLE GROUT:	14-feet
G:	GRAVEL PACK SEAL:	2-foot
H:	GRAVEL PACK:	12-feet
I:	BOTTOM SEAL:	N/A
J:	BOREHOLE SIZE:	8-inch

APPENDIX D

LIF DOCUMENTATION


Well Field Configuration, Garrison, ND
Scale (feet)
0
300
600
MW-1 Monitoring Well
VW-1 Vapor Well
Ebach Private Well
SB-1 Soil Boring
SB-1 EERC Soil Boring
LIF-1 Laser Induced Fluorescence
Implement
Farmers Union Station
Highway 37
Highway 37
MW-3
MW-2
SB-7
SB-8
VW-2
SB-4
SB-2
SB-14
VW-4
(VW-16)
MW-1
VW-1
SB-34
SB-32
(VW-14)
SB-33
(VW-15)
LIF-2
LIF-1
SB-36
(MW-19)
SB-49
SB-13
MW-24
VW-3
VW-9
SB-46
SB-12
Folden Quonset
(MW-12)
(REC-1)
(MW-17)
SB-35
SB-44
SB-45
SB-55
MW-22
VW-18
MW-23
VW-5
SB-59
Tesoro
SB-61
SB-43
Folden Pasture
SB-47
VW-8
MW-8
MW-7
VW-6
SB-52
(MW-15)
VW-7
SB-41
SB-50
(MW-16)
SB-42
VW-13
Zeisler
(MW-18)
SB-48
VW-17
MW-4
VW-12
SB-37
MW-10
MW-21
Brunsell
(MW-20)
SB-51
(MW-14)
SB-40
Concrete / Metal Dump
D. Kerzmann
Fitzgerald
MW-6
MW-9
J. Kerzmann
VW-10
VW-11
MW-5
Ebach
SB-39
MW-11
(MW-13)
SB-38
Seney

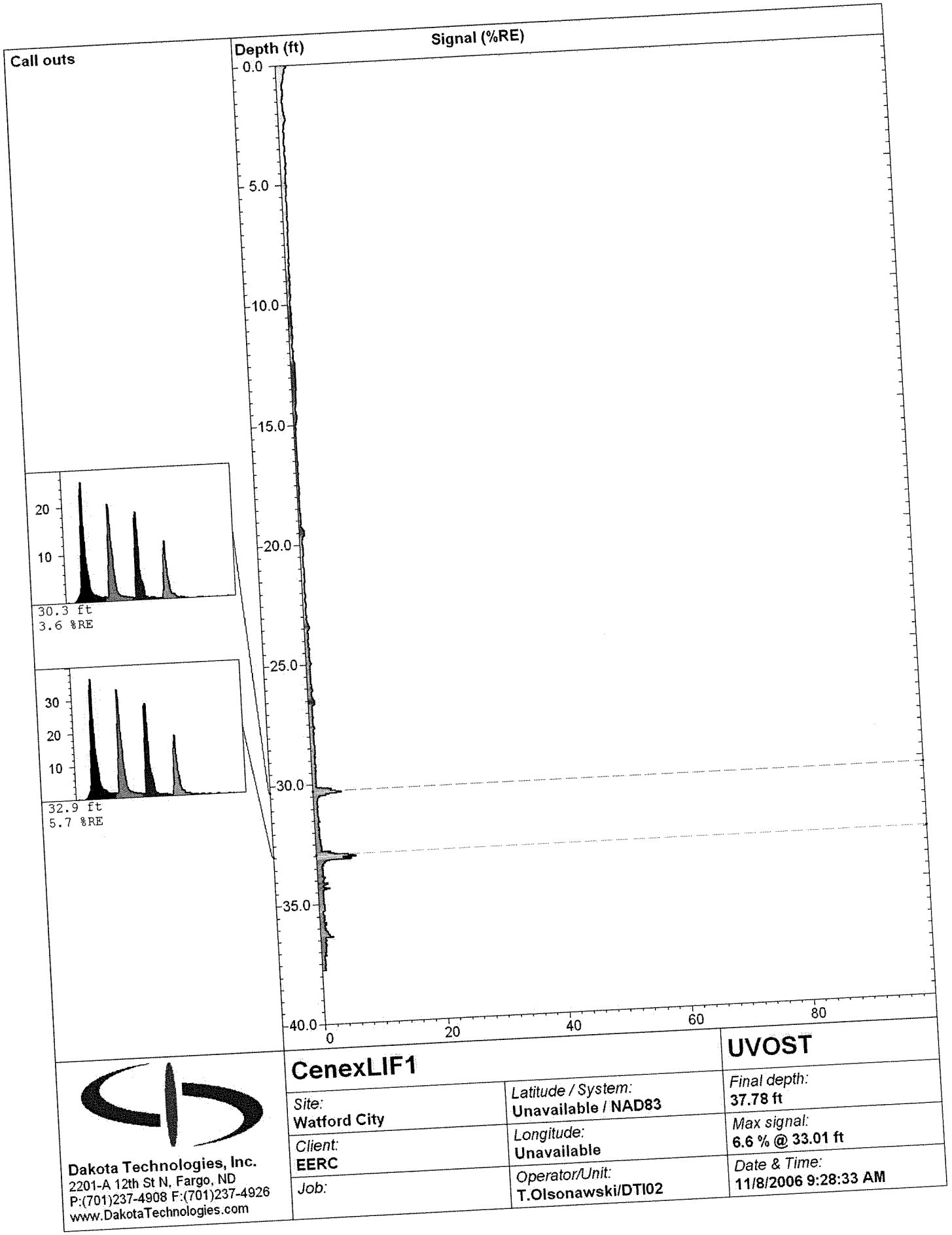


Dakota Technologies, Inc.
2201-A 12th St N, Fargo, ND
P:(701)237-4908 F:(701)237-4926
www.DakotaTechnologies.com

CenexLIF2

UVOST

Site: **Watford City**	*Latitude / System:* **Unavailable / NAD83**	*Final depth:* **33.83 ft**
Client: **EERC**	*Longitude:* **Unavailable**	*Max signal:* **6.4 % @ 1.24 ft**
Job:	*Operator/Unit:* **T.Olsonawski/DTI02**	*Date & Time:* **11/8/2006 10:10:29 AM**



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2201-A 12th St N, Fargo, ND
P:(701)237-4908 F:(701)237-4926
www.DakotaTechnologies.com

CenexLIF1

UVOST

Site: **Watford City**	*Latitude / System:* **Unavailable / NAD83**	*Final depth:* **37.78 ft**
Client: **EERC**	*Longitude:* **Unavailable**	*Max signal:* **6.6 % @ 33.01 ft**
Job:	*Operator/Unit:* **T.Olsonawski/DTI02**	*Date & Time:* **11/8/2006 9:28:33 AM**

APPENDIX E

SITE SURVEY DATA

Survey conducted by Interstate Engineering, Inc. Mandan

City of Garrison - Near Cenex Station B07-08-046

Point Name	Northing	Easting	Elevation	Latitude	Longitude	Height	Description/Code
1	236996.772	1741720.768	1888.639	47ø38'45.66209"N	101ø25'12.23367"W	1823.406	MW12
2	236989.647	1741719.934	1888.245	47ø38'45.59168"N	101ø25'12.24461"W	1823.011	REC1
3	236991.066	1741719.384	1888.473	47ø38'45.60562"N	101ø25'12.25288"W	1823.239	SPOT
4	236967.446	1741719.243	1887.805	47ø38'45.37251"N	101ø25'12.25082"W	1822.571	MW17
5	236968.862	1741719.002	1888.121	47ø38'45.38644"N	101ø25'12.25459"W	1822.887	SPOT
6	236842.277	1741744.644	1888.265	47ø38'44.14024"N	101ø25'11.85803"W	1823.029	VW5
7	236841.446	1741744.794	1885.612	47ø38'44.13206"N	101ø25'11.85570"W	1820.376	SPOT
8	237069.332	1741935.46	1894.041	47ø38'46.40347"N	101ø25'09.11101"W	1828.801	VW3
9	237069.923	1741935.842	1891.751	47ø38'46.40935"N	101ø25'09.10555"W	1826.511	SPOT
10	237043.826	1742231.467	1896.215	47ø38'46.18662"N	101ø25'04.78377"W	1830.965	VW9
11	237044.34	1742231.807	1893.535	47ø38'46.19173"N	101ø25'04.77889"W	1828.285	SPOT
12	237332.253	1741938.075	1893.688	47ø38'48.99848"N	101ø25'09.11868"W	1828.45	VW1
13	237331.998	1741938.628	1891.872	47ø38'48.99603"N	101ø25'09.11055"W	1826.634	SPOT
14	237500.003	1741925.243	1890.356	47ø38'50.65245"N	101ø25'09.33532"W	1825.119	MW2
15	237500.237	1741924.554	1890.645	47ø38'50.65468"N	101ø25'09.34542"W	1825.409	SPOT
16	237709.498	1741692.85	1893.634	47ø38'52.69251"N	101ø25'12.76578"W	1828.407	MW3
17	237709.398	1741693.275	1891.659	47ø38'52.69157"N	101ø25'12.75955"W	1826.432	SPOT
18	237380.599	1741672.448	1890.782	47ø38'49.44429"N	101ø25'13.00632"W	1825.553	VW2
19	237381.168	1741672.067	1890.994	47ø38'49.44985"N	101ø25'13.01197"W	1825.765	SPOT
20	237298.474	1741690.915	1889.671	47ø38'48.63599"N	101ø25'12.72229"W	1824.441	VW15
21	237298.545	1741690.344	1889.957	47ø38'48.63663"N	101ø25'12.73064"W	1824.727	SPOT
22	237292.085	1741742.708	1889.641	47ø38'48.57905"N	101ø25'11.96479"W	1824.409	VW16
23	237292.178	1741742.256	1890.018	47ø38'48.57992"N	101ø25'11.97141"W	1824.786	SPOT
24	237323.305	1741763.966	1889.738	47ø38'48.88966"N	101ø25'11.65978"W	1824.505	VW4
25	237323.536	1741763.466	1890.096	47ø38'48.89188"N	101ø25'11.66713"W	1824.864	SPOT
26	237314.051	1741784.204	1889.766	47ø38'48.80071"N	101ø25'11.36261"W	1824.533	VW14
27	237314.275	1741783.763	1890.178	47ø38'48.80288"N	101ø25'11.36910"W	1824.945	SPOT
28	237316.354	1741805.862	1889.579	47ø38'48.82599"N	101ø25'11.04672"W	1824.345	MW1
29	237316.525	1741805.357	1889.738	47ø38'48.82763"N	101ø25'11.05414"W	1824.504	SPOT
30	237156.063	1741526.321	1885.008	47ø38'47.21116"N	101ø25'15.10113"W	1819.781	SB36
31	237149.335	1741526.551	1885.148	47ø38'47.14479"N	101ø25'15.09659"W	1819.922	MW19
32	237150.037	1741525.541	1885.241	47ø38'47.15160"N	101ø25'15.11147"W	1820.014	SPOT
33	237085.532	1740176.288	1881.055	47ø38'46.35527"N	101ø25'34.80435"W	1815.872	SB46
34	236818.925	1741523.815	1885.241	47ø38'43.88373"N	101ø25'15.07885"W	1820.012	SB43
35	236635.923	1741213.944	1896.184	47ø38'42.04113"N	101ø25'19.57206"W	1830.964	FOLDEN PASTURE
36	236862.523	1741506.173	1884.671	47ø38'44.31190"N	101ø25'15.34409"W	1819.443	FOLDEN QUANSIT
37	236613.824	1741490.499	1902.882	47ø38'41.85571"N	101ø25'15.52955"W	1837.652	VW6
38	236613.37	1741490.061	1900.703	47ø38'41.85118"N	101ø25'15.53587"W	1835.474	SPOT
39	236561.478	1741461.499	1900.254	47ø38'41.33570"N	101ø25'15.94389"W	1835.026	PSC1
40	236560.734	1741461.546	1900.515	47ø38'41.32836"N	101ø25'15.94308"W	1835.286	SPOT
41	236427.525	1741401.76	1904.724	47ø38'40.00670"N	101ø25'16.79288"W	1839.496	VW7
42	236428.281	1741401.734	1902.4	47ø38'40.01416"N	101ø25'16.79339"W	1837.172	SPOT
43	236435.305	1741502.879	1899.229	47ø38'40.09542"N	101ø25'15.31757"W	1833.998	MW15
44	236434.35	1741502.717	1899.411	47ø38'40.08597"N	101ø25'15.31977"W	1834.179	SPOT
45	236703.175	1741650.7	1888.808	47ø38'42.75640"N	101ø25'13.20567"W	1823.574	SB47
46	236400.669	1741646.944	1895.825	47ø38'39.77060"N	101ø25'13.20771"W	1830.588	MW16
47	236399.498	1741647.632	1895.942	47ø38'39.75913"N	101ø25'13.19745"W	1830.706	SPOT
48	236357.475	1741179.683	1909.402	47ø38'39.28916"N	101ø25'20.02368"W	1844.18	SB50
49	236589.138	1741044.362	1901.296	47ø38'41.55937"N	101ø25'22.04033"W	1836.081	MW7
50	236588.473	1741043.584	1898.81	47ø38'41.55272"N	101ø25'22.05158"W	1833.594	SPOT
51	236593.871	1740547.248	1899.289	47ø38'41.54722"N	101ø25'29.30071"W	1834.09	MW8
52	236593.696	1740547.631	1896.281	47ø38'41.54554"N	101ø25'29.29508"W	1831.081	SPOT
53	236111.234	1740547.333	1887.945	47ø38'36.78422"N	101ø25'29.21481"W	1822.742	MW18
54	236110.51	1740547.653	1888.41	47ø38'36.77711"N	101ø25'29.21001"W	1823.207	SPOT
55	236106.168	1740547.856	1891.056	47ø38'36.73428"N	101ø25'29.20628"W	1825.853	MW10

City of Garrison - Near Cenex Station B07-08-046

Point Name	Northing	Easting	Elevation	Latitude	Longitude	Height	Description/Code
56	236105.673	1740547.493	1888.034	47ø38'36.72936"N	101ø25'29.21150"W	1822.83	SPOT
57	236058.004	1740349.551	1876.515	47ø38'36.23544"N	101ø25'32.09368"W	1811.318	SB37
58	235547.209	1740597.291	1882.138	47ø38'31.22392"N	101ø25'28.38636"W	1816.929	VW11
59	235547.289	1740598.37	1879.617	47ø38'31.22485"N	101ø25'28.37062"W	1814.408	SPOT
60	235786.514	1740763.496	1896.413	47ø38'33.60525"N	101ø25'26.00129"W	1831.201	VW10
61	235787.176	1740764.103	1893.761	47ø38'33.61185"N	101ø25'25.99253"W	1828.549	SPOT
62	235413.38	1740810.516	1902.264	47ø38'29.92846"N	101ø25'25.24929"W	1837.046	MW5
63	235413.416	1740811.209	1899.13	47ø38'29.92890"N	101ø25'25.23917"W	1833.913	SPOT
64	234919.894	1741155.07	1900.346	47ø38'25.09914"N	101ø25'20.13163"W	1835.114	MW13
65	234918.962	1741155.106	1900.697	47ø38'25.08994"N	101ø25'20.13094"W	1835.465	SPOT
66	235726.516	1741359.758	1912.677	47ø38'33.08366"N	101ø25'17.28373"W	1847.445	J. KERZMANN
67	235386.152	1741166.377	1905.885	47ø38'29.70185"N	101ø25'20.04809"W	1840.657	MW11
68	235386.965	1741166.397	1902.735	47ø38'29.70988"N	101ø25'20.04793"W	1837.506	SPOT
69	235745.761	1741161.491	1907.612	47ø38'33.25016"N	101ø25'20.18233"W	1842.386	MW6
70	235745.255	1741162.192	1905.105	47ø38'33.24525"N	101ø25'20.17200"W	1839.88	SPOT
71	235959.923	1741169.839	1896.902	47ø38'35.36466"N	101ø25'20.09789"W	1831.678	MW14
72	235959.767	1741170.721	1897.629	47ø38'35.36322"N	101ø25'20.08498"W	1832.404	SPOT
73	236161.684	1741296.915	1913.734	47ø38'37.37080"N	101ø25'18.27749"W	1848.507	MW4
74	236161.712	1741296.105	1911.36	47ø38'37.37098"N	101ø25'18.28931"W	1846.133	SPOT
75	235986.137	1741328.213	1899.451	47ø38'35.64207"N	101ø25'17.78975"W	1834.221	MW20
76	235986.701	1741327.159	1899.924	47ø38'35.64751"N	101ø25'17.80525"W	1834.695	SPOT
77	236609.421	1742018.146	1891.319	47ø38'41.87447"N	101ø25'07.82334"W	1826.073	VW8
78	236608.864	1742018.133	1887.972	47ø38'41.86898"N	101ø25'07.82344"W	1822.726	SPOT
79	236338.648	1741978.122	1901.824	47ø38'39.19758"N	101ø25'08.36062"W	1836.577	VW13
80	236339.11	1741977.921	1899.331	47ø38'39.20210"N	101ø25'08.36364"W	1834.084	SPOT
81	236180.106	1741806.042	1906.633	47ø38'37.61268"N	101ø25'10.84589"W	1841.39	VW12
82	236180.065	1741806.487	1904.183	47ø38'37.61234"N	101ø25'10.83939"W	1838.94	SPOT
83	235441.194	1741630.84	1909.664	47ø38'30.29990"N	101ø25'13.27539"W	1844.42	SB39
84	235819.623	1741640.334	1907.193	47ø38'34.03563"N	101ø25'13.20281"W	1841.953	MW9
85	235818.954	1741641.578	1907.374	47ø38'34.02917"N	101ø25'13.18453"W	1842.134	SPOT
86	234911.376	1741292.291	1899.011	47ø38'25.03130"N	101ø25'18.12644"W	1833.775	SENEY
87	235425.282	1741513.031	1916.974	47ø38'30.12896"N	101ø25'14.99292"W	1851.734	EBACH
88	235425.68	1741513.059	1915.998	47ø38'30.13290"N	101ø25'14.99257"W	1850.758	SPOT
89	235727.063	1741359.682	1910.331	47ø38'33.08906"N	101ø25'17.28494"W	1845.099	SPOT
90	235806.942	1741520.177	1911.69	47ø38'33.89631"N	101ø25'14.95522"W	1846.454	FITZGERALD
91	235806.775	1741520.565	1910.173	47ø38'33.89471"N	101ø25'14.94953"W	1844.937	SPOT
92	235931.03	1741296.596	1900.081	47ø38'35.09449"N	101ø25'18.24182"W	1834.853	D. KERZMANN
93	236125.095	1741541.127	1909.9	47ø38'37.03855"N	101ø25'14.70485"W	1844.665	BRUNSELL
94	236124.446	1741541.189	1907.422	47ø38'37.03215"N	101ø25'14.70384"W	1842.187	SPOT
95	236252.606	1741469.428	1904.833	47ø38'38.28845"N	101ø25'15.77415"W	1839.602	ZEISLER
96	236251.966	1741469.39	1902.927	47ø38'38.28213"N	101ø25'15.77460"W	1837.695	SPOT
97	237060.708	1741784.267	1899.314	47ø38'46.30055"N	101ø25'11.31749"W	1824.078	MW-24
98	237060.405	1741784.976	1889.707	47ø38'46.29764"N	101ø25'11.30710"W	1824.471	MW-24 SPOT
99	236896.176	1741831.325	1890.49	47ø38'44.68237"N	101ø25'10.60157"W	1825.252	MW-22
100	236896.601	1741831.996	1890.759	47ø38'44.68664"N	101ø25'10.59185"W	1825.521	MW-22 SPOT
101	236810.895	1741825.86	1886.634	47ø38'43.84011"N	101ø25'10.66651"W	1821.395	MW-23
102	236811.481	1741826.073	1886.764	47ø38'43.84593"N	101ø25'10.66350"W	1821.525	MW-23 SPOT
103	236883.462	1741951.184	1892.761	47ø38'44.57102"N	101ø25'08.84898"W	1827.519	VW-18
104	236884.245	1741951.092	1893.013	47ø38'44.57874"N	101ø25'08.85046"W	1827.771	VW-18 SPOT
105	236236.708	1741165.585	1911.769	47ø38'38.09567"N	101ø25'20.20843"W	1846.547	VW-17 SPOT
106	236236.602	1741164.89	1911.524	47ø38'38.09454"N	101ø25'20.21856"W	1846.302	VW-17 SPOT
107	236129.016	1741170.958	1906.452	47ø38'37.03352"N	101ø25'20.11113"W	1841.229	MW-21
108	236130.065	1741170.694	1906.761	47ø38'37.04385"N	101ø25'20.11517"W	1841.538	MW-21 SPOT
109	236478.137	1741184.317	1905.218	47ø38'40.48048"N	101ø25'19.97711"W	1839.997	SB-52
110	236911.705	1741847.322	1891.432	47ø38'44.83751"N	101ø25'10.37067"W	1826.193	SB-55
111	236707.823	1741817.177	1884.743	47ø38'42.82190"N	101ø25'10.77533"W	1819.504	SB-61
112	236789.538	1741933.338	1889.045	47ø38'43.64201"N	101ø25'09.09323"W	1823.803	SB-59

APPENDIX F

GROUNDWATER TABLE MONITORING

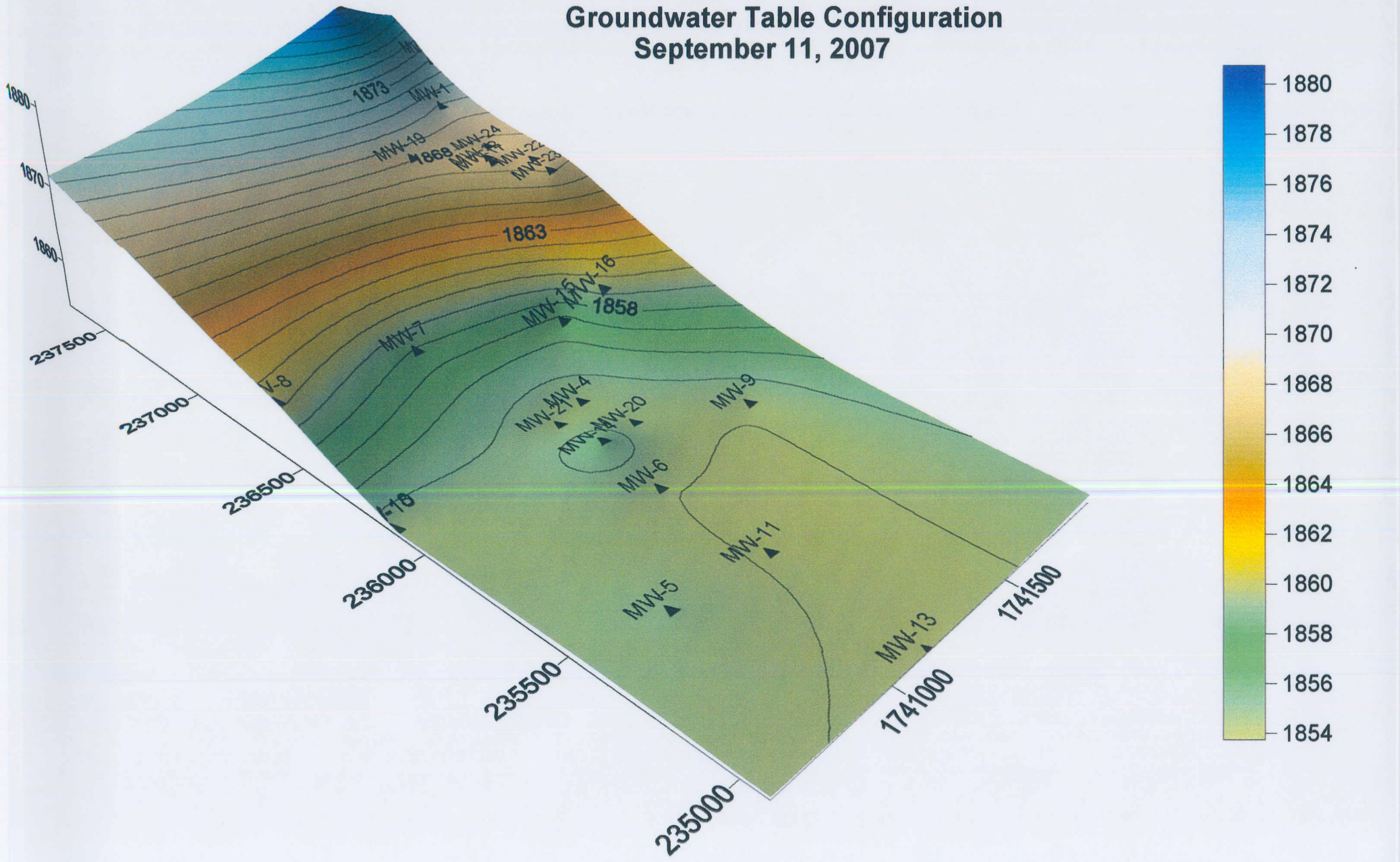
Groundwater Table Monitoring

Elevations in feet

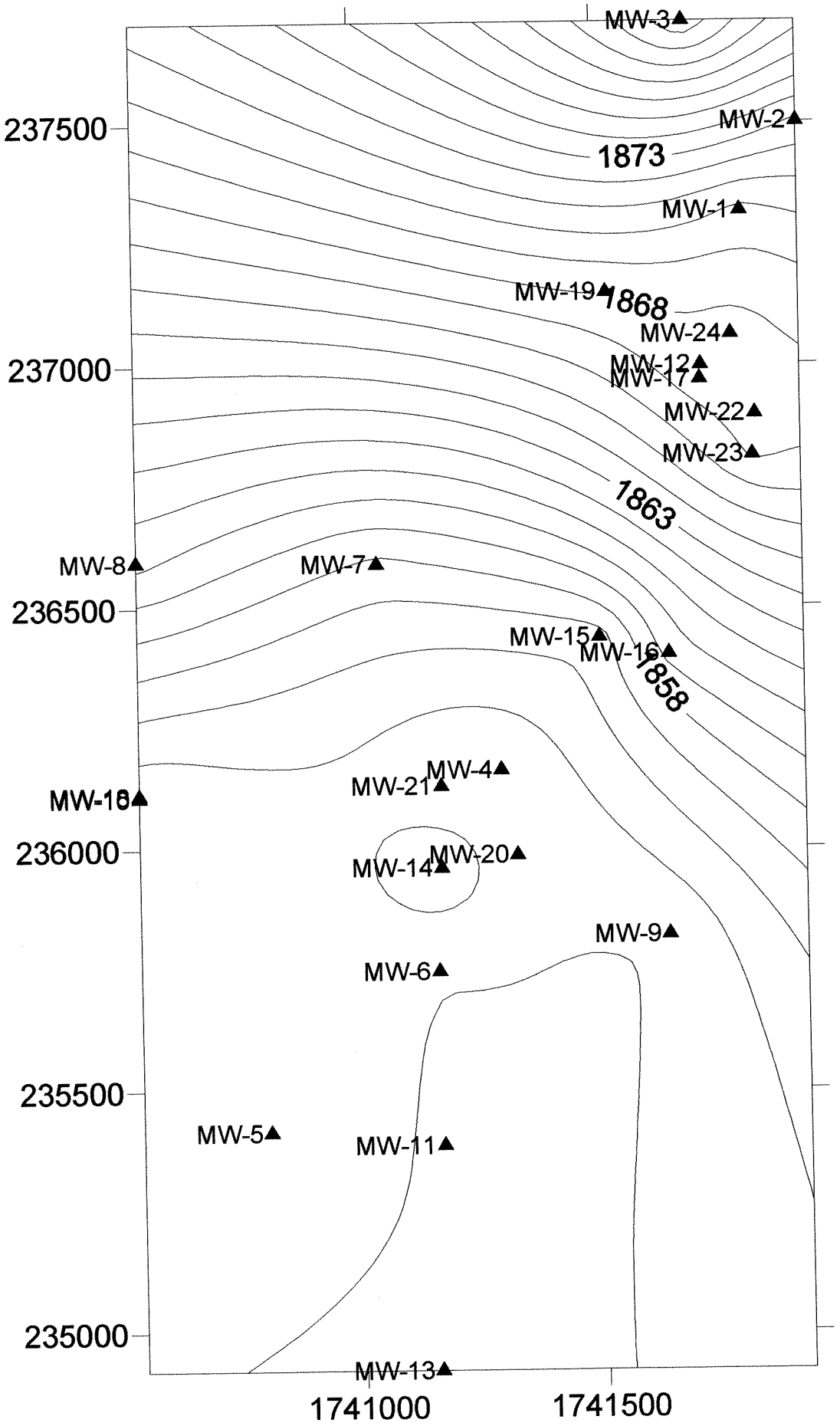
Well ID	MP (TOC)[1]	Ground	6/13/2006	7/12/2006	8/10/2006	12/11/06	01/17/07	02/21/07	03/28/07	4/25/2007	5/15/2007	6/13/2007	9/11/2007
Monitoring Wells													
MW-1	1889.58	1889.74	1869.79	1869.76	1869.76	1869.71	1869.71	1869.69	1868.36	1869.73	1869.74	1869.84	1869.73
MW-2	1890.36	1890.65	1872.93	1872.81	1872.80	1872.74	1872.69	1872.66	1872.80	1872.85	1872.85	1872.96	1872.78
MW-3	1893.63	1891.66	1879.45	1878.92	1878.42	1877.83	1877.96	1878.14	1879.35	1880.06	1880.41	1882.99	1880.89
MW-4	1913.73	1911.36	1854.10	1853.80	1854.05	1853.00	1852.65	1852.35	1852.99	1853.81	1854.82	1856.46	1854.34
MW-5	1902.26	1899.13	1853.22	1852.98	1853.08	1852.53	1852.25	1852.05	1852.42	1853.06	1853.65	1854.85	1854.75
MW-6	1907.61	1905.11	1853.60	1853.33	1853.51	1852.71	1852.46	1852.18	1852.69	1853.38	1854.20	1855.68	1854.07
MW-7	1901.30	1898.81	1858.15	1858.06	1858.18	1857.50	1857.54	1857.40	1857.80	1858.06	1858.28	1858.39	1857.77
MW-8	1899.29	1896.28	1860.18	1860.43	1860.30	1860.21	1860.27	1860.64	1860.39	1860.29	1860.17	1860.27	1860.27
MW-9	1907.19	1907.37	1853.70	1853.47	1853.63	1852.83	1852.50	1852.23	1852.79	1853.48	1854.25	1855.87	1854.16
MW-10	1891.06	1888.03		1853.53	1853.90	1853.26	1853.20	1853.19	1853.17	1853.68	1854.56	1855.78	1854.27
MW-11	1905.89	1902.74		1853.10	1853.22	1852.60	1852.36	1852.07	1852.56	1853.20	1853.82	1855.15	1853.89
MW-12	1888.64											1869.52	1867.82
MW-13	1900.35	1900.70										1854.85	1853.74
MW-14	1896.90	1897.63										1865.87	1855.84
MW-15	1899.23	1899.41										1857.37	1856.55
MW-16	1895.83	1895.94										1860.34	1859.36
MW-17	1887.81	1888.12										1869.15	1867.50
MW-18	1887.95	1888.41										1855.80	1854.28
MW-19	1885.15	1885.24										1869.81	1868.09
MW-20	1899.45	1899.92										1856.56	1854.39
MW-21	1906.45	1906.76											1854.29
MW-22	1890.49	1890.76											1867.42
MW-23	1886.63	1886.76											1867.16
MW-24	1889.31	1889.71											1867.52
REC-1	1888.25	1888.47										1869.22	1867.51

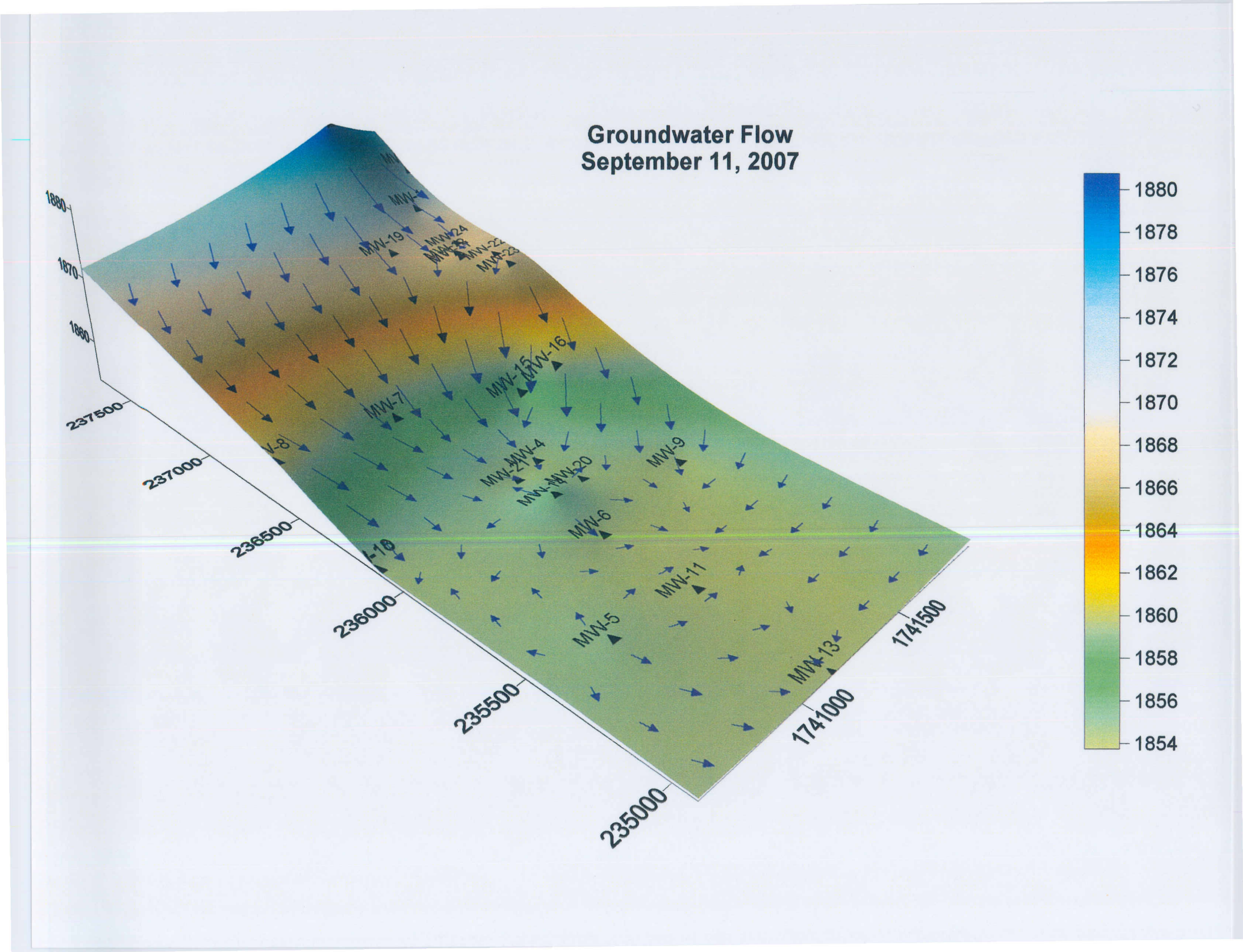
Conductive groundwater interface monitored with Slope and Heron water level indicators.

