EARTH BURNERS, INC.
P.O. Box 16083
Duluth, Minnesota 55816-6083

Terry Anderson
218/343-1162 (Mobile)
218/729-5229 (Home)
218/628-0454 (Office)

FILE COPY

October 28, 1993

Dale Schultz
Route 3, Box 334
Dairyland, WI 54830

RE: Remedial Action Plan for the Former Underground Storage Tank at the Moose Junction Lounge in Dairyland, WI. WDNR Site # 0301

Dear Mr. Schultz,

Enclosed is a copy of the Remedial Action Plan (RAP) which was also sent to the Wisconsin Department of Natural Resources (WDNR). The report is intended to furnish data to you and the WDNR to gain approval for the RAP. If approved, ERS plans a third groundwater sampling event in November. If you have any questions concerning any aspect of this report, please call either of us at (218) 628-0248.

Sincerely,

EARTH REMEDIATION SERVICES

Roger W. Biebl
Project Hydrogeologist

James R. Warren
Staff Hydrologist

RWB:saa

Enclosure

REMEDIAL ACTION PLAN

MOOSE JUNCTION LOUNGE

Prepared for:

DALE SCHULTZ
ROUTE 3, PO BOX 334
DAIRYLAND, WI 54830

Prepared by:

EARTH REMEDIATION SERVICES
P.O. BOX 16083
DULUTH, MN 55816
(218) 628-0248

Recd Nov 1, 1993
NWD HQ

OCTOBER, 1993

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1.0 INTRODUCTION

Earth Remediation Services (ERS) provides this Remedial Action Plan as part of the Site Investigation Report for the Moose Junction Lounge. The present responsible party, Dale Schultz, contracted ERS to complete a Site Investigation and Remedial Action Plan (RAP). Our objective is to mitigate soil and groundwater contamination in accordance with Wisconsin guidance. ERS proposes the following RAP options as required by the WDNR to complete the Site Investigation. Design criteria and estimated costs reflect ERS's professional opinion; no warranty is expressed or implied. The site is located in the SE1/4 of the SE1/4 of the SE1/4 of section 18, Township 44N, Range 14W and is shown in Figure 1-1.

2.0 BACKGROUND INFORMATION

2.1 SITE CHRONOLOGY

The following is an abbreviated chronology of actions to date:

- 1970 - A 1,000 gallon gasoline UST is registered with the Department of Industry, Labor and Human Relations (DILHR).
- May 1980 - Edward and Ceil Lyons sell the Moose Junction Site to Frank and Chris Day.
- Oct 1990 - Aqua-Tech, Inc. conducted a Site Investigation for the Wisconsin Department of Transportation (WDOT).
- Dec 1990 - WDNR issues a Responsible Party Letter to Chris Day.
- Oct 1991 - Dale L. Schultz begins operating business at the Moose Junction Site.
- Feb/Sept 1992 - WDNR determines that past or present possible Responsible Parties have not conducted a Site Investigation.
- Sept 1992 - WDNR issues a Notice of Violation to both Chris Day and Dale Schultz as Moose Junction is listed as the probable source of petroleum contamination.
- Oct 1992 - RMT, Inc. conducts an additional investigation for WDOT. Groundwater flow is estimated to be in a southerly direction with the highest concentration of contaminants near the Moose Junction Lounge property.

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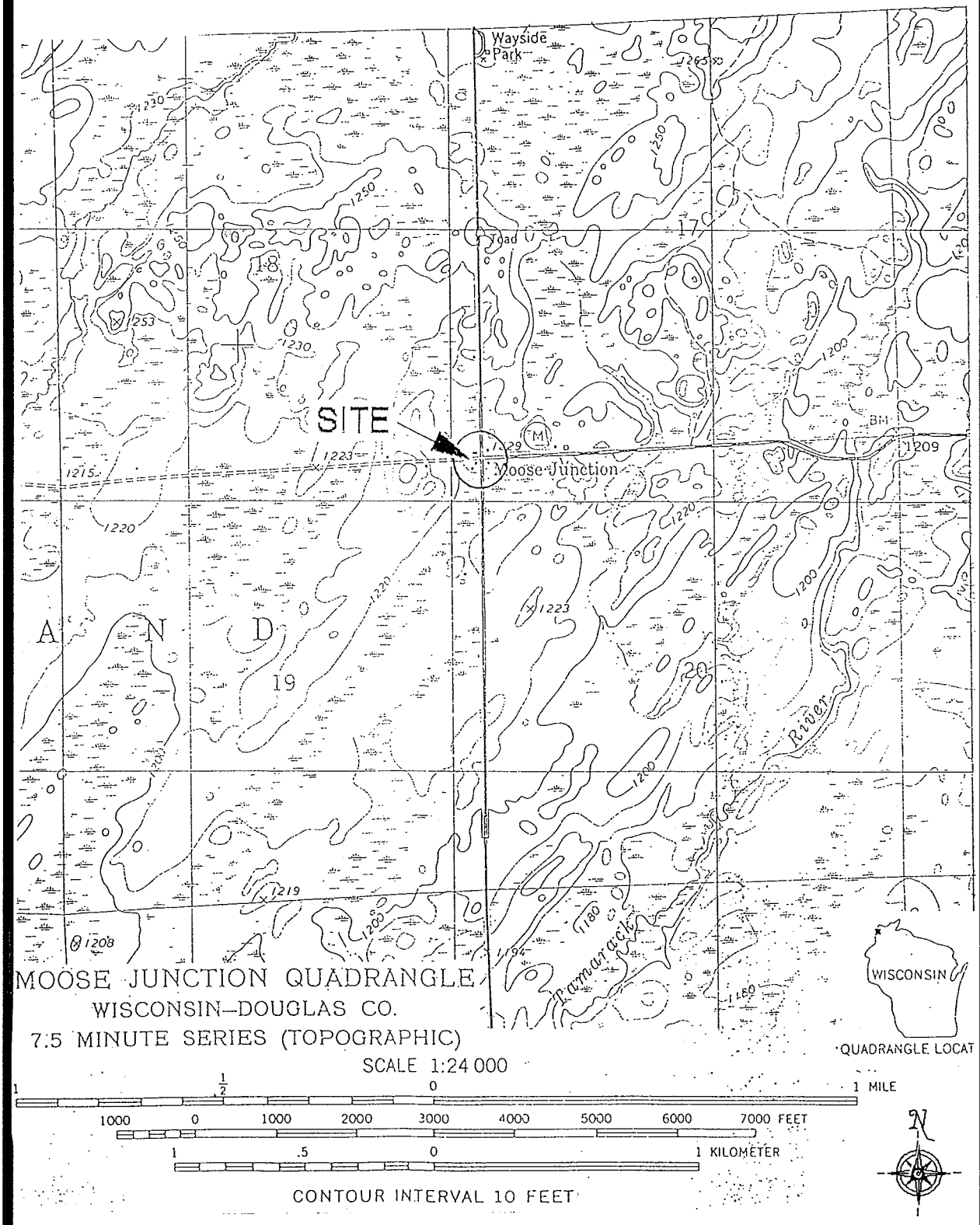

SITE LOCATION
MOOSE JUNCTION LOUNGE

FIGURE 1-1

- Oct 1992 - WDNR samples a private well south of the site; possible hydrocarbon contamination.

- Oct 1992 - Dale Schultz notifies DILHR that the Site UST has been taken out of service.

- Nov 1992 - WDNR/DILHR meet with Chris Day and Dale Schultz to inform them of an impending Administrative Order.

- Dec 1992 - Dale Schultz retains Earth Remediation Services (ERS) as an environmental consultant. Responsible Party is still in dispute.

- Jan 1993 - Terry Anderson, Manager of ERS, has teleconference with WDNR Project Manager.

- Feb 1993 - ERS complies with new PECFA regulations in receiving Consultant Certification Number 04939.

- Mar 1993 - ERS drafts a workplan, visits the site, teleconferences with WDNR/DILHR/PECFA representatives, and sends out access agreements.

- April 1993 - ERS revises the Site Investigation workplan to accommodate changes by the Wisconsin Department of Natural Resources (WDNR). Access Agreements to place soil boring on neighboring properties are received.

- May 1993 - ERS installs soil borings and monitoring wells.

- June 1993 - Earth Burners, Inc. (EBI), a certified tank excavator/site assessor (#04174), removes a 1,000 gallon gasoline UST, pump island, associated supply pipes and grossly contaminated soils from the Moose Junction Lounge property as part of an interim action.

- July 1993 - Analytical results indicate the soil is not hazardous waste allowing EBI to transport contaminated soils to their thermal treatment unit at Hallett Dock #7 in Duluth, Minnesota. 672 cubic yards of petroleum impacted soils are thermally treated.

- August 1993 - ERS completes aquifer testing and a second groundwater sampling event.

- September 1993 - No contaminants are found in the potable wells at the Moose Junction Lounge and Dickman residence for both sampling events. Aquifer test data analyzed.

- October 1993 - ERS completes a Remedial Action Plan.

2.2 Interim Excavation

On June 15, Earth Burners, Inc. excavated approximately 560 cubic yards of petroleum impacted soils and a 1,000 gallon gasoline UST, pump island, and associated supply pipes. While removing the piping, EBI found another set of supply pipes which used to service a previously removed UST. A second pump island was found approximately 10 feet north of the existing island. An additional 112 cubic yards of soil were removed as soil vapor evidence indicated the second pump island probably had a rather large petroleum release.

Contaminated soils were distinguished from clean soils using jar headspace analysis and an HNu DL-101-2 photoionization detector with a 10.2 electron volt lamp. At least one sample was analyzed for each 10 cubic yards of soil excavated. Soil vapor analysis logs are incorporated into the excavation report which can be viewed in Appendix A. ERS believes soil vapor concentrations did not match actual GRO concentrations as the lamp on the PID was constantly peaking out during testing. Soil vapors in the ambient air during part of the excavation were continuously greater than 5 ppm causing the use of respirators by field personnel. Contaminated soils were stockpiled with a sheet plastic base and cover 100 yards west of the site while waiting for analytical results. Because of the very high concentration levels of petroleum contaminants in the excavated soils, (one sample was totally saturated at 30% GRO) ERS decided thermal treatment was the only option which would economically remediate the soils. Earth Burners estimated 10,498.71 pounds of petroleum hydrocarbons were removed from the soils. The amount was calculated in accordance with Form 4400-149 'Application to Treat or Dispose of Petroleum Contaminated Soil' which is located at the end of the excavation report.

The UST was in good condition, however the supply pipes appeared to have been leaking. Pipes which led to a former tank basin and pump island also appeared to have leaked. The former tank basin on the northeast corner of the lounge had contaminated soils to 12 feet below grade which is very near the bedrock surface.

2.3 Wetlands Investigation

ERS hand augured and sampled shallow soil borings in the Highway 35 ditch and in Margaret Dickman's yard on August 26, 1993. Analytical results from the soil borings indicate no petroleum contamination is migrating to the wetlands area south of the site. Soil vapor results indicate some vapors migrating to the ground surface in the vicinity of HSB-4 as located on Figure 2-1. Soil vapor results from all soil borings can be viewed in Table 2-1. Soil borings were two to

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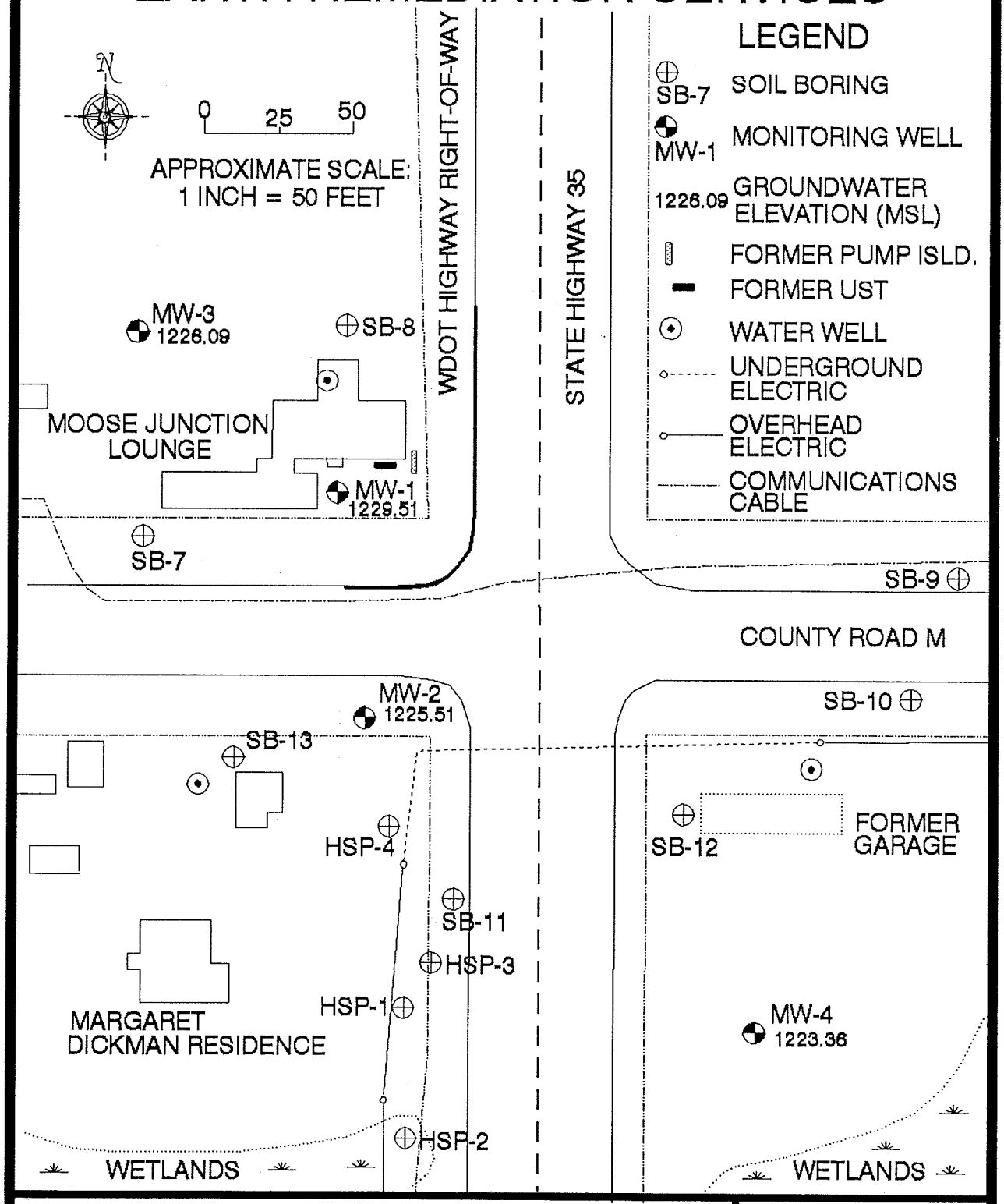

MOOSE JUNCTION LOUNGE SITE MAP

FIGURE 2-1

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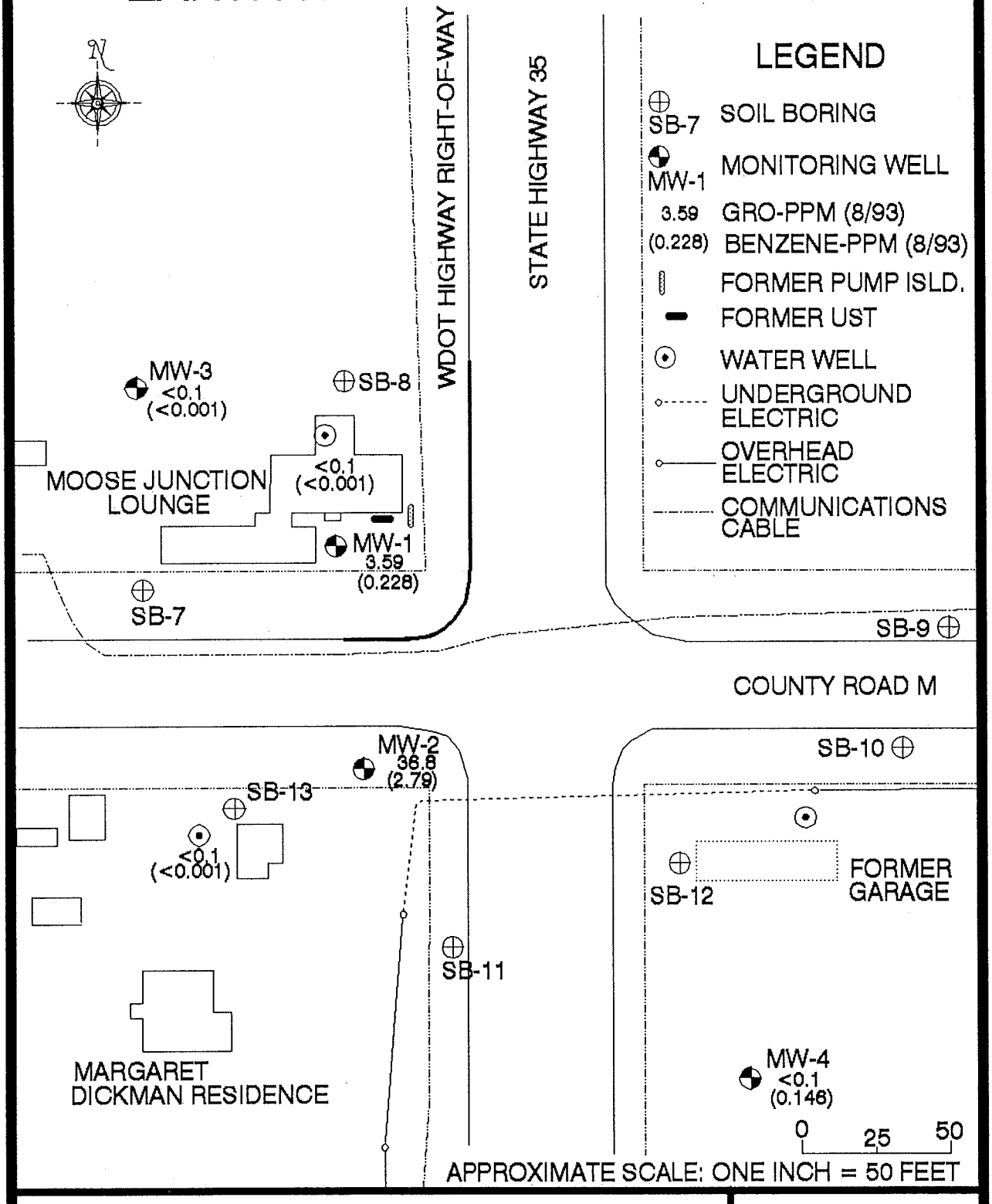

GASOLINE RANGE ORGANICS AND BENZENE CONCENTRATIONS IN WATER

FIGURE 2-2

five feet below the ground elevation of MW-2. Because the main contamination at MW-2 was between four and six feet below grade, ERS felt that shallow borings in the ditch would show if any contamination was migrating towards the wetlands area.

2.4 Hydrologic Characteristics

A Groundwater sampling event was accomplished on August 26, 1993. Groundwater quality was comparable to the first event except the significant increase in the benzene level in MW-4. This could reflect a continued migration of groundwater contaminants southward or a lowered water table caused groundwater to encounter increased concentrations of benzene. Contamination levels of GRO and benzene can be viewed in Figure 2-2. A third sampling is needed to accurately define a trend. Monitoring well construction details and groundwater analytical results can be viewed in Table 2-2 and Table 2-3, respectively. Groundwater stabilization forms are located in Appendix C with laboratory analysis in Appendix D.

Hydraulic gradient between MW-1 and MW-4 was 0.027 ft/ft on May 27, 1993 and August 26, 1993. Although previous reports indicated groundwater flow direction was southward, ERS believes the bedrock ridge striking southwest dominates the flow pattern. The bedrock ridge, probably formed by glacial scouring, may cause the decreasing hydraulic gradient between MW-1 and MW-4 as shown on a groundwater contour map which can be viewed on Figure 2-3. On August 26, 1993, ERS completed baildown test on all four monitoring wells. Data from the tests were computed utilizing AQTESOLV, a computer software for determining hydraulic properties. Aquifer testing graphs developed by the software are placed in Appendix E. Hydraulic conductivities ranged from 2.77 x 10-5 cm/sec to 4.36 x 10-5 cm/sec. These conductivities are in the range of silty soils or glacial tills. From multiplying the average hydraulic conductivity (3.25 x 10-5 cm/sec) by the hydraulic gradient and dividing by an assumed 25% porosity, an average linear groundwater velocity of 3.51 x 10-6 cm/sec is computed. At this velocity, contaminated groundwater in the MW-2 vicinity would take 14 years to reach the Margaret Dickman well area. It is possible that preferential pathways for the residual contaminants will short circuit the contaminants towards Mrs. Dickman's well. A groundwater hydrograph depicting water levels and quality can be seen on Figure 2-4.

TABLE 2-1

Moose Junction Lounge Soil Boring Vapor Results

Depth Below Grade (feet)	SB-7	SB-8	SB-9	SB-10	SB-11	SB-12	SB-13	MW-1	MW-2	MW-3	MW-4	HSB-1	HSB-2	HSB-3	HSB-4	
0 - 2	0.0	0.0	0.0	0.0	0.0	466	2.0	NS	31	0.0	4.0	0.0	0.0	0.0	0.5	
2 - 4	0.0	0.0	0.0	0.0	0.0	607	5.4	278	294	0.0	4.0	NR	0.4	0.0	10.1	
4 - 6	0.0	0.0	0.0	0.0	0.0	634	2.3	343	357	0.0	5.0		0.2		NR	
6 - 8	0.0	0.0		0.0	0.0	291	2.7	297	293	0.0	0.0					
8 - 10	0.0	NR		0.2		104	0.3	104	237	0.0	9.0					
10 - 12						34	0.0	BR	259	0.0	1.0					
12 - 14						41	0.0		178	0.0	8.0					
14 - 16						13			BR	0.0	4.0					

NR = No Recovery
NS = Not Screened
BR = Bedrock

Table 2-2 Monitor well construction and water levels.