Groundwater Table Configuration
September 11, 2007

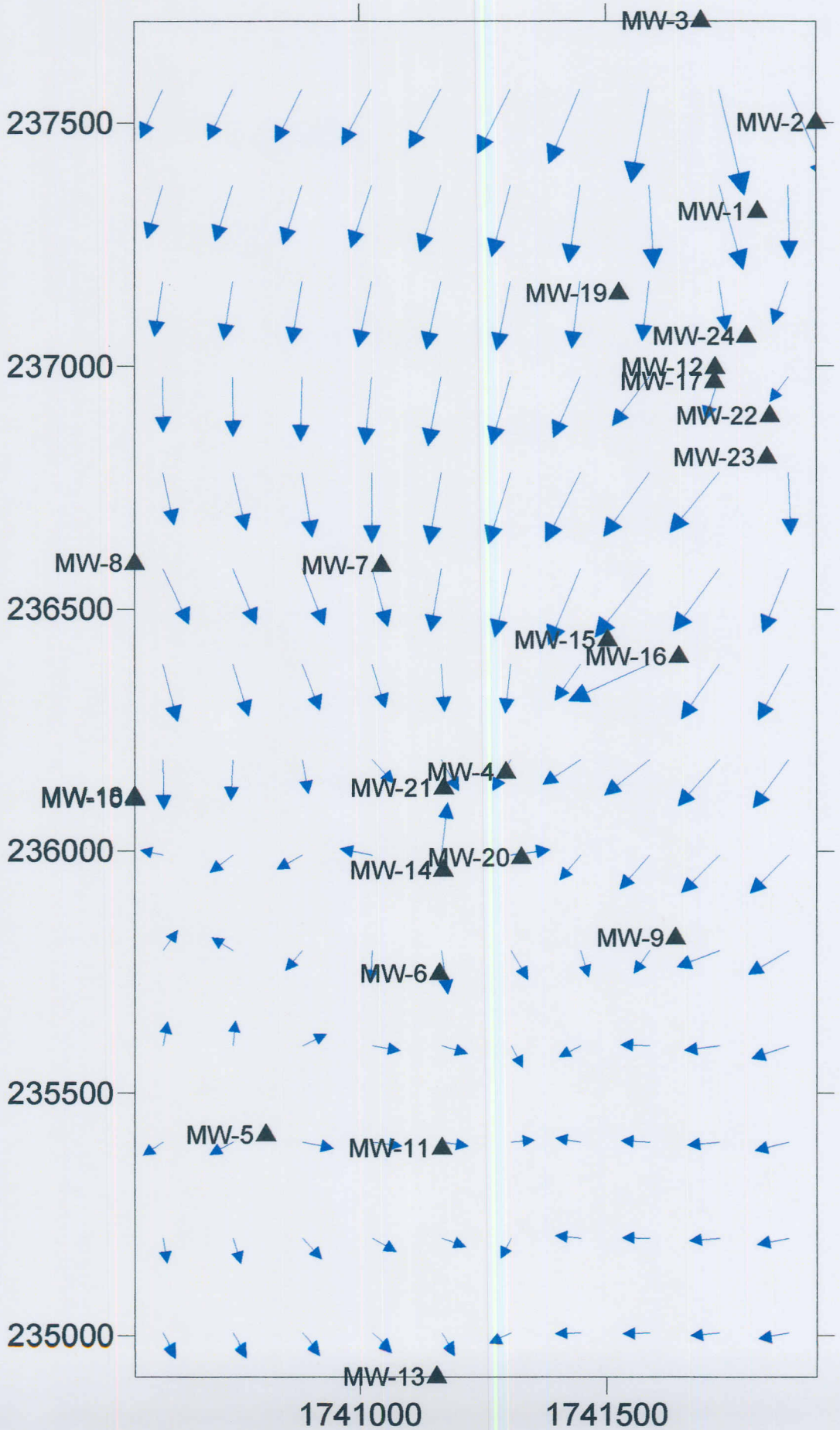


Groundwater Table Configuration
September 11, 2007

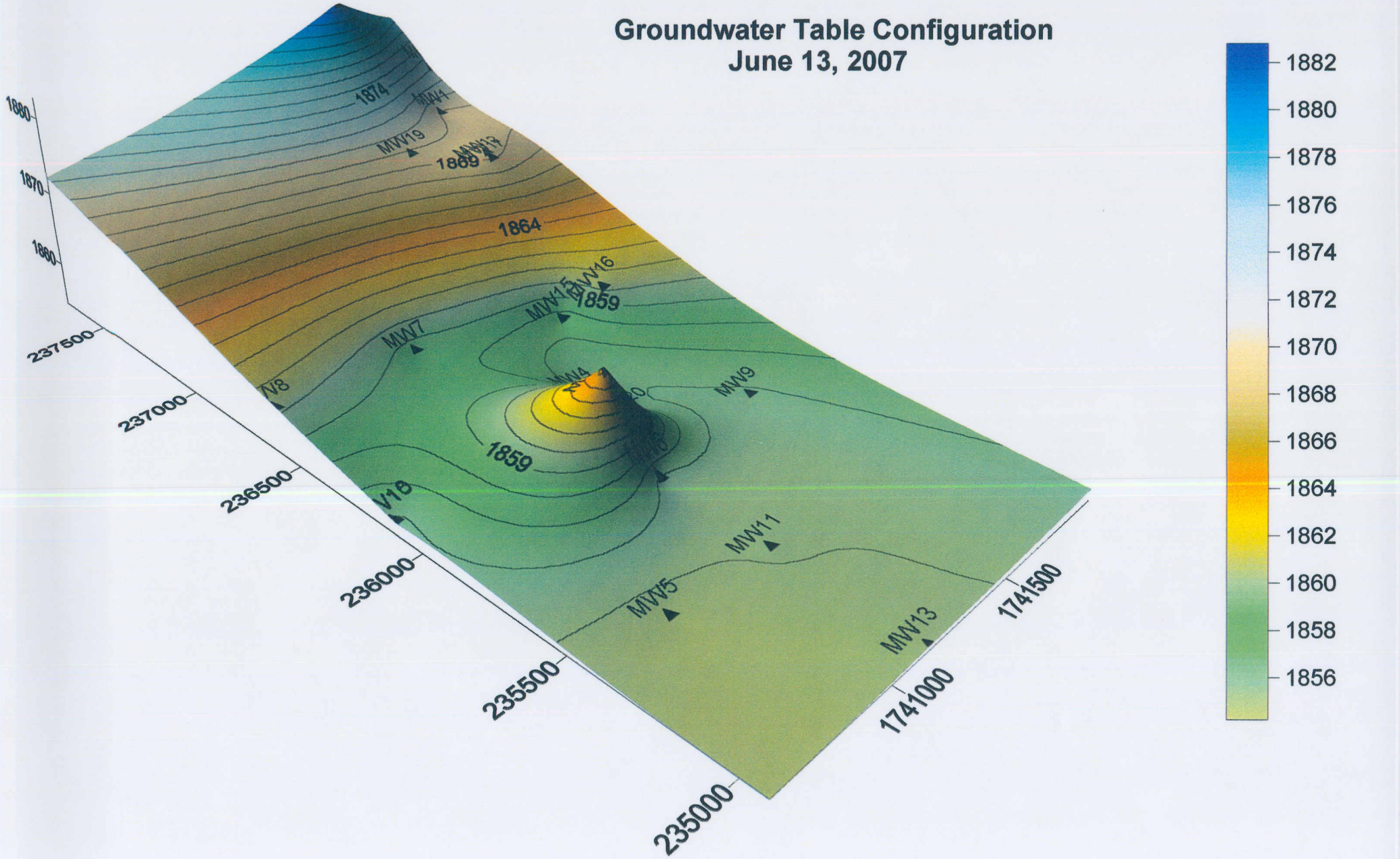



Groundwater Flow
September 11, 2007
1880
1870
1860
237500
237000
236500
236000
235500
235000
1741500
1741000
MW-19
MW-24
MW-22
MW-23
MW-15
MW-16
MW-7
MW-4
MW-20
MW-9
MW-6
MW-11
MW-5
MW-13
1880
1878
1876
1874
1872
1870
1868
1866
1864
1862
1860
1858
1856
1854

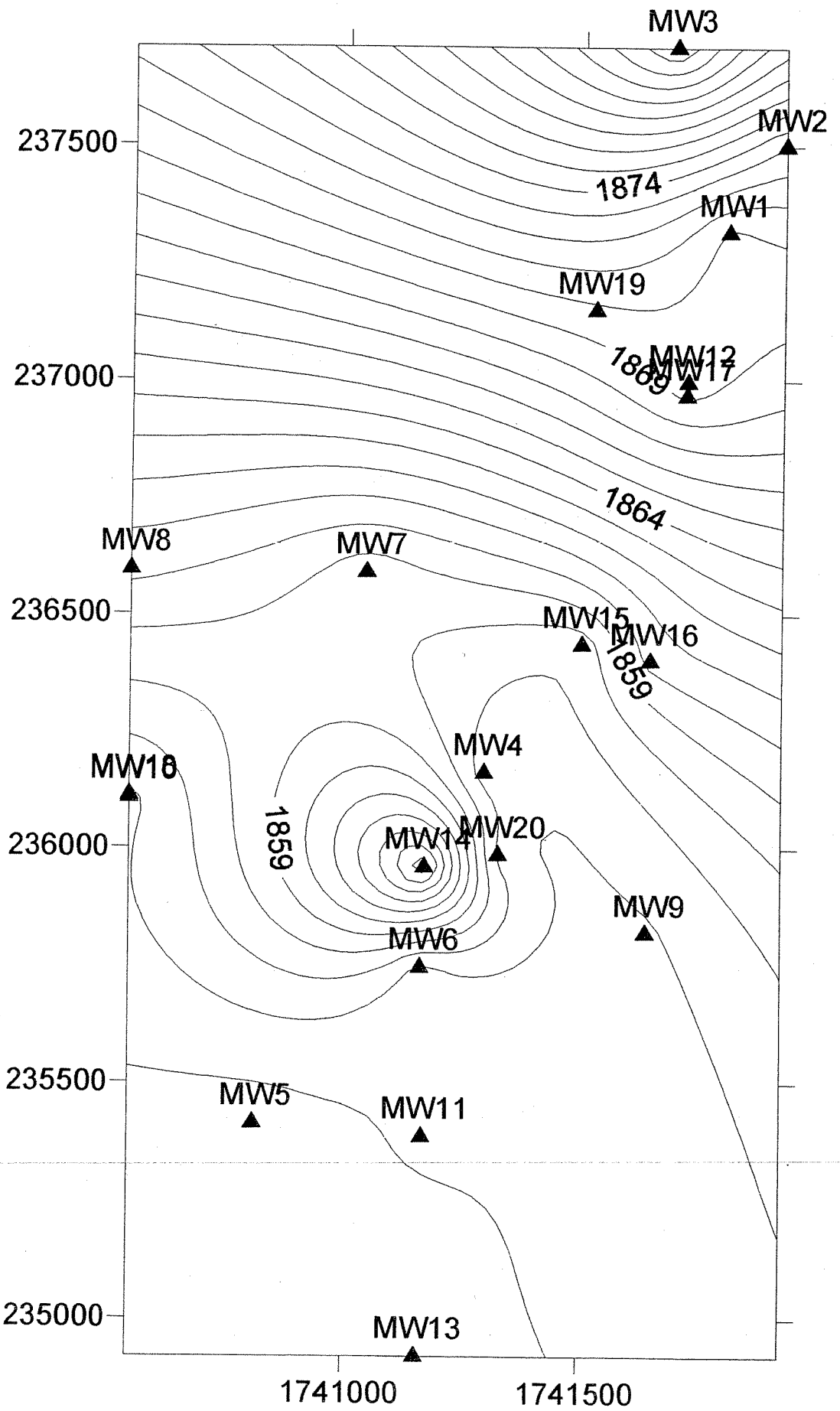
Groundwater Flow
September 11, 2007



Groundwater Table Configuration
June 13, 2007



Groundwater Table Configuration
June 13, 2007



APPENDIX G

COAL EXPERIMENTAL ANALYSIS

APPENDIX G-1

GAS ANALYSES AND THERMAL GRAVIMETRY

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07072274-001
Client Sample ID: VW-14, 15, 16 Tedlar Bag A

Report Date: 08/03/07
Collection Date: 07/24/07 10:00
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
GAS CHROMATOGRAPHY ANALYSIS REPORT							
Oxygen	3.13	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
Nitrogen	70.32	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
Carbon Dioxide	22.06	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
Hydrogen Sulfide	<0.01	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
Methane	1.29	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
Ethane	0.26	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
Propane	0.03	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
Isobutane	0.04	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
n-Butane	0.21	Mol %	1	0.01		GPA 2261-95	08/01/07 11:19 / jp
Isopentane	0.83	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
n-Pentane	0.56	Mol %	1	0.01		GPA 2261-95	08/01/07 11:19 / jp
Hexanes plus	1.27	Mol %		0.01		GPA 2261-95	08/01/07 11:19 / jp
(1) = The result includes unsaturated isomers.							
Propane	0.008	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
Isobutane	0.013	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
n-Butane	0.066	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
Isopentane	0.304	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
n-Pentane	0.203	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
Hexanes plus	0.536	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
GPM Total	1.131	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
GPM Pentanes plus	1.043	gpm		0.001		GPA 2261-95	08/01/07 11:19 / jp
CALCULATED PROPERTIES							
Gross BTU per cu ft @ Std Cond. (HHV)	143			1		GPA 2261-95	08/01/07 11:19 / jp
Net BTU per cu ft @ std cond. (LHV)	132			1		GPA 2261-95	08/01/07 11:19 / jp
Pseudo-critical Pressure, psia	630			1		GPA 2261-95	08/01/07 11:19 / jp
Pseudo-critical Temperature, deg R	321			1		GPA 2261-95	08/01/07 11:19 / jp
Specific Gravity @ 60/60F	1.14			0.001		D3588-81	08/01/07 11:19 / jp
Air, %	14.30			0.01		GPA 2261-95	08/01/07 11:19 / jp
- The analysis was not corrected for air.							
COMMENTS						-	/ jp

- BTU, GPM, and specific gravity are corrected for deviation from ideal gas behavior.
- GPM = gallons of liquid at standard conditions per 1000 cu. ft. of moisture free gas @ standard conditions.
- To convert BTU to a water-saturated basis @ standard conditions, multiply by 0.9825.
- Standard conditions: 60 F & 14.73 psi on a dry basis.

Report Definitions: RL - Analyte reporting limit. QCL - Quality control limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07072274-002
Client Sample ID: VW-14, 15, 16 Tedlar Bag B

Report Date: 08/03/07
Collection Date: 07/24/07 10:05
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
GAS CHROMATOGRAPHY ANALYSIS REPORT							
Oxygen	3.00	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
Nitrogen	70.23	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
Carbon Dioxide	22.24	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
Hydrogen Sulfide	<0.01	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
Methane	1.32	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
Ethane	0.25	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
Propane	0.03	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
Isobutane	0.04	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
n-Butane	0.22	Mol %	1	0.01		GPA 2261-95	08/01/07 12:30 / jp
Isopentane	0.83	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
n-Pentane	0.55	Mol %	1	0.01		GPA 2261-95	08/01/07 12:30 / jp
Hexanes plus	1.29	Mol %		0.01		GPA 2261-95	08/01/07 12:30 / jp
(1) = The result includes unsaturated isomers.							
Propane	0.008	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
Isobutane	0.013	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
n-Butane	0.069	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
Isopentane	0.304	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
n-Pentane	0.199	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
Hexanes plus	0.544	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
GPM Total	1.139	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
GPM Pentanes plus	1.048	gpm		0.001		GPA 2261-95	08/01/07 12:30 / jp
CALCULATED PROPERTIES							
Gross BTU per cu ft @ Std Cond. (HHV)	144			1		GPA 2261-95	08/01/07 12:30 / jp
Net BTU per cu ft @ std cond. (LHV)	133			1		GPA 2261-95	08/01/07 12:30 / jp
Pseudo-critical Pressure, psia	630			1		GPA 2261-95	08/01/07 12:30 / jp
Pseudo-critical Temperature, deg R	321			1		GPA 2261-95	08/01/07 12:30 / jp
Specific Gravity @ 60/60F	1.14			0.001		D3588-81	08/01/07 12:30 / jp
Air, %	13.69			0.01		GPA 2261-95	08/01/07 12:30 / jp
- The analysis was not corrected for air.							
COMMENTS						-	/ jp

-
- BTU, GPM, and specific gravity are corrected for deviation from ideal gas behavior.
- GPM = gallons of liquid at standard conditions per 1000 cu. ft. of moisture free gas @ standard conditions.
- To convert BTU to a water-saturated basis @ standard conditions, multiply by 0.9825.
- Standard conditions: 60 F & 14.73 psi on a dry basis.

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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Energy Laboratories Inc
Workorder Receipt Checklist

B07072274

SB Engineering

Login completed by: Gina M. McCartney

Reviewed by: Denise Ruby

Reviewed Date: 7/30/2007 9:10:11 AM

Date and Time Received: 7/27/2007 9:00 AM

Received by: lg

Carrier name: Ground

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	NA°C
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

COC states both samples as Bag A. Received one bag marked A, one B. Using ID on bags.

Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: UND / EERC	Project Name, PWS#, Permit #, Etc. Garrison, ND Cenex	
Report Mail Address: 15 23rd St North Grand Forks, ND 58202	Contact Name: Jarda Solc Voice: 701-777-5000 Fax: 701-777-5181 Email: jsolc@undeerc.org	Sampler Name if other than Contact: Randy Knutson
Invoice Address: SB Engineering Same 4525 Vallador Ave St. Louis Park, MN 55416	Invoice Contact & Phone #: 612-856-6750	Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐ Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Receipt Temp NA °C
Cooler ID(s) ____
Custody Seal Y N
Intact Y N
Signature Y N
Match

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water, Solid/Solids, Vegetation, Biomass, Other)	ANALYSIS REQUESTED: Methane	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
1	VW-14,15,16 Tedlar bag A	7-24-07	10:00	Air	☒		☒	☐	B0702274-001
2	VW-14,15,16 Tedlar bag A	7-24-07	10:05	Air	☒		☒	☐	-002
3				<Select One	☐		☐	☐	
4				<Select One	☐		☐	☐	
5				<Select One	☐		☐	☐	
6				<Select One	☐		☐	☐	
7				<Select One	☐		☐	☐	
8				<Select One	☐		☐	☐	
9				<Select One	☐		☐	☐	
10				<Select One	☐		☐	☐	

Bag reads "B"

Custody Record MUST be Signed	Relinquished by: Randy Knutson Date/Time: 7-25-07 15:00	Shipped by:
	Relinquished by: Date/Time:	Shipped by: UPS Grd
	Sample Disposal: Return to Client ☐	Lab Disposal ☐

Received by: Date/Time:
Received by: Date/Time: 7-27-07 9:00

LABORATORY USE ONLY
Sample Type ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

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ANALYTICAL SUMMARY REPORT

August 08, 2007

SB Engineering
4525 Vallacher Ave
Saint Louis Park, MN 55416

Workorder No.: B07072274

Project Name: Garrison ND Cenex

Energy Laboratories Inc received the following 2 samples from SB Engineering on 7/27/2007 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
B07072274-001	VW-14, 15, 16 Tedlar Bag A	07/24/07 10:00	07/27/07	Air	Air Correction Calculations Appearance and Comments Calculated Properties GPM @ std cond,/1000 cu. ft., moist. Free Natural Gas Analysis Specific Gravity @ 60/60
B07072274-002	VW-14, 15, 16 Tedlar Bag B	07/24/07 10:05	07/27/07	Air	Same As Above

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except if noted in report comments or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By:

Energy & Environmental Research Center

University of North Dakota
P.O. Box 9018/ Grand Forks, North Dakota 5820

Run # SB-43
Sample: odored 17'
Date: 05/08/07

	MOL %	Normal Mol %	Ideal BTU	Specific Gravity	Compress	Ave. Mol.Wt.
Helium	0.07	0.07	0.00	0.00	0.00	0.00
Hydrogen	0.03	0.03	0.10	0.00	0.00	0.00
Carbon Dioxide	51.03	51.09	0.00	0.78	0.03	22.48
Benzene	0.03	0.03	0.76	0.00	0.00	0.01
Propylene		0.00	0.00	0.00	0.00	0.00
Acetylene		0.00	0.00	0.00	0.00	0.00
iso-Butane		0.00	0.00	0.00	0.00	0.00
Carbonyl Sulfide		0.00	0.00	0.00	0.00	0.00
n-Butane	0.02	0.02	0.65	0.00	0.00	0.01
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00
1-Butene		0.00	0.00	0.00	0.00	0.00
iso-Butylene		0.00	0.00	0.00	0.00	0.00
t-2-Butene		0.00	0.00	0.00	0.00	0.00
iso-Pentane	0.18	0.18	7.22	0.00	0.00	0.13
c-2-Butene		0.00	0.00	0.00	0.00	0.00
n-Pentane	0.12	0.12	4.83	0.00	0.00	0.09
1,3-Butadiene		0.00	0.00	0.00	0.00	0.00
Ethylene		0.00	0.00	0.00	0.00	0.00
Ethane		0.00	0.00	0.00	0.00	0.00
Oxygen/Argon	8.89	8.90	0.00	0.10	0.00	2.85
Nitrogen	39.52	39.56	0.00	0.38	0.01	11.08
Methane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Monoxide		0.00	0.00	0.00	0.00	0.00
Total	99.89	100.00	13.56	1.27	0.04	36.66
	1.00					

K= 0.00
L= 0.00
M= 0.00 M1= 0.00 M2= 0.00
Z= 1.00

Real BTU (saturated)	13.35
(dry)	13.59
Ideal Specific Gravity	1.27
Real Specific Gravity	1.27
Average Mol. Wt.	36.66

Energy & Environmental Research Center

University of North Dakota
P.O. Box 9018/ Grand Forks, North Dakota 5820

Run # SB-33
Sample: odored 17'
Date: 05/08/07

	MOL %	Normal Mol %	Ideal BTU	Specific Gravity	Compress	Ave. Mol.Wt.
Helium	0.07	0.07	0.00	0.00	0.00	0.00
Hydrogen	0.01	0.01	0.03	0.00	0.00	0.00
Carbon Dioxide	8.20	8.34	0.00	0.13	0.01	3.67
Benzene	0.04	0.04	1.03	0.00	0.00	0.02
Propylene		0.00	0.00	0.00	0.00	0.00
Acetylene		0.00	0.00	0.00	0.00	0.00
iso-Butane	0.02	0.02	0.66	0.00	0.00	0.01
Carbonyl Sulfide		0.00	0.00	0.00	0.00	0.00
n-Butane	0.11	0.11	3.66	0.00	0.00	0.07
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00
1-Butene		0.00	0.00	0.00	0.00	0.00
iso-Butylene		0.00	0.00	0.00	0.00	0.00
t-2-Butene	0.01	0.01	0.31	0.00	0.00	0.01
iso-Pentane	0.58	0.59	23.65	0.01	0.00	0.43
c-2-Butene		0.00	0.00	0.00	0.00	0.00
n-Pentane	0.30	0.31	12.26	0.01	0.00	0.22
1,3-Butadiene		0.00	0.00	0.00	0.00	0.00
Ethylene		0.00	0.00	0.00	0.00	0.00
Ethane	0.02	0.02	0.36	0.00	0.00	0.01
Oxygen/Argon	17.16	17.45	0.00	0.19	0.00	5.59
Nitrogen	71.79	73.02	0.00	0.71	0.01	20.46
Methane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Monoxide		0.00	0.00	0.00	0.00	0.00
Total	98.31	100.00	41.97	1.05	0.02	30.47
	0.98					

K= 0.00
L= 0.00
M= 0.00
Z= 1.00

M1= 0.00 M2= 0.00

Real BTU (saturated)	41.27
(dry)	42.00
Ideal Specific Gravity	1.05
Real Specific Gravity	1.05
Average Mol. Wt.	30.47

Energy & Environmental Research Center

University of North Dakota
P.O. Box 9018/ Grand Forks, North Dakota 5820

Run # SB-34
Sample: odored 18'
Date: 05/08/07

	MOL %	Normal Mol %	Ideal BTU	Specific Gravity	Compress	Ave. Mol.Wt.
Helium	0.01	0.01	0.00	0.00	0.00	0.00
Hydrogen	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Dioxide	5.74	5.86	0.00	0.09	0.00	2.58
Benzene	0.06	0.06	1.55	0.00	0.00	0.03
Propylene		0.00	0.00	0.00	0.00	0.00
Acetylene		0.00	0.00	0.00	0.00	0.00
iso-Butane	0.01	0.01	0.33	0.00	0.00	0.01
Carbonyl Sulfide		0.00	0.00	0.00	0.00	0.00
n-Butane	0.09	0.09	3.00	0.00	0.00	0.05
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00
1-Butene		0.00	0.00	0.00	0.00	0.00
iso-Butylene		0.00	0.00	0.00	0.00	0.00
t-2-Butene	0.01	0.01	0.31	0.00	0.00	0.01
iso-Pentane	0.60	0.61	24.56	0.02	0.00	0.44
c-2-Butene		0.00	0.00	0.00	0.00	0.00
n-Pentane	0.33	0.34	13.54	0.01	0.00	0.24
1,3-Butadiene		0.00	0.00	0.00	0.00	0.00
Ethylene		0.00	0.00	0.00	0.00	0.00
Ethane	0.00	0.00	0.00	0.00	0.00	0.00
Oxygen/Argon	16.21	16.55	0.00	0.18	0.00	5.30
Nitrogen	74.89	76.46	0.00	0.74	0.01	21.42
Methane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Monoxide		0.00	0.00	0.00	0.00	0.00
Total	97.95	100.00	43.30	1.04	0.02	30.07
	0.98					

K= 0.00
L= 0.00
M= 0.00
Z= 1.00

M1= 0.00 M2= 0.00

Real BTU (saturated)	42.56
(dry)	43.32
Ideal Specific Gravity	1.04
Real Specific Gravity	1.04
Average Mol. Wt.	30.07

Energy & Environmental Research Center

University of North Dakota
P.O. Box 9018/ Grand Forks, North Dakota 5820

Run # SB-41
Sample: clean 13'
Date: 05/08/07

	MOL %	Normal Mol %	Ideal BTU	Specific Gravity	Compress	Ave. Mol.Wt.
Helium	0.06	0.06	0.00	0.00	0.00	0.00
Hydrogen	0.02	0.02	0.07	0.00	0.00	0.00
Carbon Dioxide	75.57	76.94	0.00	1.17	0.05	33.86
Benzene	0.01	0.01	0.26	0.00	0.00	0.00
Propylene		0.00	0.00	0.00	0.00	0.00
Acetylene		0.00	0.00	0.00	0.00	0.00
iso-Butane		0.00	0.00	0.00	0.00	0.00
Carbonyl Sulfide		0.00	0.00	0.00	0.00	0.00
n-Butane		0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00
1-Butene		0.00	0.00	0.00	0.00	0.00
iso-Butylene		0.00	0.00	0.00	0.00	0.00
t-2-Butene		0.00	0.00	0.00	0.00	0.00
iso-Pentane		0.00	0.00	0.00	0.00	0.00
c-2-Butene		0.00	0.00	0.00	0.00	0.00
n-Pentane		0.00	0.00	0.00	0.00	0.00
1,3-Butadiene		0.00	0.00	0.00	0.00	0.00
Ethylene		0.00	0.00	0.00	0.00	0.00
Ethane		0.00	0.00	0.00	0.00	0.00
Oxygen/Argon	3.82	3.89	0.00	0.04	0.00	1.24
Nitrogen	18.74	19.08	0.00	0.18	0.00	5.34
Methane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Monoxide		0.00	0.00	0.00	0.00	0.00
Total	98.22	100.00	0.32	1.40	0.05	40.46
	0.98					

K= 0.00
L= 0.00
M= 0.00 M1= 0.00 M2= 0.00
Z= 1.00

Real BTU (saturated)	0.32
(dry)	0.32
Ideal Specific Gravity	1.40
Real Specific Gravity	1.40
Average Mol. Wt.	40.46

Energy & Environmental Research Center

University of North Dakota
P.O. Box 9018/ Grand Forks, North Dakota 5820

Run # SB-42
Sample: clean 25'
Date: 05/08/07

	MOL %	Normal Mol %	Ideal BTU	Specific Gravity	Compress	Ave. Mol.Wt.
Helium	0.08	0.08	0.00	0.00	0.00	0.00
Hydrogen	0.08	0.08	0.26	0.00	0.00	0.00
Carbon Dioxide	15.42	15.55	0.00	0.24	0.01	6.85
Benzene	0.01	0.01	0.25	0.00	0.00	0.00
Propylene		0.00	0.00	0.00	0.00	0.00
Acetylene		0.00	0.00	0.00	0.00	0.00
iso-Butane		0.00	0.00	0.00	0.00	0.00
Carbonyl Sulfide		0.00	0.00	0.00	0.00	0.00
n-Butane	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00
1-Butene		0.00	0.00	0.00	0.00	0.00
iso-Butylene		0.00	0.00	0.00	0.00	0.00
t-2-Butene		0.00	0.00	0.00	0.00	0.00
iso-Pentane	0.00	0.00	0.00	0.00	0.00	0.00
c-2-Butene		0.00	0.00	0.00	0.00	0.00
n-Pentane	0.00	0.00	0.00	0.00	0.00	0.00
1,3-Butadiene		0.00	0.00	0.00	0.00	0.00
Ethylene		0.00	0.00	0.00	0.00	0.00
Ethane		0.00	0.00	0.00	0.00	0.00
Oxygen/Argon	5.96	6.01	0.00	0.07	0.00	1.92
Nitrogen	77.59	78.26	0.00	0.76	0.01	21.92
Methane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Monoxide		0.00	0.00	0.00	0.00	0.00
Total	99.14	100.00	0.52	1.06	0.02	30.70
	0.99					

K= 0.00
L= 0.00
M= 0.00 M1= 0.00 M2= 0.00
Z= 1.00

Real BTU (saturated)	0.51
(dry)	0.52
Ideal Specific Gravity	1.06
Real Specific Gravity	1.06
Average Mol. Wt.	30.70

Energy & Environmental Research Center

University of North Dakota
P.O. Box 9018/ Grand Forks, North Dakota 5820

Run # SB-39
Sample: clean 30'
Date: 05/08/07

	MOL %	Normal Mol %	Ideal BTU	Specific Gravity	Compress	Ave. Mol.Wt.
Helium	0.02	0.02	0.00	0.00	0.00	0.00
Hydrogen	0.27	0.27	0.88	0.00	0.00	0.01
Carbon Dioxide	9.64	9.72	0.00	0.15	0.01	4.28
Benzene	0.01	0.01	0.25	0.00	0.00	0.00
Propylene		0.00	0.00	0.00	0.00	0.00
Acetylene		0.00	0.00	0.00	0.00	0.00
iso-Butane		0.00	0.00	0.00	0.00	0.00
Carbonyl Sulfide		0.00	0.00	0.00	0.00	0.00
n-Butane		0.00	0.00	0.00	0.00	0.00
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00
1-Butene		0.00	0.00	0.00	0.00	0.00
iso-Butylene		0.00	0.00	0.00	0.00	0.00
t-2-Butene		0.00	0.00	0.00	0.00	0.00
iso-Pentane		0.00	0.00	0.00	0.00	0.00
c-2-Butene		0.00	0.00	0.00	0.00	0.00
n-Pentane		0.00	0.00	0.00	0.00	0.00
1,3-Butadiene		0.00	0.00	0.00	0.00	0.00
Ethylene		0.00	0.00	0.00	0.00	0.00
Ethane		0.00	0.00	0.00	0.00	0.00
Oxygen/Argon	2.92	2.94	0.00	0.03	0.00	0.94
Nitrogen	86.33	87.03	0.00	0.84	0.01	24.38
Methane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Monoxide		0.00	0.00	0.00	0.00	0.00
Total	99.19	100.00	1.14	1.02	0.02	29.61
	0.99					

K=	0.00			
L=	0.00			
M=	0.01	M1=	0.00	M2= 0.00
Z=	1.00			

Real BTU (saturated)	1.12
(dry)	1.14
Ideal Specific Gravity	1.02
Real Specific Gravity	1.02
Average Mol. Wt.	29.61

Energy & Environment Research Center University of North Dakota
P.O. Box 9018/ Grand Forks, North Dakota 58202-9018

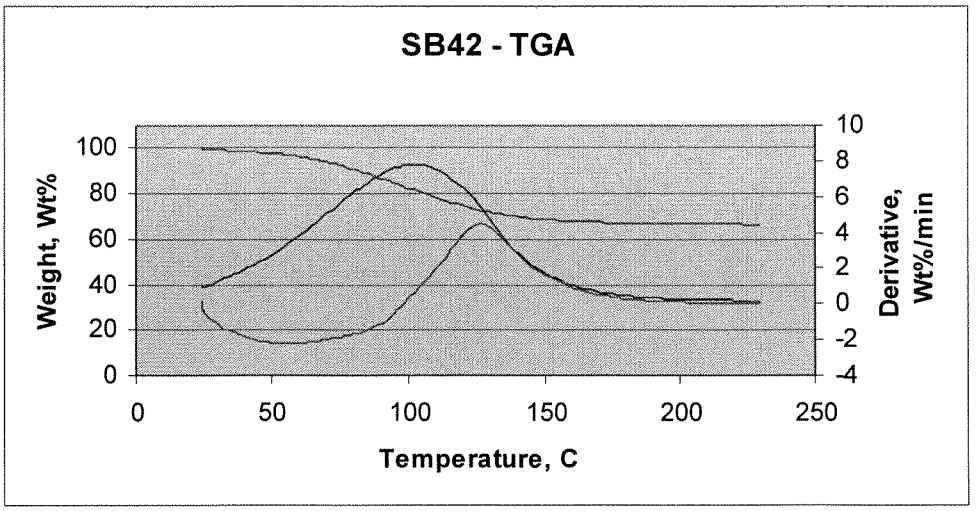
Gas Analysis Report
Process Chemistry & Development Laboratory

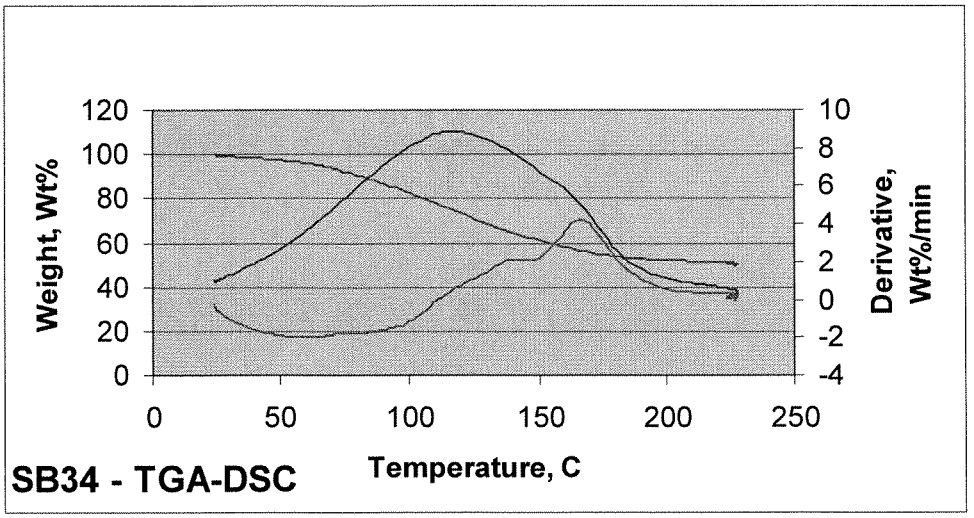
Run # Garrison Coal Headspace Samples
Date: 5/08/07

Mole Per Cent

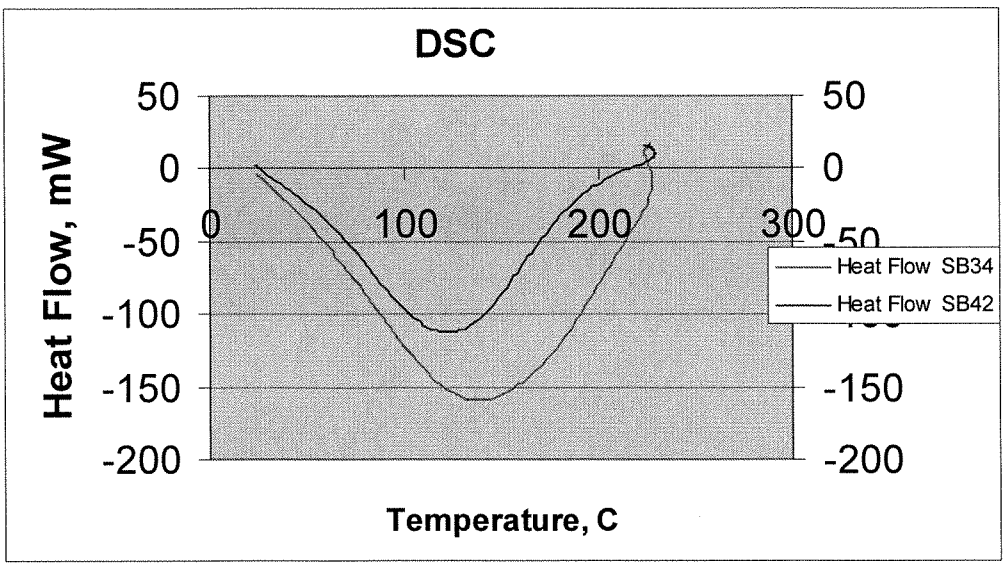
Gasoline components include benzene, n-butane, isoPentane and n-Pentane.

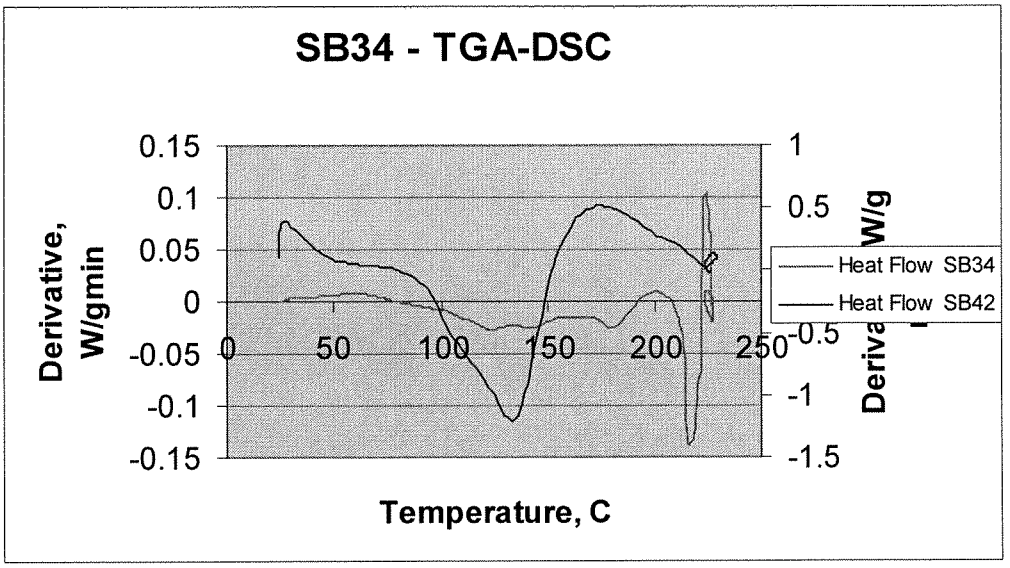
Sample:	SB-39	SB-41	SB-42	SB-33 - Odor	SB-34 Odore	SB-43 Odored
	5/08/07	5/08/07	5/08/07	5/08/07	5/08/07	'5/08/-7
Helium	0.02	0.06	0.08	0.07	0.01	0.07
Hydrogen	0.27	0.02	0.08	0.01	0.00	0.03
Carbon Dioxide	9.72	76.94	15.55	8.34	5.86	51.09
Benzene	0.01	0.01	0.01	0.04	0.06	0.03
Propane	0.00	0.00	0.00	0.00	0.00	0.00
Propylene	0.00	0.00	0.00	0.00	0.00	0.00
Acetylene	0.00	0.00	0.00	0.00	0.00	0.00
iso-Butane	0.00	0.00	0.00	0.02	0.01	0.00
Carbonyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
n-Butane	0.00	0.00	0.00	0.11	0.09	0.02
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
1-Butene	0.00	0.00	0.00	0.00	0.00	0.00
iso-Butylene	0.00	0.00	0.00	0.00	0.00	0.00
t-2-Butene	0.00	0.00	0.00	0.01	0.01	0.00
iso-Pentane	0.00	0.00	0.00	0.59	0.61	0.18
c-2-Butene	0.00	0.00	0.00	0.00	0.00	0.00
n-Pentane	0.00	0.00	0.00	0.31	0.34	0.12
1,3-Butadiene	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene	0.00	0.00	0.00	0.00	0.00	0.00
Ethane	0.00	0.00	0.00	0.02	0.00	0.00
Oxygen/Argon	2.92	3.89	6.01	17.45	16.55	8.90
Nitrogen	86.33	19.08	78.26	73.02	76.46	39.56
Methane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Monoxide	0.00	0.00	0.00	0.00	0.00	0.00
Calc. BTU/SC Sat.	1.2	0.4	0.6	41.7	43.3	13.7
Dry	1.3	0.4	0.6	42.5	44.0	13.9

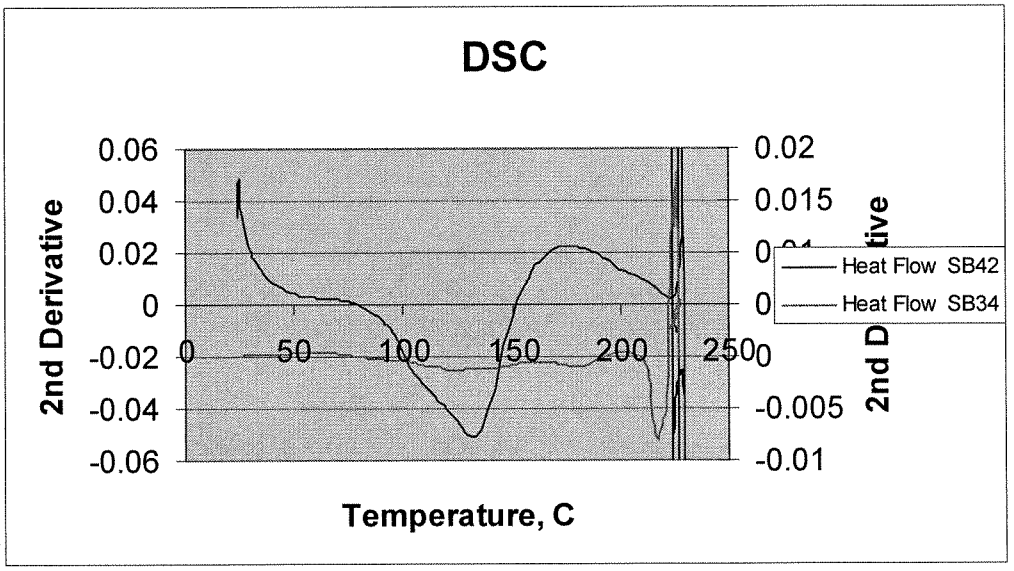

SB42 - TGA
Weight, Wt%
Derivative, Wt%/min
Temperature, C
0
20
40
60
80
100
-4
-2
0
2
4
6
8
10
0
50
100
150
200
250


Weight, Wt%
Derivative, Wt%/min
Temperature, C
0
20
40
60
80
100
120
-4
-2
0
2
4
6
8
10
0
50
100
150
200
250

SB34 - TGA-DSC


DSC
Heat Flow, mW
Temperature, C
50
0
-50
-100
-150
-200
0
100
200
300
Heat Flow SB34
Heat Flow SB42


SB34 - TGA-DSC
Derivative, W/gmin
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
0
50
100
150
200
250
1
0.5
-0.5
-1
-1.5
Heat Flow SB34
Heat Flow SB42
Temperature, C


DSC
2nd Derivative
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
0
50
100
150
200
250
0.02
0.015
0
-0.005
-0.01
Heat Flow SB42
Heat Flow SB34
Temperature, C

APPENDIX G-2

WATER ANALYSES

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724
35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com
MEMBER ACIL

Report Date: 25 Aug 07
Lab Number: 07-A38581
Work Order #: 82-1760
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 2 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON COAL

Sample Description: SB33 ONE DAY
W3544

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	23 Aug 07	RDC
Benzene	56.3	ppb	1.0	8021/5030	23 Aug 07	RDC
Toluene	8.8	ppb	1.0	8021/5030	23 Aug 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	23 Aug 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	23 Aug 07	RDC
GRO (TPH)	0.907	mg/L	0.200	8015B/OA1	23 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 104 %

GRO SURROGATE RECOVERY: 98 %

GRO(TPH) pattern is not characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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MEMBER ACIL

Report Date: 25 Aug 07
Lab Number: 07-A38580
Work Order #: 82-1760
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 1 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

Temp at Receipt: 4 C

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON COAL

Sample Description: SB34 30+ DAYS
W3543

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	22 Aug 07	RDC
Benzene	1512	ppb	1.0	8021/5030	23 Aug 07	RDC
Toluene	348.1	ppb	1.0	8021/5030	22 Aug 07	RDC
Ethyl Benzene	24.4	ppb	1.0	8021/5030	22 Aug 07	RDC
Xylenes (Total)	135.7	ppb	3.0	8021/5030	22 Aug 07	RDC
GRO (TPH)	3.980	mg/L	0.200	8015B/OA1	22 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 95 %

GRO(TPH) pattern is characteristic of gasoline.
GRO(TPH) benzene was analyzed from a used vial due to only one vial provided.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 25 Aug 07
Lab Number: 07-A38579
Work Order #: 82-1760
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 1 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

Project Name: GARRISON COAL

Sample Description: SB39 ONE DAY
W3542

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Benzene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Toluene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	22 Aug 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	22 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 95 %

GRO SURROGATE RECOVERY: 98 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 18 Sep 07
Lab Number: 07-A42069
Work Order #: 82-1926
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 4 Sep 07 8:00
Date Received: 11 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB-39 CLEAN 30days
W3964

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	14 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	14 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	14 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	14 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	14 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	14 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 97 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 25 Aug 07
Lab Number: 07-A38578
Work Order #: 82-1760
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 7 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

Project Name: GARRISON COAL

Sample Description: SB47 21' H2O
W3541

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Benzene	4.2	ppb	1.0	8021/5030	22 Aug 07	RDC
Toluene	4.0	ppb	1.0	8021/5030	22 Aug 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Xylenes (Total)	4.7	ppb	3.0	8021/5030	22 Aug 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	22 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 95 %

GRO SURROGATE RECOVERY: 92 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 25 Aug 07
Lab Number: 07-A38576
Work Order #: 82-1760
Account #: 019519
Sample Matrix: ~~GROUND~~WATER
Date Sampled: 8 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON COAL

Sample Description: SB47 21' GAS
W3539

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 5000 #	ppb	1	8021/5030	23 Aug 07	RDC
Benzene	53450	ppb	1.0	8021/5030	23 Aug 07	RDC
Toluene	144400	ppb	1.0	8021/5030	23 Aug 07	RDC
Ethyl Benzene	22910	ppb	1.0	8021/5030	23 Aug 07	RDC
Xylenes (Total)	123200	ppb	3.0	8021/5030	23 Aug 07	RDC
GRO (TPH)	1139	mg/L	0.200	8015B/OA1	23 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 96 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 25 Aug 07
Lab Number: 07-A38577
Work Order #: 82-1760
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 7 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

Temp at Receipt: 4 C

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON COAL

Sample Description: SB47 25' H2O
W3540

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Benzene	5.6	ppb	1.0	8021/5030	22 Aug 07	RDC
Toluene	1.4	ppb	1.0	8021/5030	22 Aug 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	22 Aug 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	22 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 93 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724
35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 25 Aug 07
Lab Number: 07-A38575
Work Order #: 82-1760
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 8 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

Project Name: GARRISON COAL

Sample Description: SB47 25' GAS
W3538

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1000 #	ppb	1	8021/5030	23 Aug 07	RDC
Benzene	45640	ppb	1.0	8021/5030	23 Aug 07	RDC
Toluene	89820	ppb	1.0	8021/5030	23 Aug 07	RDC
Ethyl Benzene	15400	ppb	1.0	8021/5030	23 Aug 07	RDC
Xylenes (Total)	82260	ppb	3.0	8021/5030	23 Aug 07	RDC
GRO (TPH)	720.6	mg/L	0.200	8015B/OA1	23 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 105 %

GRO SURROGATE RECOVERY: 115 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 25 Aug 07
Lab Number: 07-A38582
Work Order #: 82-1760
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 2 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

Project Name: GARRISON COAL

Sample Description: TRIP BLANK

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Benzene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Toluene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	22 Aug 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	22 Aug 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	22 Aug 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 104 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 25 Aug 07
Lab Number: 07-N5596
Work Order #: 81-961
Account #: 019519
Sample Matrix: SOIL — COAL EXPERIMENT
Date Sampled: 10 Aug 07
Date Received: 21 Aug 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON COAL

Sample Description: SB47 21'
M2184

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 @	ppb	1	8021/5035/5030	23 Aug 07	RDC
Benzene	523.5	ppb	1.0	8021/5035/5030	23 Aug 07	RDC
Toluene	312.8	ppb	1.0	8021/5035/5030	23 Aug 07	RDC
Ethyl Benzene	< 50 @	ppb	1	8021/5035/5030	23 Aug 07	RDC
Xylenes (Total)	< 150 @	ppb	3	8021/5035/5030	23 Aug 07	RDC
GRO (TPH)	< 10 @	mg/Kg	0.2	8015B/OA1	23 Aug 07	RDC

** No collection time supplied by the client.

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 96 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

MVTL LABORATORIES, Inc.
1411 South 12th Street
Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

WORK ORDER # 81-9610 81-9656, 82-1760

Company Name and Address:
EERC
15 N 23rd ST.
GRAND FORKS, ND 58202

Account #:

Contact: B. BOTNEN

Phone #: (701) 777-5073

Name of Sampler: "

Fax #:

For faxed report check box ☐

Date Submitted: 8/ /07

Billing Address (indicate name and address if different from above):
"

Quote #:

Project Name/Number: GARRISON COAL

Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance) Soil	Water	Food	Other (Please Be Specific)	Analyze For: Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
M2184 40	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	
M2155	SB47 21'		8/6/07	X				MBTEX + GRO (GPH)
W3538	SB47 25' GAS		8/6/07		X			
W3539	SB47 21' GAS		8/6/07		X			
W3540	SB47 25' H_2O		8/7/07		X			Per phone conv w/ Barry Botnen, run
W3541	SB47 21' H_2O		8/7/07		X			samples that have exceeded holding time
W3542	SB39 ONE DAY		8/1/07 0800		X			20 Aug 07 40
W3543	SB34 30+ DAYS		8/2/07 0800		X			
W3544	SB33 ONE DAY		—		X			
	TRIP BLANK		—					

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1			8/6/07 0800			17 Aug 07 1003	5.2
2							
3							

Disposal Comments:

Relinquished By:

We will return the completed original with your results.

CHAIN OF CUSTODY RECORD

Page 1 of 1

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PLEASE DO NOT WRITE IN THE SHADED AREAS

WORK ORDER # 82-1926

Company Name and Address: EERC

Account #:

Phone #: (701) 777 5073

Contact: BARRY BOTHEN

Fax #:

For faxed report check box ☐

Name of Sampler: RON KULAS

Date Submitted: 9/6/07

Billing Address (indicate name and address if different from above): ~~EERC~~ JB ENGINEERING 4525 VALLACHER AVE ST. LOUIS PARK, MN 55416

Quote #:

Project Name/Number:

Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance) Soil	Water	Food	Other (Please Be Specific)	Analyze For: Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	
03964	SJB-39 CLEAN 30'		9/4/07 0800		X			MBTEX + GRO (TPH)

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1			9/5/07	Tina Olson		7 Sept 07 1000	3.2
2							
3							

Disposed of By: Disposal Comments:

Please submit the top two copies with your samples. We will return the completed original with your results.

MINNESOTA VALLEY TESTING LABORATORIES, INC.

MVTL

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON LAB TEST

Sample Description: SB52 WATER VAPOR
W4499

Report Date: 10 Oct 07
Lab Number: 07-A46615
Work Order #: 82-2171
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 25 Sep 07 8:00
Date Received: 3 Oct 07
PO #: GARRISON LAB TEST

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	2.9	ppb	1.0	8021/5030	8 Oct 07	RDC
Toluene	1.7	ppb	1.0	8021/5030	8 Oct 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	8 Oct 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	8 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 10 Oct 07
Lab Number: 07-A46616
Work Order #: 82-2171
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 25 Sep 07 8:00
Date Received: 3 Oct 07
PO #: GARRISON LAB TEST

Project Name: GARRISON LAB TEST

Sample Description: SB52 GASOLINE VAPOR
W4500

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	9523	ppb	1.0	8021/5030	9 Oct 07	RDC
Toluene	18730	ppb	1.0	8021/5030	9 Oct 07	RDC
Ethyl Benzene	1622	ppb	1.0	8021/5030	8 Oct 07	RDC
Xylenes (Total)	8809	ppb	3.0	8021/5030	8 Oct 07	RDC
GRO (TPH)	72.43	mg/L	0.200	8015B/OA1	8 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 96 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46615
Work Order #: 82-2171
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 25 Sep 07 8:00
Date Received: 3 Oct 07
PO #: GARRISON LAB TEST

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON LAB TEST

Sample Description: SB52 WATER VAPOR
W4499

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	2.9	ppb	1.0	8021/5030	8 Oct 07	RDC
Toluene	1.7	ppb	1.0	8021/5030	8 Oct 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	8 Oct 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	8 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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www.mvtl.com
MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46616
Work Order #: 82-2171
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 25 Sep 07 8:00
Date Received: 3 Oct 07
PO #: GARRISON LAB TEST

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON LAB TEST

Sample Description: SB52 GASOLINE VAPOR
W4500

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	9523	ppb	1.0	8021/5030	9 Oct 07	RDC
Toluene	18730	ppb	1.0	8021/5030	9 Oct 07	RDC
Ethyl Benzene	1622	ppb	1.0	8021/5030	8 Oct 07	RDC
Xylenes (Total)	8809	ppb	3.0	8021/5030	8 Oct 07	RDC
GRO (TPH)	72.43	mg/L	0.200	8015B/OA1	8 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 96 %

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CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

WORK ORDER # 82-2171

Company Name and Address:
EERC

Account #:

Contact: B. BOTNEN

Phone #: 701 777-5073

Fax #: 701 777-5181

For faxed report check box ☐

Name of Sampler: B. BOTNEN

Date Submitted: 9/27/07

Billing Address (indicate name and address if different from above):
SB ENGINEERING

Quote #:

Project Name/Number: GARRISON LAB TEST

Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance): Soil	Water	Food	Other (Please Be Specific)	Analyze For: Vitamin A, TKN, Iron, Calcium, BOD, COD, Acetone, Shelf Life
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	
W4499	SB52 H2O VAPOR		9/25/07 0800		X			MBTEX + GRO (TPH)
W4500	SB52 GASOLINE VAPOR		9/25/07 0820		X			"

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson	ICE/Cooler	10:00 AM 10-1-07	R. Scheetz		10/4/07 1000	2.7°
2							
3							

Disposed of By:

Disposal Comments:

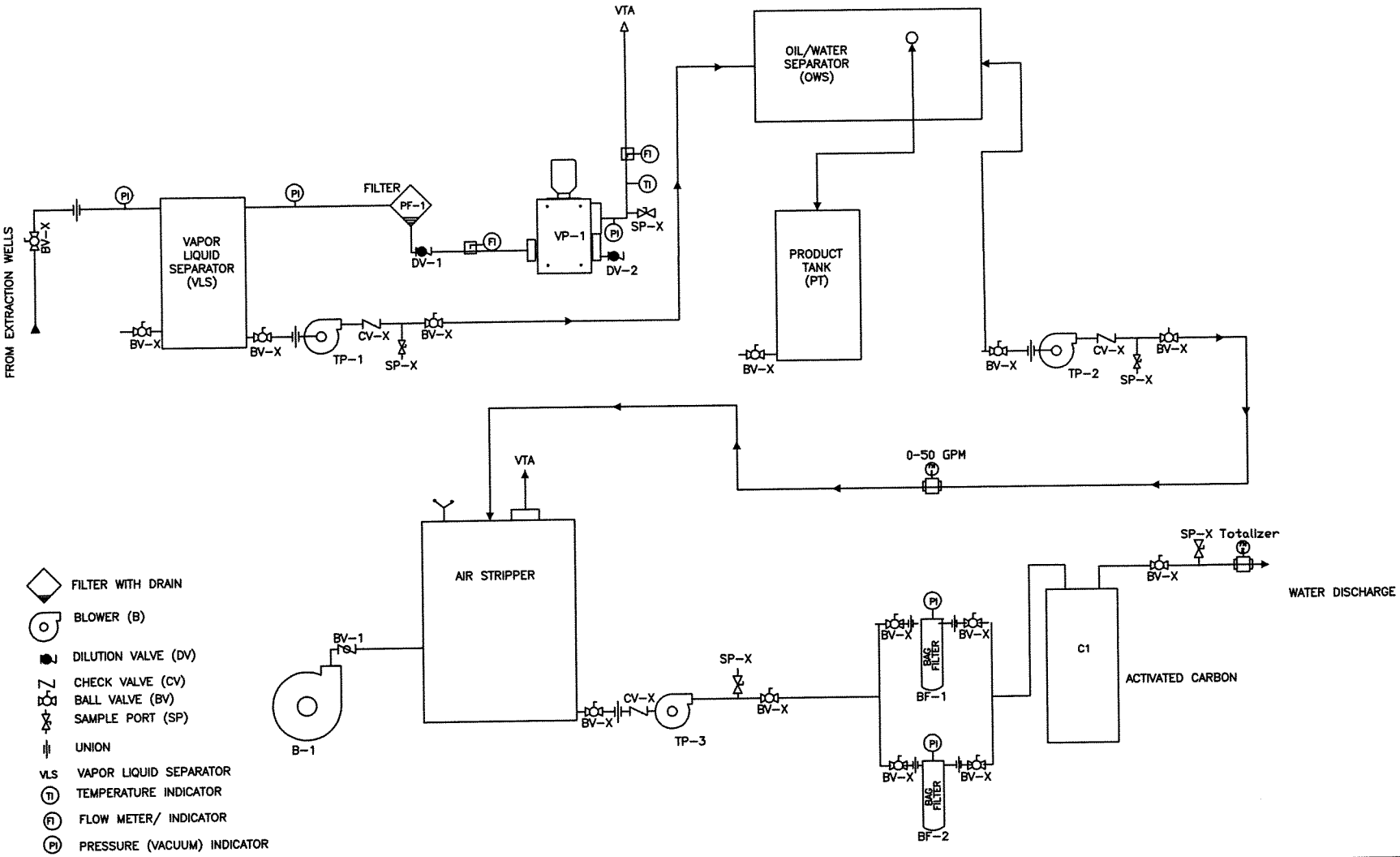
We will return the completed original with your results.