	MW-1		MW-2		MW-3		MW-4	
	05/93	08/93	05/93	08/93	05/93	08/93	05/93	08/93
Groundwater Elevation	1229.51	1228.16	1225.51	1224.17	1226.09	1225.07	1223.38	1221.99
Top of Riser Elevation	1233.23		1231.18		1228.93		1226.11	
Ground Surface Elevation	1231.2		1229.2		1226.9		1224.1	
Top of Well Screen Elevation	1228.5		1226.5		1224.1		1221.3	
Bottom of Well Elevation	1220.7		1216.0		1213.6		1210.8	
Top of Filter Pack	1229.0		1227.0		1224.3		1221.9	
Top of Bentonite Seal	1231.0		1229.0		1226.3		1223.9	

All elevations referenced to the National Geodetic Vertical Datum based on Wisconsin Department of Transportation Right of Way points 2025 and 2026 east of the Moose Junction Lounge.

Table 2-3 Analytical results from groundwater sampling at the Moose Junction Lounge during May and August 1993 (ppb).

	MW-1		MW-2		MW-3		MW-4		MD-MW		DS-WW	
Elements	05/93	08/93	05/93	08/93	05/93	08/93	05/93	08/93	05/93	08/93	05/93	08/93
GRO	6160.0	3590.0	132000.0	3680.0	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0
Benzene	41.0	228.0	19000.0	279.0	<1.0	<5.0	3.0	146.0	<1.0	<5.0	<1.0	<5.0
Toluene	210.0	54.0	29000.0	2770.0	<1.0	<5.0	<1.0	<5.0	NA	<5.0	<1.0	<5.0
Ethylbenzene	22.0	47.0	1600.0	551.0	<1.0	<5.0	<1.0	<5.0	NA	<5.0	<1.0	<5.0
Xylenes	820.0	53.0	1650.0	2650.0	<1.0	<5.0	<1.0	<5.0	NA	<5.0	<1.0	<5.0
Dibromochloro-methane	<1.0	NA	130.0	NA	<1.0	NA	<1.0	NA	NA	NA	<1.0	NA
n-Propylbenzene	6.0	NA	1300.0	NA	<1.0	NA	<1.0	NA	NA	NA	<1.0	NA
Isopropybenzene	3.0	NA	53.0	NA	<1.0	NA	<1.0	NA	NA	NA	<1.0	NA
tert-Butylbenze	<1.0	NA	270.0	NA	<1.0	NA	<1.0	NA	NA	NA	<1.0	NA
n-Butylbenzene	<1.0	NA	53.0	NA	<1.0	NA	<1.0	NA	NA	NA	<1.0	NA
p-Isopropytoluene	6.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA
1,2,4 Trimethyl-benzene	96.0	69.0	390.0	652.0	<1.0	<5.0	<1.0	<5.0	NA	<5.0	<1.0	<5.0
1,3,5 Trimethyl-benzene	190.0	45.0	470.0	259.0	<1.0	<5.0	<1.0	<5.0	NA	<5.0	<1.0	<5.0
Total Lead	406.0	<50.0	131.0	58.0	118	<50.0	18.0	<50.0	7.0	<50.0	2.0	<50.0

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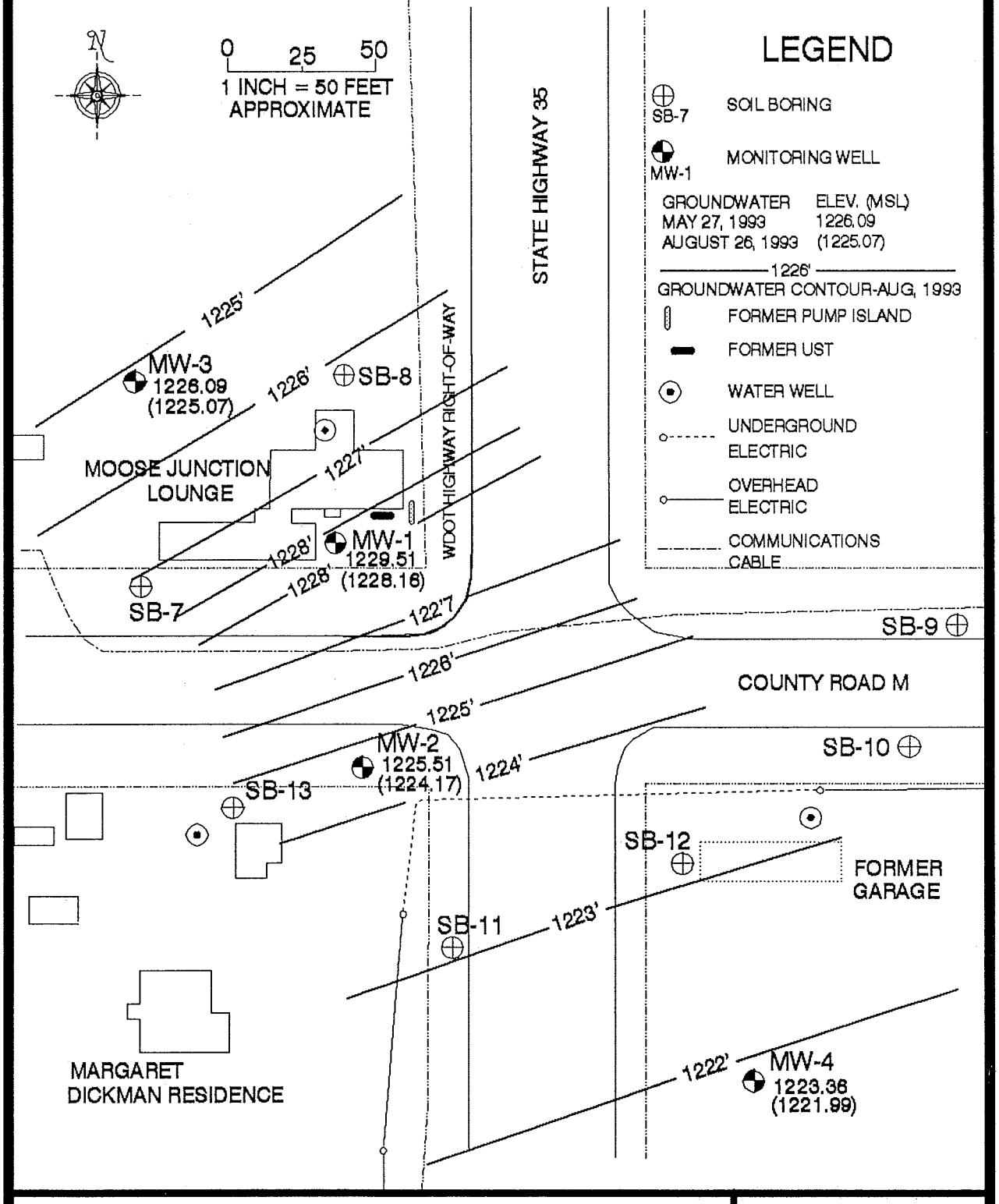

MOOSE JUNCTION LOUNGE
GROUNDWATER CONTOURS AUGUST, 1993

FIGURE 2-3

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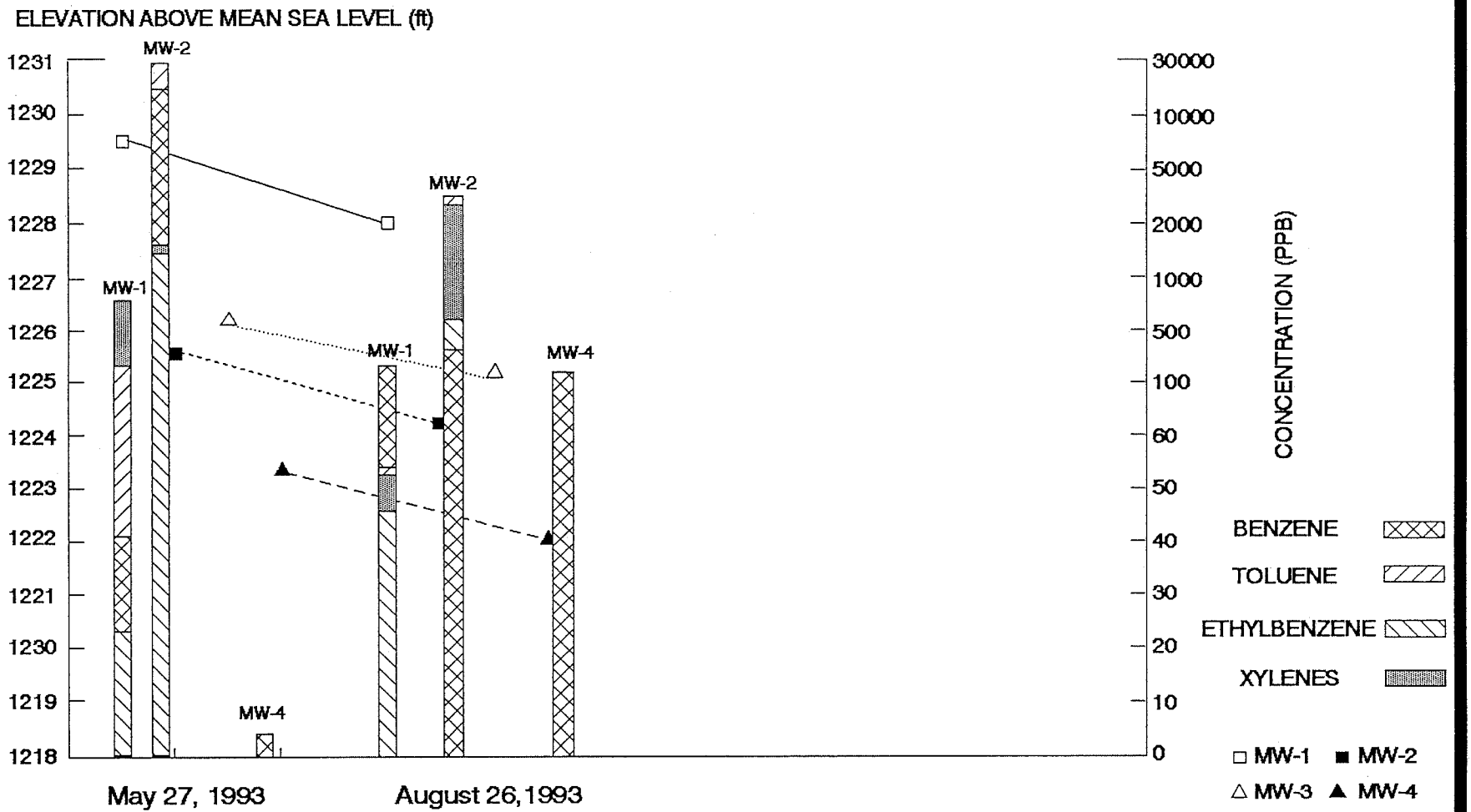

GROUNDWATER QUALITY AND ELEVATION HYDROGRAPH

FIGURE 2-4

2.5 Contamination Pathway

Contaminated soils remain under the intersection of Wisconsin State Highway 35 and Douglas County Road M. Southerly groundwater flow should slowly transport the pollutants towards the wetlands south of the site. However, hand soil borings indicate the contamination is being diverted from the assumed path. ERS suspects the contamination is following the utility lines to the east. This preferential pathway may be the source for contaminants that may have migrated onto the Mary Mckelvey property, southeast of the UST site, as located on Figure 2-5. Note an abandoned well on the McKelvey property may be near the contamination boundary. This well has not been sealed and could be sampled. It will require proper abandonment in order to eliminate the possibility of the well becoming an additional pathway.

2.6 Extent of Contamination

Estimates of the horizontal and vertical extent of contamination can be viewed on Figures 2-5 and 2-6 respectively. Estimates are made from soil borings and groundwater samples from data collected by ERS, RMT and Aqua-Tech. End point for the vertical cross section are shown on Figure 2-7. Note the odd shape of the remaining contaminants. This could be from the preferential pathway of petroleum hydrocarbons along the utilities or it is possible a second source exists on the Mckelvey property. The absence of Methyl Tertiary Butyl Ether (MTBE) in soil boring sample SB-12(4) may indicate gasoline contamination may predate contamination from the Moose Junction Lounge. The presence of MTBE indicates gasoline contamination post dated 1979, the year it was commercially produced. ERS believes MW-4 is very close to the leading boundary of the contaminant plume. Very low concentrations of benzene but no other contaminants support this theory.

Gas Station at Moose Junction Started in 1970 9 years Prior To MTBE

2.7 Summary of Investigation Results

may Need To Make That Determination for Remedial Design for BTO

Residual contaminants were characterized by bottom and sidewall samples collected during the interim excavation. The analytics indicate that grossly contaminated soils were not excavated on the southeast end of the excavation as shown by sample 9308-B7(6) at 324,000 ppm GRO. The sample was collected from the WDOT/Schultz property boundaries of the excavation. This sample is representative of a one to two foot thick layer of medium to coarse sand which may be roadbase as the layer was found to be by the road only. This layer could also be acting as preferential path for the contaminants.

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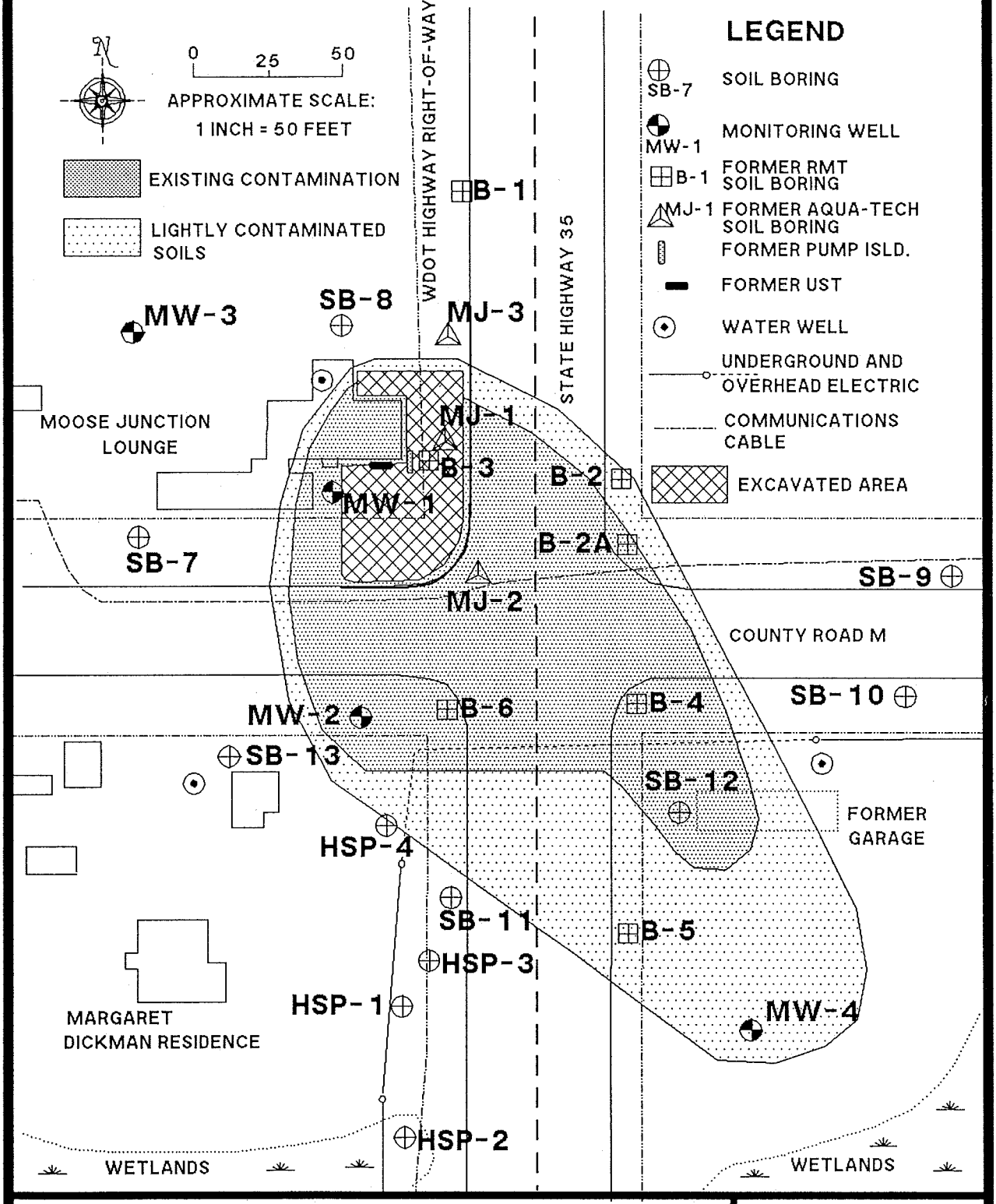

MOOSE JUNCTION LOUNGE
HORIZONTAL EXTENT OF CONTAMINATION

FIGURE 2-5

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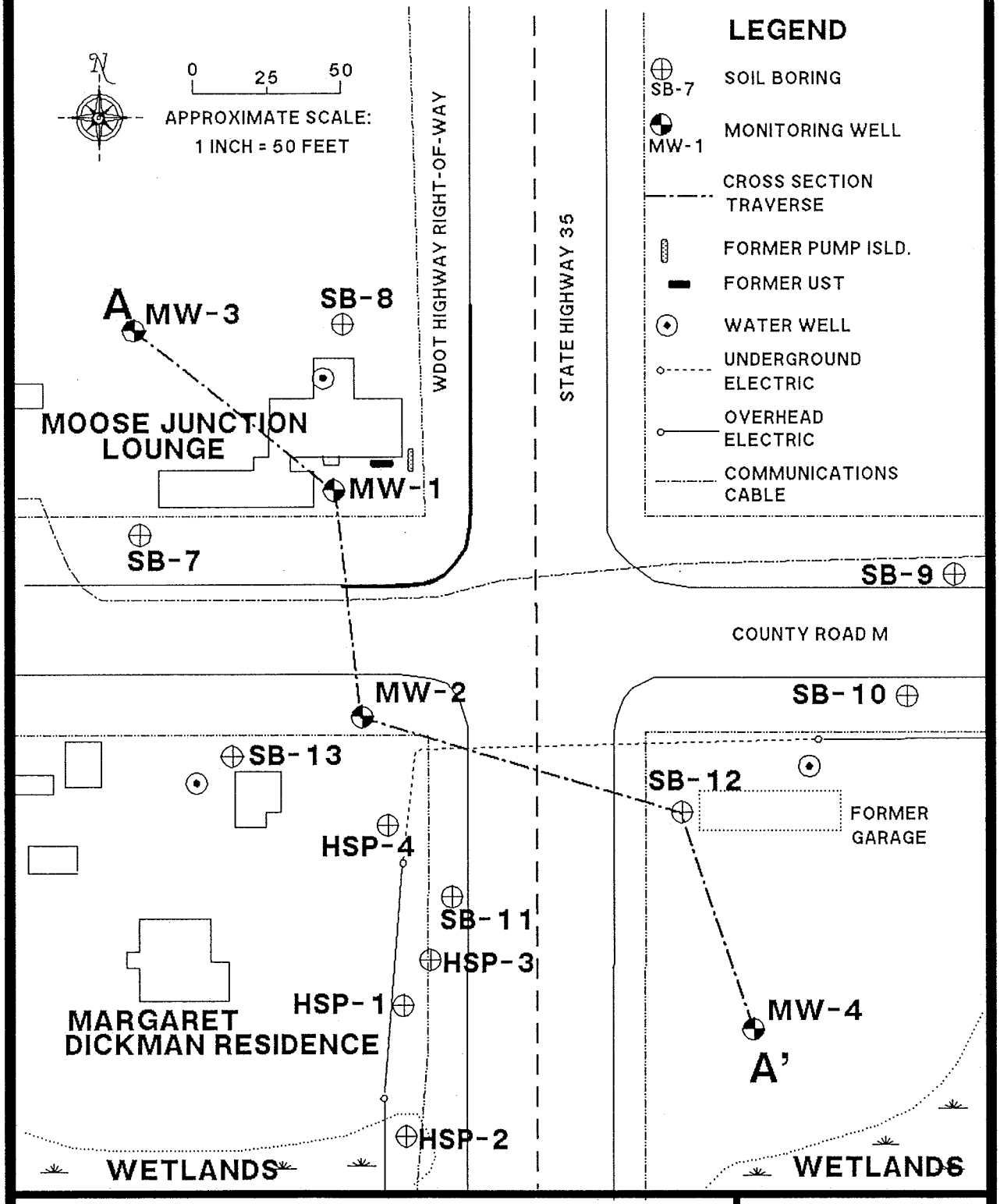

MOOSE JUNCTION LOUNGE VERTICAL CROSS SECTION A - A' END POINTS

FIGURE 2-7

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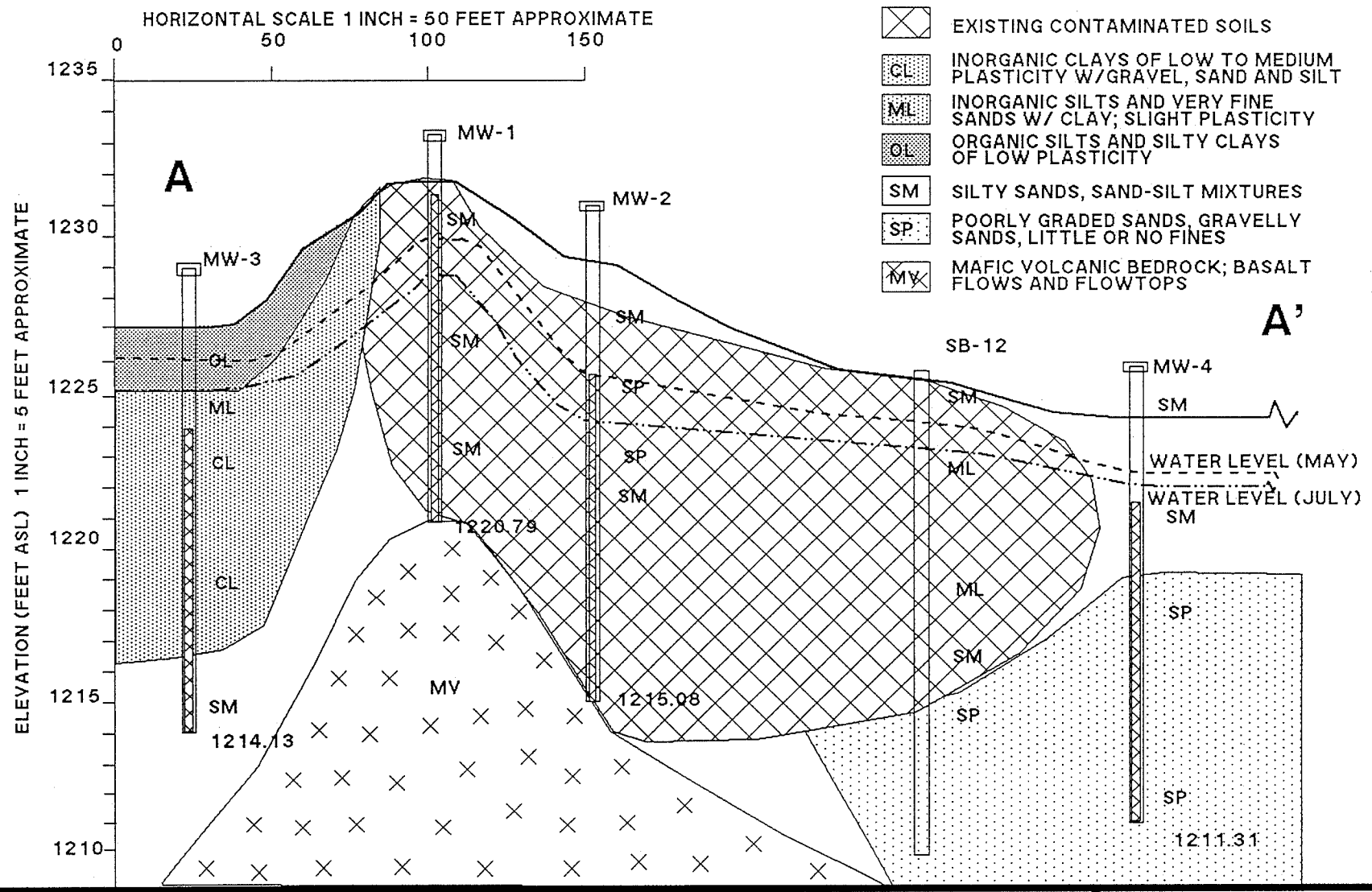

MOOSE JUNCTION LOUNGE
VERTICAL EXTENT OF CONTAMINATION

FIGURE 2-6

3.0 REMEDIAL ACTION PLAN

3.1 Remedial Action Plan Alternatives

ERS considered three options in proposing this RAP. They are as follows:

- Air Sparging/Soil venting system. - This option would probably offer the most comprehensive soil and groundwater remediation system, it would also be the most expensive and labor intensive. In this scenario, many sparge/vent points would probably be needed for the residual contamination in the soils.