APPENDIX H

MPE PILOT TEST DOCUMENTATION

APPENDIX H-1

MPE PILOT TEST SYSTEM



CONTAMINANT TREATMENT AND RECOVERY SYSTEM

PROCESS AND INSTRUMENTATION DIAGRAM

DRAWN BY: MV		SCALE: NTS	
BLDR:	MOD: JS	CKR: JS	
DATE: 11-14-2006			
PROJECT# CRS			
DRAWING# MPE-System 111306			

APPENDIX H-2

PNEUMATIC AND HYDRAULIC RESPONSE TO MPE

PNEUMATIC AND HYDRAULIC RESPONSE
Cenex Corner - Original Release

07/23/07 Pilot Test Start: 11:45

Well ID	VW-16		VW-14		VW-15		VW-4		VW-1		VW-2		MW-1	
Distance	47 ft		0 ft		94.6 ft		22.3 ft		154.9 ft		130.1 ft		21.8 ft	
Time	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)
Step 1 - VW-14														
Background	0.0	Dry	0.0	Dry	0.0	Dry	0.0	Dry	0.0	Dry	0.0	Dry	0.0	19.93
7/23/07 11:45			80.1		0.0		0.0		0.0		0.0		0 - 0.1	19.93
7/23/07 12:05	0.0		75.1		0.0		0.0		0.0		0.0		0 - 0.1	19.93
7/23/07 12:25	0.0		72.1		0.0		0.0		0.0		0.0		0 - 0.1	19.93
7/23/07 12:45	0.0		70.4		0.0		0.0		0.0		0.0		0.0	19.93
Step 2 - VW-16														
7/23/07 13:00	252.1		0.0		0.0		0.0		0.0		0.0		0.0	19.93
7/23/07 13:20	249.1		0.0		0.0		0.0		0.0		0.0		0.0	19.92
7/23/07 13:40	238.0		0.0		0.0		0.0		0.0		0.0		0.0	NM
7/23/07 14:00	231.7		0.0		0.0		0.0		0.0		0.0		0.0	NM
Step 3 - VW-15														
7/23/07 14:10	0.0		0.0		0.0		0.0		0.0		0.0		0.0	NM
7/23/07 14:30	0 - 0.1		0.0		93.6		0.0		0.0		0.0		0.0	NM
7/23/07 14:50	0.0		0.0		88.9		0.0		0.0		0.0		0.0	NM
Step 4 - VW-14,15,16														
7/23/07 15:10	0.0		0.0		85.8		0.0		0.0		0.0		0.0	NM
7/23/07 15:20	72.1		29.2		48.8		0.0		0.0		0.0		0.0	NM
7/23/07 15:40	72.1		37.6		48.8		0 - 0.1		0.0		0.0		0 - 0.1	NM
7/23/07 16:00	77.4		39.1		50.5		0 - 0.1		0.0		0.0		0 - 0.1	NM
7/23/07 16:20	77.9		39.3		50.4		0 - 0.1		0.0		0.0		0 - 0.1	NM
7/23/07 17:20	77.1		38.7		49.9		0.2 - 0.3		0.0		0.0		0.3	NM
7/23/07 18:20	79.1		38.9		50.1		0.1		0.0		0 - 0.1		0.1	NM
7/23/07 20:20	78.6		38.5		49.7		0.1		0.0		0.1		0.1	NM
7/24/07 8:30	71.5		34.9		46.4		0.1 - 0.3		0 - 0.1		0.1		.2 - .3	19.97
7/24/07 10:00	70.2		33.8		44.8		0		0.0		0.1		0.1	19.97
7/24/07 11:30	70.2		33.8		44.8		0		0.0		0.1		0.1	19.97
7/24/07 11:45	69.7		33.3		44.5		0.1		0.0		0.1		0.1	19.97
7/24/07 11:45	END OF REPRESENTATIVE TEST													

Conductive product/groundwater interface is monitored using Slope and Heron water level indicators

Vacuum response is monitored using Dwyer® 477 manometer

NM Not measured

PNEUMATIC AND HYDRAULIC RESPONSE
MW-16 Cavity

07/18/06 Pilot Test Start 12:00

Well ID	MW-16		MW-15		VW-7		VW-6		VW-12		PSC Well	
Distance			148.2 ft		246.7 ft		264.4 ft		272 ft		245 ft	
Time	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)
Step 1- 7/18/06												
7/18/07 11:45	0.0	35.84	0.0	42.54	0.0	NM	0.0	NM	0.0	NM	NM	43.66
7/18/07 12:00	0.0	NM	0.0	42.57	0.0	NM	0.0	NM	0.0	NM	NM	43.66
7/18/07 12:20	0.0	NM	0.0	42.57	0.0	NM	0.0	NM	0.0	NM	NM	43.66
7/18/07 12:40	0.0	NM	0.0	42.57	0.0	NM	0.0	NM	0.0	NM	NM	43.66
7/18/07 13:00	0.0	NM	0.0	42.57	0.0	NM	0.0	NM	0.0	NM	NM	43.65
7/18/07 14:00	0.0	NM	0.0	42.57	0.0	NM	0.0	NM	0.0	NM	NM	43.64
7/18/07 15:00	0.0	NM	0.0	42.57	0.0	NM	0.0	NM	0.0	NM	NM	43.65
7/18/07 16:00	0.0	NM	0.0	42.58	0.0	NM	0.0	NM	0.0	NM	NM	NM
7/18/07 18:00	0.0	NM	0.0	42.58	0.0	NM	0.0	NM	0.0	NM	NM	NM
7/18/07 20:00	0.0	NM	0.0	42.58	0.0	NM	0.0	NM	0.0	NM	NM	NM
7/18/07 22:30	0.0	NM	0.0	42.63	0.0	NM	0.0	NM	0.0	NM	NM	NM
7/19/07 8:10	0.0	NM	0.0	42.63	0.0	NM	0.0	NM	0.0	NM	NM	43.65
7/19/07 9:30												
Step 2												
7/19/07 9:35	0.0	NM	0.0	NM	NM	NM	NM	NM	NM	NM	NM	NM
7/19/07 10:05	0.0	NM	0.0	NM	NM	NM	NM	NM	NM	NM	NM	NM
7/19/07 10:30	0.0	NM	0.0	NM	NM	NM	NM	NM	NM	NM	NM	NM
7/19/07 11:30	0.0	NM	0.0	42.6	0.0	NM	0.0	NM	0.0	NM	NM	NM
7/19/07 12:40	0.0	NM	0.0	42.58	0.0	NM	0.0	NM	0.0	NM	NM	NM
7/19/07 13:50	0.0	NM	0.0	42.58	0.0	NM	0.0	NM	0.0	NM	NM	NM
7/19/07 13:55	0.0	35.86	0.0	42.58	0.0	NM	0.0	NM	0.0	NM	NM	43.65
7/19/07 13:55 END OF REPRESENTATIVE TEST												

Conductive product/groundwater interface is monitored using Slope and Heron water level indicators

Vacuum response is monitored using Dwyer® 477 manometer

NM Not measured

PNEUMATIC AND HYDRAULIC RESPONSE

Tesoro Corner

07/17/07 Pilot Test Start 8:30

Well ID	MPE-1		MW-12		MW-17		MW-19		VW-3		VW-5	
Distance	0 ft		7.0 ft		22.5 ft		250 ft		230 ft		150 ft	
Time	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)	Vacuum ("H_2O)	Water L. (ft)
Step 1- 7/17/07 Extraction from MPE-1												
8:30	0.0	20.97	0.0	20.49	0.0	19.97	0.0	16.67	0.0	-	0.0	-
8:50	173.0	26.42	0.0	20.45	0.0	19.97	0.0	16.68	0.0	-	0.0	-
9:10	174.5	26.42	0.0	20.45	0.0	19.97	0.0	16.69	0.0	-	0.0	-
9:30	173.1	26.42	0.0	20.45	0.0	19.97	0.0	16.69	0.0	-	0.0	-
10:30	169.7	26.42	0.0	20.45	0.0	19.98	0.0	16.69	0.0	-	0.0	-
11:30	166.2	26.42	0.0	20.45	0.0	19.97	0.0	16.68	0.0	-	0.0	-
12:30	162.9	26.42	0.0	20.45	0.0	19.98	0.0	16.69	0.0	-	0.0	-
13:30	159.3	26.42	0.0	20.45	0.0	19.96	0.0	16.69	0.0	-	0.0	-
14:30	159.3	26.42	0.0	20.45	0.0	19.96	0.0	16.68	0.0	-		
Step-2 Extraction from MW-12 (14:30-15:15) and combined MW-12 and MW-17												
16:15	0.1	21.92	33.9	-	52.1	-	0.0	16.68	0.0	-	0.0	-
17:15	0.1	21.99	35.4	-	50.1	-	NM	NM	NM	-	0.0	-
18:15	0.1	21.96	34.6	-	51.7	-	NM	NM	NM	-	0.0	-
19:15	0.1	21.94	36.1	-	50.3	-	NM	NM	NM	-	0.0	-
20:15	0.1	21.13	35.7	-	51.4	-	NM	NM	NM	-	0.0	-
21:15	0.1	20.97	34.4	-	50.2	-						
Step-2 7/18/07				-		-				-		-
8:30	0.2	21.05	34.4	-	49.6	-	0.0	16.73	0.0	-	0.0	-

END OF REPRESENTATIVE TEST

Conductive product/groundwater interface is monitored using Slope and Heron water level indicators

Vacuum response is monitored using Dwyer® 477 manometer

NM Not measured

APPENDIX H-3

MPE SYSTEM MONITORING

MPE SYSTEM PARAMETERS

Cenex Corner - Original Release

07/23/07 Pilot Test Start 11:45

Active Well	Temp	Inlet Vac	Blower Vac	Air Flow				Totalizer	Q Water AS	Summit HC	CO_2	O_2	PID	FID
				Exhaust		Intake								
Date/Time	°F	(Hg)	(Hg)	Δp (H_20)	Q (scfm)	Δp (H_20)	Q (scfm)	gal	(gpm)	ppmv	%	%	ppmv	ppmv
VW-14														
7/23/07 11:45									-	OL	0.33	8.19	1099	OL
7/23/07 12:05	212	13.5	14.0	8.8	85	5.0	97.2	8038	-	OL	0.35	8.29	1095	OL
7/23/07 12:25	220	13.5	14.0	9.0	85.4	5.1	98.0		-	OL	0.34	9.67	1130	OL
7/23/07 13:10	221	13.5	14.0	9.2	86.3	5.2	99.0		-					
VW-16									-	9825	0.15	19.19	664	OL
7/23/07 13:20	280	20.5	20.0	2.4	42.3	0.7	28.7		-	OL	0.2	17.20	651	OL
7/23/07 13:40	282	20.0	20.0	2.7	44.8	1.2	37.6		-	OL	0.23	15.84	649	OL
7/23/07 14:10	281	19.5	19.5	2.9	46.4	1.5	43.0		-					
VW-15									-	OL	0.37	9.46	440	OL
7/23/07 14:30	230	13.5	14.0	8.7	83.4	4.7	94.1		-	OL	0.37	9.33	461	OL
7/23/07 14:50	226	13.5	14.0	9.0	85	4.9	96.1		-	OL	0.37	9.25	454	OL
7/23/07 15:20	226	13.5	14.0	9.2	86	5.1	98.0		-					
VW-14,15,16									-	OL	0.43	6.40	815	OL
7/23/07 15:40	194	7.8	8.5	>10	>91.8	8.0	142.4		-	OL	0.43	6.32	829	OL
7/23/07 16:00	194	7.8	9.0	>10	>91.8	8.0	140.7		-	OL	0.43	6.33	870	OL
7/23/07 16:20	192	7.8	8.5	>10	>91.9	8.1	143.3		-	OL	0.42	6.73	849	OL
7/23/07 17:20	194	7.8	8.8	>10	>91.8	7.9	140.7		-	OL	0.42	6.81	798	OL
7/23/07 18:20	192	7.5	8.8	>10	>91.9	7.9	140.7		-	OL	0.41	6.81	845	OL
7/23/07 20:20	187	7.0	8.8	>10	>92.3	8.0	141.6		-	OL	0.42	6.76	1020	OL
7/24/07 8:30	173	4.8	8.5	>10	>93.3	8.0	142.4		-	OL	0.41	6.77	1145	OL
7/24/07 10:00	179	5.0	8.5	>10	>92.9	8.0	142.4		-	OL	0.42	5.42	1139	OL
7/24/07 11:30	184	6.0	8.5	>10	>92.5	8.1	143.3		-	OL	0.41	5.49	1201	OL
7/24/07 11:45	182	6.3	8.5	>10	>92.7	8.1	143.3	8938	-					

Air flow for inlet and exhaust is monitored using Dwyer Series DS-300 Flow sensors

Actual flow normalized to standard conditions: $Q(scfm) = 128.8 \times K \times D^2 \times \sqrt{\frac{p + \Delta p}{(T + 460)}}$

Δp=differential pressure ("H_2O)

Q=flow (scfm)

K=flow coefficient

D=inside diameter of line size (in.)

p=static line pressure (psia)

T=temperature (°F plus 460=°Rankin)

MPE SYSTEM PARAMETERS

Tesoro Corner

Active Well	Temp	Inlet Vac	Blower Vac	Air Flow				Q Water AS	Totalizer	Summit HC	CO_2	O_2	PID	FID
				Exhaust		Intake								
Date/Time	°F	(Hg)	(Hg)	Δp (H_20)	Q (scfm)	Δp (H_20)	Q (scfm)	(gpm)	gal	ppmv	%	%	ppmv	ppmv
MPE-1									4533.5					
7/17/07 8:30	Start							-	4533.5	OL	0	12.74	691	OL
7/17/07 8:50	240	19.5	21	2	39.7	1.6	41.1	-	4533.5	OL	0	15.41	685	OL
7/17/07 9:10	260	19	20.5	2.2	41.0	1.7	43.5	-	4533.5	OL	0	15.61	686	OL
7/17/07 9:30	262	19	20.5	2.3	41.9	1.75	44.2	-	4533.5	OL	0	15.83	695	
7/17/07 10:30	262	19.25	20.5	2.4	42.8	1.8	44.8	-	4533.5	OL	0	15.71	701	OL
7/17/07 11:30	264	19.25	20.5	2.5	43.6	1.85	45.4	-	4533.5	OL	0	16.16	709	OL
7/17/07 12:30	266	19.25	20.5	2.5	43.6	1.9	46	-	4533.5	OL	0	12.75	791	OL
7/17/07 14:30	266	20	20	2.7	45.3	2	48.5	-						
MW-12									4533.5	OL	0	9.64	814	OL
7/17/07 14:57	240	15	15	6.8	73.2	3.9	83	-						
MW-12,17									4533.5	OL	0	6.08	912	OL
7/17/07 15:15	210	8	11	>10	>90.7	7	125.2	-	4533.5	OL	0	5.98	896	OL
7/17/07 16:15	182	8	10.5	>10	>92.7	7.1	127.7	-	4570.0	OL	0	6.07	845	OL
7/17/07 17:15	186	8	11	>10	>92.4	7.1	126.1	12.5	4629.0	OL	0	6.12	901	OL
7/17/07 18:15	186	7.5	11	>10	>92.4	7.1	126.1	12.3	4698.0	OL	0	6.03	879	OL
7/17/07 19:15	184	7	11	>10	>92.5	7.1	126.1	-	4759.0	OL	0	6.06	863	OL
7/17/07 20:15	182	7.1	11	>10	>92.7	7	125.2	-	4759.0	OL	0	5.88	867	OL
7/17/07 21:15	180	7.00	11	>10	>92.8	7	125.2	-	5370.0	OL	0	5.64	923	OL
7/18/07 8:30	176	6.0	10.5	>10	>93.1	7	126.8	11.9	5524.0	OL	0	5.64	923	OL
7/17/07 9:30	176	6	10.5	>9	>93.0	7	126.8	-						
7/18/07 9:30	**Shutdown**													

MPE SYSTEM PARAMETERS

MW-16 Cavity				Air Flow				Totalizer	Q Water	Summit HC	CO_2	O_2	PID	FID
Active Well	**Temp**	**Inlet Vac**	**Blower Vac**	**Exhaust**		**Intake**			**AS**					
Date/Time	°F	(Hg)	(Hg)	Δp (H_20)	Q (scfm)	Δp (H_20)	Q (scfm)	gal	(gpm)	ppmv	%	%	ppmv	ppmv
Step 1								5525						
7/18/07 11:45								5525	-	2198	0.00	15.03	656	OL
7/18/07 12:00	278	19	21	1.7	35.6	0.6	25.2	5525	-	1539	0.00	16.85	450	OL
7/18/07 12:20	270	17.5	19.5	2.7	45.2	0.35	20.8	5564	-	1595	0.00	16.69	462	OL
7/18/07 12:40	264	17	19.5	2.8	46.2	0.4	22.2	5624	12.2	1681	0.01	15.58	469	OL
7/18/07 13:00	264	17	19.5	2.8	46.2	0.45	23.6	5774	-	1841	0.14	16.21	605	OL
7/18/07 14:00	269	16.75	19.25	2.7	45.2	0.37	21.6	5907	-	1942	0.00	15.93	599	OL
7/18/07 15:00	266	16.75	19.25	2.8	46.1	0.55	26.4	6104	11.8	2052	0.14	15.66	652	OL
7/18/07 16:00	270	17	19.2	2.8	46	0.57	26.9	6329	-	2142	0.14	15.40	630	OL
7/18/07 18:00	261	16	19	2.9	47.1	0.62	28.3	6329	-	2207	0.15	15.21	664	OL
7/18/07 20:00	265	16	19	2.9	47	0.7	30.1	6796	-	2205	0.15	15.22	659	OL
7/18/07 22:30	265	15.5	19	3	47.8	0.75	31.1	7789	11.9	2030	0.15	15.05	655	OL
7/19/07 8:10	254	15	19	3.2	49.7	0.85	33.2	8038	11.9	1942	0.15	15.53	630	OL
7/19/07 9:30	250	15	19	3.2	49.8	0.85	33.2							
Step 2	**Air Only**									4205	0.30	9.08	790	OL
7/19/07 9:35	220	11	15.5	7	75.3	4.1	83.7	-		4172	0.30	9.03	769	OL
7/19/07 10:05	218	11	15.5	7	75.4	4.1	83.7	-		4174	0.30	9.09	810	OL
7/19/07 10:30	216	11	15.5	7	75.5	4.1	83.7	-		4256	0.31	8.79	796	OL
7/19/07 11:30	222	12.50	16	7	75.2	4.1	82.2	-		4263	0.31	8.66	701	OL
7/19/07 12:40	224	12.5	15.5	7	75.1	4.2	84.7	-		4115	0.31	8.84	680	OL
7/19/07 13:50	226	13	15.5	7	75	4.2	84.7	-						
7/19/07 13:55	**Shut down**													

APPENDIX H-4

SYSTEM MONITORING – WATER QUALITY

WATER QUALITY MONITORING

VLS - MBTEX		Tesoro VLS-1 07/17/07	VLS-2 07/17/07	VLS-3 07/18/07	Cavity VLS-4 07/18/07	VLS-5 07/19/07
MBTE	ppb	<10	<50	<100	<20	<10
Benzene	ppb	921	3079	2912	985.9	827.7
Toluene	ppb	951.3	3367	3631	487.1	375.4
Ethylbenzene	ppb	166.9	619.4	726.7	138.5	68.5
Xylenes (Total)	ppb	951.6	3548	4327	1415	1089
GRO (TPH)	mg/l	7.42	28.94	34.35	9.12	6.16

Selected Parameters		Tesoro VLS-1 07/17/07	VLS-2 07/17/07	VLS-3 07/18/07	Cavity VLS-4 07/18/07	VLS-5 07/19/07
pH		6.52	6.68	6.38	7.1	6.51
EC	µS/cm	2172	2139	2087	1851	1850
T	°C	16.9	17.6	16.5	13.4	10.9

Air Stripper/Effluent		Tesoro Effluent-1 07/17/07	Effluent-2 07/18/07	Cavity Effluent-3 07/18/07	Effluent-4 07/19/07
MBTE	ppb	<1	<20	<1	<1
Benzene	ppb	2.1	<20	4.8	1.7
Toluene	ppb	2.8	<20	6.9	2.3
Ethylbenzene	ppb	2.2	37	1.9	<1
Xylenes (Total)	ppb	7.3	<60	9.8	5.1
Phenols (Total)	ppb	36.7	19.5	18	14.1
GRO (TPH)	mg/l	0.39	6.01	<0.2	<0.2

Selected Parameters		Tesoro Effluent-1 07/17/07	Effluent-2 07/18/07	Cavity Effluent-3 07/18/07	Effluent-4 07/19/07
Fe (total)	mg/l	12.8	13.6	14.4	14.4
Mn (total)	mg/l	1.45	1.18	1.58	1.71
TSS	mg/l	67	6	17	6
pH		7.98	7.89	7.75	7.58
EC	µS/cm	1833	2071	1855	1803
T	°C	24.14	19.96	18.69	14.62

VLS-Vapor/Liquid Separator Sample Port

COC AND SELECTED BIODEGRADATION INDICATORS

		REC-1	VLS-1	REC-1
		06/13/07	07/17/07	09/11/07
MTBE	ppb	<50	<10	<50
Benzene	ppb	2793	921	1819
Toluene	ppb	1519	951.3	58.3
Ethyl Benzene	ppb	468.9	166.9	394.6
Xylenes Total)	ppb	2796	951.6	1102
BOD	mg/l	14.8	NA	
Total Alkalinity	mg/l	429	229	
Phenolphthalein	mg/l	<4	<4	
Bicarbonate	mg/l	429	229	
Carbonate	mg/l	<4	<4	
Hydroxide	mg/l	0	0	
Total Hardness as $CaCO_3$	mg/l	1320	791	
Cation Summation	meq/l	37.6	24.2	
Anion Summation	meq/l	36.1	24.3	
Percent Error	%	2.1	-0.15	
Sulfate	mg/l	1250	875	
Chloride	mg/l	51.5	52.4	
Nitrate-Nitrite as N	mg/l	0.34	0.56	
Ammonia-Nitrogen as N	mg/l	0.47		
Phosphorus P (total)	mg/l	0.28		
Ca(total)	mg/l	261	154	
Mg (total)	mg/l	163	98.6	
Na (total)	mg/l	236	171	
K (total)	mg/l	9.5	7.4	
Fe (total)	mg/l	9.82	20.2	
Mn (total)	mg/l	7.68	2.51	
DO	(mg/l)	1.81		2.13
ORP	(mV)	-63.1		33.4
EC	(µS/cm)	2103		3177
pH		7.03		5.82
Temperature	(°C)	9.8		9.5

BOD - Biological Oxygen Demand
DO - Dissolved Oxygen
ORP - Oxidation/Reduction Potential
EC - Electrical Conductivity
NA - not analyzed, sample broken during lab manipulation

APPENDIX H-5

SYSTEM MONITORING – OFFGAS QUALITY

OFFGAS QUALITY MONITORING

Organic Vapors By Charcoal Tube Desorption, Summit Analyzer, Flame Ionization Detector, and Photo Ionization Detector

Date/Time	Collection Interval	Sampling Flow Rate (L/min)	GRO (mg/m^3)	TPH (mg/m^3)	MTBE (mg/m^3)	Benzene (mg/m^3)	Toluene (mg/m^3)	Ethyl Benzene (mg/m^3)	Xylenes (mg/m^3)	Summit (ppm)	PID (ppm)	FID (ppm)	CO_2 %	O_2 (ppm)
Cenex Corner														
VW-14														
07/23/07 13:05	[1]CT-60 s	0.28	38200	57900	ND	1660	1660	124	452	9825	664	OL	0.15	19.19
07/23/07 13:10	[1]CT-60 s	0.28	40000	61100	ND	1480	1620	167	580					
VW-16														
07/23/07 14:00	[1]CT-60 s	0.28	21200	40400	ND	188	129	15	58	OL	649	OL	0.23	15.84
07/23/07 14:05	[1]CT-60 s	0.28	20800	38600	ND	210	149	17	62					
VW-15														
07/23/07 15:15	[1]CT-60 s	0.28	9710	18800	ND	ND	ND	ND	ND	OL	454	OL	0.37	9.25
07/23/07 15:20	[1]CT-60 s	0.28	9360	18400	ND	ND	ND	ND	ND					
VW-14,VW-15,VW-16														
07/23/07 16:25	[1]CT-60 s	0.28	27600	48900	ND	786	907	76	284	OL	870	OL	0.43	6.33
07/23/07 16:30	[1]CT-60 s	0.28	27000	49300	ND	764	875	78	290					
07/24/07 10:40	[1]CT-60 s	0.28	22900	37500	ND	854	1060	81	298	OL	1145	OL	0.41	6.77
07/24/07 10:45	[1]CT-60 s	0.28	24300	35700	ND	921	1250	104	389					

[1]Charcoal tube sample collected from Tedlar bag

GRO - Gasoline Range Organics
TPH - Total Purgeable Hydrocarbons
FID - Flame Ionization Detector
PID - Photoionization Detector
Summit - Summit HydrocarbonAnalyzer
CT - Charcoal Tube
TB - Tedlar Bag

ND - Not Detected
OL - Over detection limit
>10,000 ppm for Summit (calibrated with hexane)
>10,000 ppm for PID (calibrated with isobuthylene)
>50,000 ppm for FID (calibrated with methane)

OFFGAS QUALITY MONITORING

Organic Vapors By Charcoal Tube Desorption, Summit Analyzer, Flame Ionization Detector, and Photo Ionization Detector

Date/Time	Collection Interval	Sampling Flow Rate (L/min)	GRO (mg/m^3)	TPH (mg/m^3)	MTBE (mg/m^3)	Benzene (mg/m^3)	Toluene (mg/m^3)	Ethyl Benzene (mg/m^3)	Xylenes (mg/m^3)	Summit (ppm)	PID (ppm)	FID (ppm)	CO_2 %	O_2 (ppm)
Tesoro corner														
MPE-1														
07/17/07 09:45	[1]CT-60 s	0.28	41100	78900	ND	368	493	72	260	OL	686	OL	0	15.61
07/17/07 09:50	[1]CT-60 s	0.28	40700	82500	ND	361	450	68	252					
07/17/07 17:30	[1]CT-60 s	0.28	41800	82500	ND	511	668	102	436	OL	845	OL	0	6.07
07/17/07 17:35	[1]CT-60 s	0.28	44600	86800	ND	518	675	115	417					
MW-12, MW-17														
07/18/07 08:00	[1]CT-60 s	0.28	40400	77500	ND	468	654	ND	407	OL	923	OL	0	5.67
07/18/07 08:05	[1]CT-60 s	0.28	46100	68200	ND	504	704	115	522					
Cavity														
MW-16	Droptube in water 1 hour after startup													
07/18/07 13:05	[1]CT-60 s	0.28	3790	8000	ND	110	55	14	105	1681	469	OL	0.01	15.58
07/18/07 13:10	[1]CT-60 s	0.28	3640	7570	ND	110	54	18	115					
	Droptube in water final													
07/19/07 09:00	[1]CT-60 s	0.28	3860	8210	ND	123	54	10	106	1942	630	OL	0.15	15.53
07/19/07 09:05	[1]CT-60 s	0.28	3710	8320	ND	121	54	10	108					
	Droptube out of water after 3 hours, SVE mode													
07/19/07 13:30	[1]CT-60 s	0.28	5680	11400	ND	193	92	12	151	4115	680	OL	0.31	8.84
07/19/07 13:35	[1]CT-60 s	0.28	6890	13900	ND	190	91	12	163					

[1]Charcoal tube sample collected from Tedlar bag

GRO - Gasoline Range Organics
TPH - Total Purgeable Hydrocarbons
FID - Flame Ionization Detector
PID - Photoionization Detector
Summit - Summit HydrocarbonAnalyzer
CT - Charcoal Tube
TB - Tedlar Bag

ND - Not Detected
OL - Over detection limit
>10,000 ppm for Summit (calibrated with hexane)
>10,000 ppm for PID (calibrated with isobuthylene)
>50,000 ppm for FID (calibrated with methane)

APPENDIX H-6

MASS BALANCE WORKSHEETS

CONTAMINANT RECOVERY ESTIMATE

Garrison - Cenex Corner

TPH - Vapor Phase

Date	Runtime (h)	Vacuum (in. Hg)	Q_{air} [1] (scfm)	Volume (ft^3)	TPH_{air} (mg/m^3)	$BTEX_{air}$ (mg/m^3)	TPH mass (lb)	BTEX mass (lb)
VW-14					59500	3872		
7/23/07 11:45					59500	3872	27.1	1.8
7/23/07 13:10	1.4	14.0	86	7,335				
VW-16					39500	414		
7/23/07 13:10		20.0			39500	414	6.8	0.1
7/23/07 14:10	1.0	19.5	46	2,784				
VW-15					18600	0		
7/23/07 14:30		14.0			18600	0	5.0	0.0
7/23/07 15:20	0.8	14.0	86	4,300				
VW-14,15,16					49100	2030		
7/23/07 15:20		8.5	127		49100	2030	30.6	1.3
7/23/07 16:30	1.2	8.5	143	10,031	36600	2479	440.1	23.2
7/24/07 11:45	19.3	8.5	143	165,512			**509.6**	**26.3**
Total	**23.7**			**189,962**				

CONTAMINANT RECOVERY ESTIMATE

Garrison - Tesoro Corner

TPH - Vapor Phase

Date	Runtime h)	Vacuum (in. Hg)	Q_{air} [1] (scfm)	Volume (ft^3)	TPH_{air} (mg/m^3)	$BTEX_{air}$ (mg/m^3)	TPH mass (lb)	BTEX mass (lb)
Step 1					80700	1162		
7/17/07 8:30	1.3	20.5	42	3,150	80700	1162	15.8	0.23
7/17/07 9:45	4.7	20.5	45	12,910	80700	1721	64.7	1.15
7/17/07 14:30								
Step 2					84650	1721		
7/17/07 14:30	3.0	11.0	126	22,698	84650	1721	119.2	2.42
7/17/07 17:30	14.5	10.5	127	110,316	72850	1687	539.1	11.67
7/18/07 8:00	1.0	10.5	127	7,608	72850	1687	34.4	0.80
7/18/07 9:00	**24.5**			**156,683**			**773.2**	**16.27**
Total								

TPH - Liquid Phase

	Totalizer (gal)	Flow (gal/min)	Volume (gal)	TPH_{water} (mg/l)	BTEX (mg/l)	TPH mass (lb)	BTEX mass (lb)	TPH mass (kg)	BTEX mass (kg)
	4534			7.420	2.99				
	4594	0.4	60	7.420	2.99	0.00	0.00	0.00	0.00
Step 1	4654	0.3	60	28.940	10.61	0.01	0.00	0.00	0.00
	5525	0.8	872	34.350	11.60	0.23	0.05	0.10	0.02
Step 2			992			**0.24**	**0.06**	**0.11**	**0.03**
Total									

CONTAMINANT RECOVERY ESTIMATE

Garrison - MW-16 Cavity

TPH - Vapor Phase

Date	Runtime (h)	Vacuum (in. Hg)	Q_{air} [1] (scfm)	Volume (ft^3)	TPH_{air} (mg/m^3)	$BTEX_{air}$ (mg/m^3)	TPH mass (lb)	BTEX mass (lb)
Step 1					7785	290.5		
7/18/07 12:00	0	21.0			7785	290.5	1.5	0.05
7/18/07 13:05	1	19.5	46	3,003	8265	293.0	30.4	1.10
7/19/07 9:30	20	19.0	50	61,005				
Step 2					12650	452.0		
7/19/07 9:35		15.5			12650	452.0	15.3	0.55
7/19/07 13:55	4	15.5	75	19,500			**47.1**	**1.7**
Total	**25.8**			**83,508**				

TPH - Liquid Phase

	Totalizer (gal)	Flow (gal/min)	Volume (gal)	TPH_{water} (mg/l)	BTEX (mg/l)	TPH mass (lb)	BTEX mass (lb)	TPH mass (kg)	BTEX mass (kg)
	5525	0.0	0	9.120	4.18				
Step 1	5624	1.7	99	9.120	0.48	0.01	0.00	0.00	0.00
	8038	1.6	2414	6.160	0.54	0.15	0.05	0.07	0.02
Step 2	SVE mode								
Total			2513			**0.16**	**0.06**	**0.07**	**0.03**

APPENDIX I

SUMMARY OF ANALYTICAL AND MONITORING DATA

APPENDIX I-1

SOIL ANALYSES

SOIL BTEX and GRO ANALYSES

Garrison, ND

	Date	Interval ft	MTBE (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes Total (ppb)	GRO (TPH) (mg/kg)
SB-32/17	05/01/07	17-19	<1000	27050	7862	<1000	<3000	260
SB-32/20	05/01/07	20-22	<1000	46050	7661	10100	51150	560
SB-33/15	05/01/07	15-17	<100	315.3	<100	<100	<300	35
SB-34/15	05/01/07	15-17	<1000	18170	26880	3204	13690	270
SB-34/20	05/01/07	20-22	<1000	27060	28400	6624	38770	290
SB-35/18	05/01/07	18-20	<500	15480	16770	1640	4701	130
SB-35/23	05/01/07	23-25	<1000	8071	3922	4455	24950	350
SB-38/53	05/02/07	53-55	<1	<1	<1	<1	<3	<0.2
SB-41/38	05/01/07	38-40	<50	504.2	219.1	<50	<150	15
SB-41/43	05/03/07	43-45	<10	1879	366.8	52.6	559.4	6.1
SB-42/33	05/04/07	33-35	<100	2901	1378	2147	14560	140
SB-43/19	05/04/07	19-21	<500	14370	10400	8564	31600	270
SB-45/20	05/15/07	20-22	<1000	23890	46360	24380	137500	1600
SB-44/18	05/14/07	18-20	<200	11790	10850	1007	2910	120
SB-44/23	05/14/07	23-25	<1000	14570	25940	7653	43270	290
SB-48/33	05/15/07	33-35	<1000	9334	28680	10530	71680	500
SB-47/21	08/10/07	21-23	<50	523.5	312.8	<505	<150	<10
SB-47/23	05/15/07	23-25	<5	39.6	10.5	<5	<15	1.2
SB-46/14	05/15/07	14-16	<5	28	40.3	13.5	77.8	<1
SB-51/52	05/16/07	52-54	<10	268.7	11.4	13.6	<30	<2
SB-53/48	09/11/07	48-50	<50	15400	4831	665.3	1455	120
SB-54/57	09/11/07	57-59	<1	1875	1.7	4.5	14.2	0.78
SB-55/22	09/11/07	22-24	<100	5020	8028	1139	9033	85
SB-55/23	09/11/07	23-25	<500	20680	39910	5016	92520	560
SB-56/22	09/12/07	22-24	<200	9804	12660	2559	18250	180
SB-56/24	09/12/07	24-26	<50	5616	4582	1962	9740	62
SB-57/22	09/12/07	22-24	<50	1061	1140	460.4	3212	35
SB-58/23	09/12/07	23-25	<50	2914	4659	1534	6790	74
SB-59/18	09/12/07	18-20	<1	7.2	5.8	1.2	3.7	<0.2
SB-60/20	09/12/07	20-22	<200	5441	15010	3561	16540	170
SB-60/23	09/12/07	23-25	<50	3540	4139	1589	7932	77
SB-61/15	09/12/07	15-17	<50	109.1	<50	<50	<150	<10

Samples represent a composite from 1.5-2 ft core starting at deth indicated.