  ERS estimates the system would need horizontal components to address the majority of the contaminated soils which are believed under the county and state roads. System maintenance and monitoring could be very costly with no guarantee that the system will be compatible with decontamination of the glacial till, even with enhanced bioremediation assisting the venting/sparging. Other possible problems with this alternative are: 1) the elimination of petroleum hydrocarbons from entering the atmosphere may require a separate air remedial system and associated permits which will increase costs further and 2) the actual remedial period is difficult to predict. Does this method offer an economical environmental gain?

- Excavation of contaminated soils and remediation through bioremedial composting. This method quickly eliminates the remaining source of contaminants. This option does not directly address contaminated groundwater, although elimination of the source should induce less contaminated groundwater samples in the future. Composting of soils is an economical alternative to the higher cost of soil incineration. However, ERS believes the expense of excavating the road base, and the inconvenience to travelers using the throughway, makes this alternative economically unfeasible.

- Passive bioremediation/Long-term groundwater monitoring. ERS favors this remedial alternative because this option is the most economical. Risk assessment previously published in the Summary Report: Moose Junction Lounge Site Investigation indicates a very low risk of receptors excluding the Margaret Dickman residence and the Moose Junction Lounge. The two water samples collected by ERS from the above sites have not detected any contaminants to date. The wells at these locations will be monitored quarterly for Gasoline Range Organics (GRO) and Petroleum

Volatile Organic Compounds (PVOC) to ensure contaminant migration will not create adverse health effects. Although this RAP does not address the possibility of contaminants entering the wetlands area, the contaminants will require an estimated eight to ten years to migrate to this area south of MW-4. By that time, it is possible the contaminants will be under WDNR action limits as advection, dispersion, diffusion, biodegradation, and chemical adsorption will lower concentration levels. Present groundwater contaminant levels are low in MW-4.

3.2 REMEDIAL ACTION PLAN PROPOSAL

ERS proposes passive bioremediation because the majority of grossly contaminated soils were removed during the interim action in June, 1993. The RAP includes provisions for long term groundwater sampling of the monitoring and potable wells at both the Moose Junction Lounge and the Margaret Dickman residence. Groundwater samples will be analyzed for GRO, PVOC, and total lead. The monitoring and sampling will continue until two consecutive sampling events indicate groundwater analytics are under the following levels:

benzene 100 ppb	ethylbenzene 1360 ppb
toluene 3000 ppb	xylene 10000 ppb
lead 50 ppb	

Note that the following contaminant levels are based on the Wisconsin Department of Health and Social Services (DHSS) March, 1993 list of contaminant concentrations in drinking water for which the DHSS requires notification (see Appendix F). If the potable well samples at either the Moose Junction Lounge or the Margaret Dickman residence show any contaminants above the WDNR groundwater quality standards as listed in NR 140, the WDNR will be notified immediately. The enforcement standard concentrations are as follows:

benzene 5 ppb	ethylbenzene 1360 ppb
toluene 343 ppb	xylene 620 ppb
lead 50 ppb	

It is difficult to predict with any accuracy the time the concentrations will be under the DHSS notification levels. ERS could compute a solute transport model to predict the time when concentrations will be low enough to gain a site closure. However, ERS believes the heterogeneous hydrogeological conditions at the site would add a great amount of error to the model. The model would also be biased by the preferential pathways the contaminants may be following.

ERS proposes the following contingency:

If petroleum impacted groundwater either continually increases or does not decrease in the monitoring wells after one year of sampling, the RAP can be amended, with the WDNR's approval, to install an active remedial system. If contaminants are found in either potable well near the site, carbon filter absorbers can be installed on the receiving side of the water tank to protect water quality. Sampling would then be amended to include water samples from the influent and effluent sides of the carbon filters. If benzene concentrations continue to increase in MW-4, ERS is amenable to installing a fifth monitoring well at the boundary of the wetlands.

IT WOULD be WISE To KNOW IF IMPACT TO WETLAND EXISTS, ADJUST WELL PLACEMENT AS NEEDED

3.3 SCHEDULE/PERMITS

Groundwater will be sampled on quarterly basis until the aforementioned concentration levels are met or until the WDNR instructs ERS to cease the sampling events.

ERS does not foresee any special permits needed for the passive bioremediation. Access agreements between ERS, Mary McKelvey, and Margaret Dickman may have to be renewed for access to MW-2 and MW-4 which are located on their properties, respectively. Care will be taken to disallow contaminated purge waters from flowing into the drainage system and wetlands. Purge waters from MW-1, MW-2, and MW-4 will be collected and remediated in accordance with WDNR guidelines.

3.4 SITE ABANDONMENT

After groundwater monitoring indicates the contaminant levels are under the DHSS guidelines for two consecutive sampling events, as agreed upon by the WDNR, the site will be properly abandoned. Monitoring wells will be sealed according to NR 141, Groundwater Monitoring Well Requirements. The monitoring well casings will either be removed or cut two feet below grade and the boring sealed with neat cement grout. A report will be sent to the WDNR and, if all requirements are met, a site closure should be granted.

Soils from thermal treatment will probably be used as road base or as limited fill as post burn samples indicated the remediated soils have less than five ppm petroleum hydrocarbons remaining in the soils.

4.0 ESTIMATED COSTS

The following is an estimated cost for the groundwater sampling and reporting. ERS presents the estimate on a yearly basis because the exact costs for sampling events are not known at this time. ERS thinks it is important to give a cost range because of annual cost increases and any other unpredicted circumstances.

COSTS PER ANNUM	PRICE($)/UNIT	COST RANGE($)
Groundwater Sampling/Travel	55/Hr	1,760 - 2,200
Client\Regulator Correspondence	65/Hr	520 - 780
Quarterly Progress Reports	55/Hr	1,760 - 2,200
Diagnostic Equipment/Supplies	75/Day	300 - 300
Annual Report	65/Hr	780 - 1,040
Vehicle	50/Day	200 - 300
Analytical samples	NA	- -
PVOC & GRO	63/Sample	2,016 - 2,268
Total Lead	24/Sample	384 - 480
Total		7,720 - 9,568

5.0 RECOMMENDATIONS

ERS recommends a second vapor risk assessment be accomplished at the Moose Junction Lounge and the Dale Schultz residence because of the previous elevated vapor samples. This would ensure that contaminated soils not excavated from under the building(s) are not creating unhealthy conditions. The previous groundwater receptor survey indicates almost no chance of petroleum hydrocarbons entering other potable water wells. Because of the low risk associated with the remaining contaminated soils and groundwater, the most economic solution is continued passive bioremediation.

REFERENCES

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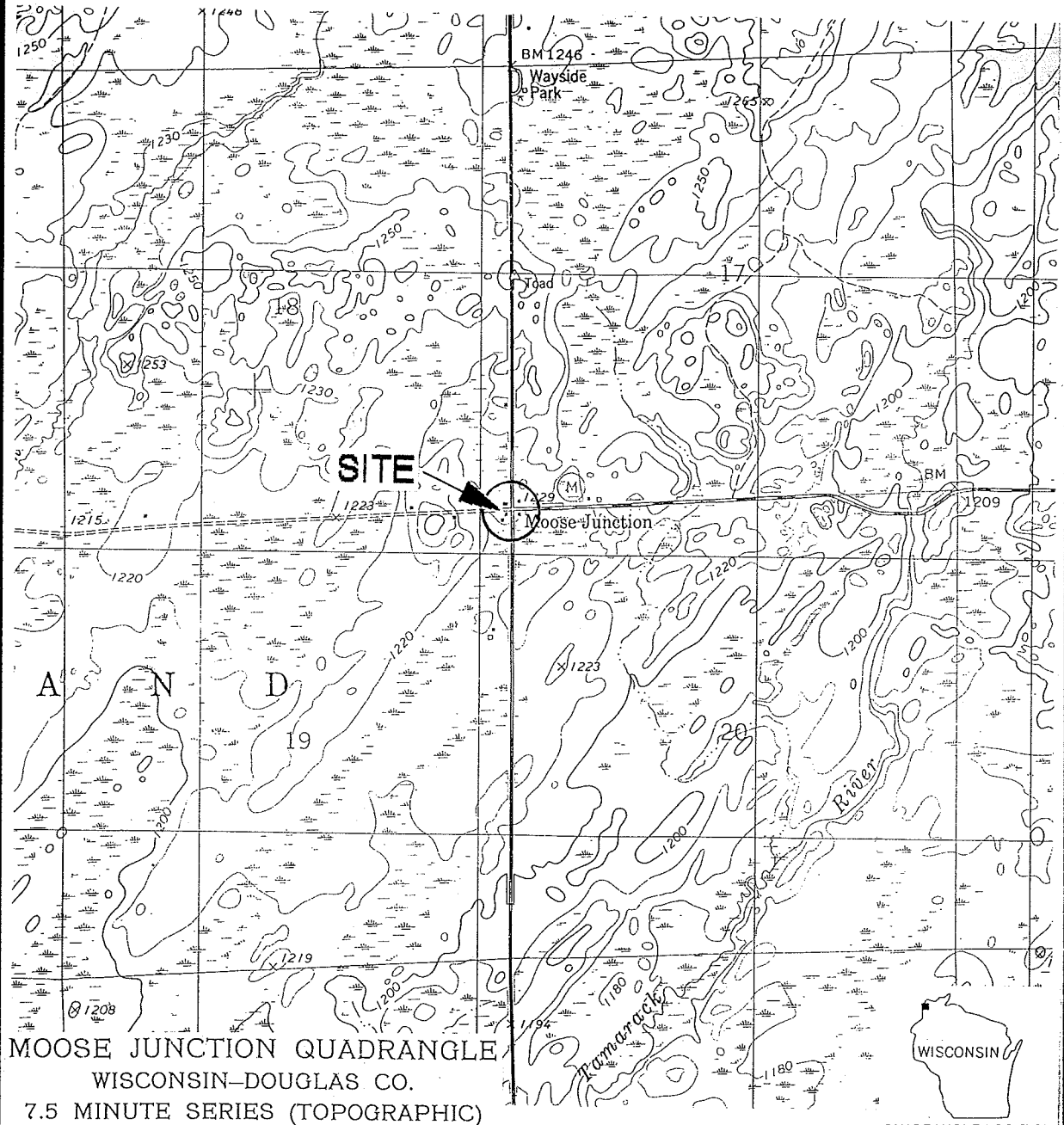
1.0 INTRODUCTION

Earth Remediation Services (ERS) presents this summary to update involved parties of the site investigation at a former Underground Storage Tank (UST) site at the present Moose Junction Lounge in Dairyland, Wisconsin (Figure 1). Soil borings and monitoring wells were installed in an attempt to define the horizontal and vertical extent of petroleum fuel contamination. ERS through Earth Burners Inc. (EBI) was contracted by Dale Schultz to accomplish a Site Investigation on his property. Evidence that petroleum contamination had migrated off site prompted ERS to seek access agreements with four surrounding property owners to place environmental borings on their properties. Copies of the access agreements are located in Appendix G of this report. Installation of wells and borings occurred between May 17 and May 19, 1993. Groundwater sampling was performed on May 27, 1993. Groundwater elevations were surveyed and calculated on June 14, 1993. Groundwater flow direction may be influenced by a possible bedrock ridge which strikes southwest and is directly under the Moose Junction Lounge. General groundwater flow direction is towards the south. Petroleum contamination was found in the groundwater in three of the four monitoring wells, however monitoring well MW-4, which has low levels of petroleum groundwater contamination, may have a source other than the Moose Junction Lounge UST.

EBI conducted an interim action on June 15, 1993 by excavating the existing UST and grossly contaminated soils as specified in the workplan. Approximately 560 cubic yards of soils were excavated and stockpiled 100 yards north of the Lounge. Soil volume was larger than ERS had anticipated as evidence of another former UST and associated pump island were found during the excavation. On June 21, 1993 EBI contracted Dean's Trucking of Superior, a licensed solid waste transport company to move the petroleum contaminated soils to EBI's thermal treatment unit located on Hallet Dock #7 in Duluth, Minnesota. Soils were stockpiled awaiting treatment. Analysis results from the soil stockpile have not been received from the laboratory at this time.

EARTH REMEDIATION SERVICES



MOOSE JUNCTION QUADRANGLE
WISCONSIN–DOUGLAS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

N

MOOSE JUNCTION SITE LOCATION MAP

FIGURE 1

2.0 BACKGROUND

2.1 Topography/Geology/Hydrology

The Moose Junction Lounge UST site is located in Douglas County as follows: SE ¼ of the SE ¼ of the SE ¼ of Section 18, Township 44N, Range 14W. The local topography is dominated by a hummocky ground moraine overlying igneous bedrock comprised of flood basalts and rhyolites. The glacial till is typically unstratified clay, with boulders, and is often interbedded with sand and gravel lenses or channels. This is indicative of a complex glacial history. According to Hydrologic Atlas HA-451, soil permeability is recorded as occurring between 0.8 to 2.5 inches per hour. Topography is influenced by the Superior glacial lobe which deposited linear glacial features striking northeast to southwest. Topographically the Moose Junction area is dominated by swampy lowland.

Depth to bedrock has been generalized for the area as being less than 100 feet below grade, however, bedrock was encountered approximately 10 to 12 feet below grade during the excavation and in soil borings by the lounge and on the Margaret Dickman residence (Figure 3-1). Soil borings to the east and west of the lounge were drilled to 16 feet without encountering bedrock. Well logs from the Wisconsin Geological And Natural Survey indicate the Moose Junction Lounge may enter bedrock 12 feet below grade. An unused well on the Mary McKelvey property is only 150 feet southeast of the tank basin and is 32 feet in depth below grade, but does not enter bedrock. The Margaret Dickman well log is not included in the well logs in Appendix F, but is reported to enter bedrock at 12 feet below grade.

Regional groundwater flow is in an easterly direction according to Hydrologic Atlas HA-451. Groundwater flow in the Moose Junction Lounge immediate vicinity is determined to be in a southerly direction.

Annual precipitation in the Moose Junction area is 30.5 inches with 65% of the rainfall expended by evapotranspiration and 35% towards surface runoff. Long term groundwater storage change is assumed to be near zero.

2.2 OTHER POSSIBLE SOURCES

Reports from local residents indicate the location of a former tavern/gas station on the present Mary McKelvey property. A gasoline UST was supposedly excavated in the near vicinity of SB-12 during 1985 or 1986. Data collected by ERS supports

this information by the high soil vapor readings and analytical results from SB-12. It is quite possible that a former UST leaked causing a second contaminant plume. MW-4 may be at the southern down gradient boundary of this plume as shown by the very low concentration of Benzene in the soil and groundwater there. The second source may explain the higher benzene concentration at the previous RMI soil boring B-4 which is higher than the concentration of AquaTec's boring MJ-2, even though MJ-2 is closer to the Moose Junction UST.

Another source that either contributed to or is responsible for the contamination is what appeared to be another UST basin on the northeast corner of the Moose Junction Lounge. During the interim action soil excavation, a former pump island was located directly in front of the Lounge. Supply pipes from the former pump island led to a contaminated soil area on the northeast corner of the lounge. Analytical soil sample 9308-B2(4) characterizes the sidewall of this area and B1(12) is indicative of the soils at the bottom of the excavation.

3.0 WORK SUMMARY

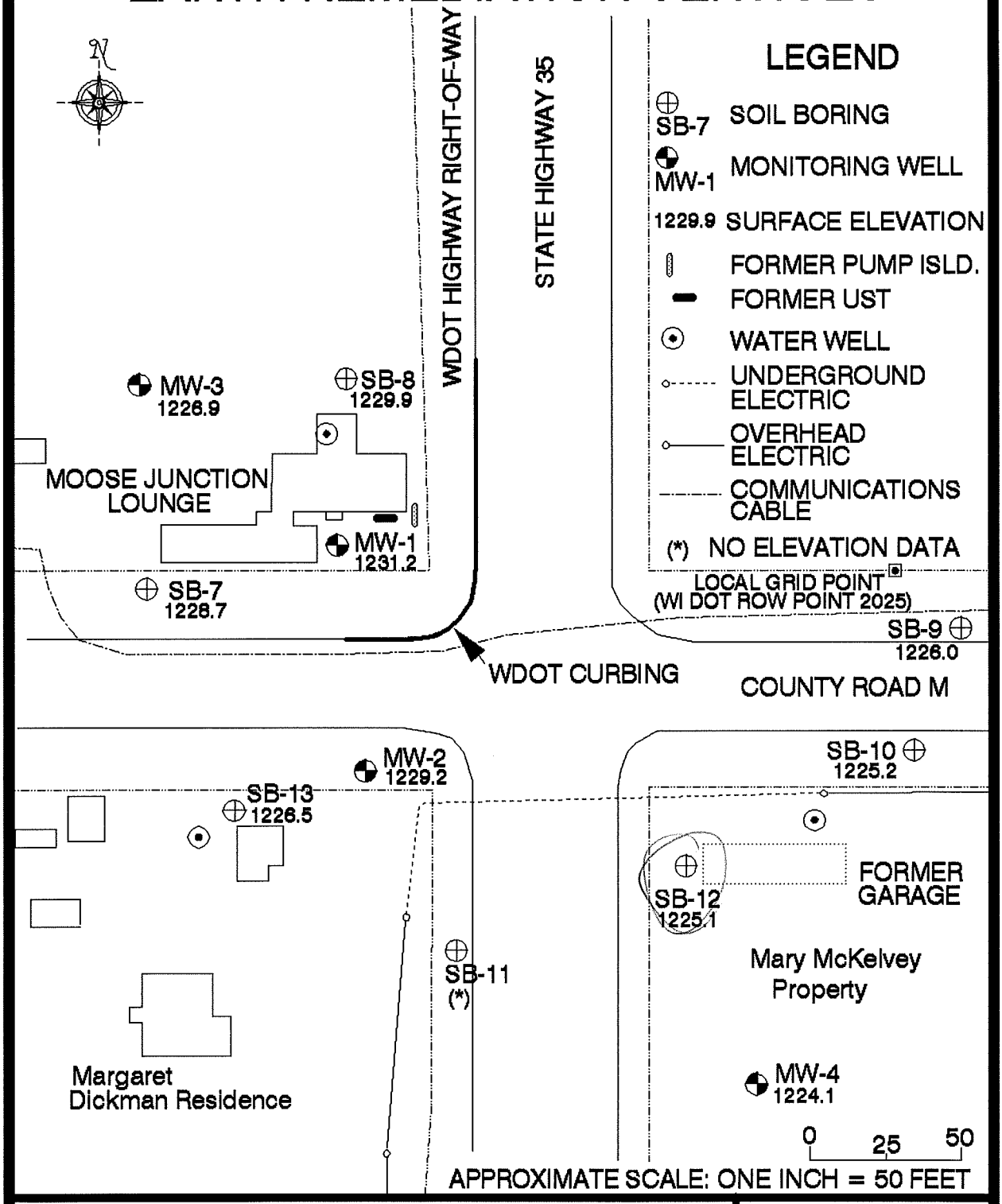
3.1 SOIL BORING/MONITORING WELL INSTALLATION

ERS and Stevens Well Drilling were scheduled to begin field work at Moose Junction Lounge on April 16, 1993; however road restrictions on Wisconsin highway 35 delayed the field work to May 17, 1993. Only SB-12 of the seven soil borings had any significant soil contamination. Monitoring wells MW-1, MW-2, MW-3, and MW-4 are water table observation wells. ERS and Stevens Well Drilling completed grouting the monitoring wells on May 19, 1993. Locations and corresponding elevations can be viewed in Figure 3-1. ERS field notes and pictures are available upon request. Soil boring and the appropriate abandonment logs are shown in Appendix A. Monitoring well logs are shown in Appendix B.

3.2 GROUNDWATER SAMPLING

Groundwater sampling was accomplished on May 27, 1993. Prior to sampling, well volumes and groundwater levels were determined. Groundwater elevations were calculated using WDOT ROW point 2025 near the highway 35/county M intersection. Elevations for the May 27, 1993 sampling event can be viewed in Figure 3-2. At least four well volumes were purged while testing for temperature, conductivity, and pH. After these field parameters stabilized, groundwater samples were collected with a dedicated bailer. No free product was seen in any of the wells, however, a noticeable petroleum odor emanated from MW-1 and MW-2. Groundwater sampling forms can be viewed in Appendix C.

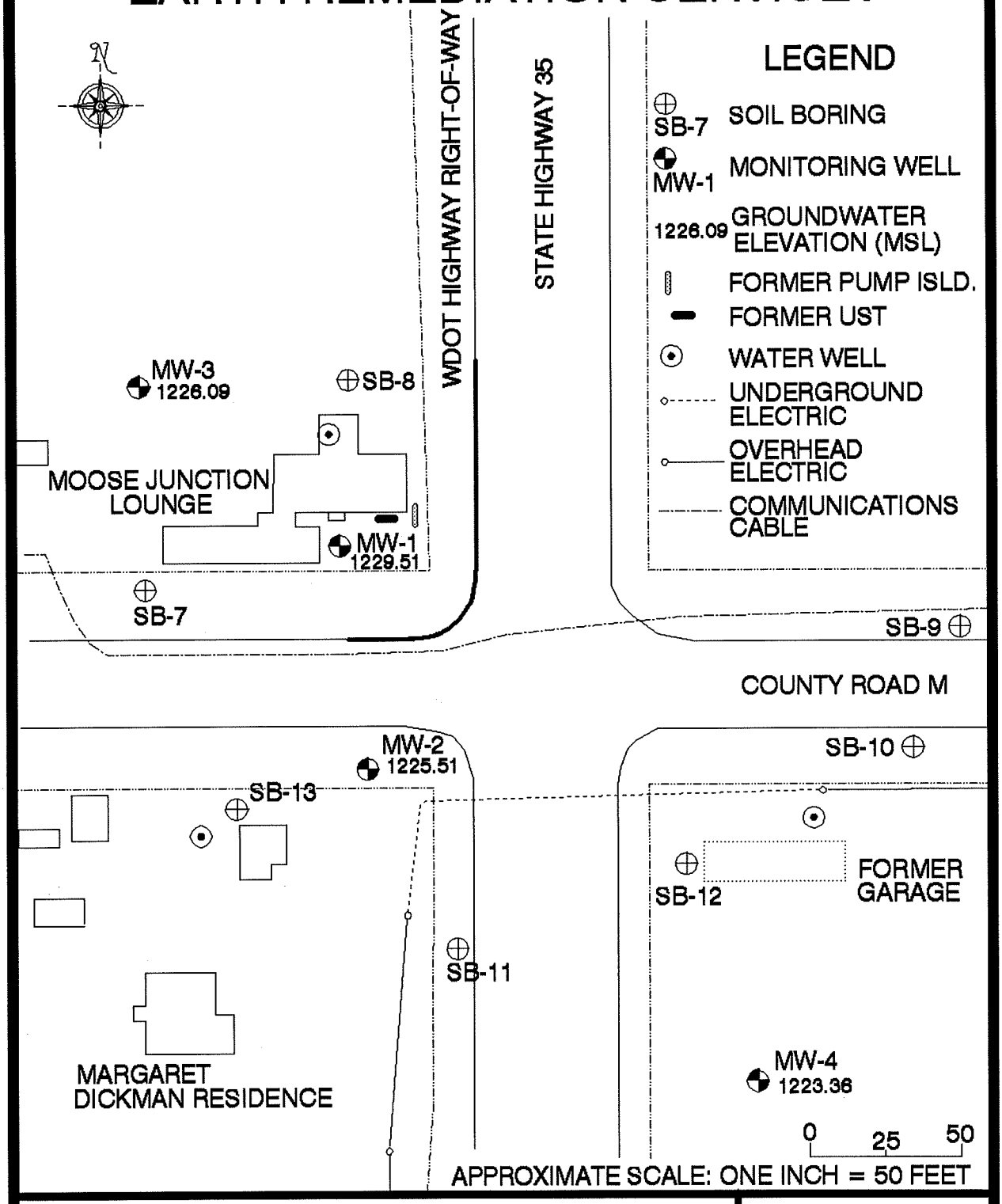
EARTH REMEDIATION SERVICES



MONITORING WELL AND SOIL BORING SITE LOCATION WITH ELEVATIONS

FIGURE 3-1

EARTH REMEDIATION SERVICES



MOOSE JUNCTION LOUNGE
GROUNDWATER ELEVATIONS

FIGURE 3-2

3.3 VAPOR RISK ASSESSMENT

An initial phase of a vapor risk assessment was completed by ERS to assure potential explosive conditions did not exist. Because of the proximity of the Moose Junction Lounge foundation to the former UST(s), ERS tested the lounge area for petroleum vapors with an HNu DL101-2 photoionizer and a Gas Pro Plus explosimeter. The explosimeter gave no indication of an explosive atmosphere. Vapor readings indicated very low concentrations of vapors in both the lounge and the Schultz residence. Results can be viewed in Figure 3-3.

3.4 INTERIM ACTION EXCAVATION

Contaminated soils were separated from clean soils using jar headspace analysis and an HNu DL-101-2 photoionization detector with a 10.2 electron volt lamp. At least one sample was analyzed for each 10 cubic yards of soil excavated. Soil vapor analysis logs can be viewed in Appendix D. It should be noted that many PID soil vapor readings were lower than the probable actual value. Soils were very contaminated and affected the 10.2 eV lamp. There was no lamp cleaning compound available during the excavation which could be a cause for the low readings. ERS feels the PID values under 100 PPM are accurate based on visual and olfactory evidence.

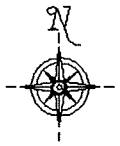
The UST was in good condition, however the supply pipes appeared to have been leaking. Pipes which led to a former tank basin and pump island (shown on figure 3-4) also appeared to have leaked. The former tank basin on the northeast corner of the lounge had contaminated soils to 12 feet below grade which is very near the bedrock surface.

4.0 ANALYTICAL SUMMARY

4.1 SOIL BORING ANALYSIS

Laboratory Analytics of Gasoline Range Organics (GRO's) for all environmental borings ranged from <10.0 to 4,220 PPM. Soil borings SB-12, and Monitoring Wells MW-1, and MW-2 were found to have olfactory and soil vapor evidence of petroleum contamination. Total lead values in the soil ranged from 3.38 to 12.90 PPM and are low enough to not be of a concern. Lead analytics show no spikes in concentrations as did a previous soil boring analytic which may have been either an anomaly or laboratory error. Low levels of Methyl Tertiary Butyl Ether (MTBE) were found in borings MW-1 and MW-2 indicating unleaded gasoline did have a part in the contamination. Soil boring analytics can be viewed in Table 4-1. Laboratory analysis by Twin Ports Testing (TPT) can be found in Appendix

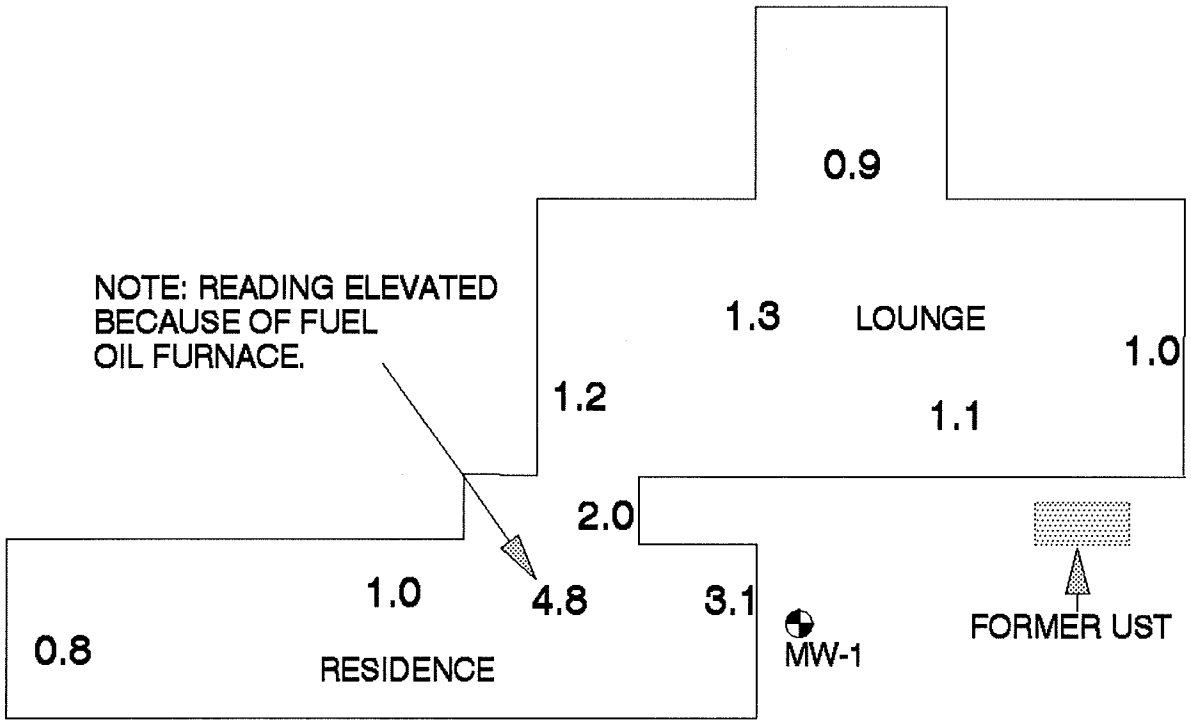
EARTH REMEDIATION SERVICES



LEGEND

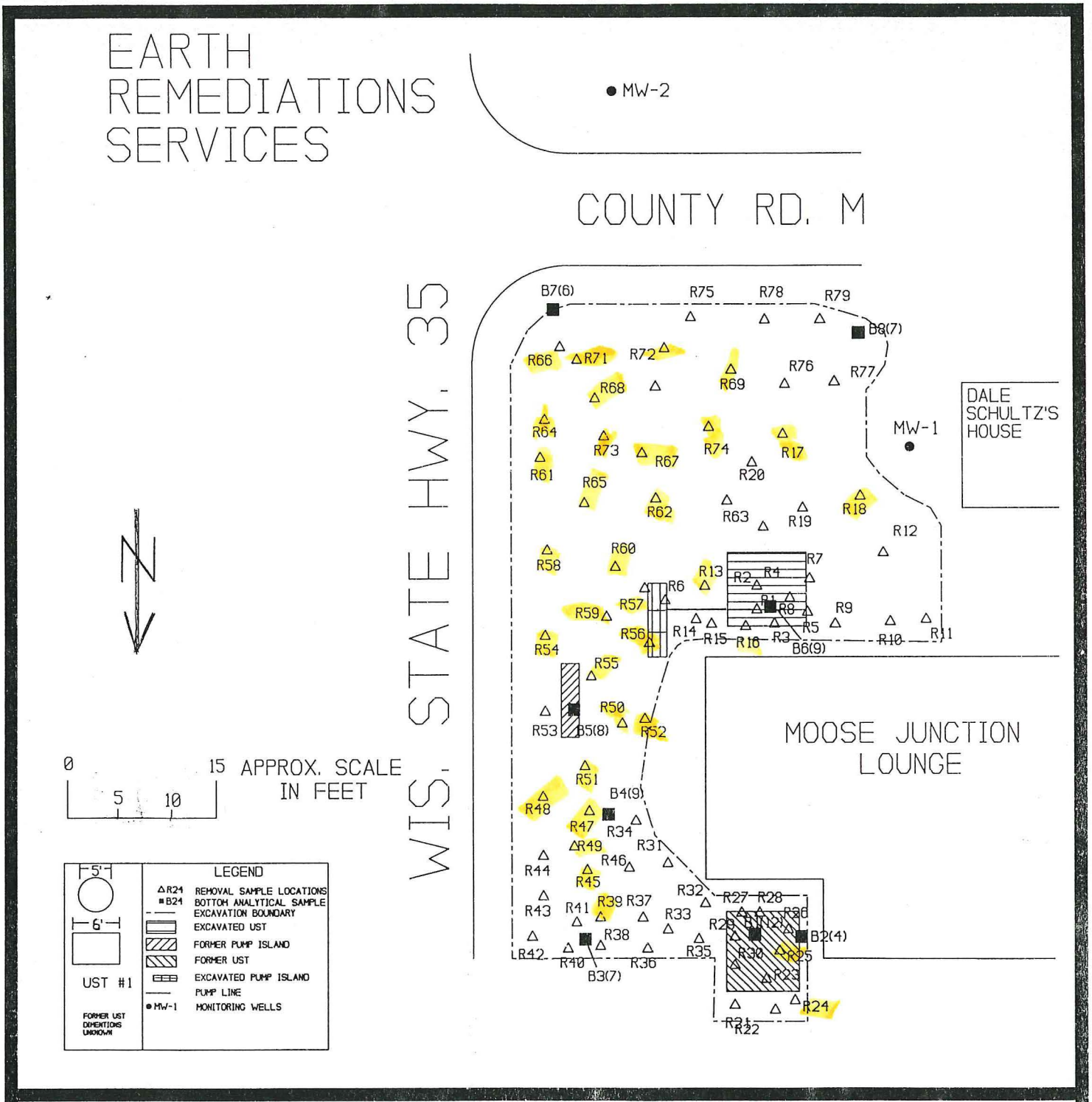
MW-1 MONITORING WELL

1.3 VAPOR READING (PPM)



All PID Readings Are Above The background of 0.7 ppm.

MOOSE JUNCTION LOUNGE VAPOR RISK ASSESSMENT	FIGURE 3-3



SOIL VAPOR AND ANALYTICAL SAMPLE LOCATION: UST EXCAVATION, MOOSE JUNCTION

FIGURE 3-4

E. Soil vapor headspace results from the soil borings are recorded on the Soil Boring Logs in Appendix A.

4.2 GROUNDWATER ANALYSIS

Groundwater samples were obtained from the four monitoring wells, the Margaret Dickman residence, and the Moose Junction Lounge. No chemical contaminants were found in the Moose Junction Lounge well indicating it is probably drawing water below the vertical extent of contamination. The Dickman well was sampled for only GRO. No contaminants were found in that range. Benzene and GRO concentrations for each groundwater sample are listed in Figure 4-1. Highest concentrations were found in MW-2 which is a water table observation well installed directly down gradient of the former UST basin. Total lead concentrations ranged from 0.002 to 0.406 PPM and should not be an environmental problem. Selected groundwater laboratory analytics can be viewed in Table 4-2. Complete analysis can be viewed in Appendix E.

4.3 EXCAVATION ANALYSIS

Eight sidewall and bottom samples were collected to characterize the remaining soils. Additionally, three grab samples were collected 18 inches into the contaminated stockpile shortly after the excavation was completed. Laboratory analytical samples were placed in an iced cooler to be preserved at four degrees centigrade before being transported to Lake Superior Labs. The excavation samples were analyzed for GRO, BTEX, and total lead. Soil vapor results from the UST excavation can be viewed in Appendix D. Bottom and sidewall analytics can be seen in Table 4-3 with the laboratory report in Appendix E.

5.0 CONCLUSIONS

ERS believes the high soil vapor readings and the analytical results from the SB-12 location are inconsistent with the concentration gradation from the Moose Junction Lounge. This fact, plus local population reports lead to a possible former UST in the SB-12 vicinity. It is improbable that the concentrations found at the Moose Junction Lounge could be the source of petroleum contamination found at the Mary Mckelvey property. Dispersion, diffusion, advection, and to some degree biodegradation would have reduced the concentrations of petroleum contaminants.

The contaminants found in MW-2 are impacted to the bedrock but do not seem to have migrated toward the nearby Dickman water

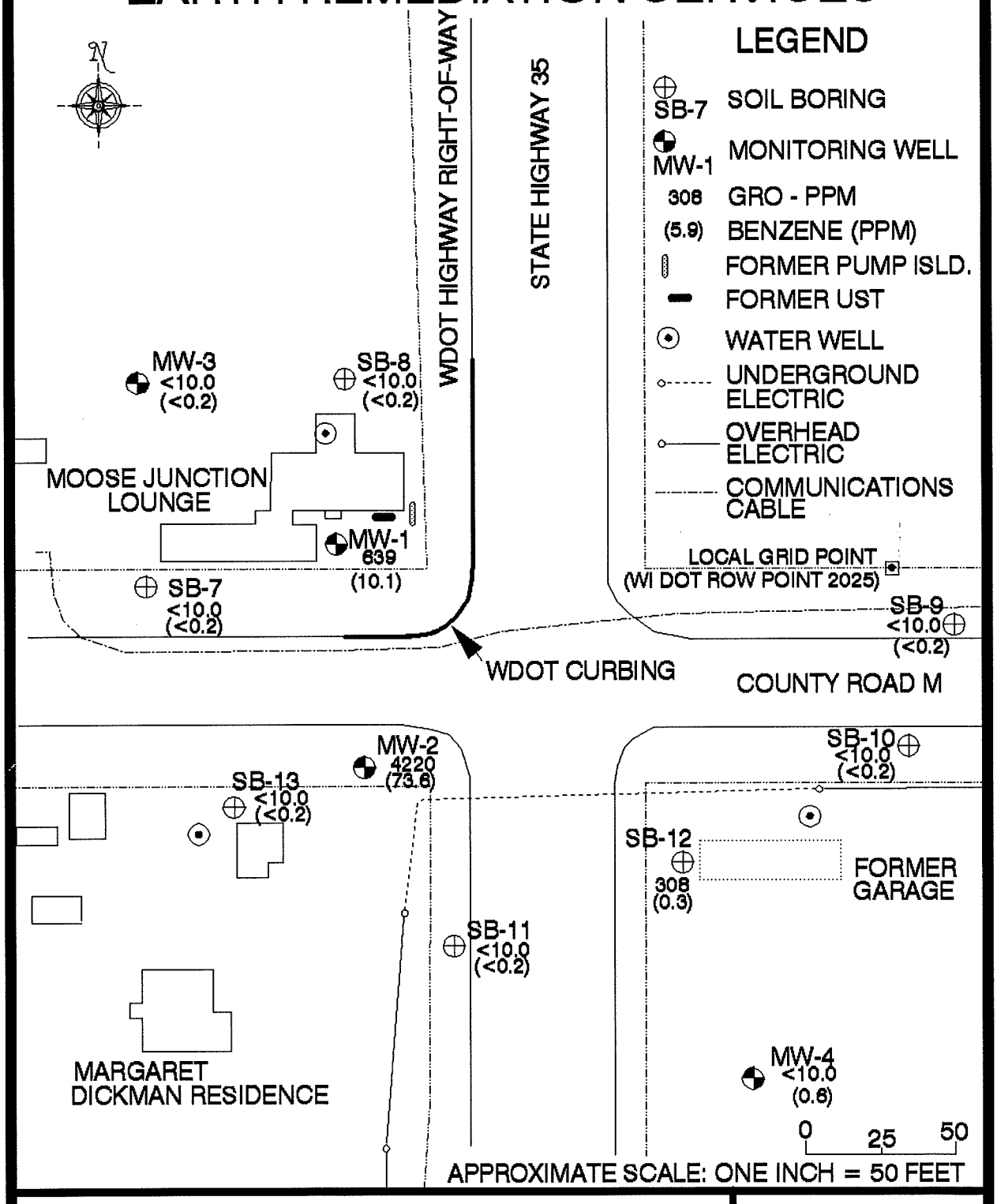
well as proven by SB-13 soil analytics. Coarser soils and possible utility lines may have created a preferential path for the impacted groundwater.

Although lab results indicate some very contaminated soils still remain on the south side of the excavation and under the Moose Junction Lounge, ERS believes the majority of the grossly contaminated soils were excavated. The excavation of soils may serve a double purpose:

1) Eliminate the source of the plume thereby stopping the contamination before it encounters Margaret Dickman's water well.
2) Lower the petroleum vapors which may be entering the Moose Junction Lounge and the Dale Schultz residence.

Groundwater flow may be affected by a probable bedrock ridge underlying the Moose Junction Lounge. Groundwater flow on the east side of the ridge is toward the south. The groundwater flow on the west side of the ridge is inconclusive, however, the flow may follow the glacial lineation to the southwest.