APPENDIX I-2

GROUNDWATER QUALITY – COC

GROUNDWATER QUALITY MONITORING

Well ID	Date	MTBE ppb	Benzene ppb	Toluene ppb	Ethylbenz. ppb	Xylenes (total) ppb	GRO (TPH) mg/l	BTEX ppb
Monitoring Wells								
MW-1	08/14/06	ND	50500	78200	4160	25800	NA	158,660
MW-1	12/12/06	<1000	49580	40210	3104	16770	250.0	109,664
MW-1	01/17/07	<500	53880	55280	5888	33300	420.5	148,348
MW-1	02/21/07	<1000	63150	60710	4308	24070	320.7	152,238
MW-1	03/28/07	Dry						
MW-1	04/25/07	<1000	72200	67500	5196	30510	348.4	175,406
MW-1	05/15/07	<1000	59610	66580	10420	62580	551.4	199,741
MW-1	06/13/07	<1000	52880	51040	4026	25020	288.2	133,254
MW-1	09/11/07	<1000	56510	51880	3737	22820	237.3	135,184
MW-2	08/14/06	ND	ND	ND	ND	ND	NA	0
MW-2	09/18/06	ND	ND	ND	ND	ND	NA	0
MW-2	12/12/06	<1	<1	<1	<1	<3	<0.2	0
MW-2	01/17/07	<1	<1	<1	<1	<3	<0.2	0
MW-2	02/21/07	<1	<1	<1	<1	<3	<0.2	0
MW-2	03/28/07	Frozen						
MW-2	04/25/07	<1	<1	<1	<1	<3	<0.2	0
MW-2	05/15/07	<1	<1	<1	<1	<3	<0.2	0
MW-2	06/12/07	<1	<1	<1	<1	<3	<0.2	0
MW-2	09/11/07	<1	<1	<1	<1	<3	<0.2	0
MW-3	08/14/06	ND	ND	ND	ND	ND	NA	0
MW-3	09/18/06	ND	ND	ND	ND	ND	NA	0
MW-3	12/12/06	<1	<1	<1	<1	<3	<0.2	0
MW-3	01/17/07	<1	<1	<1	<1	<3	<0.2	0
MW-3	02/21/07	<1	<1	<1	<1	<3	<0.2	0
MW-3	03/28/07	<1	<1	<1	<1	<3	<0.2	0
MW-3	04/25/07	<1	<1	<1	<1	<3	<0.2	0
MW-3	05/15/07	<1	<1	<1	<1	<3	<0.2	0
MW-3	06/12/07	<1	<1	<1	<1	<3	<0.2	0
MW-3	09/11/07	<1	<1	<1	<1	<3	<0.2	0
MW-4	08/14/06	ND	986	ND	ND	ND	NA	986
MW-4	09/18/06	ND	958	ND	ND	11.4	NA	969
MW-4	10/20/06	ND	858	ND	ND	ND	NA	858
MW-4	12/12/06	<1	1784	1.1	21.1	44.1	3.47	1,850
MW-4	01/17/07	<1	1339	1.1	18.4	18.3	1.50	1,378
MW-4	02/21/07	<20	2728	<20	85.2	85.1	6.28	2,905
MW-4	03/28/07	<20	3349	42.1	121.5	160.4	7.17	3,680
MW-4	04/25/07	<10	4689	59.2	248.9	462.7	9.65	5,469
MW-4	05/15/07	<20	6732	497.8	719	1962	18.89	9,930
MW-4	06/13/07	<10	3598	35.8	363.9	828	10.84	4,826
MW-4	09/11/07	<10	4120	<10	423	782.7	10.44	5,326
MW-5	08/14/06	ND	15.7	ND	ND	ND	NA	16
MW-5	09/18/06	ND	68.3	ND	3	5.74	NA	77
MW-5	10/20/06	ND	71.4	ND	ND	ND	NA	71
MW-5	12/12/06	<1	91.8	<1	1.9	<3	0.21	94
MW-5	01/17/07	<1	67.8	1.7	2.8	4.1	0.21	76
MW-5	02/21/07	<1	56.8	12.2	7.4	16.6	0.40	93
MW-5	03/28/07	<10	123.1	454.9	248.3	1305	6.69	2,138
MW-5	04/25/07	<20	107.7	166.1	217.3	1084	6.00	1,581
MW-5	05/15/07	<10	127.8	199.4	185.8	920.5	6.81	1,440
MW-5	06/13/07	<10	226.5	115.2	113.2	554.8	5.10	1,015
MW-5	09/11/07	<10	684.9	15.2	103.9	349.9	6.11	1,160

GROUNDWATER QUALITY MONITORING (Continued)

Well ID	Date	MTBE ppb	Benzene ppb	Toluene ppb	Ethylbenz. ppb	Xylenes (total) ppb	GRO (TPH) mg/l	BTEX ppb
MW-6	08/14/06	ND	138.0	ND	ND	ND	NA	138
MW-6	09/18/06	ND	259.0	ND	ND	ND	NA	259
MW-6	10/20/06	ND	5.8	ND	ND	ND	NA	6
MW-6	12/12/06	<1	665.2	<1	<1	3.1	0.957	668
MW-6	01/17/07	<1	460.2	<1	<1	<3	0.803	460
MW-6	02/21/07	<1	442.7	<1	<1	<3	0.760	443
MW-6	03/28/07	<1	669.6	2.9	1.1	3.3	0.944	677
MW-6	04/25/07	<1	1118	38.9	27.1	77.2	2.553	1,264
MW-6	05/15/07	<10	1833	97.6	115.4	329.1	4.389	2,379
MW-6	06/13/07	<10	1109	14.4	89.3	206.3	3.170	1,422
MW-6	09/12/07	<10	1176	<10	51.8	63.2	2.640	1,294
MW-7	08/14/06	ND	4.4	ND	ND	ND	NA	4
MW-7	09/18/06	ND	5.3	ND	ND	ND	NA	5
MW-7	12/12/06	<1	8.3	<1	<1	<3	0.786	8
MW-7	01/17/07	<1	6.5	<1	<1	<3	0.761	7
MW-7	02/21/07	<1	5.9	<1	<1	<3	0.785	6
MW-7	03/28/07	<1	8.2	<1	<1	<3	1.156	8
MW-7	04/25/07	<1	11.5	<1	<1	<3	1.096	12
MW-7	05/15/07	<1	12.1	<1	<1	<3	1.259	12
MW-7	06/13/07	<1	10.1	<1	<1	<3	1.110	11
MW-7	09/11/07	<1	9.5	<1	<1	<3	0.852	10
MW-8	08/14/06	ND	ND	ND	ND	ND	NA	0
MW-8	09/18/06	ND	ND	ND	ND	ND	NA	0
MW-8	12/12/06	<1	<1	<1	<1	<3	<0.2	0
MW-8	01/17/07	<1	<1	<1	<1	<3	<0.2	0
MW-8	02/21/07	<1	<1	<1	<1	<3	<0.2	0
MW-8	03/28/07	<1	<1	<1	<1	<3	<0.2	0
MW-8	04/25/07	<1	<1	<1	<1	<3	<0.2	0
MW-8	05/15/07	<1	<1	<1	<1	<3	<0.2	0
MW-8	06/13/07	<1	<1	<1	<1	<3	<0.2	0
MW-8	09/11/07	<1	<1	<1	<1	<3	<0.2	0
MW-9	08/14/06	ND	2600	60.5	80.5	374	NA	3,115
MW-9	09/18/06	ND	3080	208	308	1190	NA	4,786
MW-9	10/20/06	ND	3110	92	340	1070	NA	4,612
MW-9	12/12/06	<10	3547	12.5	282.6	410.7	9.616	4,253
MW-9	01/17/07	<10	4166	22	298.4	501.2	10.30	4,998
MW-9	02/21/07	<10	2933	19.1	254.9	522.7	9.23	3,739
MW-9	03/28/07	<10	3836	31.7	332.6	747.1	10.01	4,957
MW-9	04/25/07	<50	4034	122.5	602.6	1975	15.93	6,750
MW-9	05/15/07	<50	3760	169.1	1135	5112	30.67	10,207
MW-9	06/13/07	<50	3819	410.2	703.3	2590	21.67	7,544
MW-9	09/11/07	<50	3302	<50	836	2524	21.55	6,684
MW-10	08/14/06	ND	14200	55600	6400	36700	NA	112,900
MW-10	09/18/06	ND	14600	53200	12100	75100	NA	155,000
MW-10	12/12/06	FP	0.10 ft					
MW-10	01/17/07	FP	0.20 ft					
MW-10	02/21/07	FP	0.19 ft					
MW-10	03/28/07	FP	0.19 ft					
MW-10	04/25/07	FP	0.03 ft					
MW-10	05/15/07	<500	10610	22310	4199	30660	140.6	67,920
MW-10	06/13/07	<500	7941	13160	2823	23930	118.5	47,973
MW-10	09/11/07	<200	7468	3673	3810	23730	90.32	38,771

GROUNDWATER QUALITY MONITORING (Continued)

Well ID	Date	MTBE ppb	Benzene ppb	Toluene ppb	Ethylbenz. ppb	Xylenes (total) ppb	GRO (TPH) mg/l	BTEX ppb
MW-11	08/14/06	ND	150.0	ND	ND	ND	NA	150
MW-11	09/18/06	ND	106.0	ND	ND	ND	NA	106
MW-11	10/20/06	ND	256.0	ND	ND	ND	NA	256
MW-11	12/12/06	<1	194.6	<1	<1	<3	0.338	195
MW-11	01/17/07	<1	188	<1	<1	<3	0.383	188
MW-11	02/21/07	<1	159.5	<1	<1	<3	0.319	160
MW-11	03/28/07	<1	166.1	<1	<1	<3	0.274	166
MW-11	04/25/07	<1	170.3	<1	<1	<3	0.285	170
MW-11	05/15/07	<1	182.9	<1	<1	<3	0.275	183
MW-11	06/13/07	<1	419.5	<1	<1	<3	0.653	420
MW-11	09/12/07	<1	704.2	<1	10	6.6	1.135	722
MW-12	06/13/07	<100	3730	3357	1271	7145	39.35	15,542
MW-12	09/11/07	<100	2132	293.2	760.8	3755	22.47	6,963
MW-13	06/13/07	<1	<1	<1	<1	<3	<0.2	0
MW-13	09/12/07	<1	<1	<1	<1	<3	<0.2	0
MW-14	06/13/07	<1	<1	<1	<1	<3	<0.2	0
MW-14	09/12/07	<1	<1	<1	<1	<3	<0.2	0
MW-15	06/13/07	<100	4976	704.6	808.3	3966	27.25	10,482
MW-15	09/11/06	<50	3384	<50	228.9	468.6	7.966	4,089
MW-16	06/13/07	<100	2615	1756	795.1	5110	27.88	10,304
MW-16	09/11/07	<100	2737	716.6	756.1	4587	24.48	8,821
MW-17	06/13/07	<100	4323	5374	1620	8815	48	20,180
MW-17	09/11/07	<100	2126	470.8	769	4049	22.63	7,437
MW-18	06/13/07	<100	7620	7792	2913	17030	76.84	35,432
MW-18	09/11/07	<100	5926	572.7	2527	12570	51.55	21,647
MW-19	06/13/07	<1	<1	<1	<1	<3	<0.2	0
MW-19	09/11/07	<1	<1	<1	<1	<3	<0.2	0
MW-20	06/13/07	<10	2170	71.8	79.9	231.1	4.56	2,557
MW-20	09/12/07	<10	1377	<10	37.3	42.7	2.716	1,460
MW-21	09/26/07	<100	1866	<10	76.5	91.4	3.69	2,038
MW-22	09/26/07	<1	364.6	49.6	42.7	259.3	3.089	719
MW-23	09/26/07	<10	567.6	<10	234.4	1027	5.780	1,835
MW-24	09/26/07	<10	2609	1954	330.2	1675	12.81	6,581
MW-17D	06/13/07	<100	4447	5432	1629	8924	47.26	20,479
REC-1	06/13/07	<50	2793	1519	468.9	2796	16.76	7,594
REC-1	09/11/07	<50	1819	58.3	394.6	1102	11.20	3,385
PSC Well	10/20/06	ND	4860	191	3470	3470	ND	11,991

GROUNDWATER QUALITY MONITORING (Continued)

Well ID	Date	MTBE ppb	Benzene ppb	Toluene ppb	Ethylbenz. ppb	Xylenes (total) ppb	GRO (TPH) mg/l	BTEX ppb
Domestic Wells								
D K. Well	11/03/05	ND	764	ND	ND	ND	ND	764
D K. Well	12/22/05	ND	2320	ND	ND	ND	ND	2,320
D K. Well	01/24/06	ND	3080	ND	ND	ND	ND	3,080
D K. Well	03/07/06	ND	2930	ND	ND	ND	ND	2,930
D K. Well	05/18/06	ND	4770	20.4	6.8	26.2	ND	4,823
D K. Well	08/14/06	ND	5360	ND	ND	95	ND	5,455
D K. Well	09/18/06	ND	6240	20.6	94	222	ND	6,577
D K. Well	10/20/06	ND	5500	ND	82	230	ND	5,812
D K. Well	01/29/07	Broken piping - no access						
D K. Well	04/24/07	Broken piping - no access						
D K. Well	07/23/07	<10	3704	<10	348.6	766.1	10.74	4,819
Folden Q.	09/29/05	ND	ND	ND	ND	ND	ND	
Folden Q.	10/20/06	ND	ND	ND	ND	ND	ND	
Folden Q.	01/29/07	<1	<1	<1	<1	<3	<0.2	
Folden Q.	04/24/07	<1	<1	<1	<1	<3	<0.2	
Folden Q.	07/23/07	<1	<1	<1	<1	<3	<0.2	
Folden Q.	09/11/07	<1	<1	<1	<1	<3	<0.2	
Folden Pas	01/29/07	<1	<1	<1	<1	<3	<0.2	
Folden Pas	04/24/07	<1	<1	<1	<1	<3	<0.2	
Folden Pas	07/23/07	<1	<1	<1	<1	<3	<0.2	
Folden Pas	09/11/07	<1	<1	<1	<1	<3	<0.2	
Brunsell	10/20/06	ND	ND	ND	ND	ND	ND	
Brunsell	01/29/07	<1	<1	<1	<1	<3	<0.2	
Brunsell	04/24/07	<1	<1	<1	<1	<3	<0.2	
Brunsell	07/23/07	<1	<1	<1	<1	<3	<0.2	
Brunsell	09/12/07	<1	<1	<1	<1	<3	<0.2	
Zeisler	10/20/06	ND	ND	ND	ND	ND	ND	
Zeisler	01/29/07	<1	<1	<1	<1	<3	<0.2	
Zeisler	04/24/07	<1	<1	<1	<1	<3	<0.2	
Zeisler	07/23/07	<1	<1	<1	<1	<3	<0.2	
Zeisler	09/12/07	<1	<1	<1	<1	<3	<0.2	
Fitzgerald	10/20/06	ND	ND	ND	ND	ND	ND	
Fitzgerald	01/29/07	Owner absent - no acess						
Fitzgerald	02/21/07	<1	<1	<1	<1	<3	<0.2	
Fitzgerald	04/24/07	<1	<1	<1	<1	<3	<0.2	
Fitzgerald	07/23/07	<1	<1	<1	<1	<3	<0.2	
Fitzgerald	09/12/07	<1	<1	<1	<1	<3	<0.2	
Seney	10/20/06	ND	ND	ND	ND	ND	ND	
Seney	01/29/07	<1	<1	<1	<1	<3	<0.2	
Seney	04/24/07	<1	<1	<1	<1	<3	<0.2	
Seney	07/23/07	<1	<1	<1	<1	<3	<0.2	
Seney	09/12/07	<1	<1	<1	<1	<3	<0.2	
Joe K.	10/20/06	ND	ND	ND	ND	ND	ND	
Joe K.	01/29/07	<1	<1	<1	<1	<3	<0.2	
Joe K.	04/24/07	<1	<1	<1	<1	<3	<0.2	
Joe K.	07/23/07	<1	<1	<1	<1	<3	<0.2	
Joe K.	09/12/07	<1	<1	<1	<1	<3	<0.2	

GROUNDWATER QUALITY MONITORING (Continued)

Well ID	Date	MTBE ppb	Benzene ppb	Toluene ppb	Ethylbenz. ppb	Xylenes (total) ppb	GRO (TPH) mg/l	BTEX ppb
Ebach	07/23/07	<1	<1	<1	<1	<3	<0.2	
Ebach	09/12/07	<1	<1	<1	<1	<3	<0.2	

NA - not analyzed
ND - not detected

Well ID	Date	MTBE ppb	Benzene ppb	Toluene ppb	Ethylbenz. ppb	Xylenes (total) ppb	GRO (TPH) mg/l	BTEX ppb
MW-5D	12/12/06	<1	92.4	<1	1.8	<3	0.208	94
MW-4D	01/17/06	<14	1532	1.2	19.7	19.6	3.052	1,573
MW-11D	02/21/07	<1	141.6	<1	<1	<3	0.337	0
MW-7D	03/28/07	<5	10.9	<5	<5	<15	1.398	11
MW-11D	04/25/07	<1	152.4	<1	<1	<3	0.273	152
MW-4D	05/15/07	<100	6558	526.4	750	2050	21.16	9,884
MW-4D	09/11/07	<100	4318	<100	421.4	574.1	10.34	5,324

NA - not analyzed
ND - not detected

APPENDIX I-3

BIODEGRADATION INDICATORS AND IN WELL PARAMETERS

COC AND SELECTED BIODEGRADATION INDICATORS

		MW-2	MW-2	MW-3	MW-3	MW-6	MW-6	MW-9	MW-9	MW-11	MW-11
		06/12/07	09/11/07	06/12/07	09/11/07	06/13/07	09/12/07	06/13/07	09/11/07	06/13/07	09/12/07
MTBE	ppb	<1	<1	<1	<1	<10	<10	<50	<50	<1	<1
Benzene	ppb	<1	<1	<1	<1	1109	1176	3819	3302	419.5	704.2
Toluene	ppb	<1	<1	<1	<1	14.4	<10	410.2	<50	<1	<1
Ethyl Benzene	ppb	<1	<1	<1	<1	89.3	51.8	703.3	836	<1	10
Xylenes Total)	ppb	<3	<3	<3	<3	206.3	63.2	2590	2524	<3	6.6
Sulfate	mg/l	3100	2990	329	193	344	424	550	731	950	777
Nitrate-Nitrite as N	mg/l	18.5	23.4	5.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ammonia-Nitrogen as N	mg/l	0.3	0.12	0.27	0.32	0.23	0.27	0.11	0.36	0.24	0.27
Phosphorus P (total)	mg/l	0.43	0.75	0.19	0.2	0.41	0.32	0.93	0.94	0.85	0.42
BOD	mg/l	<2	<2	<2	<2	62.6	<20	17.9	<20	6.09	<20
Fe (total)	mg/l	1.27	7.8	8.4	7.05	16.5	12	22.3	9.38	13.7	9.48
Mn (total)	mg/l	0.79	1.01	0.44	0.43	0.68	0.69	1.93	0.51	0.71	0.52
DO	(mg/l)	0.63	2.63	2.43	1.35	1.5	2.16	1.07	1.85	1.76	1.56
ORP	(mV)	48.3	105.3	12.1	110.4	-82.2	38.1	-119.8	-45.2	-19.8	40.3
EC	(µS/cm)	4971	5390	1743	1462	1600	1263	2189	2270	2011	2156
pH		6.35	5.78	7.63	6.85	7.35	6.55	7.53	6.43	6.84	6.19
Temperature	(°C)	9.23	10.6	8.97	10.5	8.94	7.58	9.38	9.32	9.75	8.35

BOD - Biological Oxygen Demand
DO - Dissolved Oxygen
ORP - Oxidation/Reduction Potential
EC - Electrical Conductivity
NA - Not analyzed, low sample volume
Wells were sampled for BTEX on 9/12/07 and for biodegradation indocators on 10/3/2007

COC AND SELECTED BIODEGRADATION INDICATORS

		MW-12	MW-12	MW-13	MW-13	MW-18	MW-18	MW-20	MW-20
		06/13/07	09/11/07	06/13/07	09/12/07	06/13/07	09/11/07	06/13/07	09/12/07
MTBE	ppb	<100	<100	<1	<1	<100	<100	<10	<10
Benzene	ppb	3730	2132	<1	<1	7620	5926	2170	1377
Toluene	ppb	3357	293.3	<1	<1	7792	572.7	71.8	<10
Ethyl Benzene	ppb	1271	760.8	<1	<1	2913	2527	79.9	37.3
Xylenes Total)	ppb	7145	3755	<3	<3	17030	12570	231.1	42.7
Sulfate	mg/l	1200	1030	782	720	412	260	1620	929
Nitrate-Nitrite as N	mg/l	0.83	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ammonia-Nitrogen as N	mg/l	1.91	0.59	0.44	0.39	0.33	0.44	4.31	0.4
Phosphorus P (total)	mg/l	0.41	0.39	0.16	0.19	0.29	0.55	2.71	0.97
BOD	mg/l	47	41.2	<6	<20	40.4	NA	240	56.9
Fe (total)	mg/l	23.8	25.7	3.71	3.92	7.84	12.7	120	38
Mn (total)	mg/l	1.54	1.39	0.47	0.42	1.06	1.22	4.86	1.74
DO	(mg/l)	1.29	3.38	1.17	1.5	2.37	3.19	2.16	1.99
ORP	(mV)	-32.7	-36.9	-12.2	41.8	-46.3	-51.2	-64.2	38.8
EC	(µS/cm)	2569	2447	2112	2381	1855	1980	1704	2634
pH		6.76	6.29	6.86	6.36	6.86	6.63	7.07	6.34
Temperature	(°C)	11.75	10.41	9.68	9.45	8.6	7.76	10.06	8.37

BOD - Biological Oxygen Demand
DO - Dissolved Oxygen
ORP - Oxidation/Reduction Potential
EC - Electrical Conductivity
NA - Not analyzed, low sample volume
Wells were sampled for BTEX on 9/12/07 and for biodegradation indocators on 10/3/2007

WATER QUALITY PARAMETERS AS MEASURED WITH YSI MULITIPROBE SYSTEM IN W

Monitoring Wells

Well ID	Date	Time	DO (mg/l)	ORP (mV)	EC (µS/cm)	pH	Temp (°C)
MW-1	12/11/06	Free product					
MW-1	1/17/2007	Free product					
MW-1	02/21/07	Free product					
MW-1	03/28/07	Well Dry, very strong HC odor					
MW-1	04/25/07	Free product					
MW-1	05/15/07	Free product					
MW-1	06/13/07	7:30 PM	1.17	-83.3	1868	7.12	10.28
MW-1	09/11/07	Free product					
MW-2	12/11/06	2:40 PM	2.72	251.3	5078	6.52	8.9
MW-2	01/17/07	8:45 AM	1.97	113.4	4622	6.42	9.49
MW-2	02/21/07	9:00 AM	1.60	136.7	4243	6.71	8.45
MW-2	03/28/07	Well frozen inaccessible					
MW-2	04/25/07	8:45 AM	2.05	115.2	3478	6.05	9.37
MW-2	05/15/07	8:15 AM	1.78	128.1	3209	5.86	9.31
MW-2	06/12/07	5:43 PM	0.63	48.3	4971	6.35	9.23
MW-2	09/11/07	9:00 AM	2.16	101.3	5937	5.49	9.06
MW-2	10/03/07	5:00 PM	2.63	105.3	5390	5.78	10.6
MW-3	12/11/06	5:00 PM	2.46	207.1	1156	7.06	10.38
MW-3	01/17/07	9:45 AM	1.62	259.3	1259	7.36	8.64
MW-3	02/21/07	10:15 AM	2.43	220.8	1275	7.6	8.07
MW-3	03/28/07	8:50 AM	1.50	-66.2	1565	7.16	8.36
MW-3	04/25/07	9:15 AM	1.09	91.4	1752	6.68	8.29
MW-3	05/15/07	9:15 AM	2.51	44.3	1654	7.04	7.08
MW-3	06/12/07	6:20 PM	2.43	12.1	1743	7.63	8.97
MW-3	09/11/07	9:45 AM	1.43	74.8	1417	7.01	9.06
MW-3	10/03/07	5:30 PM	1.35	110.4	1462	6.85	10.5
MW-4	12/11/06	3:30 PM	1.25	172.3	1746	6.35	8.32
MW-4	01/17/07	3:45 PM	1.74	230.2	1780	6.87	7.52
MW-4	02/21/07	10:54 AM	1.24	130.8	1767	6.57	7.85
MW-4	03/28/07	11:50 AM	0.64	-130.4	1868	6.73	8.57
MW-4	04/25/07	11:40 AM	1.44	-101.5	1576	6.9	9.05
MW-4	05/15/07	12:15 PM	1.92	-98.5	1602	6.76	9.2
MW-4	06/13/07	3:00 PM	1.06	-119.3	1956	7.54	10.41
MW-4	09/11/07	4:30 PM	1.37	-73.9	2027	6.28	10.58
MW-5	12/11/06	11:05 AM	3.65	185.3	1759	6.58	7.23
MW-5	01/17/07	2:55 PM	3.73	195.1	1752	7.1	6.35
MW-5	02/21/07	2:00 PM	1.38	83.7	1714	7.09	6.97
MW-5	03/28/07	9:50 AM	1.26	-101.3	1767	6.45	7.62
MW-5	04/25/07	11:00 AM	1.4	-166.9	1630	7.13	8.16
MW-5	05/15/07	10:10 AM	0.85	-107.3	1712	6.86	8.41
MW-5	06/13/07	10:20 AM	3.02	-83.7	1980	7.01	8.48
MW-5	09/11/07	5:10 PM	1.09	-79.2	2195	6.1	9.37
MW-6	12/11/06	1:00 PM	2.16	100.1	1204	6.75	7.38
MW-6	01/17/07	12:10 PM	1.22	128.7	1459	7	6.64
MW-6	02/21/07	12:00 PM	1.00	96.8	1454	6.72	6.76
MW-6	03/28/07	12:35 PM	1.37	-29.8	1509	6.2	7.53
MW-6	04/25/07	12:15 PM	1.19	-7.3	1112	6.71	8.24
MW-6	05/15/07	5:30 PM	2.25	-79.1	1459	6.94	8.02
MW-6	06/13/07	3:30 PM	1.5	-82.2	1600	7.35	8.94
MW-6	09/12/07	11:45 AM	1.36	8.6	1524	6.08	8.93
MW-6	10/04/07	9:00 AM	2.16	38.1	1263	6.55	7.58

WATER QUALITY PARAMETERS AS MEASURED WITH YSI MULITIPROBE SYSTEM IN WI

Monitoring Wells

Well ID	Date	Time	DO (mg/l)	ORP (mV)	EC (µS/cm)	pH	Temp (°C)
MW-7	12/11/06	9:10 AM	3.53	233.4	2317	6.25	7.36
MW-7	01/17/07	12:45 PM	5.36	175.1	2364	7.1	6.37
MW-7	02/21/07	12:30 PM	2.02	123.8	2490	6.97	6.57
MW-7	03/28/07	11:05 AM	1.49	-130.9	2597	6.57	7.77
MW-7	04/25/07	10:00 AM	1.36	-156.6	2178	7.16	9.01
MW-7	05/15/07	11:30 AM	1.36	-134.2	2285	6.99	8.28
MW-7	06/13/07	7:45 AM	1.68	-77.6	2415	6.96	8.59
MW-7	09/11/07	6:40 PM	2.31	-98	2502	6.13	8.45
MW-8	12/11/06	10:00 AM	1.39	222.3	1814	7.15	7.89
MW-8	01/17/07	1:13 PM	4.56	145.3	1706	7.23	6.95
MW-8	02/21/07	1:00 PM	3.27	110.2	1685	7.86	7.47
MW-8	03/28/07	10:45 AM	2.32	-67.6	1784	7.23	7.92
MW-8	04/25/07	1:45 PM	2.35	3.5	1645	7.39	8.4
MW-8	05/15/07	11:10 AM	11.32	-8.2	1612	7.32	8.64
MW-8	06/13/07	8:20 AM	5.74	-1	1854	7.43	8.43
MW-8	09/11/07	6:20 PM	3.13	35.1	1889	7.43	8.72
MW-9	12/11/06	4:00 PM	1.10	73.1	1757	6.38	8.2
MW-9	01/17/07	10:30 AM	1.56	37.3	1754	7.39	7.88
MW-9	02/21/07	3:00 PM	0.90	-47.6	1861	7.56	8.32
MW-9	03/28/07	1:50 PM	0.67	-236.9	1961	7.36	8.59
MW-9	04/25/07	2:30 PM	1.96	-175.7	1757	7.38	9.37
MW-9	05/15/07	5:50 PM	1.1	-159.6	1753	7.2	8.8
MW-9	06/13/07	3:40 PM	1.07	-119.8	2189	7.53	9.38
MW-9	09/11/07	1:40 PM	2.28	-118.8	2110	6.22	9.3
MW-9	10/03/07	6:30 PM	1.85	-45.2	2270	6.43	9.32
MW-10	12/11/06	Free product					
MW-10	01/17/07	Free product					
MW-10	02/21/07	Free product					
MW-10	03/28/07	Free product					
MW-10	04/25/07	Free product					
MW-10	05/15/07	10:30 AM	1.9	-113.8	1358	6.86	8.46
MW-10	06/13/07	9:45 AM	1.5	-91.2	1661	7.02	8.42
MW-10	09/11/07	5:40 PM	2.92	-130.7	2352	6.5	9.54
MW-11	12/11/06	12:15 PM	1.22	248.3	1780	6.33	7.64
MW-11	01/17/07	11:29 AM	2.69	160.2	1781	6.74	6.66
MW-11	02/21/07	11:30 AM	1.56	144.3	1734	6.48	7
MW-11	03/28/07	1:15 PM	1.08	-26.5	1790	6.18	7.8
MW-11	04/25/07	1:00 PM	1.79	60.1	1614	6.4	8.94
MW-11	05/15/07	5:20 PM	1.48	15.3	1601	6.54	8.53
MW-11	06/13/07	11:40 AM	1.76	-19.8	2011	6.84	9.75
MW-11	09/12/07	10:45 AM	2.42	17.1	2171	6.05	8.15
MW-11	10/03/07	7:30 PM	1.56	40.3	2156	6.19	8.35
MW-12	06/13/07	5:00 PM	1.29	-32.7	2569	6.76	11.75
MW-12	09/11/07	12:45 PM	1.27	-66.8	2284	5.91	9.88
MW-12	10/03/07	6:00 PM	3.38	-36.9	2447	6.29	10.41
MW-13	06/13/07	10:45 AM	1.17	-12.2	2112	6.86	9.68
MW-13	09/12/07	12:30 PM	2.13	42.6	2481	6.16	9.83
MW-13	10/04/07	7:00 PM	1.5	41.8	2381	6.36	9.45

WATER QUALITY PARAMETERS AS MEASURED WITH YSI MULITIPROBE SYSTEM IN WI

Monitoring Wells

Well ID	Date	Time	DO (mg/l)	ORP (mV)	EC (µS/cm)	pH	Temp (°C)
MW-14	06/13/07	1:00 PM	1.29	-3.1	2837	7.01	8.68
MW-14	09/12/07	9:50 AM	1.97	82.6	3307	5.96	7.7
MW-15	06/13/07	7:00 PM	1.1	-90.5	2126	7.39	10.28
MW-15	09/11/07	3:40 PM	1.21	-83.2	2333	6.36	9.98
MW-16	06/13/07	4:14 PM	1.63	-34.9	4524	7.1	10.16
MW-16	09/11/07	2:05 PM	2.22	-97.7	2029	5.82	9.8
MW-17	06/13/07	NA	0.77	-79.4	1831	6.76	9.75
MW-17	09/11/07	1:00 PM	1.79	-89.4	2143	5.95	9.82
MW-18	06/13/07	NA	2.37	-46.3	1855	6.86	8.6
MW-18	09/11/07	5:50 PM	1.83	-113.8	2165	6.23	9.37
MW-18	10/04/07	11:30 AM	3.19	-51.2	1980	6.63	7.76
MW-19	06/13/07	NA	2.4	-36.5	1320	7.81	8.87
MW-19	09/11/07	2:45 PM	0.93	41.3	1618	6.61	9.73
MW-20	06/13/07	NA	2.16	-64.2	1704	7.07	10.06
MW-20	09/12/07	9:00 AM	3.2	-6.3	2462	6.54	8.47
MW-20	10/04/07	10:00 AM	1.99	38.8	2634	6.34	8.37
MW-21	09/26/07	2:00PM	2.21	43.3	2196	5.9	9.76
MW-22	09/26/07	1:35 PM	2.26	41.6	1618	5.56	9.47
MW-23	09/26/07	1:45 PM	3.08	42.2	1460	5.5	9.17
MW-24	09/26/07	1:20 PM	1.83	42.8	1520	5.9	10.06
REC-1	06/13/07	NA	1.81	-63.1	2103	7.03	9.8
REC-1	09/11/07	12:35 PM	2.13	33.4	3177	5.82	9.51

APPENDIX I-4

VAPOR MONITORING

Garrison Vapor Monitoring Wells

PID Reading (ppm)

Well ID	12/12/06	01/17/07	02/20/07	03/28/07	04/24/07	05/14/07	06/12/07	09/10/07
VW-1	213	379	527	604	678	643	582	516
VW-2	450	389.0	704.0	678.0	309	562	274	347
VW-3	615	604.0	498.0	445.0	441	491	485	457
VW-4	1147	646.0	417.0	212.0	543	562	540	737
VW-5	916	833.0	798.0	704.0	688	843	854	832
VW-6	829	681.0	680.0	661.0	608	787	636	514
VW-7	22.7	91.4	660.0	673.0	703	914	715	690
VW-8	78.4	0.0	22.8	35.1	31.9	52.1	29.4	24.3
VW-9	294	20.6	22.7	68.4	67.8	84.7	53.7	32.4
VW-10	1151	585.0	566.0	511.0	473	583	452	385
VW-11	422	181.0	580.0	373.0	365	450	367	276
VW-12	852	335.0	358.0	365.0	327	262	202	152
VW-13	208	69.7	32.5	44.3	41.7	45.7	23.8	28.3
VW-14							626	825
VW-15							446	662
VW-16							603	483
VW-17								434
VW-18								445

FID Reading (ppm)

Well ID	12/12/06	01/17/07	02/20/07	03/28/07	04/24/07	05/14/07	06/12/07	09/10/07
VW-1	2011	2840	OL	OL	OL	OL	OL	OL
VW-2	OL	OL	OL	OL	OL	OL	OL	OL
VW-3	OL	OL	OL	40,000	OL	OL	OL	OL
VW-4	OL	OL	OL	140	OL	OL	OL	OL
VW-5	OL	6453	OL	OL	OL	OL	OL	OL
VW-6	1858	OL	OL	OL	46,450	46,450	43,759	50,000
VW-7	0	197	9853	35,000	50,000	50,000	49,352	50,000
VW-8	8.7	0	3	85	111.3	51.3	94.3	43.9
VW-9	0	0	OL	14,000		2,053	786	156
VW-10	275	OL	49,075	OL	37,453	42,214	27,224	2,873
VW-11	257	968.9	7,355	4,011	14,822	13,185	11,487	2,285
VW-12	443	2404	8,053	5,500		3,255	3,357	642
VW-13	110	0	102	242	246.3	166.7	178.3	35.4
VW-14							OL	OL
VW-15							OL	OL
VW-16							OL	OL
VW-17								OL
VW-18								OL

OL - overloaded FID > 50000 (calibrated on methane)

APPENDIX J

COMPLETE ANALYTICAL DOCUMENTATION

APPENDIX J-1

SOIL ANALYSES

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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51 L Avenue ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com
MEMBER ACIL

Report Date: 25 Sep 07
Lab Number: 07-N6874
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 11 Sep 07 8:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB53 48-50
M2552

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5035/5030	18 Sep 07	RDC
Benzene	15400	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Toluene	4831	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Ethyl Benzene	665.3	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Xylenes (Total)	1455	ppb	3.0	8021/5035/5030	18 Sep 07	RDC
GRO (TPH)	120	mg/Kg	0.20	8015B/OA1	19 Sep 07	RDC

BTEX SURROGATE RECOVERY: 128 %

GRO SURROGATE RECOVERY: 92 %

GRO(TPH) pattern is characteristic of gasoline.
BTEX surrogate AAA-TFT was out of acceptable range due to matrix interference.
GRO(TPH) matrix spike and matrix spike duplicate recoveries were out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 25 Sep 07
Lab Number: 07-N6875
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 11 Sep 07 13:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB54 57-59
M2553

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5035/5030	18 Sep 07	RDC
Benzene	1875	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Toluene	1.7	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Ethyl Benzene	4.5	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Xylenes (Total)	14.2	ppb	3.0	8021/5035/5030	18 Sep 07	RDC
GRO (TPH)	0.78	mg/Kg	0.20	8015B/OA1	18 Sep 07	RDC

BTEX SURROGATE RECOVERY: 104 %

GRO SURROGATE RECOVERY: 78 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 25 Sep 07
Lab Number: 07-N6876
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 11 Sep 07 15:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Temp at Receipt: 3.0 C

Sample Description: SB55 22
M2554

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5035/5030	19 Sep 07	RDC
Benzene	5020	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Toluene	8028	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Ethyl Benzene	1139	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Xylenes (Total)	9033	ppb	3.0	8021/5035/5030	19 Sep 07	RDC
GRO (TPH)	85	mg/Kg	0.20	8015B/OA1	19 Sep 07	RDC

BTEX SURROGATE RECOVERY: 112 %

GRO SURROGATE RECOVERY: 114 %

GRO(TPH) pattern is characteristic of gasoline.
GRO(TPH) matrix spike and matrix spike duplicate recoveries were out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 25 Sep 07
Lab Number: 07-N6877
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 11 Sep 07 15:30
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB55 23
M2555

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 500 #	ppb	1	8021/5035/5030	20 Sep 07	RDC
Benzene	20680	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Toluene	39910	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Ethyl Benzene	5016	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Xylenes (Total)	92520	ppb	3.0	8021/5035/5030	20 Sep 07	RDC
GRO (TPH)	560	mg/Kg	0.20	8015B/OA1	20 Sep 07	RDC

BTEX SURROGATE RECOVERY: 113 %

GRO SURROGATE RECOVERY: 106 %

GRO(TPH) pattern is characteristic of gasoline.
GRO(TPH) matrix spike and matrix spike duplicate recoveries were out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB56 22
M2556

Report Date: 25 Sep 07
Lab Number: 07-N6878
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 8:00
Date Received: 14 Sep 07
PO #: GARRISON

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 200 #	ppb	1	8021/5035/5030	20 Sep 07	RDC
Benzene	9804	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Toluene	12660	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Ethyl Benzene	2559	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Xylenes (Total)	18250	ppb	3.0	8021/5035/5030	20 Sep 07	RDC
GRO (TPH)	180	mg/Kg	0.20	8015B/OA1	20 Sep 07	RDC

BTEX SURROGATE RECOVERY: 110 %

GRO SURROGATE RECOVERY: 106 %

GRO(TPH) pattern is characteristic of gasoline.
GRO(TPH) matrix spike and matrix spike duplicate recoveries were out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB56 24
M2557

Report Date: 25 Sep 07
Lab Number: 07-N6879
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 8:30
Date Received: 14 Sep 07
PO #: GARRISON

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5035/5030	18 Sep 07	RDC
Benzene	5616	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Toluene	4582	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Ethyl Benzene	1962	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Xylenes (Total)	9740	ppb	3.0	8021/5035/5030	18 Sep 07	RDC
GRO (TPH)	62	mg/Kg	0.20	8015B/OA1	20 Sep 07	RDC

BTEX SURROGATE RECOVERY: 104 %

GRO SURROGATE RECOVERY: 108 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 25 Sep 07
Lab Number: 07-N6880
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 9:30
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB57 22
M2558

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5035/5030	18 Sep 07	RDC
Benzene	1061	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Toluene	1140	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Ethyl Benzene	460.4	ppb	1.0	8021/5035/5030	18 Sep 07	RDC
Xylenes (Total)	3212	ppb	3.0	8021/5035/5030	18 Sep 07	RDC
GRO (TPH)	35	mg/Kg	0.20	8015B/OA1	18 Sep 07	RDC

BTEX SURROGATE RECOVERY: 108 %

GRO SURROGATE RECOVERY: 102 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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MEMBER ACIL

Report Date: 25 Sep 07
Lab Number: 07-N6881
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 10:30
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB58 23
M2559

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5035/5030	19 Sep 07	RDC
Benzene	2914	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Toluene	4659	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Ethyl Benzene	1534	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Xylenes (Total)	6790	ppb	3.0	8021/5035/5030	19 Sep 07	RDC
GRO (TPH)	74	mg/Kg	0.20	8015B/OA1	19 Sep 07	RDC

BTEX SURROGATE RECOVERY: 115 %

GRO SURROGATE RECOVERY: 125 %

GRO(TPH) pattern is characteristic of gasoline.
GRO surrogate BrFB was out of acceptable range due to matrix interference.
GRO(TPH) matrix spike and matrix spike duplicate recoveries were
out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 25 Sep 07
Lab Number: 07-N6882
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 11:30
Date Received: 14 Sep 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: SB59 18
M2560

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5035/5030	20 Sep 07	RDC
Benzene	7.2	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Toluene	5.8	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Ethyl Benzene	1.2	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Xylenes (Total)	3.7	ppb	3.0	8021/5035/5030	20 Sep 07	RDC
GRO (TPH)	< 0.2	mg/Kg	0.2	8015B/OA1	20 Sep 07	RDC

BTEX SURROGATE RECOVERY: 107 %

GRO SURROGATE RECOVERY: 85 %

GRO(TPH) matrix spike and matrix spike duplicate recoveries were out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING LAB
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Report Date: 25 Sep 07
Lab Number: 07-N6883
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 13:30
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SB60 20
M2561

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 200 #	ppb	1	8021/5035/5030	20 Sep 07	RDC
Benzene	5441	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Toluene	15010	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Ethyl Benzene	3561	ppb	1.0	8021/5035/5030	20 Sep 07	RDC
Xylenes (Total)	16540	ppb	3.0	8021/5035/5030	20 Sep 07	RDC
GRO (TPH)	170	mg/Kg	0.20	8015B/OA1	20 Sep 07	RDC

BTEX SURROGATE RECOVERY: 110 %

GRO SURROGATE RECOVERY: 115 %

GRO(TPH) pattern is characteristic of gasoline.
GRO(TPH) matrix spike and matrix spike duplicate recoveries were out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 25 Sep 07
Lab Number: 07-N6884
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 14:00
Date Received: 14 Sep 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: SB60 23
M2562

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5035/5030	19 Sep 07	RDC
Benzene	3540	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Toluene	4139	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Ethyl Benzene	1589	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Xylenes (Total)	7932	ppb	3.0	8021/5035/5030	19 Sep 07	RDC
GRO (TPH)	77	mg/Kg	0.20	8015B/OA1	19 Sep 07	RDC

BTEX SURROGATE RECOVERY: 111 %

GRO SURROGATE RECOVERY: 134 %

GRO(TPH) pattern is characteristic of gasoline.
GRO surrogate BrFB was out of acceptable range due to matrix interference.
GRO(TPH) matrix spike and matrix spike duplicate recoveries were
out of acceptable range. All other QC was acceptable.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 25 Sep 07
Lab Number: 07-N6885
Work Order #: 81-1086
Account #: 019519
Sample Matrix: SOIL
Date Sampled: 12 Sep 07 15:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Temp at Receipt: 3.0 C

Sample Description: SB61 15
M2563

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 @	ppb	1	8021/5035/5030	19 Sep 07	RDC
Benzene	109.1	ppb	1.0	8021/5035/5030	19 Sep 07	RDC
Toluene	< 50 @	ppb	1	8021/5035/5030	19 Sep 07	RDC
Ethyl Benzene	< 50 @	ppb	1	8021/5035/5030	19 Sep 07	RDC
Xylenes (Total)	< 150 @	ppb	3	8021/5035/5030	19 Sep 07	RDC
GRO (TPH)	< 10	mg/Kg	0.2	8015B/OA1	19 Sep 07	RDC

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 91 %

GRO(TPH) pattern is not characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

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1411 South 12th Street
Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

WORK ORDER # 81-1086

Company Name and Address:
EERC
15 N. 23rd
GRAND FORKS, ND 58202

Account #:

Contact: B. BOTNEN

Phone #: 701 777-5073

Name of Sampler:
" "

Fax #:
For faxed report check box ☐

Billing Address (indicate name and address if different from above):
SB ENGINEERING

Quote #:

Date Submitted:

Project Name/Number:
GARRISON SOILS

Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance): Soil	Water	Food	Other (Please Be Specific)	Analyze For: Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	MBTEX + GRO (GPH)
M2552	SB53 48-50		9/11/07 0800	X				
M2553	SB54 57-59		9/11/07 1300					
M2554	SB 55 22		9/11/07 1500					
M2555	SB 55 23		9/11/07 1530					
M2556	SB 56 22		9/12/07 0800					
M2557	SB 56 24		9/12/07 0830					
M2558	SB 57 22		9/12/07 0830					
M2559	SB 58 23		9/12/07 1030					
M2560	SB 59 18		9/12/07 1130					
M2561	SB 60 20		9/12/07 1330					

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1				Tera L Olson		12 Sept 07 1700	
2							
3							

Disposal Comments:

Disposed of By:

We will return the completed original with your results.

CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

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Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

WORK ORDER # 81-1086

Company Name and Address: EERC

Account #:

Contact: B. BOTNEN

Phone #(701) 777-5073

Name of Sampler:

Fax #:

For faxed report check box ☐

Billing Address (indicate name and address if different from above): SB ENGINEERING

Quote #:

Date Submitted:

Project Name/Number: GARRISON SOILS

Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance): Soil	Water	Food	Other (Please Be Specific)	Analyze For: Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	MBTEX + GRO (TPH)
M25602	SB60 23		9/12/07 1400	X				
M25603	SB61 15		9/13/07 1500	X				
	TRIP BLANK			X				

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1				Teri A Olson		12 Sept 07 1700	
2							
3							

Disposal Comments:

Disposed of By:

We will return the completed original with your results.

APPENDIX J-2

GROUNDWATER ANALYSES – COC AND FIELD PARAMETERS

APPENDIX J-2A

MONITORING WELLS

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51 L Avenue ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 27 Sep 07
Lab Number: 07-A43084
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 11:45
Date Received: 14 Sep 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: MW-1
W4097

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1000 #	ppb	1	8021/5030	19 Sep 07	RDC
Benzene	56510	ppb	1.0	8021/5030	19 Sep 07	RDC
Toluene	51880	ppb	1.0	8021/5030	19 Sep 07	RDC
Ethyl Benzene	3737	ppb	1.0	8021/5030	19 Sep 07	RDC
Xylenes (Total)	22820	ppb	3.0	8021/5030	19 Sep 07	RDC
GRO (TPH)	237.3	mg/L	0.200	8015B/OA1	19 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 92 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43085
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 9:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-2
W4098

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	19 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	19 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 89 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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www.mvtl.com

MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43086
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 9:45
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-3
W4099

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	19 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	19 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 89 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 27 Sep 07
Lab Number: 07-A43087
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 16:30
Date Received: 14 Sep 07
PO #: GARRISON

Project Name: GARRISON

Temp at Receipt: 3.0 C

Sample Description: MW-4
W4100

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	19 Sep 07	RDC
Benzene	4120	ppb	1.0	8021/5030	20 Sep 07	RDC
Toluene	< 10 #	ppb	1	8021/5030	19 Sep 07	RDC
Ethyl Benzene	423.0	ppb	1.0	8021/5030	19 Sep 07	RDC
Xylenes (Total)	782.7	ppb	3.0	8021/5030	19 Sep 07	RDC
GRO (TPH)	10.44	mg/L	0.200	8015B/OA1	19 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 96 %

GRO SURROGATE RECOVERY: 103 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43088
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 17:10
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-5
W4101

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	19 Sep 07	RDC
Benzene	684.9	ppb	1.0	8021/5030	19 Sep 07	RDC
Toluene	15.2	ppb	1.0	8021/5030	19 Sep 07	RDC
Ethyl Benzene	103.9	ppb	1.0	8021/5030	19 Sep 07	RDC
Xylenes (Total)	349.9	ppb	3.0	8021/5030	19 Sep 07	RDC
GRO (TPH)	6.110	mg/L	0.200	8015B/OA1	19 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 115 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 27 Sep 07
Lab Number: 07-A43089
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 23:45
Date Received: 14 Sep 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: MW-6
W4102

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	22 Sep 07	RDC
Benzene	1176	ppb	1.0	8021/5030	22 Sep 07	RDC
Toluene	< 10 #	ppb	1	8021/5030	22 Sep 07	RDC
Ethyl Benzene	51.8	ppb	1.0	8021/5030	22 Sep 07	RDC
Xylenes (Total)	63.2	ppb	3.0	8021/5030	22 Sep 07	RDC
GRO (TPH)	2.640	mg/L	0.200	8015B/OA1	22 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 92 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43090
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 18:40
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-7
W4103

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Benzene	9.5	ppb	1.0	8021/5030	19 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	19 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	19 Sep 07	RDC
GRO (TPH)	0.852	mg/L	0.200	8015B/OA1	19 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 89 %

GRO(TPH) pattern is not characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43091
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 18:20
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-8
W4104

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	20 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	20 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	20 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	20 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	20 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	20 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-9
W4105

Report Date: 27 Sep 07
Lab Number: 07-A43092
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 13:40
Date Received: 14 Sep 07
PO #: GARRISON

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5030	20 Sep 07	RDC
Benzene	3302	ppb	1.0	8021/5030	20 Sep 07	RDC
Toluene	< 50	ppb	1	8021/5030	20 Sep 07	RDC
Ethyl Benzene	836.0	ppb	1.0	8021/5030	20 Sep 07	RDC
Xylenes (Total)	2524	ppb	3.0	8021/5030	20 Sep 07	RDC
GRO (TPH)	21.55	mg/L	0.200	8015B/OA1	20 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 101 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43093
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 17:40
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-10
W4106

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 200 #	ppb	1	8021/5030	22 Sep 07	RDC
Benzene	7468	ppb	1.0	8021/5030	22 Sep 07	RDC
Toluene	3673	ppb	1.0	8021/5030	22 Sep 07	RDC
Ethyl Benzene	3810	ppb	1.0	8021/5030	22 Sep 07	RDC
Xylenes (Total)	23730	ppb	3.0	8021/5030	22 Sep 07	RDC
GRO (TPH)	90.32	mg/L	0.200	8015B/OA1	22 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 97 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43094
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 10:45
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-11
W4107

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	22 Sep 07	RDC
Benzene	704.2	ppb	1.0	8021/5030	22 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	22 Sep 07	RDC
Ethyl Benzene	10.0	ppb	1.0	8021/5030	22 Sep 07	RDC
Xylenes (Total)	6.6	ppb	3.0	8021/5030	22 Sep 07	RDC
GRO (TPH)	1.135	mg/L	0.200	8015B/OA1	22 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 93 %

GRO SURROGATE RECOVERY: 92 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43095
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 12:15
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-12
W4108

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	20 Sep 07	RDC
Benzene	2132	ppb	1.0	8021/5030	20 Sep 07	RDC
Toluene	293.2	ppb	1.0	8021/5030	20 Sep 07	RDC
Ethyl Benzene	760.8	ppb	1.0	8021/5030	20 Sep 07	RDC
Xylenes (Total)	3755	ppb	3.0	8021/5030	20 Sep 07	RDC
GRO (TPH)	22.47	mg/L	0.200	8015B/OA1	20 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 94 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-13
W4109

Report Date: 27 Sep 07
Lab Number: 07-A43096
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 12:30
Date Received: 14 Sep 07
PO #: GARRISON

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	24 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 99 %

GRO SURROGATE RECOVERY: 88 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 27 Sep 07
Lab Number: 07-A43097
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 9:50
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-14
W4110

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	24 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 88 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43098
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 15:40
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-15
W4111

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5030	22 Sep 07	RDC
Benzene	3384	ppb	1.0	8021/5030	22 Sep 07	RDC
Toluene	< 50 #	ppb	1	8021/5030	22 Sep 07	RDC
Ethyl Benzene	228.9	ppb	1.0	8021/5030	22 Sep 07	RDC
Xylenes (Total)	468.6	ppb	3.0	8021/5030	22 Sep 07	RDC
GRO (TPH)	7.966	mg/L	0.200	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 98 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 27 Sep 07
Lab Number: 07-A43099
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 14:05
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-16
W4112

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	20 Sep 07	RDC
Benzene	2737	ppb	1.0	8021/5030	20 Sep 07	RDC
Toluene	716.6	ppb	1.0	8021/5030	20 Sep 07	RDC
Ethyl Benzene	756.1	ppb	1.0	8021/5030	20 Sep 07	RDC
Xylenes (Total)	4587	ppb	3.0	8021/5030	20 Sep 07	RDC
GRO (TPH)	24.48	mg/L	0.200	8015B/OA1	20 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 94 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 27 Sep 07
Lab Number: 07-A43100
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 13:00
Date Received: 14 Sep 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: MW-17
W4113

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	20 Sep 07	RDC
Benzene	2126	ppb	1.0	8021/5030	20 Sep 07	RDC
Toluene	470.8	ppb	1.0	8021/5030	20 Sep 07	RDC
Ethyl Benzene	769.0	ppb	1.0	8021/5030	20 Sep 07	RDC
Xylenes (Total)	4049	ppb	3.0	8021/5030	20 Sep 07	RDC
GRO (TPH)	22.63	mg/L	0.200	8015B/OA1	20 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 95 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43101
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 17:50
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-18
W4114

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	20 Sep 07	RDC
Benzene	5926	ppb	1.0	8021/5030	20 Sep 07	RDC
Toluene	572.7	ppb	1.0	8021/5030	20 Sep 07	RDC
Ethyl Benzene	2527	ppb	1.0	8021/5030	20 Sep 07	RDC
Xylenes (Total)	12570	ppb	3.0	8021/5030	20 Sep 07	RDC
GRO (TPH)	51.55	mg/L	0.200	8015B/OA1	20 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 99 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 27 Sep 07
Lab Number: 07-A43102
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 14:45
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-19
W4115

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	21 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	21 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 27 Sep 07
Lab Number: 07-A43103
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 9:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-20
W4116

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	24 Sep 07	RDC
Benzene	1377	ppb	1.0	8021/5030	24 Sep 07	RDC
Toluene	< 10 #	ppb	1	8021/5030	24 Sep 07	RDC
Ethyl Benzene	37.3	ppb	1.0	8021/5030	24 Sep 07	RDC
Xylenes (Total)	42.7	ppb	3.0	8021/5030	24 Sep 07	RDC
GRO (TPH)	2.716	mg/L	0.200	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 90 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit
Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 27 Sep 07
Lab Number: 07-A43104
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 16:45
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-4D MW-4 D
W4117

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	21 Sep 07	RDC
Benzene	4318	ppb	1.0	8021/5030	21 Sep 07	RDC
Toluene	< 100 #	ppb	1	8021/5030	21 Sep 07	RDC
Ethyl Benzene	421.4	ppb	1.0	8021/5030	21 Sep 07	RDC
Xylenes (Total)	574.1	ppb	3.0	8021/5030	21 Sep 07	RDC
GRO (TPH)	10.34	mg/L	0.200	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 97 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46623
Work Order #: 82-2170
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 26 Sep 07 14:00
Date Received: 3 Oct 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-21
W4494

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	1866	ppb	1.0	8021/5030	8 Oct 07	RDC
Toluene	< 10 #	ppb	1	8021/5030	9 Oct 07	RDC
Ethyl Benzene	76.5	ppb	1.0	8021/5030	9 Oct 07	RDC
Xylenes (Total)	91.4	ppb	3.0	8021/5030	9 Oct 07	RDC
GRO (TPH)	3.690	mg/L	0.200	8015B/OA1	9 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 92 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46624
Work Order #: 82-2170
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 26 Sep 07 13:35
Date Received: 3 Oct 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-22
W4495

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	364.6	ppb	1.0	8021/5030	9 Oct 07	RDC
Toluene	49.6	ppb	1.0	8021/5030	8 Oct 07	RDC
Ethyl Benzene	42.7	ppb	1.0	8021/5030	8 Oct 07	RDC
Xylenes (Total)	259.3	ppb	3.0	8021/5030	9 Oct 07	RDC
GRO (TPH)	3.089	mg/L	0.200	8015B/OA1	9 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 93 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46625
Work Order #: 82-2170
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 26 Sep 07 13:45
Date Received: 3 Oct 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: MW-23
W4496

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	9 Oct 07	RDC
Benzene	567.6	ppb	1.0	8021/5030	9 Oct 07	RDC
Toluene	< 10 #	ppb	1	8021/5030	9 Oct 07	RDC
Ethyl Benzene	234.4	ppb	1.0	8021/5030	9 Oct 07	RDC
Xylenes (Total)	1027	ppb	3.0	8021/5030	9 Oct 07	RDC
GRO (TPH)	5.780	mg/L	0.200	8015B/OA1	9 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 99 %

GRO SURROGATE RECOVERY: 104 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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www.mvtl.com
MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46622
Work Order #: 82-2170
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 26 Sep 07 13:20
Date Received: 3 Oct 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: VW-19 W4493 → CONVERTED TO MW-24

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	2609	ppb	1.0	8021/5030	9 Oct 07	RDC
Toluene	1954	ppb	1.0	8021/5030	9 Oct 07	RDC
Ethyl Benzene	330.2	ppb	1.0	8021/5030	8 Oct 07	RDC
Xylenes (Total)	1675	ppb	3.0	8021/5030	8 Oct 07	RDC
GRO (TPH)	12.81	mg/L	0.200	8015B/OA1	8 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 104 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46626
Work Order #: 82-2170
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 26 Sep 07 14:00
Date Received: 3 Oct 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: FIELD BLANK
W4497

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Toluene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Ethyl Benzene	2.9	ppb	1.0	8021/5030	8 Oct 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	8 Oct 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	8 Oct 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 85 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 10 Oct 07
Lab Number: 07-A46627
Work Order #: 82-2170
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 26 Sep 07
Date Received: 3 Oct 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: EQUIPMENT BLANK
W4498

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Toluene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Ethyl Benzene	2.8	ppb	1.0	8021/5030	8 Oct 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	8 Oct 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	8 Oct 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 97 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 10 Oct 07
Lab Number: 07-A46628
Work Order #: 82-2170
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 26 Sep 07
Date Received: 3 Oct 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: TRIP BLANK

Temp at Receipt: 4 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Benzene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Toluene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	8 Oct 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	8 Oct 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	8 Oct 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 96 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

Page 1 of 1

CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

VTL LABORATORIES, Inc.
1411 South 12th Street
Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

WORK ORDER #

Company Name and Address: UND / EERC

Account #:

Contact: JARDA Solc

Name of Sampler: Randy Knutson

Quote #:

Project Name/Number: GARRISON

Phone #: 701-777-5000

Fax #:

For faxed report check box ☐

Date Submitted: 10-1-07

Purchase Order #:

Mailing Address (indicate name and address if different from above): SB Engineering

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance): Soil	Water	Food	Other (Please Be Specific) Sampled Liquid Layer Not bottom sludge	Analyze For: Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X		MBTEx GRO (TPH)
4493	VW-19		9-26-07 1:20 PM		X			
4494	MW-21		9-26-07 2:00 PM		X			
4495	MW-22		9-26-07 1:35 PM		X			
4496	MW-23		9-26-07 1:45 PM		X			
4497	FIELD BLANK		9-26-07 2:00		X			
	TRIP "		9-26-07 2:05		X			
4498	EQUIP "							

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson	ICE/COOLER	10:00 AM 10-1-07	R. Schatz		20070 1000	2.7°
2							
3							

Disposal Comments:

Disposed of By:

We will return the completed original with your results.

APPENDIX J-2B

DOMESTIC WELLS

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 27 Sep 07
Lab Number: 07-A43105
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 15:50
Date Received: 14 Sep 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: FOLDEN PASTURE
W4118

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	21 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	21 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43106
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 16:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: FOLDEN QUONSET
W4119

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	21 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	21 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	21 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 99 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43107
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 13:45
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: BRUNSELL
W4120

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	24 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 104 %

GRO SURROGATE RECOVERY: 86 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43108
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 13:30
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: ZEISZLER
W4121

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	24 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 89 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 27 Sep 07
Lab Number: 07-A43109
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 11 Sep 07 12:35
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: REC-1
W4122

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5030	21 Sep 07	RDC
Benzene	1819	ppb	1.0	8021/5030	21 Sep 07	RDC
Toluene	58.3	ppb	1.0	8021/5030	21 Sep 07	RDC
Ethyl Benzene	394.6	ppb	1.0	8021/5030	21 Sep 07	RDC
Xylenes (Total)	1102	ppb	3.0	8021/5030	21 Sep 07	RDC
GRO (TPH)	11.20	mg/L	0.200	8015B/OA1	21 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 103 %

GRO SURROGATE RECOVERY: 93 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: J. KERZMAN
W4123

Report Date: 27 Sep 07
Lab Number: 07-A43110
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 14:25
Date Received: 14 Sep 07
PO #: GARRISON

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	24 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	24 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	24 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 89 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43111
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 14:15
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: EBACH
W4124

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	25 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	25 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 88 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: FITZGERALD
W4125

Report Date: 27 Sep 07
Lab Number: 07-A43112
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 13:55
Date Received: 14 Sep 07
PO #: GARRISON

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	25 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	25 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 88 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING
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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43113
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 14:35
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SENEY
W4126

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	25 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	25 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 88 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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www.mvtl.com

MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43114
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 15:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: FIELD BLANK
W4127

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Ethyl Benzene	2.8	ppb	1.0	8021/5030	25 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	25 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	25 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 99 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43115
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07 15:00
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: EQUIP BLANK
W4128

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Ethyl Benzene	2.7	ppb	1.0	8021/5030	25 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	25 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	25 Sep 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 27 Sep 07
Lab Number: 07-A43116
Work Order #: 82-1990
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 12 Sep 07
Date Received: 14 Sep 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: TRIP BLANK

Temp at Receipt: 3.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Toluene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	25 Sep 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	25 Sep 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	25 Sep 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 90 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

№ 2823

WORK ORDER # 82-1990

Company Name and Address: UND / EERC

Billing Address (indicate name and address if different from above): ~~UND / EERC~~ SB Engineering

Account #:

Contact: JARDA Silc

Name of Sampler: Randy Knutson

Quote #:

Project Name/Number: GARRISON

Phone #: 701-777-5000

Fax #:

For faxed report check box ☐

Date Submitted: 9-12-07

Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Soil	Water	Food	Other (Please Be Specific)	Analyze For:
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
W4097	mw-1		9-11-07 11:45 AM		X			MBTEX GRO
W4098	mw-2		9-11-07 9:00 AM		X			
W4099	-3		9-11-07 9:45 AM		X			
W4100	-4		9-11-07 4:30 PM		X			
W4101	-5		9-11-07 5:10 PM		X			
W4102	-6		9-12-07 11:45 PM		X			
W4103	-7		9-11-07 6:40 PM		X			
W4104	-8		9-11-07 6:20 PM		X			
W4105	-9		9-11-07 1:40 PM		X			
W4106	mw-10		9-11-07 5:40 PM		X			

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson	ICE	9-12-07 5:00 pm	Tera Olson		12 Sept 07 1700	
2							
3							

Disposed of By:

Disposal Comments:

Please submit the top two copies with your samples. We will return the completed original with your results.

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CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

№ 2843

WORK ORDER # 82-1990

Company Name and Address: UND / EERC	Account #:	Phone #: 701-777-5000
	Contact: JARDA Solc	Fax #:
	Name of Sampler: Randy Knutson	For faxed report check box ☐
Billing Address (indicate name and address if different from above): SB Engineering	Quote #:	Date Submitted: 9-12-07
	Project Name/Number: GARRISON	Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Soil	Water	Food	Other (Please Be Specific)	Analyze For:
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
W4107	MW-11		9-12-07 10:45AM		X			MBTEX GRO
W4108	-12		9-11-07 12:15PM		X			↓
W4109	-13		9-12-07 12:30 PM		X			↓
W4110	-14		9-12-07 9:50 AM		X			↓
W4111	-15		9-11-07 3:40 PM		X			↓
W4112	-16		9-11-07 2:35 PM		X			↓
W4113	-17		9-11-07 1:00 PM		X			↓
W4114	-18		9-11-07 5:50PM		X			↓
W4115	-19		9-11-07 2:45 PM		X			↓
W4116	-20		9-12-07 9:00AM		X			↓

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson	ICE	9-12-07 5:00 pm	Tera Olson		12Sep07 1700	
2							
3							

Disposed of By: | Disposal Comments:

Please submit the top two copies with your samples. We will return the completed original with your results.

K11475

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CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

№ 2796

WORK ORDER # 82-1990

Company Name and Address: UND / EERC	Account #:	Phone #: 701-777-5000
	Contact: JARDA SOLC	Fax #:
	Name of Sampler: Randy Knutson	For faxed report check box ☐
Billing Address (indicate name and address if different from above): SB Engineering	Quote #:	Date Submitted: 9-13-07
	Project Name/Number: Garrison	Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance) Soil	Water	Food	Other (Please Be Specific)	Analyze For:
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
W4117	MW-21		9-11-07 4:45PM		X			MBTEX -GRO
W4118	Folden Pasture		9-11-07 3:50 PM		X			
W4119	Folden Quonset		9-11-07 4:00 PM		X			
W4120	Brunsell		9-12-07 1:45 PM		X			
W4121	Zeiszler		9-12-07 1:30 PM		X			
W4122	REC-1		9-11-07 12:35PM		X			
W4123	J. Kerzman		9-12-07 2:25 PM		X			
W4124	~~D. Kerzman~~ EBACH		9-12-07 2:15 PM		X			
W4125	Fitzgerald		9-12-07 1:55PM		X			
W4126	Seney		9-12-07 2:35 PM		X			

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson	ICE	9-12-07 5:00	Tera K Ola		9/13/07 1700	
2							
3							
Disposed of By:				Disposal Comments:			

Please submit the top two copies with your samples. We will return the completed original with your results.

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CHAIN OF CUSTODY RECORD

PLEASE DO NOT WRITE IN THE SHADED AREAS

WORK ORDER # 82-1990

Company Name and Address: UND / EERC	Account #:	Phone #: 701-777-5000
	Contact: JADA Sorg	Fax #:
	Name of Sampler: Randy Knutson	For faxed report check box ☐
Billing Address (indicate name and address if different from above):	Quote #:	Date Submitted: 9-12-07
	Project Name/Number: GARRISON	Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance) Soil	Water	Food	Other (Please Be Specific)	Analyze For:
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
W4127	Field Blank		~~9~~ 9-12-07 3:00		X			MBTEX GRO
~~W4128~~	Trip Blank				X			|
W4128	Equip Blank		9-12-07 3:00		X			|

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson	ICE	9-12-07 5:00	Tina Olson		12 Sept 07 1700	
2							
3							

Disposed of By: Disposal Comments:

Please submit the top two copies with your samples. We will return the completed original with your results.