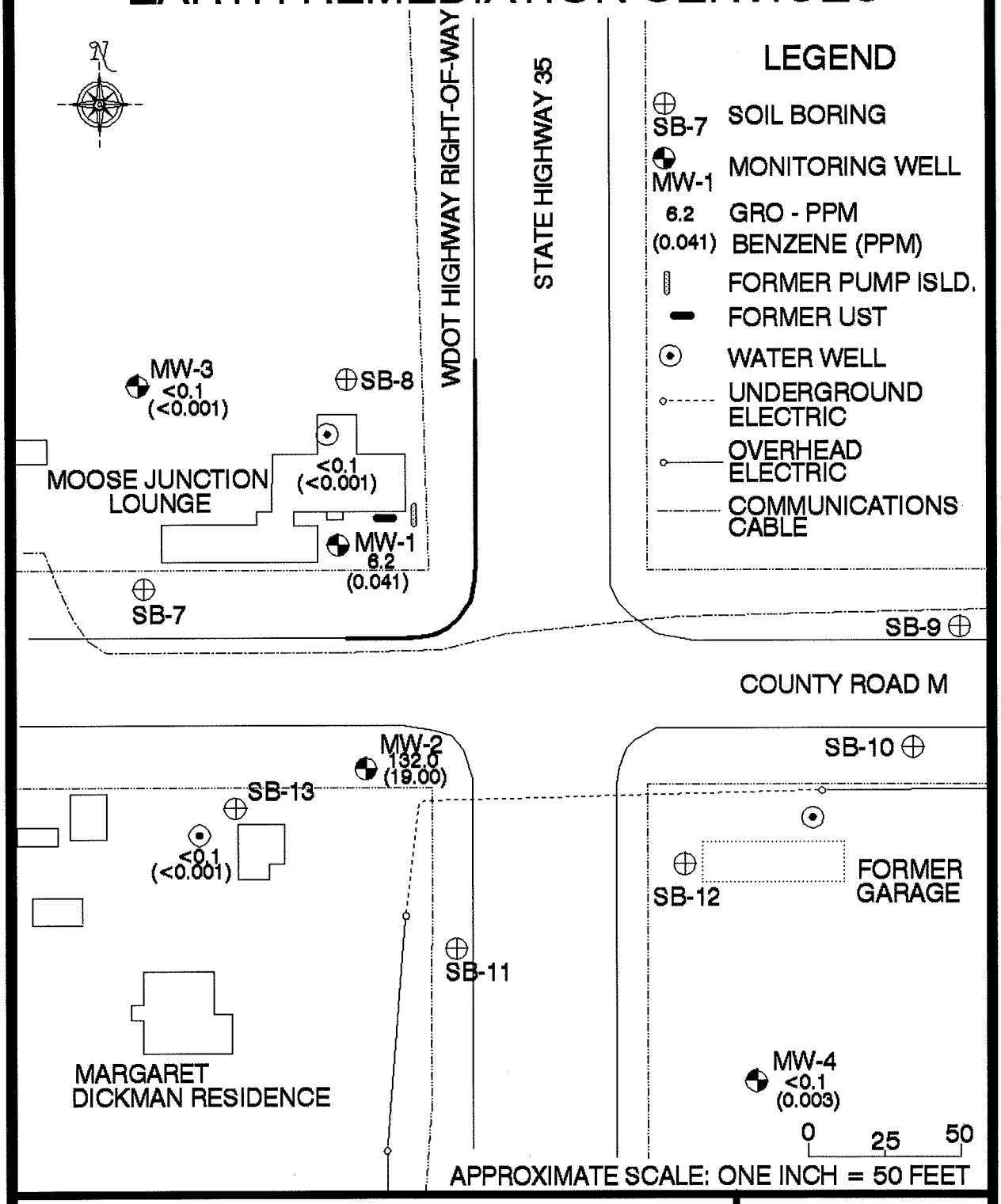
EARTH REMEDIATION SERVICES



GASOLINE RANGE ORGANICS AND BENZENE CONCENTRATIONS IN SOILS

FIGURE 4-1

EARTH REMEDIATION SERVICES



GASOLINE RANGE ORGANICS AND BENZENE CONCENTRATIONS IN WATER

FIGURE 4-2

Moose Junction Lounge
Soil Analytics
Table 4-1

Compounds in PPM	Sample number (Depth in feet below grade)														
	SB-7 (8-10)	SB-8 (6-8)	SB-9 (4-6)	SB-10 (8-10)	SB-11 (6-8)	SB-12 (4-6)	SB-12 (14-16)	SB-13 (2-4)	SB-13 (12-14)	MW-1 (4-6)	MW-2 (4-6)	MW-2 (12-13)	MW-3 (14-16)	MW-4 (8-10)	MW-4 (14-16)
GRO	<10.0	<10.0	<10.0	<10.0	<10.0	308	<10.0	<10.0	<10.0	639	4220	51.5	<10.0	<10.0	<10.0
Benzene	<.200	<.200	<.200	<.200	<.200	0.28	<.200	<.200	<.200	10.1	73.6	5.9	<.200	<.200	0.57
Toluene	<.200	<.200	<.200	<.200	<.200	1.19	<.200	<.200	<.200	12.7	164	5.81	<.200	<.200	0.384
Ethylbenzene	<.200	<.200	<.200	<.200	<.200	2.51	<.200	<.200	<.200	8.77	30.7	0.846	<.200	<.200	<.200
Total Xylenes	<.200	<.200	<.200	<.200	<.200	8.25	<.200	<.200	<.200	39.7	358	3.78	<.200	<.200	0.64
MTBE	<.200	<.200	<.200	<.200	<.200	<.200	<.200	<.200	<.200	5.67	13.9	<.200	<.200	<.200	<.200
1,2,4-Trimethylbenzene	<.200	<.200	<.200	<.200	<.200	3.95	<.200	<.200	<.200	9.57	112	0.472	<.200	<.200	<.200
1,3,5-Trimethylbenzene	<.200	<.200	<.200	<.200	<.200	9.73	<.200	<.200	<.200	23.7	192	1.39	<.200	<.200	0.247
Total Lead	12.8	8.64	10.3	7.18	9.48	12.9	11.1	12	6.81	9.99	3.38	5.72	6.31	5.95	5.93

Moose Junction Lounge
Selected Groundwater Analytics
Table 4-2

Components in PPB	May 1993 MW-1	MW-2	MW-3	MW-4	MD-WW	DS-WW
		Monitoring Well				
GRO	6160	132000	<100	<100	<100	<100
Benzene	41	19000	<1	3	<1	<1
Touluene	210	29000	<1	<1	N/A	<1
Ethylbenzene	22	1600	<1	<1	N/A	<1
m and/or p-Xylene	290	12000	<1	<1	N/A	<1
o-Xylene	530	4500	<1	<1	N/A	<1
Dibromochloromethane	<1	130	<1	<1	N/A	<1
n-Propylbenzene	6	1300	<1	<1	N/A	<1
Isopropylbenzene	3	53	<1	<1	N/A	<1
tert-Butylbenzene	<1	270	<1	<1	N/A	<1
n-Butylbenzene	<1	53	<1	<1	N/A	<1
p-Isopropytoluene	6	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	96	390	<1	<1	N/A	<1
1,3,5-Trimethylbenzene	190	470	<1	<1	N/A	<1
Total Lead	406	131	118	18	7	2

Moose Junction Lounge
Soil Excavation Analysis
Table 4-3

Bottom Soil Sample (feet below grade)

Compounds in PPM	B1(12)	B2(4)	B3(7)	B4(9)	B5(8)	B6(9)	B7(6)	B8(7)
GRO	<10.000	769	<10.000	61.6	577	640	324000	12.1
Benzene	<.200	6.61	<.200	0.644	1.57	11.6	7240	1.39
Ethylbenzene	<.200	7.98	<.200	1.25	5.7	6.72	4200	<.200
Toluene	<.200	12.4	<.200	2.25	5.72	19.8	10500	1.01
Total Xylenes	<.200	9.56	<.200	5.82	24.9	30	18400	0.448
Lead	7.03	9.53	7.62	9.73	7.65	9.55	12.4	7.91

APPENDIX A

SOIL BORING LOGS/BOREHOLE ABANDONMENT LOGS

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		MW-1

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
STEVENS WELL DRILLING / RANDY JOHNSON	05/18/93 (M M / D D / Y Y)	05/19/93 (M M / D D / Y Y)	HOLLOW STEM AUGER

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-1	1229.5 Feet MSL	1231.2 Feet MSL	8.25 inches

Boring Location
State Plane ____ N, ____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W)
Lat 46° 17' 20" Long 92° 09' 20"

Local Grid Location (If applicable)
☒ N ☐ E
5.1 Feet ☐ S 183.6 Feet ☒ W

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
		1	1	No Recovery										
			2											
	22"	25	3	Brown to grayish brown (2.5YR 5/2) silty sand, loose, damp (Fill) Strong petroleum odor	SM			278						
			4											
MW-1 (4-6)	24"	13	5	Same as above	SM			343						
			6											
	24"	46	7	Mottled very dark gray and brown (7.5YR 4/2) silty fine to coarse grained sand, loose to semi compact, petroleum odor	SM			297						
			8											
	12"	114	9	Same as above	SM			104						
			10	NOTE: Refusal at 10.5 feet below grade. Boring restarted twice with same refusal. Possible bedrock at 10 feet below grade.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Bichel
Firm: Earth Remediation Services

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		MW-2

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
STEVENS WELL DRILLING / RANDY JOHNSON	05/19/93 (M M / D D / Y Y)	05/19/93 (M M / D D / Y Y)	HOLLOW STEM AUGER

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-2	1225.5 Feet MSL	1229.2 Feet MSL	8.25 inches

Boring Location
State Plane ____ N, ____ E S/C/N | Lat 46°17'20" | Long 92°09'20"
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E/W

Local Grid Location (If applicable)
☐ N ☒ S 64.8 Feet ☐ E ☒ W 177.1 Feet

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	10"	21	1	Reddish brown (5YR 4/4) silty sand, damp, loose (fill)	SM			31						
	19"	15	3	Dark reddish gray (5YR 4/2) fine to medium grained sand, moist to wet, loose, strong petroleum odor	SP			294						
MW-2 (5-6)	19"	17	5	Same as above, coarser sand-poorly graded	SP			357						
	13"	93	7	Dark grayish brown (10YR 4/2) Silty gravelly sand, compact, wet, petroleum odor, sheen on water	SM			293						
	12"	111	9	Same as above	SM			237						
	10"	100	11	Same as above	SM			259						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biebl | Firm: Earth Remediation Services

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
MW-2 (12-13)	5"	60/—	13	Same as above NOTE: Rock fragments from the bottom of the borehole are a Vesicular rhyolite with microcrystalline quartz amygdules.	SM			178						

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-92

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		MW-3

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started (M M D D Y Y)	Date Drilling Completed (M M D D Y Y)	Drilling Method
STEVENS WELL DRILLING / RANDY JOHNSON	05/19/93	05/19/93	HOLLOW STEM AUGER

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-3	1226.1 Feet MSL	1226.9 Feet MSL	8.25 inches

Boring Location
State Plane _____ N, _____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 (W)
Lat 46° 17' 20" Long 92° 09' 20"

Local Grid Location (If applicable)
67.8 Feet ☒ N ☐ S 251.9 Feet ☐ E ☒ W

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	13"	9	1	Very dark gray (5YR 3/1) organic rich sandy silt, soft damp	OL			0.0						
	14"	24	3	Dark gray (5YR 4/1) sandy silt, soft, moist	ML			0.0						
	14"	9	5	Dark reddish brown (5YR 3/2) silty clay, soft, moist, low-medium plasticity.	CL			0.0						
	22"	22	7	Same as above	CL			0.0						
	20"	60	9	Same as above with some interbeds of a dark reddish gray sandy silt	CL			0.0						
	13"	49	11	Dark reddish brown (5YR 3/3) silty fine to medium grained sand, loose, wet	SM			0.0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Bielt — Firm: Earth Remediation Services

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
	11"	36 / 87	13	Same as above with some gravel	SM			0.0						
			14											
MW-3 (14-16)	12"		15	Same as above	SM			0.0						
			16											

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 5-92

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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		MW-4

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started (M M D D Y Y)	Date Drilling Completed (M M D D Y Y)	Drilling Method
STEVENS WELL DRILLING / RANDY JOHNSON	05/18/93	05/18/93	Hollow Stem Auger

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-4	1223.4 Feet MSL	1224.1 Feet MSL	8.25 inches

Boring Location
State Plane _____ N, _____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E(W)
Lat 46°17'20" Long 92°09'20"

Local Grid Location (If applicable)
173.6 Feet ☐ N ☒ S 47.1 Feet ☐ E ☒ W

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	17"	12	1	Brown (7.5YR 4/4) silty fine to medium grained sand, loose moist, some organic debris	SM			4.0						
			2											
	23"	30	3	Same as above, sand becomes coarser,	SM			4.0						
			4											
	22"	38	5	Same as above, wet	SM			5.0						
			6											
	20"	12	7	Dark brown (7.5YR 3/2) fine to coarse grained sand with interbedded silt layers, loose wet	SP			0.0						
			8											
MW-4 (8-10)	19"	26	9	Same as above	SP			9.0						
			10											
	22"	17	11	Same as above	SP			1.0						
			12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Bickel — Firm: Earth Remediation Services

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Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID-FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	24"	54 – 96	13	Same as above	SP			8.0						
MW-4 (14-16)	16"		14	Same as above, much more gravel	SP			4.0						
			15											
			16											

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION

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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		SB-7

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
STEVENS WELL DRILLING RANDY JOHNSON	05/17/93 (M M D D Y Y)	05/17/93 (M M D D Y Y)	Sample probe

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Boring Location
State Plane ____ N, ____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W)
Lat 46° 17' 20" Long 92° 09' 20"

Local Grid Location (If applicable)
21.4 Feet ☒ S 252.0 Feet ☒ W ☐ N ☐ E

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	10"	12	1	Reddish brown (5YR 4/4) silty sand with trace gravel, loose damp	SM			0.0						
			2	Same as above, hit boulder	SM			0.0						
	2"	77	3											
			4	Brown (7.5YR 4/3) silty clay interbedded with silty sand soft, moist	CL			0.0						
	8"	23	5		SM									
			6	Mottled brown and reddish brown (2.5YR 4/4) silty sand with some gravel, semi-compact, wet				SM						
	19"	58	7											
			8					SM						
CB-7 (8-10)	10"	113	9	Same as above, more gravel										
			10											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biebl
Firm: EARTH REMEDIATION SERVICES

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	Sample	Soil Properties
	Number and Type	
	Length Att. & Recovered (in)	
	Blow Counts	
	Depth in Feet	
	Soil/Rock Description And Geologic Origin For Each Major Unit	
	U S C S	
	Graphic Log	
	Well Diagram	
	PID/FID	
		Compressive Strength
		Moisture Content
		Liquid Limit
		Plasticity Index
		P 200
	RQD/ Comments	

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION

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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		SB-8

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
STEVENS WELL DRILLING RANDY JOHNSON	05/17/93 (M M D D Y Y)	05/17/93 (M M D D Y Y)	Sample probe

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Boring Location
State Plane _____ N, _____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W)
Lat 46° 17' 20"
Long 92° 09' 20"

Local Grid Location (If applicable)
67.2 Feet ☒ N ☐ S 180.1 Feet ☐ E ☒ W

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	13"	14	1	Reddish brown (5YR 4/4) silty sand, loose, damp (Fill)	SM			0.0						
	5"	16	3	Black (5YR 2.5/1) sandy silt, loose, moist; organic rich	OL			0.0						
	13"	27	5	Dark reddish gray (5YR 4/2) sandy silt, soft, wet	ML			0.0						
S-8 (0-8)	14"	23	7	Weak red (2.5YR 4/2) silty sand, loose.	SM			0.0						
			8	Refusal at 8 Feet										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biehl
Firm: EARTH REMEDIATION SERVICES

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	Sample	Soil Properties
	Number and Type	
	Length Att. & Recovered (in)	
	Blow Counts	
	Depth in Feet	
	Soil/Rock Description And Geologic Origin For Each Major Unit	
	U S C S	
	Graphic Log	
	Well Diagram	
	PID/FID	
		Compressive Strength
		Moisture Content
		Liquid Limit
		Plasticity Index
		P 200
	RQD/ Comments	

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION

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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		SB-9

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
STEVENS WELL DRILLING, RANDY JOHNSON	05/18/93 (M M D D Y Y)	05/18/93 (M M D D Y Y)	Sample probe

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Boring Location
State Plane ____ N, ____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W)
Lat 46° 17' 20" Long 92° 09' 20"

Local Grid Location (If applicable)
21.0 Feet ☐ N ☒ S 24.1 Feet ☐ W ☒ E

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	14"	8	1-2	Reddish brown (5YR 4/4) Silty sand with some gravel, loose moist (fill)		SM		0.0						
			3	Brown (7.5YR 4/3) silty, gravelly clay, Soft, wet		CL		0.0						
	17"	73	4											
SB-9 (1-6)	19"	55	5-6	Reddish brown (5YR 4/4) silty gravelly sand, semi compact, wet		SM		0.0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biebl
Firm: Earth Remediation Services

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	Number and Type	Sample
	Length Att. & Recovered (in)	
	Blow Counts	
	Depth in Feet	
	Soil/Rock Description And Geologic Origin For Each Major Unit	
	U S C S	
	Graphic Log	
	Well Diagram	
	PID/FID	
	Compressive Strength	Soil Properties
	Moisture Content	
	Liquid Limit	
	Plasticity Index	
	P 200	
	RQD/ Comments	

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION

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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		SB-10

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started (M M D D Y Y)	Date Drilling Completed (M M D D Y Y)	Drilling Method
STEVENS WELL DRILLING / RANDY JOHNSON	05/18/93	05/18/93	Sample probe

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Boring Location
State Plane _____ N, _____ E S/C/N Lat 46° 17' 20"
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W) Long 92° 09' 20"

Local Grid Location (If applicable)
☐ N ☐ E
57.4 Feet ☒ S 9.6 Feet ☒ W

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	12"	20	1–2	Dark Brown (7.5YR 3/2) sandy silt with a trace gravel and some organic debris, loose damp	ML			0.0						
	14"	33	3–4	Brown (7.5YR 4/4) silty sandy clay with a trace gravel, soft, moist	CL			0.0						
	16"	72	5–6	Brown (7.5YR 4/4) silty sand with some gravel, loose, moist to wet	SM			0.0						
	18"	44	7–8	Same as above.	SM			0.0						
B-10 (8-10)	24"	52	9–10	Strong brown (7.5YR 4/6) poorly graded sand with a trace gravel, semi compact, wet.	SP			0.2						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biebl — Firm: Earth Remediation Services

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	Number and Type	Sample
	Length Att. & Recovered (in)	
	Blow Counts	
	Depth in Feet	
	Soil/Rock Description And Geologic Origin For Each Major Unit	
	U S C S	
	Graphic Log	
	Well Diagram	
	PID/FID	
	Compressive Strength	Soil Properties
	Moisture Content	
	Liquid Limit	
	Plasticity Index	
	P 200	
	RQD/ Comments	

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION
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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		SB-11

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
STEVENS WELL DRILLING RANDY JOHNSON	05/18/93 (M M D D Y Y)	05/18/93 (M M D D Y Y)	Sample probe

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Boring Location
State Plane ____ N, ____ E S/C/N Lat 46°17'20" Long 92°09'20"
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W)

Local Grid Location (If applicable) (APPROX)
125 Feet ☒ S 150 Feet ☒ W ☐ N ☐ E

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	18"	68	1-2	Brown (7.5YR 4/4) silty gravelly sand, compact, damp (Fill, Class 5 roadbase)	SM			0.0						
			2-3	Same as above	SM			0.0						
	19"	159	4											
	17"	124	5-6	Dark brown (7.5YR 3/3) silty sand with some gravel, semi-compact, wet	SM			0.0						
SB-11 (1-8)	20"	30	7-8	Same as Above, loose	SM			0.0						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Bickel Firm: Earth Remediation Services

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	Sample	Number and Type
		Length Att. & Recovered (in)
		Blow Counts
		Depth in Feet
		Soil/Rock Description And Geologic Origin For Each Major Unit
		U S C S
		Graphic Log
		Well Diagram
		PID/FID
	Soil Properties	Compressive Strength
		Moisture Content
		Liquid Limit
		Plasticity Index
		P 200
		RQD/ Comments

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION
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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		SB-12

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started (M M / D D / Y Y)	Date Drilling Completed (M M / D D / Y Y)	Drilling Method
STEVENS WELL DRILLING / RANDY JOHNSON	05 / 18 / 93	05 / 18 / 93	Sample probe

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Boring Location
State Plane _____ N, _____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W)
Lat 46° 17' 20" Long 92° 09' 20"

Local Grid Location (If applicable)
98.4 Feet ☐ N ☒ S 67.1 Feet ☐ E ☒ W

County	DNR County Code	Civil Town/City/ or Village
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	18"	24	1	Dark brown (7.5YR 3/3) silty sand with a trace gravel, loose damp (Fill) petroleum odor	SM			466						
			2											
			3	mottled gray and very dark grayish brown (10YR 3/2) clayey sandy silt, soft, wet, petroleum odor	ML			607						
	12"	42	4											
SB-12 (4-6)			5	Same as above	ML			634						
	14"	49	6											
			7	Same as above										
	13"	5	8		ML			291						
			9	Dark brown (7.5YR 3/3) silty fine sand with some gravel, semi-compact, petroleum odor	SM			104						
	10"	75	10											
			11	Dark gray (7.5YR 4/1) fine to coarse gravelly sand, loose wet, slight petroleum odor	SP			34						
	5"	51	12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Bickel Firm: Earth Remediation Services

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Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	5"	54	13	Same as Above	SP			41						
			14											
SB-12 (14-16)	24"	41	15	Same as Above	SP			13						
			16											

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Superfund ☐ Other

SOIL BORING LOG INFORMATION
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Facility/Project Name	License/Permit/Monitoring Number	Boring Number
MOOSE JUNCTION LOUNGE		SB-13

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started (M M D D Y Y)	Date Drilling Completed (M M D D Y Y)	Drilling Method
STEVENS WELL DRILLING/RANDY JOHNSON	05/19/93	05/19/93	Sample probe

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Boring Location
State Plane _____ N, _____ E S/C/N
SE 1/4 of SE 1/4 of Section 18, T 44 N, R 14 E (W)
Lat 46° 17' 20" Long 92° 09' 20"

Local Grid Location (If applicable)
78.2 Feet ☐ N ☒ S 218.8 Feet ☐ E ☒ W

County	DNR County Code	Civil Town/City/ or (Village)
DOUGLAS	16	DAIRYLAND

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
		16	1–2	Brown (7.5YR 4/2) Sandy silt with little organic debris, soft damp	ML			2.0						
			3	Same as above	ML			5.4						
		27	4											
			5	Mottled reddish brown and brown (7.5YR 4/3) sandy gravelly silt, semi-compact, moist	ML			2.3						
		56	6											
			7	Reddish brown 5YR 4/4 silty gravelly sand, loose, wet	SM			2.7						
		53	8											
			9	Dark reddish brown (5YR 3/2) silty fine grained sand, semi compact, wet	SM			0.3						
		60	10											
			11	Same as above	SM			0.0						
		68	12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Bird | Firm: Earth Remediation Services

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

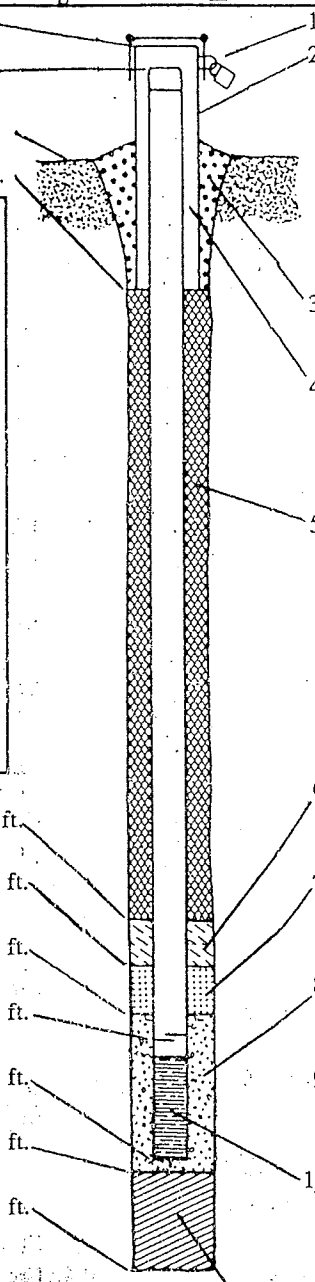
Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
SB-13 (12-14)	12"	112	13	Same as above, coarser sand, poorly sorted	SM			0.0						
SB-13A (12-14)			14	NOTE: Refusal at 14' below grade (? bedrock?)										

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: MOOSE JUNCTION LOUNGE	Local Grid Location of Well: 5.1 ft. ☒N. ☐S. 183.6 ft. ☐E. ☒W.	Well Name: MW-1
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. 46° 17' 20" Long. 92° 09' 20" or	Wis. Unique Well Number / DNR Well Number: _____
Type of Well: Water Table Observation Well ☒ 11; Piezometer ☐ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 05/18/93 (m m d d y y)
Distance Well Is From Waste/Source Boundary: 13 ft.	Section Location of Waste/Source: SE 1/4 of SE 1/4 of Sec. 18, T. 44 N, R. 14 ☐E. ☒W.	Well Installed By: (Person's Name and Firm): RANDY JOHNSON; STEVENS WELL DRILLING
Is Well A Point of Enforcement Std. Application? ☐ Yes ☒ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☒ Downgradient n ☐ Not Known	



A. Protective pipe, top elevation 1233.38 ft. MSL
B. Well casing, top elevation 1233.23 ft. MSL
C. Land surface elevation 1231.2 ft. MSL
D. Surface seal, bottom 1231.0 ft. MSL or ____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☒ 41; Other ☐ ____

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☒ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top 1231.0 ft. MSL or ____ ft.
F. Fine sand, top ____ ft. MSL or ____ ft.
G. Filter pack, top 1229.0 ft. MSL or ____ ft.
H. Screen joint, top 1228.5 ft. MSL or ____ ft.
I. Well bottom 1220.5 ft. MSL or ____ ft.
J. Filter pack, bottom 1220.7 ft. MSL or ____ ft.
K. Borehole, bottom 1220.7 ft. MSL or ____ ft.
L. Borehole, diameter 8.0 in.
M. O.D. well casing 2 3/8 in.
N. I.D. well casing 2.00 in.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.0 ft.
c. Material: Steel ☒ 04; Other ☐ ____
d. Additional protection? ☒ Yes ☐ No
If yes, describe: Bumper POSTS
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ ____
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☒ ____; Other ☐ ____
5. Annular space seal: a. Granular Bentonite ☒ 33
b. ____ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35
c. ____ Lbs/gal mud weight ..... Bentonite slurry ☐ 31
d. ____ % Bentonite ..... Bentonite-cement grout ☐ 50
e. 1 Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. Bentonite granules ☒ 33
b. ☐1/4 in. ☒3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ ____
7. Fine sand material: Manufacturer, product name & mesh size
a. —
b. Volume added — Ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. American Materials Corp. 45/55 Red Flint
b. Volume added 3 Ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ ____
10. Screen material: PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ ____
b. Manufacturer TIMCO
c. Slot size: 0.010 in.
d. Slotted length: 8.0 ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ ____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biehl | Firm: Earth Remediation Services

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
MOOSE JUNCTION LOUNGE	DOUGLAS	MW-1
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	16	_____ / _____

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☒ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 12.4 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing 6.7 gal.

7. Volume of water removed from well 210.0 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 3.72 ft.	12.40 ft.
Date	b. 05/18/93 (m m d d y y)	05/18/93 (m m d d y y)
Time	c. 17:30 ☐ a.m. ☐ p.m.	18:00 ☐ a.m. ☐ p.m.
12. Sediment in well bottom	0.1 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Brown	Clear ☐ 20 Turbid ☒ 25 (Describe) Brown

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

$V_1 = (3.14)\left(\frac{0.17'}{2}\right)^2(8.7)$ $.2 + .9 = 1.1^{ft^3} \times 7.48 = 6.7$ gal.

$V_2 = (.30)(3.14)(8.7)\left[\left(\frac{0.69'}{2}\right)^2 - \left(\frac{.20'}{2}\right)^2\right] =$

Well developed by: Person's Name and Firm

Name: Randy Johnson

Firm: Stevens Well Drilling

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: Roger W Biehl

Print Initials: RWB

Firm: Earth Remediation Services

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: MOOSE JUNCTION LOUNGE	Local Grid Location of Well: 64.8 ft. ☐N. ☒S. 177.1 ft. ☐E. ☒W.	Well Name: MW-2
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. 46° 17' 26" Long. 92° 09' 20" or	Wis. Unique Well Number / DNR Well Number: _____
Type of Well: Water Table Observation Well ☒ 11; Piezometer ☐ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 05 / 19 / 93 (m m / d d / y y)
Distance Well Is From Waste/Source Boundary: 80 ft.	Section Location of Waste/Source: NE 1/4 of NE 1/4 of Sec. 19, T. 44 N, R. 14 ☐E. ☒W.	Well Installed By: (Person's Name and Firm): RANDY JOHNSON / STEVENS WELL DRILLIN
Is Well A Point of Enforcement Std. Application? ☒ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation 1231.29 ft. MSL

B. Well casing, top elevation 1231.18 ft. MSL

C. Land surface elevation 1229.2 ft. MSL

D. Surface seal, bottom 1229.0 ft. MSL or _____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☒ 41; Other ☐ _____

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☒ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top 1229.0 ft. MSL or _____ ft.

F. Fine sand, top _____ ft. MSL or _____ ft.

G. Filter pack, top 1227.0 ft. MSL or _____ ft.

H. Screen joint, top 1226.5 ft. MSL or _____ ft.

I. Well bottom 1216.1 ft. MSL or _____ ft.

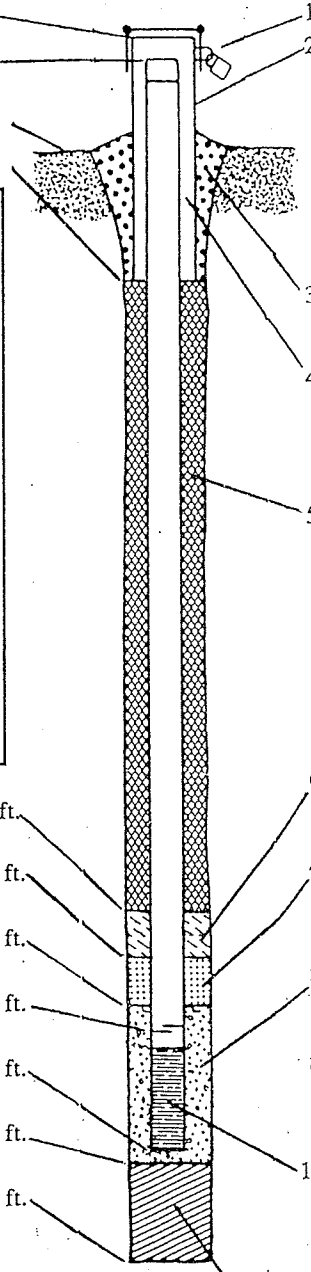
J. Filter pack, bottom 1216.0 ft. MSL or _____ ft.

K. Borehole, bottom 1216.0 ft. MSL or _____ ft.

L. Borehole, diameter 8.2 in.

M. O.D. well casing 2 3/8 in.

N. I.D. well casing 2.00 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.0 ft.
c. Material: Steel ☒ 04; Other ☐ _____
d. Additional protection? ☒ Yes ☐ No
If yes, describe: Bumper posts

3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ _____

4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☒ _____; Other ☐ _____

5. Annular space seal: a. Granular Bentonite ☒ 33; b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35; c. _____ Lbs/gal mud weight .... Bentonite slurry ☐ 31; d. _____ % Bentonite ..... Bentonite-cement grout ☐ 50; e. 1 Ft^3 volume added for any of the above; f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08

6. Bentonite seal: a. Bentonite granules ☒ 33; b. ☐1/4 in. ☒3/8 in. ☐1/2 in. Bentonite pellets ☐ 32; c. _____ Other ☐ _____

7. Fine sand material: Manufacturer, product name & mesh size
a. —
b. Volume added — ft^3

8. Filter pack material: Manufacturer, product name and mesh size
a. American Materials Corp. 45/55 Red Flint
b. Volume added 4 ft^3

9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ _____

10. Screen material: PVC
a. Screen type: Factory cut ☐ 11; Continuous slot ☐ 01; Other ☐ _____
b. Manufacturer TIMCO
c. Slot size: 0.010 in
d. Slotted length: 10.0 ft

11. Backfill material (below filter pack): None ☒ 14; Other ☐ _____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biehl | Firm: Earth Remediation Services

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
MOOSE JUNCTION LOUNGE	DOUGLAS	MW-2
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well Number**
_____	16	_____	_____

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☒ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 15.1 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing 8.8 gal.

7. Volume of water removed from well 21.2 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 5.67 ft.	9.40 ft.
Date	b. 05/19/93 (m m d d y y)	05/19/93 (m m d d y y)
Time	c. 14:30 ☐ a.m. ☐ p.m.	15:00 ☐ a.m. ☐ p.m.
12. Sediment in well bottom	0.1 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) yellowish brown	Clear ☐ 20 Turbid ☒ 25 (Describe) yellowish brown

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

$V_1 = (3.14)\left(\frac{0.17'}{2}\right)^2(9.4)$ .21 + 97 = 1.18 ft^3 × 7.48 gal/ft^3 = 8.8 gal

$V_2 = (.30)(3.14)(9.4)\left[\left(\frac{0.69'}{2}\right)^2 - \left(\frac{.20}{2}\right)^2\right]$

Well developed by: Person's Name and Firm

Name: RANDY JOHNSON

Firm: Stevens Well Drilling

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: Roger W Bielby

Print Initials: R W B

Firm: Earth Remediation Services

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: MOOSE JUNCTION LOUNGE

Facility License, Permit or Monitoring Number: _____

Type of Well: Water Table Observation Well ☒ 11; Piezometer ☐ 12

Distance Well Is From Waste/Source Boundary: 100 ft.

Is Well A Point of Enforcement Std. Application? ☐ Yes ☒ No

Local Grid Location of Well: 67.8 ft. ☒ N. ☐ S. 251.9 ft. ☐ E. ☒ W.

Grid Origin Location: Lat. 46° 17' 20" Long. 92° 09' 20" or

St. Plane _____ ft. N, _____ ft. E.

Section Location of Waste/Source: SE 1/4 of SE 1/4 of Sec. 18, T. 44 N, R. 14 ☐ E. ☒ W.

Location of Well Relative to Waste/Source: u ☒ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Well Name: MW-3

Wis. Unique Well Number: _____ DNR Well Number: _____

Date Well Installed: 05/17/93 (m m d d y y)

Well Installed By: (Person's Name and Firm)
RANDY JOHNSON
STEVENS WELL DRILLING

A. Protective pipe, top elevation 1229.14 ft. MSL

B. Well casing, top elevation 1228.93 ft. MSL

C. Land surface elevation 1226.9 ft. MSL

D. Surface seal, bottom 1226.3 ft. MSL or _____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☒ 41; Other ☐ _____

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☒ 99

16. Drilling additives used? ☐ Yes ☐ No

Describe _____

17. Source of water (attach analysis):

E. Bentonite seal, top 1226.3 ft. MSL or _____ ft.

F. Fine sand, top _____ ft. MSL or _____ ft.

G. Filter pack, top 1224.3 ft. MSL or _____ ft.

H. Screen joint, top 1224.1 ft. MSL or _____ ft.

I. Well bottom 1214.1 ft. MSL or _____ ft.

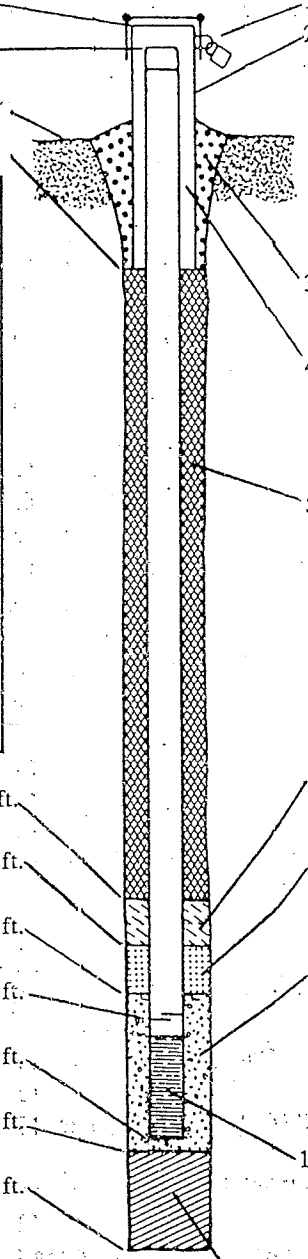
J. Filter pack, bottom 1213.6 ft. MSL or _____ ft.

K. Borehole, bottom 1210.9 ft. MSL or _____ ft.

L. Borehole, diameter 8.2 in.

M. O.D. well casing 2 3/8 in.

N. I.D. well casing 2.00 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.0 ft.
c. Material: Steel ☒ 04; Other ☐ _____
d. Additional protection? ☒ Yes ☐ No
If yes, describe: Bumper Posts

3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ _____

4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☒ _____; Other ☐ _____

5. Annular space seal: a. Granular Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 1 Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08

6. Bentonite seal: a. Bentonite granules ☒ 33
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ _____

7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ ft³

8. Filter pack material: Manufacturer, product name and mesh size
a. American Material Corp 45/55 Red Flint
b. Volume added 4 ft³

9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ _____

10. Screen material: PVC
a. Screen type: Factory cut ☐ 11; Continuous slot ☐ 01; Other ☐ _____
b. Manufacturer TIMCO
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.

11. Backfill material (below filter pack): None ☐ 14; Other ☒ _____
Caved Native Soils

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Biehl Firm: Earth Remediation Services

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
MOOSE JUNCTION	DOUGLAS	MW-3
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	16	_____ / _____

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☒ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 60 min.

4. Depth of well (from top of well casisng) 14.8 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 11.2 gal.

7. Volume of water removed from well 140.0 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 2.84 ft.	12.20 ft.
Date	b. 05/19/93 (m m d d y y)	05/19/93 (m m d d y y)
Time	c. 17:00 ☐ a.m. ☐ p.m.	18:00 ☐ a.m. ☐ p.m.
12. Sediment in well bottom	1.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☒ 25
(Describe)	Reddish Brown	Reddish Brown
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Additional comments on development:

$V_1 = (3.14)\left(\frac{0.17}{2}\right)^2(12.0)$ .27 + 1.23 = 1.50 ft³ x 7.48 gal/ft³ = 11.2

$V_2 = (.30)(3.14)(12.0)\left[\left(\frac{0.69}{2}\right)^2 - \left(\frac{.20}{2}\right)^2\right]$

Well developed by: Person's Name and Firm

Name: Randy Johnson

Firm: Stevens Well Drilling

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: Roger W Biehl

Print Initials: RWB

Firm: Earth Remediation Services

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: MOOSE JUNCTION LOUNGE	Local Grid Location of Well: 173.6 ft. ☐N. ☒S. 47.1 ft. ☐E. ☒W.	Well Name: MW-4
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. 46° 17' 20" Long. 92° 09' 20" or	Wis. Unique Well Number / DNR Well Number:
Type of Well: Water Table Observation Well ☒ 11; Piezometer ☐ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 05 / 18 / 93 (m m / d d / y y)
Distance Well Is From Waste/Source Boundary: 150 ft.	Section Location of Waste/Source: NW 1/4 of NW 1/4 of Sec. 20, T. 44 N, R. 14 ☐E. ☒W.	Well Installed By: (Person's Name and Firm): RANDY JOHNSON / STEVENS WELL DRILLING
Is Well A Point of Enforcement Std. Application? ☒ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☒ Sidegradient; d ☐ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation 1226.25 ft. MSL

B. Well casing, top elevation 1226.11 ft. MSL

C. Land surface elevation 1224.1 ft. MSL

D. Surface seal, bottom 1223.9 ft. MSL or _____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☒ 41; Other ☐ _____

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☒ 99

16. Drilling additives used? ☐ Yes ☒ No

Describe _____

17. Source of water (attach analysis):

E. Bentonite seal, top 1223.9 ft. MSL or _____ ft.

F. Fine sand, top _____ ft. MSL or _____ ft.

G. Filter pack, top 1221.9 ft. MSL or _____ ft.

H. Screen joint, top 1221.3 ft. MSL or _____ ft.

I. Well bottom 1211.3 ft. MSL or _____ ft.

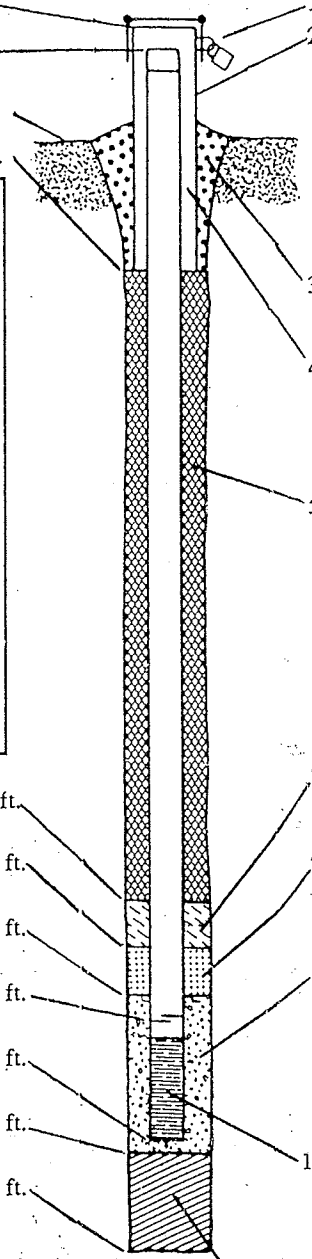
J. Filter pack, bottom 1210.8 ft. MSL or _____ ft.

K. Borehole, bottom 1208.1 ft. MSL or _____ ft.

L. Borehole, diameter 8.2 in.

M. O.D. well casing 2 3/8 in.

N. I.D. well casing 2.00 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.0 ft.
c. Material: Steel ☒ 04; Other ☐ _____
d. Additional protection? ☒ Yes ☐ No
If yes, describe: Bumper Posts

3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ _____

4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☒; Other ☐ _____

5. Annular space seal: a. Granular Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 1 Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08

6. Bentonite seal: a. Bentonite granules ☒ 33
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
a. _____
b. Volume added _____ Ft³

8. Filter pack material: Manufacturer, product name and mesh size
a. American Material Corp. 45/55 Red Flint
b. Volume added 4 Ft³

9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ _____

10. Screen material: PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ _____
b. Manufacturer TIMCO
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.

11. Backfill material (below filter pack): None ☐ 14; Other ☐
Caved Native Material

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Roger W Bielke | Firm: Earth Remediation Services

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
MOOSE JUNCTION LOUNGE	DOUGLAS	MW-4

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well Number
_____	16	_____	_____

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☒	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well 30 min.

4. Depth of well (from top of well casing) 14.8 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing 11.3 gal.

7. Volume of water removed from well 37.0 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 2.75 ft.	14.70 ft.
Date	b. 05/18/9 (m m d d y y)	__/__/__ (m m d d y y)
Time	c. 15:30 ☐ a.m. ☐ p.m.	16:00 ☐ a.m. ☐ p.m.
12. Sediment in well bottom	0.5 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☒ 25
(Describe)	Yellowish Brown	Yellowish Brown

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

$V_1 = (3.14)\left(\frac{0.17}{2}\right)^2(12.1)$

$V_2 = (.30)(3.14)(12.1)\left[\left(\frac{0.69}{2}\right)^2 - \left(\frac{.20}{2}\right)^2\right]$

.27 + 1.24 = 1.51 ft³ × 7.48 gal/ft³ = 11.3 gal

Well developed by: Person's Name and Firm

Name: Randy Johnson

Firm: Stevens Well Drilling

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: Roger W Biehl

Print Initials: RWB

Firm: Earth Remediation Service

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

GROUNDWATER MONITORING WELL INFORMATION FORM

Chapter 144, Wis. Stats.
Form 4400-89
Rev. 1-90

Facility Name: MOOSE JUNCTION LOUNGE
Facility ID Number:
Date: 6/30/93
Completed By (Name and Firm): ROGER W BIEBL EARTH REMEDIATION SERVICES

Well Name	DNR Well ID Number	Well Location	N	S	E	W	Date Established	Well Casing Diam.	Well Casing Type	Elevations Top of Well Casing	Elevations Ground Surface	Reference MSL (√)	Reference Site Datum (√)	Screen Length	Well Depth	Type of Well (√) PIEZ	OW	PW	LYS	Other	Aban-doned	Enf. Stds Apply	Gradient U, S, D or N
MW-1		5.1'	X				5/18/93	2.0"	PVC	1233.23	1231.2	✓		8.0	10.5		✓						D
		183.6'				X																	
MW-2		64.8		X			5/19/93	2.0"	PVC	1231.18	1229.2	✓		10.0	13.0		✓						D
		177.1				X																	
MW-3		67.8	X				5/19/93	2.0"	PVC	1228.93	1226.9	✓		10.0	13.0		✓						U
		251.9				X																	
MW-4		173.6		X			5/18/93	2.0"	PVC	1226.11	1224.1	✓		10.0	13.0		✓						S
		47.1				X																	

Location Coordinates Are:

☒ Local Grid System (preferred) ☐ State Plane Coordinate ☐ Northern ☐ Central

Remarks:

PSS Use:

File Maint. Completed:

Other:

INSTRUCTIONS FOR GROUNDWATER MONITORING
WELL INFORMATION - FORM 4400-89

This form, when completed provides a record of information for each well that is part of a facility's groundwate monitoring program. It provides the facility or consultant with a means of presenting in a consistent format the well data which the department requires during a site review process. It should be updated as new wells are added to the monitoring program.