K11475 KEMSKE PAPER CO., NEW ULM, MN

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 8 Aug 07
Lab Number: 07-A34691
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 18:25
Date Received: 27 Jul 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: FOLDEN QUONSET
W2908

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 8 Aug 07
Lab Number: 07-A34692
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 18:35
Date Received: 27 Jul 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: FOLDEN PASTURE
W2909

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 97 %

GRO SURROGATE RECOVERY: 93 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 8 Aug 07
Lab Number: 07-A34693
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 18:45
Date Received: 27 Jul 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: ZEISLER
W2910

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 97 %

GRO SURROGATE RECOVERY: 93 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: BRUNSELL
W2911

Report Date: 8 Aug 07
Lab Number: 07-A34694
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 18:55
Date Received: 27 Jul 07
PO #: GARRISON

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 92 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Report Date: 8 Aug 07
Lab Number: 07-A34695
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 19:05
Date Received: 27 Jul 07
PO #: GARRISON

Project Name: GARRISON

Sample Description: FITZGERALD
W2912

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 99 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: J. KERZMAN
W2913

Report Date: 8 Aug 07
Lab Number: 07-A34696
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 19:15
Date Received: 27 Jul 07
PO #: GARRISON

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 8 Aug 07
Lab Number: 07-A34697
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 19:30
Date Received: 27 Jul 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: EBACH
W2914

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 92 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 8 Aug 07
Lab Number: 07-A34698
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 19:40
Date Received: 27 Jul 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: SENEY
W2915

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	31 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	31 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 99 %

GRO SURROGATE RECOVERY: 91 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 8 Aug 07
Lab Number: 07-A34700
Work Order #: 82-1531
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 23 Jul 07 20:00
Date Received: 27 Jul 07
PO #: GARRISON

JARDA SOLC
EERC/UND
15 23RD ST N
GRAND FORKS ND 58202

Project Name: GARRISON

Sample Description: D. KERZMAN
W2916

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	31 Jul 07	RDC
Benzene	3704	ppb	1.0	8021/5030	1 Aug 07	RDC
Toluene	< 10 #	ppb	1	8021/5030	31 Jul 07	RDC
Ethyl Benzene	348.6	ppb	1.0	8021/5030	31 Jul 07	RDC
Xylenes (Total)	766.1	ppb	3.0	8021/5030	31 Jul 07	RDC
GRO (TPH)	10.74	mg/L	0.200	8015B/OA1	31 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 96 %

GRO SURROGATE RECOVERY: 104 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

CHAIN OF CUSTODY RECORD

Page 1 of 1

PLEASE DO NOT WRITE IN THE SHADED AREAS

MVTL LABORATORIES, Inc.
1411 South 12th Street
Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

WORK ORDER # 80-1531

Company Name and Address: UND / EERC 15 N 23rd St Grand Forks, ND 58203	Account #:	Phone #: 701-777-5000
	Contact: JARDA Solc	Fax #:
	Name of Sampler: Randy Knutson	For faxed report check box ☐
Billing Address (indicate name and address if different from above):	Quote #:	Date Submitted:
	Project Name/Number: GARRISON Residential Well	Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance) Soil	Water	Food	Other (Please Be Specific)	Analyze For:
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
W2908	Folden Quonset		7/23/07 6:25 PM		X			MBTEX GRO
W2909	Folden PASTURE		6:35 PM		X			
W2910	ZEISZLER		6:45 PM		X			
W2911	Brunsell		6:55 PM		X			
W2912	Fitzgerald		7:05 PM		X			
W2913	J. Kerzman		7:15 PM		X			
W2914	EBACH		7:30 PM		X			
W2915	Seney		7:40 PM		X			
W2916	D. Kerzman		8:00 PM		X			
	Trip / Field / Equip Blank	* Note Rec'd *			X			

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson			R. Scheet		24 July 07 1000	2.5°
2							
3							

Disposed of By: Disposal Comments:

Please submit the top two copies with your samples. We will return the completed original with your results.

K11475 KEMSKE PAPER CO., NEW ULM, MN

APPENDIX J-3

BIODEGRADATION INDICATORS

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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51 L Avenue ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com

MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4533
Work Order #: 82-2200
Account #: 019519
Date Sampled: 3 Oct 07 17:00
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-2
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	< 2	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	2990	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	23.4	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.12	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.75	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	7.80	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	1.01	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C Canfield

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4534
Work Order #: 82-2200
Account #: 019519
Date Sampled: 3 Oct 07 17:30
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-3
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	< 2	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	193	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.32	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.20	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	7.05	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	0.43	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C. Carroll

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4535
Work Order #: 82-2200
Account #: 019519
Date Sampled: 4 Oct 07 9:00
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-6
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	< 20	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	424	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.27	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.32	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	12.0	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	0.69	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C Cantrell

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4536
Work Order #: 82-2200
Account #: 019519
Date Sampled: 3 Oct 07 18:30
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-9
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	< 20	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	731	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.36	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.94	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	9.38	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	0.51	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C Antell

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4537
Work Order #: 82-2200
Account #: 019519
Date Sampled: 3 Oct 07 19:30
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-11
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	< 20	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	777	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.27	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.42	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	9.48	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	0.52	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C. Carroll

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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Report Date: 22 Oct 07
Lab Number: 07-W4539
Work Order #: 82-2200
Account #: 019519
Date Sampled: 3 Oct 07 18:00
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-12
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	41.2	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	1030	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.59	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.39	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	25.7	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	1.39	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C. Canrep

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4538
Work Order #: 82-2200
Account #: 019519
Date Sampled: 3 Oct 07 19:00
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-13
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	< 20	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	720	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.39	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.19	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	3.92	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	0.42	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C Cantrell

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4540
Work Order #: 82-2200
Account #: 019519
Date Sampled: 4 Oct 07 11:30
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-18
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Sulfate	260	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.44	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.55	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	12.7	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	1.22	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Insufficient sample received to run BOD analysis.

Approved by: C. Canfield

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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MEMBER ACIL

Report Date: 22 Oct 07
Lab Number: 07-W4541
Work Order #: 82-2200
Account #: 019519
Date Sampled: 4 Oct 07 10:00
Date Received: 4 Oct 07 13:10
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: MW-20
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Biochemical Oxygen Demand	56.9	mg/l	2	SM 5210-B	4 Oct 07 14:15	Shannon
Sulfate	929	mg/l	5.00	EPA 375.4	10 Oct 07 9:15	Morgan
Nitrate-Nitrite as N	< 0.1	mg/l	0.10	EPA 353.2	11 Oct 07 9:30	Morgan
Ammonia-Nitrogen as N	0.40	mg/l	0.10	EPA 350.1	8 Oct 07 14:00	Morgan
Phosphorus as P - Total	0.97	mg/l	0.10	EPA 365.1	9 Oct 07 11:10	Morgan
Iron - Total	38.0	mg/l	0.10	6010	18 Oct 07 10:04	Stacy
Manganese - Total	1.74	mg/l	0.05	6010	18 Oct 07 10:04	Stacy

Approved by: C. Canrep

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

APPENDIX J-4

EXTRACTION SYSTEM WATER QUALITY

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MEMBER ACIL

Report Date: 18 Aug 07
Lab Number: 07-W2740
Work Order #: 82-1464
Account #: 019519
Date Sampled: 17 Jul 07 11:00
Date Received: 19 Jul 07 11:50
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: VLS-1
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
pH	6.7	units	N/A	SM4500 H+ B	19 Jul 07 15:45	Ashley
Specific Conductance	2000	umhos/cm	N/A	SM2510-B	19 Jul 07 15:45	Ashley
Total Alkalinity	229	mg/l CaCO3	4	SM2320-B	20 Jul 07 16:00	Ashley
Phenolphthalein Alk	< 4	mg/l CaCO3	4	SM2320-B	20 Jul 07 16:00	Ashley
Bicarbonate	229	mg/l CaCO3	4	SM2320-B	20 Jul 07 16:00	Ashley
Carbonate	< 4	mg/l CaCO3	4	SM2320-B	20 Jul 07 16:00	Ashley
Hydroxide	0.0	mg/l CaCO3	0	SM2320-B	20 Jul 07 16:00	Ashley
Tot Dis Solids(Summation)	1500	mg/l	NA	SM1030-F	15 Aug 07 12:45	Calculated
Total Hardness as CaCO3	791	mg/l	NA	SM2340-B	30 Jul 07 10:34	Calculated
Hardness in grains/gallon	46.2	gr/gal	NA	SM2340-B	30 Jul 07 10:34	Calculated
Cation Summation	24.2	meq/L	NA	SM1030-F	31 Jul 07 10:12	Calculated
Anion Summation	24.3	meq/L	NA	SM1030-F	15 Aug 07 12:45	Calculated
Percent Error	-0.15	%	NA	SM1030-F	15 Aug 07 12:45	Calculated
Sodium Adsorption Ratio	2.65		NA	USDA 20b	30 Jul 07 10:34	Calculated
Fluoride	0.25	mg/l	0.10	SM4500-F-C	19 Jul 07 15:45	Ashley
Sulfate	875	mg/l	5.00	EPA 375.4	15 Aug 07 12:45	Claudette
Chloride	52.4	mg/l	1.0	SM4500-Cl-E	1 Aug 07 13:40	Morgan
Nitrate-Nitrite as N	0.56	mg/l	0.10	EPA 353.2	31 Jul 07 13:45	Morgan
Phenols	13.6	ug/l	10.0	EPA 420.4	20 Jul 07 16:45	Morgan
Calcium - Total	154	mg/l	0.5	6010	30 Jul 07 10:34	Stacy
Magnesium - Total	98.6	mg/l	0.5	6010	30 Jul 07 10:34	Stacy
Sodium - Total	171	mg/l	0.5	6010	30 Jul 07 10:34	Stacy
Potassium - Total	7.4	mg/l	0.5	6010	30 Jul 07 10:34	Stacy
Iron - Total	20.2	mg/l	0.10	6010	31 Jul 07 10:12	Stacy
Manganese - Total	2.51	mg/l	0.05	6010	31 Jul 07 10:12	Stacy

Approved by: C. Canup

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

CHAIN OF CUSTODY RECORD

Page 1 of 1

MVTL LABORATORIES, Inc.
1411 South 12th Street
Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

PLEASE DO NOT WRITE IN THE SHADED AREAS

WORK ORDER # 82-2200

Company Name and Address: UND/EERC

Account #:

Contact: JARDA SOLC

Name of Sampler: RandyKnutson

Quote #:

Project Name/Number: GARRISON

Phone #: 701-777-5000

Fax #:

For faxed report check box ☐

Date Submitted: 10/4/07

Purchase Order #:

Billing Address (indicate name and address if different from above): SB Engineering

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance) Soil	Water	Food	Other (Please Be Specific)	Analyze For: Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	
W4533	MW-2		10-3-07 5:00 PM		X			Sulfate, Nitrate Nitrite as N, Ammonia-Nitrogen as N, Phosphorus P total, BOD, Fe/Mn total
W4534	MW-3		10-3-07 5:30 PM		X			
W4535	MW-6		10-4-07 9:00 AM		X			
W4536	MW-9		10-3-07 6:30 PM		X			
W4537	MW-11	7:30pm	10-3-07 7:00		X			
W4538	MW-13	7:00pm	10-3-07 6:30PM		X			
W4539	MW-12		10-3-07 6:00 PM		X			
W4540	MW-18		10-4-07 11:30 AM		X			
W4541	MW-20		10-4-07 10:00 AM		X			
	Trip Blank Field Equip Blank		10-4-07 12:00		X		* Blanks not run per discussion with Jarda Solc 40907	MBTEX-GRO

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1	Randy Knutson	Ice/Cooler	10-4-07 12:1:10	Tina Olson		40907 1310	
2							
3							

Disposed of By: Disposal Comments:

Please submit the top two copies with your samples. We will return the completed original with your results.

K11475 KEMSKE PAPER CO., NEW ULM, MN

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www.mvtl.com

MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33176
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 17 Jul 07 11:00
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: VLS-1
W2740

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	921.0	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	951.3	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	166.9	ppb	1.0	8021/5030	26 Jul 07	RDC
Xylenes (Total)	951.6	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	7.420	mg/L	0.200	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 100 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33168
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 17 Jul 07 14:20
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: VLS-2
W2732

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 50 #	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	3079	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	3367	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	619.4	ppb	1.0	8021/5030	26 Jul 07	RDC
Xylenes (Total)	3548	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	28.94	mg/L	0.200	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 102 %

GRO SURROGATE RECOVERY: 100 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33169
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 18 Jul 07 9:00
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: VLS-3
W2733

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 100 #	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	2912	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	3631	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	726.7	ppb	1.0	8021/5030	26 Jul 07	RDC
Xylenes (Total)	4327	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	34.35	mg/L	0.200	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 101 %

GRO SURROGATE RECOVERY: 97 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 18 Aug 07
Lab Number: 07-W2736
Work Order #: 82-1464
Account #: 019519
Date Sampled: 17 Jul 07 17:30
Date Received: 19 Jul 07 11:50
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: EFF-1
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Total Suspended Solids	67	mg/l	1	SM2540-D	20 Jul 07 9:00	Ashley
Phenols	36.7	ug/l	10.0	EPA 420.4	20 Jul 07 16:45	Morgan
Iron - Total	12.8	mg/l	0.10	6010	31 Jul 07 10:12	Stacy
Manganese - Total	1.45	mg/l	0.05	6010	31 Jul 07 10:12	Stacy

Approved by: C Cantrell

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33172
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 17 Jul 07 17:30
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: EFF-1
W2736

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	2.1	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	2.8	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	2.2	ppb	1.0	8021/5030	26 Jul 07	RDC
Xylenes (Total)	7.3	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	0.393	mg/L	0.200	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 108 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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Report Date: 31 Jul 07
Lab Number: 07-A33173
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 18 Jul 07 9:00
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: EFF-2
W2737

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 20 @	ppb	1	8021/5030	27 Jul 07	RDC
Benzene	< 20 @	ppb	1	8021/5030	27 Jul 07	RDC
Toluene	< 20 @	ppb	1	8021/5030	27 Jul 07	RDC
Ethyl Benzene	37.0	ppb	1.0	8021/5030	27 Jul 07	RDC
Xylenes (Total)	< 60 @	ppb	3	8021/5030	27 Jul 07	RDC
GRO (TPH)	6.009	mg/L	0.200	8015B/OA1	27 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 94 %

GRO SURROGATE RECOVERY: 138 %

GRO(TPH) pattern is characteristic of weathered gasoline.
GRO surrogate BrFB was out of acceptable range due to matrix interference.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33170
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 18 Jul 07 13:00
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: VLS-4
W2734

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 20 #	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	985.9	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	487.1	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	138.5	ppb	1.0	8021/5030	26 Jul 07	RDC
Xylenes (Total)	1415	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	9.120	mg/L	0.200	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 101 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 18 Aug 07
Lab Number: 07-W2739
Work Order #: 82-1464
Account #: 019519
Date Sampled: 19 Jul 07 9:00
Date Received: 19 Jul 07 11:50
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: EFF-4
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Total Suspended Solids	6	mg/l	1	SM2540-D	20 Jul 07 9:00	Ashley
Phenols	14.1	ug/l	10.0	EPA 420.4	20 Jul 07 16:45	Morgan
Iron - Total	14.4	mg/l	0.10	6010	31 Jul 07 10:12	Stacy
Manganese - Total	1.71	mg/l	0.05	6010	31 Jul 07 10:12	Stacy

Approved by: C Canup

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
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MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33177
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 17 Jul 07
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: TRIP BLANK

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	27 Jul 07	RDC
Benzene	< 1	ppb	1	8021/5030	27 Jul 07	RDC
Toluene	< 1	ppb	1	8021/5030	27 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	27 Jul 07	RDC
Xylenes (Total)	< 3	ppb	3	8021/5030	27 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	27 Jul 07	RDC

** No collection time supplied by the client.

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 89 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

CHAIN OF CUSTODY RECORD

Page 1 of 1

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Bismarck, ND 58504
Phone: (701) 258-9720
Toll Free: (800) 279-6885 Fax: (701) 258-9724

WORK ORDER # 82-1464

Company Name and Address: EERC, 15 N 23rd, GRAND FORKS, ND 58202	Account #:	Phone #: 701 777-5073
	Contact: BARRY BOTNEN	Fax #:
	Name of Sampler: BARRY BOTNEN	For faxed report check box ☐
Billing Address (indicate name and address if different from above): EERC	Quote #:	Date Submitted: 7/19/07
	Project Name/Number: GARRISON PILOT	Purchase Order #:

Lab Use Only	Your Sample I.D. or Number	Sample Description	Date / Time	Type of Sample (Matrix or Substance) Soil	Water	Food	Other (Please Be Specific)	Analyze For:
	Example	Tank Bottom Tank #3	01/01/99 11:45 a.m.			X	Sampled Liquid Layer Not bottom sludge	Vitamin A, TKN, Iron, Calcium BOD, COD, Acetone, Shelf Life
W2740	VLS-1		7/17/07 1100		X			MBTEX & GRO (TPH), GENERAL CHEM, PHENOLS.
W2732	VLS-2		7/17/07 1420		X			MBTEX + GRO (TPH)
W2733	VLS-3		7/18/07 0900		X			"
W2734	VLS-4		7/18/07 1300		X			"
W2735	VLS-5		7/19/07 0900		X			"
W2736	Eff-1		7/17/07 1730		X			PHENOLS, TSS, Fe/Mn, MBTEX+GRO (TPH)
W2737	Eff-2		7/18/07 0900		X			"
W2738	Eff-3		7/18/07 1300		X			"
W2739	Eff-4		7/19/07 0900		X			"
	TRIP BLK		—		X			MBTEX + GRO (TPH)

	Transferred by:	Comments: (Sample Condition)	Date / Time	Received by:	Comments: (Sample Condition)	Date / Time	°C
1						19 Jul 07 1150	6.9°
2							
3							

Disposed of By: | Disposal Comments:

Please submit the top two copies with your samples. We will return the completed original with your results.

APPENDIX J-5

OFFGAS ANALYSES

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MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33171
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 19 Jul 07 9:00
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: VLS-5
W2735

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 10 #	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	827.7	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	375.4	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	68.5	ppb	1.0	8021/5030	26 Jul 07	RDC
Xylenes (Total)	1089	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	6.160	mg/L	0.200	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 100 %

GRO SURROGATE RECOVERY: 96 %

GRO(TPH) pattern is characteristic of gasoline.

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com

MEMBER ACIL

Report Date: 31 Jul 07
Lab Number: 07-A33175
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 19 Jul 07 9:00
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: EFF-4
W2739

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	1.7	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	2.3	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	< 1	ppb	1	8021/5030	26 Jul 07	RDC
Xylenes (Total)	5.1	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 92 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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MEMBER ACIL

Report Date: 18 Aug 07
Lab Number: 07-W2738
Work Order #: 82-1464
Account #: 019519
Date Sampled: 18 Jul 07 13:00
Date Received: 19 Jul 07 11:50
PO #: Garrison

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Sample Description: EFF-3
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Total Suspended Solids	17	mg/l	1	SM2540-D	20 Jul 07 9:00	Ashley
Phenols	18.0	ug/l	10.0	EPA 420.4	20 Jul 07 16:45	Morgan
Iron - Total	14.4	mg/l	0.10	6010	31 Jul 07 10:12	Stacy
Manganese - Total	1.58	mg/l	0.05	6010	31 Jul 07 10:12	Stacy

Approved by: C Canup

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

MINNESOTA VALLEY TESTING LABORATORIES, INC.
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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com

Report Date: 31 Jul 07
Lab Number: 07-A33174
Work Order #:82-1464
Account #: 019519
Sample Matrix: GROUNDWATER
Date Sampled: 18 Jul 07 13:00
Date Received: 20 Jul 07
PO #: GARRISON

SB ENGINEERING
4525 VALLACHER AVE
ST LOUIS PARK MN 55416

Project Name: GARRISON PILOT

Sample Description: EFF-3
W2738

Temp at Receipt: 6.0 C

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Methyl Tert-Butyl Ether	< 1	ppb	1	8021/5030	26 Jul 07	RDC
Benzene	4.8	ppb	1.0	8021/5030	26 Jul 07	RDC
Toluene	6.9	ppb	1.0	8021/5030	26 Jul 07	RDC
Ethyl Benzene	1.9	ppb	1.0	8021/5030	26 Jul 07	RDC
Xylenes (Total)	9.8	ppb	3.0	8021/5030	26 Jul 07	RDC
GRO (TPH)	< 0.2	mg/L	0.2	8015B/OA1	26 Jul 07	RDC

BTEX/GRO Sample pH < 2

BTEX SURROGATE RECOVERY: 98 %

GRO SURROGATE RECOVERY: 103 %

RL = Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MVTL

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MEMBER ACIL

Jarda Solc
UND-Energy & Environmental
15 N. 23rd St.
Grand Forks ND 58201

Report Date: 18 Aug 07
Lab Number: 07-W2737
Work Order #: 82-1464
Account #: 019519
Date Sampled: 18 Jul 07 9:00
Date Received: 19 Jul 07 11:50
PO #: Garrison

Sample Description: EFF-2
Sample Site: Garrison

	As Received Result		Method RL	Method Reference	Date Analyzed	Analyst
Total Suspended Solids	6	mg/l	1	SM2540-D	20 Jul 07 9:00	Ashley
Phenols	19.5	ug/l	10.0	EPA 420.4	20 Jul 07 16:45	Morgan
Iron - Total	13.6	mg/l	0.10	6010	31 Jul 07 10:12	Stacy
Manganese - Total	1.18	mg/l	0.05	6010	31 Jul 07 10:12	Stacy

Approved by: C. Carlson

RL = Method Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 038-999-267 ND # ND-00016

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ANALYTICAL SUMMARY REPORT

August 09, 2007

SB Engineering
4525 Vallacher Ave
Saint Louis Park, MN 55416

Workorder No.: B07071856
Project Name: Garrison ND Cenex TESORO CORNER

Energy Laboratories Inc received the following 12 samples from SB Engineering on 7/24/2007 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
B07071856-001	MPE-1 A, 60 Sec @ 0.28 L/MIN	07/17/07 9:45	07/24/07	Air	VOC CHARCOAL EXTRACTION 8260-Volatile Organic Compounds-Short List
B07071856-002	MPE-1 B, 60 Sec @ 0.28 L/MIN	07/17/07 9:50	07/24/07	Air	Same As Above
B07071856-003	MPE-1 C, 60 Sec @ 0.28 L/MIN	07/17/07 17:30	07/24/07	Air	Same As Above
B07071856-004	MPE-1 D, 60 Sec @ 0.28 L/MIN	07/17/07 17:35	07/24/07	Air	Same As Above
B07071856-005	MW-12, 17 E, 60 Sec @ 0.28 L/MIN	07/18/07 8:00	07/24/07	Air	Same As Above
B07071856-006	MW-12, 17 F, 60 Sec @ 0.28 L/MIN	07/18/07 8:05	07/24/07	Air	Same As Above
B07071856-007	MW-16, G, 60 Sec @ 0.28 L/MIN	07/18/07 13:05	07/24/07	Air	Same As Above
B07071856-008	MW-16 H, 60 Sec @ 0.28 L/MIN	07/18/07 13:10	07/24/07	Air	Same As Above
B07071856-009	MW-16 I, 60 Sec @ 0.28 L/MIN	07/19/07 9:00	07/24/07	Air	Same As Above
B07071856-010	MW-17 J, 60 Sec @ 0.28 L/MIN	07/19/07 9:05	07/24/07	Air	Same As Above
B07071856-011	MW-17 K, 60 Sec @ 0.28 L/MIN	07/19/07 13:30	07/24/07	Air	Same As Above
B07071856-012	MW-17 L, 60 Sec @ 0.28 L/MIN	07/19/07 13:35	07/24/07	Air	Same As Above

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except if noted in report comments or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: _____

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-002
Client Sample ID: MPE-1 B, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/17/07 09:50
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	40700	mg/m3		8930		SW8260B	08/06/07 20:23 / jp
GRO as Gasoline	40700	mg/m3		8930		SW8260B	08/06/07 20:23 / jp
Total Extractable Hydrocarbons	82500	mg/m3		8930		SW8260B	08/06/07 20:23 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/04/07 18:57 / jp
Benzene	361	mg/m3		179		SW8260B	08/04/07 18:57 / jp
Ethylbenzene	68	mg/m3	J	179		SW8260B	08/04/07 18:57 / jp
Toluene	450	mg/m3		179		SW8260B	08/04/07 18:57 / jp
Xylenes, Total	252	mg/m3		179		SW8260B	08/04/07 18:57 / jp
Surr: p-Bromofluorobenzene	83.0	%REC			80-120	SW8260B	08/04/07 18:57 / jp
Surr: p-Bromofluorobenzene	88.0	%REC			80-120	SW8260B	08/06/07 20:23 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-001
Client Sample ID: MPE-1 A, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/17/07 09:45
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	41100	mg/m3		8930		SW8260B	08/06/07 19:50 / jp
GRO as Gasoline	41100	mg/m3		8930		SW8260B	08/06/07 19:50 / jp
Total Extractable Hydrocarbons	78900	mg/m3		8930		SW8260B	08/06/07 19:50 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/04/07 18:24 / jp
Benzene	368	mg/m3		179		SW8260B	08/04/07 18:24 / jp
Ethylbenzene	72	mg/m3	J	179		SW8260B	08/04/07 18:24 / jp
Toluene	493	mg/m3		179		SW8260B	08/04/07 18:24 / jp
Xylenes, Total	260	mg/m3		179		SW8260B	08/04/07 18:24 / jp
Surr: p-Bromofluorobenzene	96.0	%REC			80-120	SW8260B	08/04/07 18:24 / jp
Surr: p-Bromofluorobenzene	90.0	%REC			80-120	SW8260B	08/06/07 19:50 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-003
Client Sample ID: MPE-1 C, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/17/07 17:30
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	41800	mg/m3		8930		SW8260B	08/06/07 20:56 / jp
GRO as Gasoline	41800	mg/m3		8930		SW8260B	08/06/07 20:56 / jp
Total Extractable Hydrocarbons	82500	mg/m3		8930		SW8260B	08/06/07 20:56 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/04/07 19:30 / jp
Benzene	511	mg/m3		179		SW8260B	08/04/07 19:30 / jp
Ethylbenzene	102	mg/m3	J	179		SW8260B	08/04/07 19:30 / jp
Toluene	668	mg/m3		179		SW8260B	08/04/07 19:30 / jp
Xylenes, Total	436	mg/m3		179		SW8260B	08/04/07 19:30 / jp
Surr: p-Bromofluorobenzene	92.0	%REC			80-120	SW8260B	08/04/07 19:30 / jp
Surr: p-Bromofluorobenzene	93.0	%REC			80-120	SW8260B	08/06/07 20:56 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-004
Client Sample ID: MPE-1 D, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/17/07 17:35
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	44600	mg/m3		8930		SW8260B	08/06/07 21:29 / jp
GRO as Gasoline	44600	mg/m3		8930		SW8260B	08/06/07 21:29 / jp
Total Extractable Hydrocarbons	86800	mg/m3		8930		SW8260B	08/06/07 21:29 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/04/07 20:03 / jp
Benzene	518	mg/m3		179		SW8260B	08/04/07 20:03 / jp
Ethylbenzene	115	mg/m3	J	179		SW8260B	08/04/07 20:03 / jp
Toluene	675	mg/m3		179		SW8260B	08/04/07 20:03 / jp
Xylenes, Total	417	mg/m3		179		SW8260B	08/04/07 20:03 / jp
Surr: p-Bromofluorobenzene	92.0	%REC			80-120	SW8260B	08/04/07 20:03 / jp
Surr: p-Bromofluorobenzene	86.0	%REC			80-120	SW8260B	08/06/07 21:29 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-006
Client Sample ID: MW-12, 17 F, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/18/07 08:05
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	46100	mg/m3		8930		SW8260B	08/06/07 22:35 / jp
GRO as Gasoline	46100	mg/m3		8930		SW8260B	08/06/07 22:35 / jp
Total Extractable Hydrocarbons	68200	mg/m3		8930		SW8260B	08/06/07 22:35 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/04/07 21:10 / jp
Benzene	504	mg/m3		179		SW8260B	08/04/07 21:10 / jp
Ethylbenzene	115	mg/m3	J	179		SW8260B	08/04/07 21:10 / jp
Toluene	704	mg/m3		179		SW8260B	08/04/07 21:10 / jp
Xylenes, Total	522	mg/m3		179		SW8260B	08/04/07 21:10 / jp
Surr: p-Bromofluorobenzene	98.0	%REC			80-120	SW8260B	08/04/07 21:10 / jp
Surr: p-Bromofluorobenzene	89.0	%REC			80-120	SW8260B	08/06/07 22:35 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-005
Client Sample ID: MW-12, 17 E, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/18/07 08:00
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	40400	mg/m3		8930		SW8260B	08/06/07 22:02 / jp
GRO as Gasoline	40400	mg/m3		8930		SW8260B	08/06/07 22:02 / jp
Total Extractable Hydrocarbons	77500	mg/m3		8930		SW8260B	08/06/07 22:02 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/04/07 20:36 / jp
Benzene	468	mg/m3		179		SW8260B	08/04/07 20:36 / jp
Ethylbenzene	ND	mg/m3		179		SW8260B	08/04/07 20:36 / jp
Toluene	654	mg/m3		179		SW8260B	08/04/07 20:36 / jp
Xylenes, Total	407	mg/m3		179		SW8260B	08/04/07 20:36 / jp
Surr: p-Bromofluorobenzene	84.0	%REC			80-120	SW8260B	08/04/07 20:36 / jp
Surr: p-Bromofluorobenzene	83.0	%REC			80-120	SW8260B	08/06/07 22:02 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-007
Client Sample ID: MW-16, G, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/18/07 13:05
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	3790	mg/m3		1790		SW8260B	08/06/07 23:09 / jp
GRO as Gasoline	3790	mg/m3		1790		SW8260B	08/06/07 23:09 / jp
Total Extractable Hydrocarbons	8000	mg/m3		1790		SW8260B	08/06/07 23:09 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/08/07 07:59 / jp
Benzene	110	mg/m3		36		SW8260B	08/08/07 07:59 / jp
Ethylbenzene	14	mg/m3	J	36		SW8260B	08/08/07 07:59 / jp
Toluene	55	mg/m3		36		SW8260B	08/08/07 07:59 / jp
Xylenes, Total	105	mg/m3		36		SW8260B	08/08/07 07:59 / jp
Surr: p-Bromofluorobenzene	97.0	%REC			80-120	SW8260B	08/06/07 23:09 / jp
Surr: p-Bromofluorobenzene	96.0	%REC			80-120	SW8260B	08/08/07 07:59 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-008
Client Sample ID: MW-16 H, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/18/07 13:10
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	3640	mg/m3		1790		SW8260B	08/06/07 23:42 / jp
GRO as Gasoline	3640	mg/m3		1790		SW8260B	08/06/07 23:42 / jp
Total Extractable Hydrocarbons	7570	mg/m3		1790		SW8260B	08/06/07 23:42 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/08/07 08:32 / jp
Benzene	110	mg/m3		36		SW8260B	08/08/07 08:32 / jp
Ethylbenzene	18	mg/m3	J	36		SW8260B	08/08/07 08:32 / jp
Toluene	54	mg/m3		36		SW8260B	08/08/07 08:32 / jp
Xylenes, Total	115	mg/m3		36		SW8260B	08/08/07 08:32 / jp
Surr: p-Bromofluorobenzene	89.0	%REC			80-120	SW8260B	08/06/07 23:42 / jp
Surr: p-Bromofluorobenzene	94.0	%REC			80-120	SW8260B	08/08/07 08:32 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Report Date: 08/09/07
Collection Date: 07/19/07 09:05
DateReceived: 07/24/07
Matrix: Air

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-010
Client Sample ID: MW-16J, 60 Sec @ 0.28 L/MIN
MW-16 QAVIT

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	3710	mg/m3		1790		SW8260B	08/07/07 00:48 / jp
GRO as Gasoline	3710	mg/m3		1790		SW8260B	08/07/07 00:48 / jp
Total Extractable Hydrocarbons	8320	mg/m3		1790		SW8260B	08/07/07 00:48 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/08/07 09:38 / jp
Benzene	121	mg/m3		36		SW8260B	08/08/07 09:38 / jp
Ethylbenzene	10	mg/m3	J	36		SW8260B	08/08/07 09:38 / jp
Toluene	54	mg/m3		36		SW8260B	08/08/07 09:38 / jp
Xylenes, Total	108	mg/m3		36		SW8260B	08/08/07 09:38 / jp
Surr: p-Bromofluorobenzene	90.0	%REC			80-120	SW8260B	08/07/07 00:48 / jp
Surr: p-Bromofluorobenzene	95.0	%REC			80-120	SW8260B	08/08/07 09:38 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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QA/QC Summary Report