Each element of the form is described below. Complete the form with the necessary information, using the description of the elements as a guide.

Facility ID Number: The license number or identification number of the facility, asssigned by the Department.
Date: The date on which the form is filled out.
Completed By: The name and firm of person completing the form.
Facility Name: The name of the site or landfill.

Well Name: The name given to the well by the facility or consultant; e.g. MW-2, OW-5.
DNR Number: The number assigned to the well by the Department, for use by the Department.

Well Location: The location of the well, measured in feet, in relation to a grid system origin established for the site or state plane coordinate system. (A local grid system is preferred.)

Date Established: The installation date of the well.

Well Casing Diam.: The inside diameter of the pipe used in the well construction, in inches.
Well Casing Type: The type of pipe used: plastic (P), steel (S), or other (O).

Elevations:

Top of Well Casing: The measurement, in feet, of the top of the well casing (not top of protective casing), in feet.

Ground Surface: The measurement, in feet, of the ground surface adjacant to the well.

Reference: Are elevations in reference to Mean Sea Level (MSL) or to a particular site datum established consultant or facility? Check one or the other.

Screen Length: The length of the screen measured in feet.

Well Depth: The depth of the well from the top of well casing, measured in feet.

Type of Well:

PIEZ:	piezometer (sealed below water table)	Abandoned:	Check this box if the well has been abandoned.
OW:	water table observation well		
PVT	private well	Enf. Stds. Apply:	Check this box if enforcement standards apply (well is outsi DMZ or property line).
LYS:	lysimeter		
OTHER:	not any of the above. e.g. head well.		

Gradient: The location of the well in the groundwater flow system relative to the disposal site, spill, etc. Use on of the four letters designated below:

U = up gradient
D = down gradient
S = side gradient
N = not known

Location Coordinates Are:

Local grid system, established by consultant and submitted to the Department; or State Plane Coordinate System, an established location system for Wisconsin.

Comments.

Add any comments to help clarify items listed above; e.g. MW-17 was abandoned on 1/24/90 and replaced by MW-17R; LHW-1 and LHW-2 are leachate head wells.

Appendix A Excavation Report

EXCAVATION REPORT WORKSHEET FOR PETROLEUM RELEASE SITE: MOOSE JUNCTION LOUNGE

I. BACKGROUND

A. Site: Moose Junction Lounge
Location/Address: Route 3 Box 334
Dairyland, WI 54830
County: Douglas
WDNR LUST # 301
Project Manager: John Prohaska

B. Tank Owner/Operator: Dale Schultz
Mailing Address: Route 3 Box 334
Dairyland, WI 54830
Telephone: (715) 224-3362

C. Excavating Contractor: Earth Burners, Inc.
Contact: Terry Anderson
Telephone: (218) 628-0454
Tank Contractor Certification Number: 0227

D. Consultant Earth Remediation Services
Contact: Roger W Biebl
Address: PO Box 16083
Duluth, MN 55816-6083
Telephone: (218) 628-0248

E. Others on-site during site work (e.g., fire marshal, local officials, etc.): John Prohaska

II. DATES

A. Date release reported to WDNR: October, 1990
B. Dates site work performed:

Work Performed	Date
Existing 1000 gallon UST removed and approximately 672 cy of contaminated soils were excavated.	June 15, 1993
Contaminated soils were transported to Duluth for treatment at Earth Burners, Inc. facility on Hallett Dock #7.	June 21, 1993

III. RELEASE INFORMATION

A. Provide the following information for all removed tanks.

Tank 1: Capacity 1000 gallon Type Steel Age 23 years

Condition: Fair Product history: Gasoline

Approximate quantity of petroleum released, if known: Unknown

Cause of release: Possible leaky lines and dispensers, overfills, remaining piping from an earlier excavation.

Tank 2: Capacity Unknown Type Unknown Age Unknown

B. Provide the following information for all existing tanks.

Tank No.	Capacity	Contents	Type	Age
NA				

C. If the release was associated with the lines or dispensers, briefly describe the problem: Piping that connected previously removed pump island and UST remained in the ground until this excavation. It is unknown whether the piping was properly drained during the earlier excavation.

D. If the release was a surface spill, briefly describe the problem: NA

IV. EXCAVATION

A. Dimensions of excavation: 61′ X 30′ X 10′ on average

B. Original tank backfill material (sand, gravel, etc.): Sand

C. Native soil type (clay, sand, etc.): Unstratified clay

D. Quantity of contaminated soil removed (cubic yards): 672 cy

E. Was groundwater encountered or was there evidence of a seasonally high groundwater table? At what depth? Groundwater may have been encountered at a depth of five feet.

H. If ground water was encountered or if a soil boring was conducted, was there evidence of ground water contamination? Product sheen was observed on the groundwater in the bottom of the excavation.

I. Was bedrock encountered in the excavation? At what depth? Bedrock was encountered at depths between 10 and 12 feet.

J. Were there other unique conditions associated with this site? If so, explain. NA

V. SAMPLING

A. Briefly describe the field screening methods used to distinguish contaminated from uncontaminated soil:
Contaminated soils were distinguished from clean soils using an HNu DL 101-2 photoionization detector with a 10.2 electron volt lamp. At least one sample was analyzed for each 8.5 cubic yards excavated. Soil vapor samples were allowed to develop at least 10 minutes before PID readings were recorded.

B. List soil vapor headspace analysis results. Indicate sampling locations using sample codes (with sampling depths in parentheses), e.g. R-1 (2 feet), R-2 (10 feet), etc. "R" stands for "removed". Samples collected at different depths at the same location should be labeled R-1A (2 feet), R-1B (4 feet), R-1C (6 feet), etc. If the sample was collected from the sidewall or bottom after excavation was complete, label it S-1 (for "sidewall") or B-1 (for "bottom"). Be sure the sample codes correspond with the site map required in Part VI, below.

Sample Code	Date/ Time	Soil Type	PID Reading	Comments
R1-1	12:00 6/14	Fill	100	
R2-1	12:00	"	200	
R3-1	12:00	"	200	
R4-2	12:00	"	>400	
R5-1	12:00	"	220	
R6-1	13:30	"	57.2	
R7-1	13:50	"	482	
R8-2.5	14:01	"	44.3	
R9-2.5	14:13	"	446	
R10-2.5	14:16	"	17.2	
R11-3	14:25	"	344	
R12-8	14:28	Silt	385	
R13-2.5	14:28	Fill/sand	>240	
R14-11	14:38	Silt	284	

Sample Code	Date/ Time	Soil Type	PID Reading	Comments
R15-2	15:10	"	427	
R16-5	15:12	"	>500	
R17-4	10:25 6/15	"	565	
R18-5	10:30	"	588	
R19-8	10:45	"	55	Former tank basin
R20-2	10:50	Gravel	5.0	
R21-4	10:55	Clay	9.0	
R22-3	11:00	"	518	Sidewall of building
R23-4	11:00	"	570	" "
R24-3	11:05	Sand	391	Under pipe joint
R25-8	11:30	"	278	
R26-9	11:40	"	141	Center of tank basin
R27-4	11:42	Silt	13	
R28-12	11:45	Sand	145	Center of tank basin
R29-5	11:55	"	250	
R30-5	12:00	"	290	
R31-6	12:10	"	158	
R32-5	12:20	Sand	31	
R33-4	12:25	Silt	303	
R34-4	12:35	Sand	48	
R35-5	12:45	"	474	
R36-2	12:50	"	572	
R37-7	12:55	"	201	
R38-6	13:00	"	385	
R39-7	13:05	"	532	
R40-9	13:10	"	490	Bedrock encountered
R41-6	13:20	"	27	
R42-6	13:25	"	278	

Sample Code	Date/ Time	Soil Type	PID Reading	Comments
R43-6	13:30	Sand	92	
R44-4	14:00	"	428	
R45-4	14:00	"	238	Under pump island
R46-3	14:05	"	410	Under concrete pad
R47-4	14:10	"	543	
R48-3	14:15	"	529	
R49-7	14:20	"	300	
R50-3	14:25	"	249	
R51-9	14:35	"	579	Pump dispenser sample B4
R52-3	14:40	"	253	
R53-4	14:45	"	424	
R54-5	14:55	"	289	Sand layer with groundwater
R55-5	15:00	"	285	
R56-7	15:10	"	298	
R57-6	15:15	"	319	
R58-4	15:20	"	258	
R59-6	15:25	"	472	
R60-8	15:35	"	485	Pump dispenser sample B5
R61-5	15:45	Sand	540	
R62-6	15:50	"	309	
R63-6	15:55	"	489	
R64-4	16:00	"	460	
R65-5	16:00	"	370	
R66-6	16:10	"	362	
R67-7	16:20	"	378	
R68-4	16:25	"	288	
R69-8	16:30	"	656	
R70-3	16:45	"	263	
R71-6	17:00	Sand	321	Bottom sidewall sample B7

Sample Code	Date/ Time	Soil Type	PID Reading	Comments
R72-5	6/15 17:10	Sand	287	
R73-9	17:25	"	486	UST bottom sample B6
R74-8	17:35	"	297	
R75-6	17:45	"	521	
R76-6	17:55	"	411	
R77-6	18:05	"	15	
R78-6	18:10	"	278	
R79-7	18:15	Sand	51	Bottom sidewall sample B8

C. Briefly describe the soil analytical sampling and handling procedures used: Eight analytical soil samples were collected. Laboratory soil samples were immediately placed in an iced cooler to be preserved at 4 degrees centigrade. Laboratory samples were collected with a separate clean trowel and disposable gloves. BTEX and GRO analytical samples were preserved with methanol in tared 60 ml bottles from the analytical lab. Approximately 25 grams of soil were collected for GRO and BTEX.

D. List below the soil sample analytical results from bottom and sidewall samples. Note: samples B2-4, B3-7, B7-6 and B8-7 characterize the sidewalls of the excavation.

Sample Code	GRO ppm	Benzene ppm	Ethyl-benzene ppm	Toluene ppm	Xylene ppm	Lead ppm
B1-12	<10.0	<0.20	<0.20	<0.20	<0.20	7.03
B2-4	769.0	6.61	7.98	12.40	9.56	9.53
B3-7	<10.0	<0.20	<0.20	<0.20	<0.20	7.62
B4-9	61.6	0.644	1.25	2.25	5.82	9.73
B5-8	577.0	1.57	5.70	5.72	24.90	7.65
B6-9	640.0	11.60	6.72	19.80	30.00	9.55
B7-6	324000	7240.00	4200.0	10500.0	18400.0	12.40
B8-7	12.1	1.39	<0.20	1.01	0.448	7.91
FB	<10.0	NA	NA	NA	NA	NA

VI.FIGURES

Attach the following figures to this report:

1. Site location map.
2. Site map(s) drawn to scale illustrating the following:
   a.Location (or former location) of all present and former tanks, lines, and dispensers;
   b.location of other structures (buildings, canopies, etc.);
   c.Adjacent city, township, or county roadways;
   d.Final extent and depth of excavation;
   e.Location of soil screening samples (e.g. R-1), soil analytical samples (e.g., S-1 or B-1), and soil borings (e.g. SB-1). Also, attach all boring logs.
   f.North arrow, bar scale and map legend.

VII.SUMMARY

Briefly summarize evidence indicating whether additional investigation is necessary at the site.
Contaminated soils remain at depth and in the sidewall in all but the north portion of the excavation (Samples B3(7) and B1 (12). Grossly contaminated soil remains in the SW west corner of the excavation (Sample B7 (6)). Only 10 out of 79 soil vapor samples had readings below 100 ppm. The amount of contamination observed may be, in part, due to a previously excavated UST and pump island. The associated supply pipes were left in the ground, revealing the former location of the UST. It is not known whether the former UST was properly removed. Since the site vertical and horizontal extent of contamination have been defined, further investigation is not warranted.

VIII.SOIL TREATMENT INFORMATION

A.Soil treatment method used (thermal, land application, other). If you choose "other" specify treatment method: Thermal

B.Location of treatment site/facility: Earth Burners Inc.

C.Date of soil treatment: July 1 - 6, 1993

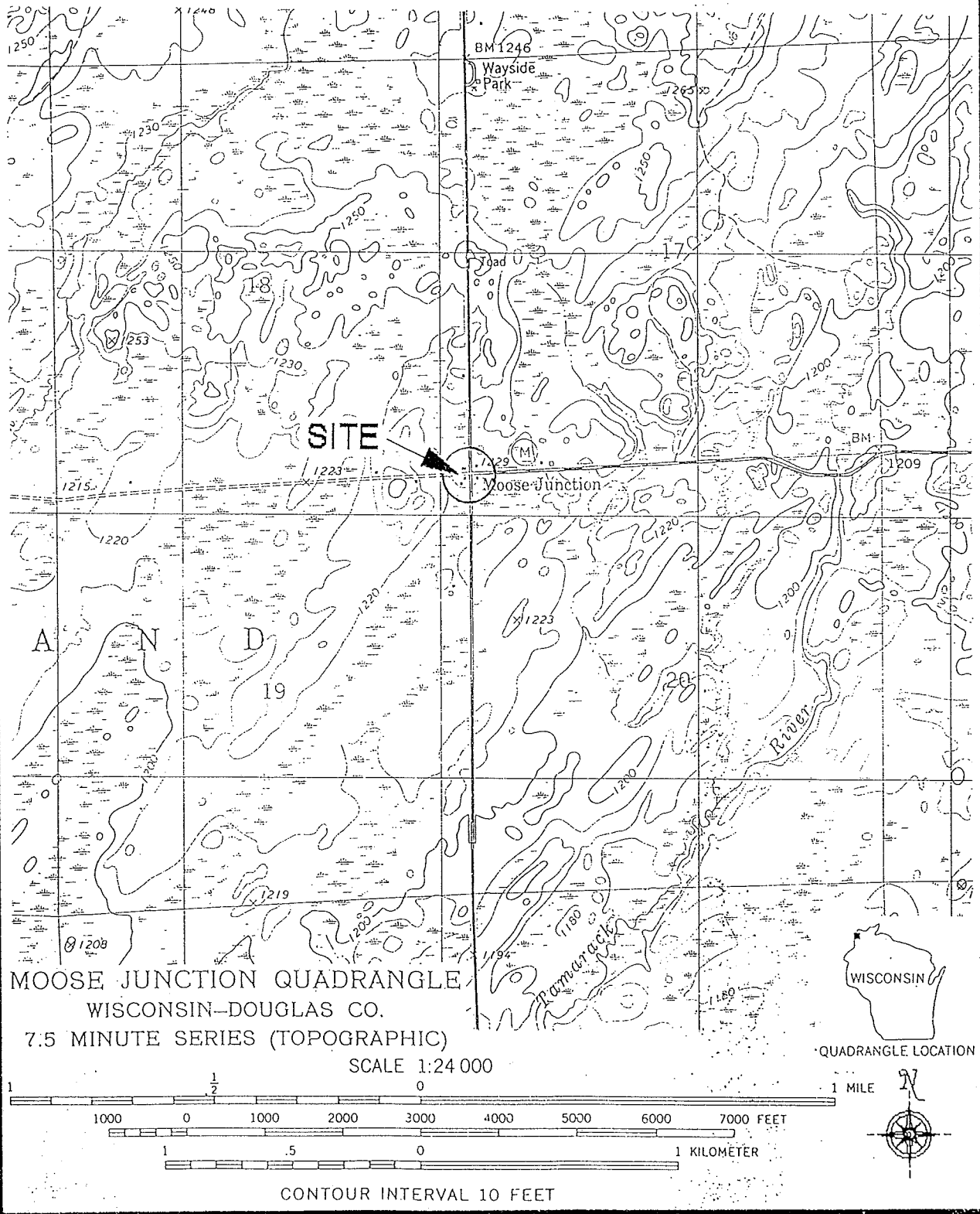
D.Identify the location of any stockpiled contaminated soil: Treated soils are stockpiled at Hallett Dock #7 awaiting reuse.

IX. CONSULTANT (OR OTHER) PREPARING THIS REPORT

Company Name:	Earth Remediation Services
Street/Box:	PO Box 16083
City, Zip:	Duluth, MN 55816-0083
Telephone:	(218) 628-0248
Contact:	Roger W Biebl

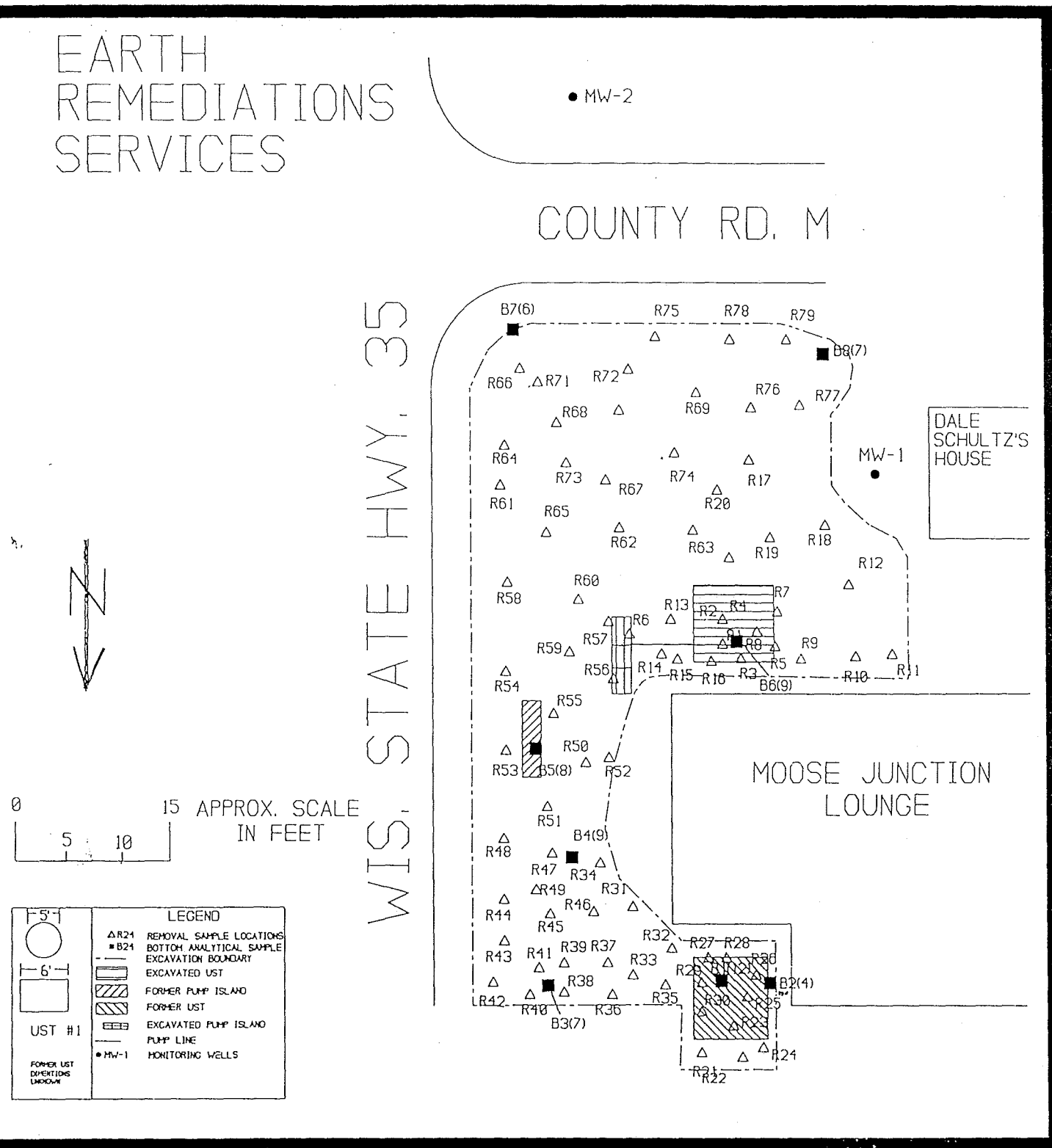
Signature: Roger W Biebl Date: 10/28/93

EARTH REMEDIATION SERVICES



MOOSE JUNCTION SITE LOCATION MAP

FIGURE 1



SOIL VAPOR AND ANALYTICAL SAMPLE LOCATION: UST EXCAVATION, MOOSE JUNCTION

FIGURE 2

Laboratory Analytical Results

SERIAL NUMBER

№ 10574

LAKE SUPERIOR LABORATORIES

728 GARFIELD AVENUE • DULUTH, MINNESOTA 55802
MN (218) 722-1911 • FAX (218) 722-3295

A DIVISION OF TWIN PORTS TESTING, INC.

LABORATORY REQUEST AND CHAIN OF CUSTODY RECORD

Project Name/No. Moose Junction Lounge 9308-030) P.O. # _____

Client Earth Burners, Inc. Report To Roger Bieb)

Address P.O. Box 16083

Duluth MN, 55816 Bill To EBI

Phone (218) 628-0454

Sampler Signature Roger W Bieb)

Sampler (Print) Roger W Bieb)

Remarks

Analyze Field Blank for GRO only. ↖ 1934-1935

Sample No./Location	Date	Time	Matrix: Air	Matrix: Liquid	Matrix: Solid	Number Of Containers	Preservative	Analyses: GRO/BTEX	Analyses: Moisture/Total-Pb	LSL No.
9308-B1 (12)	6/15/13	11:45			✓	2	MeOH	1	1	1926
9308-B2 (4)		12:00			✓			1	1	1927
9308-B3 (7)		14:00			✓			1	1	1928
9308-B4 (9)		14:30			✓			1	1	1929
9308-B5 (8)		15:30			✓			1	1	1930
9308-B6 (9)		17:30			✓			1	1	1931
9308-B7 (6)		16:30			✓			1	1	1932
9308-B8 (7)		18:00			✓			1	1	1933
~~9308-P1~~		~~16:30~~			✓			1	1	
~~9308-P2~~		~~18:45~~			✓			1	1	
~~9308-P3~~		~~19:00~~			✓			1	1	

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
Roger W Bieb)	6/16/13 14:30	Kaitlin Peterson			
Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By

Turnaround Time: 24 Hour Rush _____ ~~24~~ Day X 2 Week _____

Billed

LAKE SUPERIOR LABORATORIES

LABORATORY ANALYSIS REPORT
728 GARFIELD AVENUE ■ DULUTH, MINNESOTA 55802
MN (218) 722-1911 ■ FAX (218) 722-3295

A DIVISION OF TWIN PORTS TESTING, INC.