Report Date: 08/09/07
Work Order: B07071856

Client: SB Engineering
Project: Garrison ND Cenex

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 28005
Sample ID: LCS-28005-MBTEX	Laboratory Control Sample			Run: SV5970.I AIR_070803A					08/04/07 15:39
Methyl tert-butyl ether (MTBE)	20.9	ug/Media	5.0	104	60	140			
Benzene	22.9	ug/Media	5.0	115	60	140			
Ethylbenzene	19.0	ug/Media	5.0	95	60	140			
Toluene	22.7	ug/Media	5.0	114	60	140			
Xylenes, Total	50.9	ug/Media	5.0	85	60	140			
Surr: p-Bromofluorobenzene			5.0	97	80	120			
Sample ID: LCSD-28005-MBTEX	Laboratory Control Sample Duplicate			Run: SV5970.I AIR_070803A					08/04/07 16:12
Methyl tert-butyl ether (MTBE)	21.7	ug/Media	5.0	108	60	140	3.8	20	
Benzene	22.5	ug/Media	5.0	113	60	140	1.8	20	
Ethylbenzene	20.0	ug/Media	5.0	100	60	140	5.1	20	
Toluene	23.4	ug/Media	5.0	117	60	140	3.0	20	
Xylenes, Total	52.1	ug/Media	5.0	87	60	140	2.3	20	
Surr: p-Bromofluorobenzene			5.0	98	80	120			
Sample ID: LCS-28005-GRO	Laboratory Control Sample			Run: SV5970.I AIR_070803A					08/04/07 16:45
Total Extractable Hydrocarbons	540	ug/Media	50	108	60	140			
Surr: p-Bromofluorobenzene			5.0	99	80	120			
Sample ID: LCSD-28005-GRO	Laboratory Control Sample Duplicate			Run: SV5970.I AIR_070803A					08/04/07 17:18
Total Extractable Hydrocarbons	557	ug/Media	50	111	60	140	5.7	20	
Surr: p-Bromofluorobenzene			5.0	104	80	120			
Sample ID: MB-28005	Method Blank			Run: SV5970.I AIR_070803A					08/04/07 17:51
Total Extractable Hydrocarbons	ND	ug/Media	50						
Methyl tert-butyl ether (MTBE)	ND	ug/Media	5.0						
Benzene	ND	ug/Media	5.0						
Ethylbenzene	ND	ug/Media	5.0						
Toluene	ND	ug/Media	5.0						
Xylenes, Total	ND	ug/Media	5.0						
Surr: p-Bromofluorobenzene			5.0	85	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: SB Engineering
Project: Garrison ND Cenex

Report Date: 08/09/07
Work Order: B07071856

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B								Analytical Run: SV5970.I AIR_070803A	
Sample ID: 03-Aug-07_CCV-MBTEX	Continuing Calibration Verification Standard							08/04/07 14:00	
Methyl tert-butyl ether (MTBE)	20.5	ug/Media	5.0	102	70	130			
Benzene	22.9	ug/Media	5.0	115	70	130			
Ethylbenzene	20.0	ug/Media	5.0	100	70	130			
Toluene	25.8	ug/Media	5.0	129	70	130			
Xylenes, Total	59.3	ug/Media	5.0	99	70	130			
Surr: p-Bromofluorobenzene			5.0	107	80	120			
Sample ID: 03-Aug-07_CCV-GRO	Continuing Calibration Verification Standard							08/04/07 14:33	
Total Extractable Hydrocarbons	429	ug/Media	50	86	70	130			
Surr: p-Bromofluorobenzene			5.0	103	80	120			
Sample ID: 06-Aug-07_CCV-GRO	Continuing Calibration Verification Standard							08/06/07 18:44	
Total Extractable Hydrocarbons	435	ug/Media	50	87	70	130			
Surr: p-Bromofluorobenzene			5.0	110	80	120			
Sample ID: 08-Aug-07_CCV-MBTEX	Continuing Calibration Verification Standard							08/08/07 07:26	
Methyl tert-butyl ether (MTBE)	19.2	ug/Media	5.0	96	70	130			
Benzene	19.1	ug/Media	5.0	96	70	130			
Ethylbenzene	18.4	ug/Media	5.0	92	70	130			
Toluene	18.9	ug/Media	5.0	95	70	130			
Xylenes, Total	53.4	ug/Media	5.0	89	70	130			
Surr: p-Bromofluorobenzene			5.0	100	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-009
Client Sample ID: MW-16 I, 60 Sec @ 0.28 L/MIN

Report Date: 08/09/07
Collection Date: 07/19/07 09:00
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	3860	mg/m3		1790		SW8260B	08/07/07 00:15 / jp
GRO as Gasoline	3860	mg/m3		1790		SW8260B	08/07/07 00:15 / jp
Total Extractable Hydrocarbons	8210	mg/m3		1790		SW8260B	08/07/07 00:15 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/08/07 09:05 / jp
Benzene	123	mg/m3		36		SW8260B	08/08/07 09:05 / jp
Ethylbenzene	10	mg/m3	J	36		SW8260B	08/08/07 09:05 / jp
Toluene	54	mg/m3		36		SW8260B	08/08/07 09:05 / jp
Xylenes, Total	106	mg/m3		36		SW8260B	08/08/07 09:05 / jp
Surr: p-Bromofluorobenzene	81.0	%REC			80-120	SW8260B	08/07/07 00:15 / jp
Surr: p-Bromofluorobenzene	92.0	%REC			80-120	SW8260B	08/08/07 09:05 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-012
Client Sample ID: MW-16 L, 60 Sec @ 0.28 L/MIN
MW-16 CAUTY

Report Date: 08/09/07
Collection Date: 07/19/07 13:35
DateReceived: 07/24/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	6890	mg/m3		1790		SW8260B	08/07/07 01:54 / jp
GRO as Gasoline	6890	mg/m3		1790		SW8260B	08/07/07 01:54 / jp
Total Extractable Hydrocarbons	13900	mg/m3		1790		SW8260B	08/07/07 01:54 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/08/07 10:44 / jp
Benzene	190	mg/m3		36		SW8260B	08/08/07 10:44 / jp
Ethylbenzene	12	mg/m3	J	36		SW8260B	08/08/07 10:44 / jp
Toluene	91	mg/m3		36		SW8260B	08/08/07 10:44 / jp
Xylenes, Total	163	mg/m3		36		SW8260B	08/08/07 10:44 / jp
Surr: p-Bromofluorobenzene	87.0	%REC			80-120	SW8260B	08/07/07 01:54 / jp
Surr: p-Bromofluorobenzene	94.0	%REC			80-120	SW8260B	08/08/07 10:44 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Report Date: 08/09/07
Collection Date: 07/19/07 13:30
DateReceived: 07/24/07
Matrix: Air

Client: SB Engineering
Project: Garrison ND Cenex
Lab ID: B07071856-011
Client Sample ID: MW-16 K, 60 Sec @ 0.28 L/MIN

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	5680	mg/m3		1790		SW8260B	08/07/07 01:21 / jp
GRO as Gasoline	5680	mg/m3		1790		SW8260B	08/07/07 01:21 / jp
Total Extractable Hydrocarbons	11400	mg/m3		1790		SW8260B	08/07/07 01:21 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/08/07 10:11 / jp
Benzene	193	mg/m3		36		SW8260B	08/08/07 10:11 / jp
Ethylbenzene	12	mg/m3	J	36		SW8260B	08/08/07 10:11 / jp
Toluene	92	mg/m3		36		SW8260B	08/08/07 10:11 / jp
Xylenes, Total	151	mg/m3		36		SW8260B	08/08/07 10:11 / jp
Surr: p-Bromofluorobenzene	80.0	%REC			80-120	SW8260B	08/07/07 01:21 / jp
Surr: p-Bromofluorobenzene	101	%REC			80-120	SW8260B	08/08/07 10:11 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Total Extractable Hydrocarbons are defined as the total hydrocarbon responses regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

Energy Laboratories Inc
Workorder Receipt Checklist

B07071856

SB Engineering

Login completed by: Krystal McDonald

Reviewed by: Darcy Chirrick

Reviewed Date: 7/24/2007 12:00:00 AM

Date and Time Received: 7/24/2007 12:00 AM

Received by: smr

Carrier name: UPS Ground

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	23°C
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: UND / EERC	Project Name, PWS#, Permit #, Etc. Garrison, ND Cenex	
Report Mail Address: 15 23rd St North Grand Forks, ND 58202	Contact Name: Jarda Solc Voice: 701-777-5000 Fax: 701-777-5181 Email: jsolc@undeerc.org	Sampler Name if other than Contact: Randy Knutson
Invoice Address: Same	Invoice Contact & Phone #:	Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Receipt Temp 2.3 °C
Cooler ID(s) ____
Custody Seal Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water, Soil/Solids, Vegetation, Biosolids, Other)	BTEX	TPH	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	LAB ID
1	MW-17 K 60 sec	7-19-07	13:30	Air	☒	☒			☒	0.28 L/MIN	B707185Z-11
2	MW-17 L 60 sec	7-19-07	13:35	Air	☒	☒			☒	0.28 L/MIN	12
3				<Select One>							
4				<Select One>							
5				<Select One>							
6				<Select One>							
7				<Select One>							
8				<Select One>							
9				<Select One>							
10				<Select One>							

Custody Record MUST be Signed

Relinquished by: Randy Knutson Date/Time: 7-20-07 11:30
Relinquished by: Date/Time:
Sample Disposal: Return to Client ☐

Shipped by:
Shipped by: UPS GRD
Lab Disposal ☐

Received by: Date/Time:
Received by: Date/Time: 7-24-07 9:15

LABORATORY USE ONLY
Sample Type ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: UND / EERC	Project Name, PWS#, Permit #, Etc. Garrison, ND Cenex
Report Mail Address: 15 23rd St North, Grand Forks, ND 58202	Contact Name: Jarda Solc; Voice: 701-777-5000; Fax: 701-777-5181; Email: jsolc@undeerc.org
Sampler Name if other than Contact: Randy Knutson	
Invoice Address: ~~Same~~	Invoice Contact & Phone #:
Purchase Order #:	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Receipt Temp 23 °C
Cooler ID(s)
Custody Seal Y (N)
Intact Y (N)
Signature Match Y (N)

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O — Air, Water, Soils/Solids, Vegetation, Bioassay, Other)	BTEX	TPH								SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	LAB ID
1	MW-17 K 60 sec	7-19-07	13:30	Air	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	0.28 L/MIN	B07071852-11
2	MW-17 L 60 sec	7-19-07	13:35	Air	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	0.28 L/MIN	12
3				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
4				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
5				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
6				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
7				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
8				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
9				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
10				<Select One	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		

LABORATORY USE ONLY

Custody Record MUST be Signed			
Relinquished by: Randy Knutson Date/Time: 7-20-07 11:30	Shipped by:	Received by:	Date/Time:
Relinquished by: Date/Time:	Shipped by: UPS GRD	Received by: [signature]	Date/Time: 7-24-07 9:15
Sample Disposal: Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type ____ # of fractions ____	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

ANALYTICAL SUMMARY REPORT

August 20, 2007

SB Engineering
4525 Vallacher Ave
Saint Louis Park, MN 55416

Workorder No.: B07072266

Project Name: Garrison ND Farmers Union Cenex
CENEX CORNER

Energy Laboratories Inc received the following 10 samples from SB Engineering on 7/27/2007 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
B07072266-001	VW-14 A, 60 Sec @ 0.28 L/MIN	07/23/07 13:05	07/27/07	Air	VOC CHARCOAL EXTRACTION 8260-Volatile Organic Compounds-Short List
B07072266-002	VW-14 B, 60 Sec @ 0.28 L/MIN	07/23/07 13:10	07/27/07	Air	Same As Above
B07072266-003	VW-16 C, 60 Sec @ 0.28 L/MIN	07/23/07 14:00	07/27/07	Air	Same As Above
B07072266-004	VW-16 D, 60 Sec @ 0.28 L/MIN	07/23/07 14:05	07/27/07	Air	Same As Above
B07072266-005	VW-15 E 60 Sec @ 0.28 L/Min	07/23/07 15:15	07/27/07	Air	Same As Above
B07072266-006	VW-15 F, 60 Sec @ 0.28 L/MIN	07/23/07 15:20	07/27/07	Air	Same As Above
B07072266-007	VW-14, 15, 16 G, 60 Sec @ 0.28 L/MIN	07/23/07 16:25	07/27/07	Air	Same As Above
B07072266-008	VW-14, 15, 16 H, 60 Sec @ 0.28 L/MIN	07/23/07 16:30	07/27/07	Air	Same As Above
B07072266-009	VW-14, 15, 16 I, 60 Sec @ 0.28 L/MIN	07/24/07 10:40	07/27/07	Air	Same As Above
B07072266-010	VW-14, 15, 16 J, 60 Sec @ 0.28 L/MIN	07/24/07 10:45	07/27/07	Air	Same As Above

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except if noted in report comments or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: _____

Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: UND / EERC	Project Name, PWS#, Permit #, Etc.: ~~Carrington, ND Vining Oil~~ GARRISON, ND Cover	
Report Mail Address: 15 23rd St North, Grand Forks, ND 58202	Contact Name: Jarda Solc Voice: 701-777-5000 Fax: 701-777-5181 Email: jsolc@undeerc.org	Sampler Name if other than Contact: Randy Knutson
Invoice Address: Same	Invoice Contact & Phone #:	Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Receipt Temp 23 °C
Cooler ID(s) ____
Custody Seal Intact Y N N
Signature Match Y

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX	Number of Containers / Sample Type: A W S V B O Air, Water Spills/Solids, Vegetation, Biomass, Other	BTEX	TPH	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)		LAB ID
1	MPE-1 A, 60 sec	7-17-07	9:45	Air		☒	☒		☒	☐	0.28 L/MIN	1207071856-1
2	MPE-1 B, 60 sec	7-17-07	9:50	Air		☒	☒		☒	☐	0.28 L/MIN	2
3	MPE-1 C 60 sec	7-17-07	17:30	Air		☒	☒		☐	☐	0.28 L/MIN	3
4	MPE-1 D 60 sec	7-17-07	17:35	Air		☒	☒		☐	☐	0.28 L/MIN	4
5	MW-12,17 E 60 sec	7-18-07	8:00	Air		☒	☒		☐	☐	0.28 L/MIN	5
6	MW-12,17 F 60 sec	7-18-07	8:05	Air		☒	☒		☐	☐	0.28 L/MIN	6
7	MW-16 G 60 sec	7-18-07	13:05	Air		☒	☒		☐	☐	0.28 L/MIN	7
8	MW-16 H 60 sec	7-18-07	13:10	Air		☒	☒		☐	☐	0.28 L/MIN	8
9	MW-16 I 60 sec	7-19-07	9:00	Air		☒	☒		☐	☐	0.28 L/MIN	9
10	MW-17 J 60 sec	7-19-07	9:05	Air		☒	☒		☐	☐	0.28 L/MIN	10

Custody Record MUST be Signed	Relinquished by: Randy Knutson Date/Time: 7/20/07 11:30	Shipped by:	Received by: Date/Time:
	Relinquished by: Date/Time:	Shipped by: UPS GRD	Received by: Date/Time: 7-24-07 9:15
	Sample Disposal: Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-001
Client Sample ID: VW-14 A, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/23/07 13:05
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	38200	mg/m3		1790		SW8260B	08/15/07 10:59 / jp
GRO as Gasoline	38200	mg/m3		1790		SW8260B	08/15/07 10:59 / jp
Total Extractable Hydrocarbons	57900	mg/m3		1790		SW8260B	08/15/07 10:59 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/15/07 10:59 / jp
Benzene	1660	mg/m3		179		SW8260B	08/15/07 10:59 / jp
Ethylbenzene	124	mg/m3	J	179		SW8260B	08/15/07 10:59 / jp
Toluene	1660	mg/m3		179		SW8260B	08/15/07 10:59 / jp
Xylenes, Total	452	mg/m3		179		SW8260B	08/15/07 10:59 / jp
Surr: p-Bromofluorobenzene	97.0	%REC		80-120		SW8260B	08/15/07 10:59 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-002
Client Sample ID: VW-14 B, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/23/07 13:10
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	40000	mg/m3		1790		SW8260B	08/15/07 11:32 / jp
GRO as Gasoline	40000	mg/m3		1790		SW8260B	08/15/07 11:32 / jp
Total Extractable Hydrocarbons	61100	mg/m3		1790		SW8260B	08/15/07 11:32 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/15/07 11:32 / jp
Benzene	1480	mg/m3		179		SW8260B	08/15/07 11:32 / jp
Ethylbenzene	167	mg/m3	J	179		SW8260B	08/15/07 11:32 / jp
Toluene	1620	mg/m3		179		SW8260B	08/15/07 11:32 / jp
Xylenes, Total	580	mg/m3		179		SW8260B	08/15/07 11:32 / jp
Surr: p-Bromofluorobenzene	99.0	%REC		80-120		SW8260B	08/15/07 11:32 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-003
Client Sample ID: VW-16 C, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/23/07 14:00
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	21200	mg/m3		1790		SW8260B	08/15/07 12:05 / jp
GRO as Gasoline	21200	mg/m3		1790		SW8260B	08/15/07 12:05 / jp
Total Extractable Hydrocarbons	40400	mg/m3		1790		SW8260B	08/15/07 12:05 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/15/07 12:38 / jp
Benzene	188	mg/m3		36		SW8260B	08/15/07 12:38 / jp
Ethylbenzene	15	mg/m3	J	36		SW8260B	08/15/07 12:38 / jp
Toluene	129	mg/m3		36		SW8260B	08/15/07 12:38 / jp
Xylenes, Total	58	mg/m3		36		SW8260B	08/15/07 12:38 / jp
Surr: p-Bromofluorobenzene	93.0	%REC		80-120		SW8260B	08/15/07 12:05 / jp
Surr: p-Bromofluorobenzene	89.0	%REC		80-120		SW8260B	08/15/07 12:38 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-004
Client Sample ID: VW-16 D, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/23/07 14:05
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	20800	mg/m3		1790		SW8260B	08/15/07 13:11 / jp
GRO as Gasoline	20800	mg/m3		1790		SW8260B	08/15/07 13:11 / jp
Total Extractable Hydrocarbons	38600	mg/m3		1790		SW8260B	08/15/07 13:11 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		36		SW8260B	08/15/07 16:26 / jp
Benzene	210	mg/m3		36		SW8260B	08/15/07 16:26 / jp
Ethylbenzene	17	mg/m3	J	36		SW8260B	08/15/07 16:26 / jp
Toluene	149	mg/m3		36		SW8260B	08/15/07 16:26 / jp
Xylenes, Total	62	mg/m3		36		SW8260B	08/15/07 16:26 / jp
Surr: p-Bromofluorobenzene	94.0	%REC		80-120		SW8260B	08/15/07 13:11 / jp
Surr: p-Bromofluorobenzene	100	%REC		80-120		SW8260B	08/15/07 16:26 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-005
Client Sample ID: VW-15 E 60 Sec @ 0.28 L/Min

Report Date: 08/20/07
Collection Date: 07/23/07 15:15
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	9710	mg/m3		179		SW8260B	08/16/07 09:55 / jp
GRO as Gasoline	9710	mg/m3		179		SW8260B	08/16/07 09:55 / jp
Total Extractable Hydrocarbons	18800	mg/m3		179		SW8260B	08/16/07 09:55 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		18		SW8260B	08/16/07 09:55 / jp
Benzene	ND	mg/m3		18		SW8260B	08/16/07 09:55 / jp
Ethylbenzene	ND	mg/m3		18		SW8260B	08/16/07 09:55 / jp
Toluene	ND	mg/m3		18		SW8260B	08/16/07 09:55 / jp
Xylenes, Total	ND	mg/m3		18		SW8260B	08/16/07 09:55 / jp
Surr: p-Bromofluorobenzene	96.0	%REC		80-120		SW8260B	08/16/07 09:55 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-006
Client Sample ID: VW-15 F, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/23/07 15:20
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	9360	mg/m3		179		SW8260B	08/16/07 11:02 / jp
GRO as Gasoline	9360	mg/m3		179		SW8260B	08/16/07 11:02 / jp
Total Extractable Hydrocarbons	18400	mg/m3		179		SW8260B	08/16/07 11:02 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		18		SW8260B	08/16/07 11:02 / jp
Benzene	ND	mg/m3		18		SW8260B	08/16/07 11:02 / jp
Ethylbenzene	ND	mg/m3		18		SW8260B	08/16/07 11:02 / jp
Toluene	ND	mg/m3		18		SW8260B	08/16/07 11:02 / jp
Xylenes, Total	ND	mg/m3		18		SW8260B	08/16/07 11:02 / jp
Surr: p-Bromofluorobenzene	93.0	%REC		80-120		SW8260B	08/16/07 11:02 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
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QCL - Quality control limit.
MCL - Maximum contaminant level.
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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-007
Client Sample ID: VW-14, 15, 16 G, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/23/07 16:25
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	27600	mg/m3		1790		SW8260B	08/16/07 11:35 / jp
GRO as Gasoline	27600	mg/m3		1790		SW8260B	08/16/07 11:35 / jp
Total Extractable Hydrocarbons	48900	mg/m3		1790		SW8260B	08/16/07 11:35 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/16/07 11:35 / jp
Benzene	786	mg/m3		179		SW8260B	08/16/07 11:35 / jp
Ethylbenzene	76	mg/m3	J	179		SW8260B	08/16/07 11:35 / jp
Toluene	907	mg/m3		179		SW8260B	08/16/07 11:35 / jp
Xylenes, Total	284	mg/m3		179		SW8260B	08/16/07 11:35 / jp
Surr: p-Bromofluorobenzene	97.0	%REC		80-120		SW8260B	08/16/07 11:35 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

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QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-008
Client Sample ID: VW-14, 15, 16 H, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/23/07 16:30
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	27000	mg/m3		1790		SW8260B	08/16/07 12:08 / jp
GRO as Gasoline	27000	mg/m3		1790		SW8260B	08/16/07 12:08 / jp
Total Extractable Hydrocarbons	49300	mg/m3		1790		SW8260B	08/16/07 12:08 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/16/07 12:08 / jp
Benzene	764	mg/m3		179		SW8260B	08/16/07 12:08 / jp
Ethylbenzene	78	mg/m3	J	179		SW8260B	08/16/07 12:08 / jp
Toluene	875	mg/m3		179		SW8260B	08/16/07 12:08 / jp
Xylenes, Total	290	mg/m3		179		SW8260B	08/16/07 12:08 / jp
Surr: p-Bromofluorobenzene	98.0	%REC		80-120		SW8260B	08/16/07 12:08 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-009
Client Sample ID: VW-14, 15, 16 I, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/24/07 10:40
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	22900	mg/m3		1790		SW8260B	08/16/07 12:40 / jp
GRO as Gasoline	22900	mg/m3		1790		SW8260B	08/16/07 12:40 / jp
Total Extractable Hydrocarbons	37500	mg/m3		1790		SW8260B	08/16/07 12:40 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/16/07 12:40 / jp
Benzene	854	mg/m3		179		SW8260B	08/16/07 12:40 / jp
Ethylbenzene	81	mg/m3	J	179		SW8260B	08/16/07 12:40 / jp
Toluene	1060	mg/m3		179		SW8260B	08/16/07 12:40 / jp
Xylenes, Total	298	mg/m3		179		SW8260B	08/16/07 12:40 / jp
Surr: p-Bromofluorobenzene	92.0	%REC		80-120		SW8260B	08/16/07 12:40 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
J - Estimated value. The analyte was present but less than the reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex
Lab ID: B07072266-010
Client Sample ID: VW-14, 15, 16 J, 60 Sec @ 0.28 L/MIN

Report Date: 08/20/07
Collection Date: 07/24/07 10:45
DateReceived: 07/27/07
Matrix: Air

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
VOLATILE ORGANIC COMPOUNDS							
Gasoline Range Organics (GRO)	24300	mg/m3		1790		SW8260B	08/16/07 13:14 / jp
GRO as Gasoline	24300	mg/m3		1790		SW8260B	08/16/07 13:14 / jp
Total Extractable Hydrocarbons	35700	mg/m3		1790		SW8260B	08/16/07 13:14 / jp
Methyl tert-butyl ether (MTBE)	ND	mg/m3		179		SW8260B	08/16/07 13:14 / jp
Benzene	921	mg/m3		179		SW8260B	08/16/07 13:14 / jp
Ethylbenzene	104	mg/m3	J	179		SW8260B	08/16/07 13:14 / jp
Toluene	1250	mg/m3		179		SW8260B	08/16/07 13:14 / jp
Xylenes, Total	389	mg/m3		179		SW8260B	08/16/07 13:14 / jp
Surr: p-Bromofluorobenzene	93.0	%REC		80-120		SW8260B	08/16/07 13:14 / jp

- Note: The sample was a charcoal tube desorbed in CS2 and analyzed by GC/MS. A sampling time of 60 seconds with a flow rate of 0.28 liters per minute was used for calculations.
- Note 1: Gasoline Range Organics(GRO) are defined as all hydrocarbons eluting between 2-Methylpentane and 1,2,4-Trimethylbenzene.
- Note 2: GRO as Gasoline is defined by the analyst as the portion of the GRO range that resembles gasoline.
- Note 3: Total Extractable Hydrocarbons are defined as the total hydrocarbon response regardless of elution time.

Report Definitions:
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QA/QC Summary Report

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex

Report Date: 08/17/07
Work Order: B07072266

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B									Batch: 28087
Sample ID: LCS-28087-MBTEX	Laboratory Control Sample				Run: SV5970.I AIR_070813A				08/13/07 18:57
Methyl tert-butyl ether (MTBE)	18.8	ug/Media	5.0	94	60	140			
Benzene	17.9	ug/Media	5.0	89	60	140			
Ethylbenzene	17.5	ug/Media	5.0	88	60	140			
Toluene	19.6	ug/Media	5.0	98	60	140			
Xylenes, Total	45.2	ug/Media	5.0	75	60	140			
Surr: p-Bromofluorobenzene			5.0	94	80	120			
Sample ID: LCSD-28087-MBTEX	Laboratory Control Sample Duplicate				Run: SV5970.I AIR_070813A				08/13/07 19:30
Methyl tert-butyl ether (MTBE)	19.4	ug/Media	5.0	97	60	140	3.1	20	
Benzene	18.9	ug/Media	5.0	95	60	140	5.4	20	
Ethylbenzene	17.8	ug/Media	5.0	89	60	140	1.7	20	
Toluene	20.9	ug/Media	5.0	104	60	140	6.4	20	
Xylenes, Total	45.8	ug/Media	5.0	76	60	140	1.3	20	
Surr: p-Bromofluorobenzene			5.0	90	80	120			
Sample ID: LCSD-28087-GRO	Laboratory Control Sample Duplicate				Run: SV5970.I AIR_070813A				08/14/07 09:59
Total Extractable Hydrocarbons	518	ug/Media	50	104	60	140	1.9	20	
Surr: p-Bromofluorobenzene			5.0	86	80	120			
Sample ID: MB-28087	Method Blank				Run: SV5970.I AIR_070813A				08/14/07 17:11
Total Extractable Hydrocarbons	ND	ug/Media	50						
Methyl tert-butyl ether (MTBE)	ND	ug/Media	5.0						
Benzene	ND	ug/Media	5.0						
Ethylbenzene	ND	ug/Media	5.0						
Toluene	ND	ug/Media	5.0						
Xylenes, Total	ND	ug/Media	5.0						
Surr: p-Bromofluorobenzene			5.0	100	80	120			
Sample ID: LCS-28087-GRO	Laboratory Control Sample				Run: SV5970.I AIR_070813A				08/14/07 17:44
Total Extractable Hydrocarbons	508	ug/Media	50	102	60	140			
Surr: p-Bromofluorobenzene			5.0	99	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: SB Engineering
Project: Garrison ND Farmers Union Cenex

Report Date: 08/17/07
Work Order: B07072266

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW8260B							Analytical Run: SV5970.I AIR_070813A		
Sample ID: 10-Aug-07_CCV-MBTEX	Continuing Calibration Verification Standard							08/13/07 17:51	
Methyl tert-butyl ether (MTBE)	23.2	ug/Media	5.0	116	70	130			
Benzene	22.3	ug/Media	5.0	112	70	130			
Ethylbenzene	20.8	ug/Media	5.0	104	70	130			
Toluene	22.3	ug/Media	5.0	112	70	130			
Xylenes, Total	60.9	ug/Media	5.0	101	70	130			
Surr: p-Bromofluorobenzene			5.0	93	80	120			
Sample ID: CCV-MBTEX	Continuing Calibration Verification Standard							08/14/07 08:53	
Methyl tert-butyl ether (MTBE)	24.3	ug/Media	5.0	122	70	130			
Benzene	22.9	ug/Media	5.0	115	70	130			
Ethylbenzene	19.7	ug/Media	5.0	99	70	130			
Toluene	23.5	ug/Media	5.0	118	70	130			
Xylenes, Total	61.2	ug/Media	5.0	102	70	130			
Surr: p-Bromofluorobenzene			5.0	92	80	120			
Sample ID: CCV-GRO	Continuing Calibration Verification Standard							08/14/07 09:26	
Total Extractable Hydrocarbons	416	ug/Media	50	83	70	130			
Surr: p-Bromofluorobenzene			5.0	92	80	120			
Sample ID: 15-Aug-07_CCV-MBTEX	Continuing Calibration Verification Standard							08/15/07 09:05	
Methyl tert-butyl ether (MTBE)	23.3	ug/Media	5.0	117	70	130			
Benzene	21.4	ug/Media	5.0	107	70	130			
Ethylbenzene	18.6	ug/Media	5.0	93	70	130			
Toluene	20.1	ug/Media	5.0	101	70	130			
Xylenes, Total	58.1	ug/Media	5.0	97	70	130			
Surr: p-Bromofluorobenzene			5.0	93	80	120			
Sample ID: 15-Aug-07_CCV-GRO	Continuing Calibration Verification Standard							08/15/07 09:38	
Total Extractable Hydrocarbons	458	ug/Media	50	92	70	130			
Surr: p-Bromofluorobenzene			5.0	95	80	120			
Sample ID: 15-Aug-07_CCV-MBTEX	Continuing Calibration Verification Standard							08/16/07 08:49	
Methyl tert-butyl ether (MTBE)	24.3	ug/Media	5.0	122	70	130			
Benzene	20.3	ug/Media	5.0	102	70	130			
Ethylbenzene	20.8	ug/Media	5.0	104	70	130			
Toluene	21.9	ug/Media	5.0	109	70	130			
Xylenes, Total	57.4	ug/Media	5.0	96	70	130			
Surr: p-Bromofluorobenzene			5.0	103	80	120			
Sample ID: 15-Aug-07_CCV-GRO	Continuing Calibration Verification Standard							08/16/07 09:22	
Total Extractable Hydrocarbons	467	ug/Media	50	93	70	130			
Surr: p-Bromofluorobenzene			5.0	96	80	120			

Qualifiers:

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Energy Laboratories Inc
Workorder Receipt Checklist

B07072266

SB Engineering

Login completed by: Gina M. McCartney
Reviewed by: Denise Ruby
Reviewed Date: 7/27/2007 5:11:16 PM

Date and Time Received: 7/27/2007 9:00 AM
Received by: lg
Carrier name: Ground

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	NA°C
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: UND / EERC	Project Name, PWS#, Permit #, Etc.: Garrison, ND Farmers Union Cenex	
Report Mail Address: 15 23rd St North, Grand Forks, ND 58202	Contact Name: Jarda Solc Voice: 701-777-5000 Fax: 701-777-5181 Email: jsolc@undeerc.org	Sampler Name if other than Contact: Randy Knutson
Invoice Address: SB Engineering ~~Same~~ 4525 Valhacher Ave. St. Louis Park, MN 55416	Invoice Contact & Phone #: 612-850-~~8545~~ 6750	Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐ Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Receipt Temp NA °C
Cooler ID(s) ____
Custody Seal Y N
Intact Y N
Signature Y N
Match

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water, Soils/Solids, Vegetation, Biomass, Other)	BTEX	TPH	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	LAB ID
1	VW-14 A, 60 sec	7-23-07	13:05	Air	☒	☒	☐	☒	☐	0.28 L/MIN	B707226001
2	VW-14 B, 60 sec	7-23-07	13:10	Air	☒	☒	☐	☒	☐	0.28 L/MIN	-002
3	VW-16 C 60 sec	7-23-07	14:00	Air	☒	☒	☐	☐	☐	0.28 L/MIN	-003
4	VW-16 D 60 sec	7-23-07	14:05	Air	☒	☒	☐	☐	☐	0.28 L/MIN	-004
5	VW-15 E 60 sec	7-23-07	15:15	Air	☒	☒	☐	☐	☐	0.28 L/MIN	-005
6	VW-15 F 60 sec	7-23-07	15:20	Air	☒	☒	☐	☐	☐	~~0.28~~ L/MIN	-006
7	VW-14,15,16 G 60 sec	7-23-07	16:25	Air	☒	☒	☐	☐	☐	0.28 L/MIN	-007
8	VW-14,15,16 H 60 sec	7-23-07	16:30	Air	☒	☒	☐	☐	☐	0.28 L/MIN	-008
9	VW-14,15,16 I 60 sec	7-24-07	10:40	Air	☒	☒	☐	☐	☐	0.28 L/MIN	-009
10	VW-14,15,16 J 60 sec	7-24-07	10:45	Air	☒	☒	☐	☐	☐	0.28 L/MIN	-010

Custody Record MUST be Signed	Relinquished by: Randy Knutson Date/Time: 7-25-07 15:00	Shipped by:	Received by: Date/Time:
	Relinquished by: Date/Time:	Shipped by: UPS GRD	Received by: Date/Time: 7-27-07
	Sample Disposal: Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type ____ # of fractions 9+10

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.