Client
Earth Burners, Inc.
500 Leisure St.
PO Box 16083
Duluth, MN 55816

Project Moose Junction Lounge
Project No. 9308-0301

Collected By Roger Biebl
Delivered By Roger Biebl

Chem. Lab ID	1926-93LS	1927-93LS	1928-93LS	1929-93LS
Sample Type	Soil	Soil	Soil	Soil
Collected	06/15/93	06/15/93	06/15/93	06/15/93
Received	06/16/93	06/16/93	06/16/93	06/16/93
Analyzed	06/28/93	06/28/93	06/28/93	06/28/93
Reported	07/01/93	07/01/93	07/01/93	07/01/93
Sample Description	9308-B1 (12)	9308-B2 (4)	9308-B3 (7)	9308-B4 (9)
Analysis				
Gasoline Range Organics	<10.000 mg/kg	769 mg/kg	<10.000 mg/kg	61.6 mg/kg
Moisture	18.0%	11.7%	11.4%	10.5%
Benzene	<0.200 mg/kg	6.61 mg/kg	<0.200 mg/kg	0.644 mg/kg
Ethylbenzene	<0.200 mg/kg	7.98 mg/kg	<0.200 mg/kg	1.25 mg/kg
Lead	7.03 mg/kg	9.53 mg/kg	7.62 mg/kg	9.73 mg/kg
Toluene	<0.200 mg/kg	12.4 mg/kg	<0.200 mg/kg	2.25 mg/kg
Total Xylenes	<0.200 mg/kg	9.56 mg/kg	<0.200 mg/kg	5.82 mg/kg

Remarks

Sara Arthur 7-1-93
Analyzed By **Date**

Bretta Peterson 7/1/93
Reviewed By **Date**

LAKE SUPERIOR LABORATORIES

LABORATORY ANALYSIS REPORT
728 GARFIELD AVENUE ■ DULUTH, MINNESOTA 55802
MN (218) 722-1911 ■ FAX (218) 722-3295

A DIVISION OF TWIN PORTS TESTING, INC.

Client
Earth Burners, Inc.
500 Leisure St.
PO Box 16083
Duluth, MN 55816

Project Moose Junction Lounge
Project No. 9308-0301

Collected By Roger Biebl
Delivered By Roger Biebl

Chem. Lab ID	1930-93LS	1931-93LS	1932-93LS	1933-93LS
Sample Type	Soil	Soil	Soil	Soil
Collected	06/15/93	06/15/93	06/15/93	06/15/93
Received	06/16/93	06/16/93	06/16/93	06/16/93
Analyzed	06/28/93	06/28/93	06/28/93	06/28/93
Reported	07/01/93	07/01/93	07/01/93	07/01/93
Sample Description	9308-B5 (8)	9308-B6 (9)	9308-B7 (6)	9308-B8 (7)
Analysis				
Gasoline Range Organics	577 mg/kg	640 mg/kg	324000 mg/kg	12.1 mg/kg
Moisture	10.8%	9.81%	12.5%	12.0%
Benzene	1.57 mg/kg	11.6 mg/kg	7240 mg/kg	1.39 mg/kg
Ethylbenzene	5.70 mg/kg	6.72 mg/kg	4200 mg/kg	<0.200 mg/kg
Lead	7.65 mg/kg	9.55 mg/kg	12.4 mg/kg	7.91 mg/kg
Toluene	5.72 mg/kg	19.8 mg/kg	10500 mg/kg	1.01 mg/kg
Total Xylenes	24.9 mg/kg	30.0 mg/kg	18400 mg/kg	0.448 mg/kg

Remarks

Sarah Arthur 7-1-93
Analyzed By **Date**

Lorette Peterson 7/1/93
Reviewed By **Date**

LAKE SUPERIOR LABORATORIES

728 GARFIELD AVENUE ■ DULUTH, MINNESOTA 55802
MN (218) 722-1911 ■ FAX (218) 722-3295

A DIVISION OF TWIN PORTS TESTING, INC.

LABORATORY ANALYSIS REPORT

Client
Earth Burners, Inc.
500 Leisure St.
PO Box 16083
Duluth, MN 55816

Project Moose Junction Lounge
Project No. 9308-0301

Collected By Roger Biebl
Delivered By Roger Biebl

Chem. Lab ID	1934-93LS			
Sample Type	Soil			
Collected	06/15/93			
Received	06/16/93			
Analyzed	06/28/93			
Reported	07/01/93			
Sample Description	FB			
Analysis				
Gasoline Range Organics	<10.000 mg/kg			
Moisture	-			
Benzene	-			
Ethylbenzene	-			
Lead	-			
Toluene	-			
Total Xylenes	-			

Remarks
- Not tested for.

Sarah Arthur 7-1-93
Analyzed By **Date**

Scott Peterson 7/1/93
Reviewed By **Date**

AL BEI

№ 10521

LAKE SUPERIOR LABORATORIES

728 GARFIELD AVENUE • DULUTH, MINNESOTA 55802
MN (218) 722-1911 • FAX (218) 722-3295

A DIVISION OF TWIN PORTS TESTING, INC.

LABORATORY REQUEST AND CHAIN OF CUSTODY RECORD

Project Name/No. Moose Junction 9308 P.O. # _____

Client Moose Junction Report To Barr Barnes Inc

Address _____ _____

_____ Bill To EBD

Phone _____ _____

Remarks

Sampler Signature Kevin J Lund

Sampler (Print) Kevin J. Lund

Sample No./Location	Date	Time	Matrix: Air	Matrix: Liquid	Matrix: Solid	Number Of Containers	Preservative	Analyses: GRO	Analyses: BTEX	Analyses: DRY weight	Analyses: Lead	LSL No.
9308-PB1	7-13-13	14:30			✓	2	1	✓	✓	✓	✓	2188

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
Kevin J Lund	7-13	Keith Ritter			
Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By

Turnaround Time: 24 Hour Rush _____ 2-5 Day _____ 2 Week X

LAKE SUPERIOR LABORATORIES
A DIVISION OF TWIN PORTS TESTING, INC.
728 GARFIELD AVENUE ■ DULUTH, MINNESOTA 55802
MN (218) 722-1911 ■ FAX (218) 722-3295

LABORATORY ANALYSIS REPORT

Client
Earth Burners, Inc.
500 Leisure St.
PO Box 16083
Duluth, MN 55816

Project Moose Junction Lounge
Project No. 9308-0301

Collected By Kevin J. Lund
Delivered By Kevin J. Lund

Chem. Lab ID	2188-93LS			
Sample Type	Soil			
Collected	07/13/93			
Received	07/13/93			
Analyzed	07/27/93			
Reported	08/02/93			
Sample Description	9308-PB1	Post Burn Sample		
Analysis				
Gasoline Range Organics	<5.000 mg/kg			
Moisture	3.22%			
Benzene	<0.200 mg/kg			
Ethylbenzene	<0.200 mg/kg			
Lead	28.0 mg/kg			
Toluene	<0.200 mg/kg			
Total Xylenes	<0.200 mg/kg			

Remarks

Sarah Arthur 8-2-93
Analyzed By Date

Britta Peterson 8/2/93
Reviewed By Date

Wisconsin DNR Certification Number 816057440

Application to Treat Contaminated Soil

6-28-93 mailed to MPCA

APPLICATION TO TREAT PETROLEUM CONTAMINATED SOIL

MINNESOTA POLLUTION CONTROL AGENCY
APPLICATION TO THERMALLY TREAT PETROLEUM CONTAMINATED SOIL
May 1992

I. Minnesota Pollution Control Agency (MPCA) Site ID Number: LEAK#

II. MPCA Project Manager: WDNR John Prohaska

III. Source of Soil:

Facility Name: Moose Junction Lounge
Street Address: Route 3 Box 334
City, State, Zip: Dairyland, WI 54830

Contact Name: Dale Shultz
Telephone: 715-224-3362

IV. Contamination Details:

Weight of Soil (tons): (One cubic yard of soil is approximately equivalent to 1.4 tons.) 940.8

Type Petroleum Contamination: Gasoline, diesel fuel, No. 1 fuel oil, Leaded gasoline

No. 2 fuel oil, kerosene, used oil, (hydraulic fluid, cutting oil, motor oil, quench oil).

(circle one)

Contaminant Concentration (parts per million)*

Benzene	160	540	10.1	____	____
Toluene	720	1600	12.7	____	____
Ethyl Benzene	200	370	8.77	____	____
Xylene	1220	2150	39.7	____	____
Total Lead	21.0	<0.9	9.99	____	____
Total Hydrocarbons as Fuel Oil or Gasoline	5100	11000	639	____	____

Soil Type (sand, silt, clay, etc.) Brown Silty clay

*Note: See Tanks and Spills Section document "Soil and Ground Water Analysis at Petroleum Release Sites" (Guidance Document 11) for additional analysis that may be necessary.

V. Thermal Treatment Unit

Name: Earth Burners Inc.
Address: 500 Leisure st
(if portable, where will plant be located)

City, State, Zip: Duluth, MN 55816

Plant Number or Model: RS-15
(If portable, separation distance in feet from nearest residence(s): 2,000.)

Contact Name: Terry Anderson Title: Vice President
Telephone: (218) 726-1537 Site Telephone: (218) 628-0454
Air Quality Permit Number: 2439-91-OT-1

6/15/93
Date

Signature of Authorized Thermal Treatment Unit Representative Accepting Soil

VI. Date treatment will be completed: 7/18/93

VII. Individual Submitting Request:

Company Name: Dale Schultz
Address: Route 3 Box 334
City, State, Zip: Dairyland, WI 54830

Contact Name: Dale Schultz
Telephone: (715) 224-3362

Signature: Dale L Schultz

Date: 6-18-93

This application, if complete and confirmed by information submitted in the monthly log by the thermal treatment facility, constitutes an acceptable form of a soil corrective action plan. The signatures of the individual submitting the request and the authorized thermal treatment unit representative constitute certification that the concentration and the type of contamination in the contaminated soil falls within the criteria established by the MPCA's guidance document. "Thermal Treatment of Petroleum Contaminated Soil" (Guidance Document 21) and that the thermal treatment facility is operating in compliance with its Air Quality emission permit.

Mail to: Project Manager
Minnesota Pollution Control Agency
Hazardous Waste Division
Tanks and Spills Section
520 Lafayette Road
St. Paul, Minnesota 55155-4194
Fax No.: 612/297-8676

ATTACH EMISSIONS CALCULATIONS

(a/1,000,000) x (2,800 lbs/yd^3) x b = benzene emission in lbs., where a = benzene concentration of soil sample in ppm or mg/kg dry weight basis, and b = amount of contaminated soil in yds^3. NOTE: This calculation can also be used to estimate TPH emissions by substituting TPH concentration (ppm or mg/kg) for "a". It may also be used to calculate VOCs.

Part II: Proposed Treatment Facility

Name of Plant Earth Burner's, Inc

Plant number and Model RS-15

Contact Terry Anderson

DNR Facility I.D. No. 998020100

Address Hallett Dock #7 Duluth, MN
(or location of portable plant)

Distance to Nearest Residence/Business 2000 feet

LEAVE BLANK - DEPARTMENT OF NATURAL RESOURCES USE ONLY

Application Concurrence:

Air Management _____ Date _____

Project Manager _____ Date _____

Comments:

THIS SECTION TO BE COMPLETED BY THE ASPHALT/THERMAL UNIT PROCESSING THE CONTAMINATED SOIL
AFTER PROCESSING IS COMPLETED

Part III

WDNR Air Pollution Control Permit Number 92-OCF-051

Actual Volume of Soil Treated (tons/cubic yards) 672

Date of transport to plant June 21, 1993

Date of treatment July 1 - 6, 1993

Transporter Name Dean's Trucking of Superior

Transporter License Number

Circle One: Roasted and Incorporated Roasted Only

Total Benzene emissions in pounds for this batch (apply 50% destruction factor if no after burner is used)

Benzene emissions to date for this plant (including this batch) for this calendar year

Signature of Treatment plant representative

Telephone Number at Plant (218) 628-0248

POST BURN SAMPLE RESULTS: COMPLETE ONLY FOR SOILS NOT INCORPORATED!

(One representative sample for each 100 cubic yards-not composites)

Sample Number	9308-PB1			
TPH	<5.00			

DNR APPROVAL IS REQUIRED BEFORE USING AS COMMON FILL.

Date of backfilling or use as common fill _____ Location of fill site ____ 1/4 ____ 1/4 ____ S ____ T ____ R

APPLICATION TO TREAT OR DISPOSE OF PETROLEUM CONTAMINATED SOIL
ASPHALT PLANT OR OTHER TYPE OF THERMAL TREATMENT UNIT

Form 4400-149

This form is required by the Department of Natural Resources for leaking underground storage tank sites to ensure that petroleum contaminated soil is treated or disposed o;f in compliance with NR 500-540, NR 158, and NR 419, Wis. Adm. Code. Failure to comply with applicable statutes and administrative rules may lead to violations of subchapters III and IV of ch. 144 Wis. Stats. and may result in forfeitures of not less than $10 or more than $25,000 for each violation, pursuant to ss. 144.426(1), 144.74 (1), and 144.99, Wis. Stats., or fines of not less than $100 or more than $150,000 or imprisonment for not more than 10 years, or both, pursuant to s. 144.74 (2), Wis. Stats. Each day of a continuing violation constitutes a separate violation. Department approval of this form is required prior to site remediation, except for soils to be buried in landfills.

DIRECTIONS: 1) Complete parts I and II. 2) Submit the application to the DNR project manager for approval. 3) Have the treatment facility complete part III of the approved form after the soil has been treated. 4) Return the ORIGINAL form to the DNR project manager. 5) Keep a copy for your files.

ALL SITES MUST COMPLETE PART I.

Part I. Source of Soil

Site/Facility Name: Moose Junction Lounge

Site I.D. # (for DNR use only):

Site Address: Route 3 Box 334

Contact Name: Dale Schultz

City, State, Zip Code: Dairyland, WI 54830

1/4, 1/4, Section, Township, and Range: SE 1/4, SE 1/4 Section 18 T44N R14W

The information on this form is accurate to the best of my knowledge.
Signature of Soil Generator

Telephone Number (include area code)

Consulting Firm	Contact	Telephone Number
Earth Burners, Inc.	Terry Anderson	(218) 628-0454

Estimated Volume Contaminated Soil

672 Tons/(cubic yards) (circle one)

Type of Petroleum Contamination (Circle):

(Gasoline) Diesel Fuel/#2 Fuel Oil

Other _____

Soil Type (USCS)

- X sand (SP, SW)
- X silty/clayey sands (SM, SC)
- X silt (ML, MH, OL)
- X clay (Cl, CH, OH)
- X gravel (GC, GM, GP, GW)
- ___ peat (PT)

Distance to Nearest Residence/Business 0

Contaminant concentration:

One screened sample for each 15 yds^3 and one laboratory analysis for each 300 yds^3 of contaminated soil when the field instrument *registers contamination* OR one laboratory analysis for each 100 yds^3 when the field instrument *does not register contamination* on soil shown to be contaminated during the site investigation/excavation or stockpiling. PLEASE ATTACH A TABLE LISTING RESULTS OF BOTH FIELD SCREENING AND LAB ANALYSES, AND INCLUDE SUPPORTING LAB REPORTS, IN ADDITION TO THE TPH AND BENZENE INFORMATION REQUESTED BELOW. NOTE: DILHR requires a minimum of 3 laboratory samples on excavated soil for PECFA claims.

Total Benzene in soil to be remediated (attach calculations) 445.37 lbs

Total Petroleum Hydrocarbons(TPH) in soil to be remediated (attach calculations) 10,498.71 lbs

Total TPH as Gasoline Range Organics

Appendix B Hand Soil Boring Logs

SITE Moose Junction Lounge	DRILLER	AUGER ID	1.8 inch
DATE/LOCATION 08/26/93	COMPANY	AUGER OD	2.0 inch
BORING # HSB-1	TYPE RIG	TYPE BIT	Hand Auger
PROJECT # 9308-0301	METHOD Hand Auger	LOGGED BY	JRW

SAMPLE NUMBER	TIME	BLOW COUNT	RECOV. (FEET)	DEPTH RANGE	SOIL DESCRIPTION WITH MUNSELL COLOR CODE	USCS	PID (PPM)
	14:30			1	Sand with little gravel, damp, reddish brown, mottled (2.5YR 3/3)	SM	0.0
				2			
				3	Could not extend hole past 2.5 feet due to rocks		
				4			
				5			
				6			
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			

GROUNDWATER DEPTH Not encountered TOTAL DEPTH 2.5 feet below grade

NOTES: Vegetation does not appear to be affected by any contamination in ditch or in the wetland area.

SITE Moose Junction Lounge	DRILLER	AUGER ID	1.8 inch
DATE/LOCATION 08/26/93	COMPANY	AUGER OD	2.0 inch
BORING # HSB-2	TYPE RIG	TYPE BIT	Hand Auger
PROJECT # 9308-0301	METHOD Hand Auger	LOGGED BY	JRW

SAMPLE NUMBER	TIME	BLOW COUNT	RECOV. (FEET)	DEPTH RANGE	SOIL DESCRIPTION WITH MUNSELL COLOR CODE	USCS	PID (PPM)
				1			
				2	Silty sand, few pebbles; mottled appearance - rust to bluish gray clay (5YR 3/3 and 10R 3/1))	SM	0.0
				3	Same as above	SM	0.4
9308 HSB-2 (4')	15:00			4	Same as above, little less silt, wet	SM	0.2
				5			
				6			
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			

GROUNDWATER DEPTH 3.5 feet below grade TOTAL DEPTH 4 feet below grade

NOTES:

SITE Moose Junction Lounge	DRILLER	AUGER ID	1.8 inch
DATE/LOCATION 08/26/93	COMPANY	AUGER OD	2.0 inch
BORING # HSB-3	TYPE RIG	TYPE BIT	Hand Auger
PROJECT # 9308-0301	METHOD Hand Auger	LOGGED BY	JRW

SAMPLE NUMBER	TIME	BLOW COUNT	RECOV. (FEET)	DEPTH RANGE	SOIL DESCRIPTION WITH MUNSELL COLOR CODE	USCS	PID (PPM)
9308 HSB-3 (4')	15:35			1			
				2	Silty sand with little gravel, dull rust brown, to brown (5YR 5/3), moist, loose	SM	0.0
				3			
				4	Same as above, more gray and mottled (2.5YR 5/1 to 5YR 5/3), wet, loose	SM	0.0
				5	Could not extend hole past 4.0 feet due to rocks		
				6			
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			

GROUNDWATER DEPTH 3 feet below grade TOTAL DEPTH 4.0 feet below grade

NOTES:

SITE Moose Junction Lounge	DRILLER	AUGER ID	1.8 inch
DATE/LOCATION 08/26/93	COMPANY	AUGER OD	2.0 inch
BORING # HSB-4	TYPE RIG	TYPE BIT	Hand Auger
PROJECT # 9308-0301	METHOD Hand Auger	LOGGED BY	JRW

SAMPLE NUMBER	TIME	BLOW COUNT	RECOV. (FEET)	DEPTH RANGE	SOIL DESCRIPTION WITH MUNSELL COLOR CODE	USCS	PID (PPM)
				1	Dark reddish brown gravel (5YR 3/3) dry, loose (fill)	GM	0.5
				2			
				3	Thin black organic rich layer (original surface?)		
9308 HSB-4 (4')	16:30			4	Reddish brown (5YR 3/3) silty sand, moist, loose	SM	10.1
				5			
				6	Could not extend hole past 4 feet due to rocks		
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			

GROUNDWATER DEPTH Not encountered TOTAL DEPTH 4.0 feet below grade

NOTES:

Appendix C Groundwater Stabilization Logs

EARTH REMEDIATION SERVICES

a division of Earth Burners, Inc.
500 Leisure St
PO Box 16083
Duluth, MN 55816-0083

Office: (218) 628-0248
Fax: (218) 628-0455

GROUND WATER SAMPLING FORM

SITE: Moose Junction Lounge
DATE: 08/26/93
WELL #: MW-1
PROJECT #: 9308-0301

WELL CONDITION: Capped & Locked
WEATHER CONDITIONS: Sunny 80°
SAMPLED BY: RWB/JRW

WATER LEVEL MEASUREMENT AND WELL PURGING

Location of measuring point: Top of Casing
Height of measuring point above ground surface: _____ feet
Total depth of well below measuring point: 12.15 feet
Depth of water table from measuring point: 5.07 feet
Length of water column: 7.08 feet
Purge method: Dedicated Bailer
Required purge volume: 1.15 gallons

Volume Removed Gallons	pH	Cond. (um/cm)	Temp (F)	Color
1.2	6.8	870	61.3°	Yellowish brown
2.4	6.7	950	61.0°	"
3.6	7.0	970	61.0	"
4.8	6.9	960	60.7	"

SAMPLE COLLECTION

Collection method: Dedicated Bailer Time: 14:00

Analysis	Containers	Sample Prep/ Preservation
GRO/VOC's (465D)	3-40 ml each	HCl
Total Pb	1-250 ml plastic	*

Chain of Custody form: [ ] No [X] Yes
Chain of Custody Tape: [X] No [ ] Yes

Shipping Container: Iced Cooler

NOTES: * Unpreserved - will be preserved with HNO_3 after filtering by the analytical laboratory. Petroleum odor.

EARTH REMEDIATION SERVICES

a division of Earth Burners, Inc.
500 Leisure St
PO Box 16083
Duluth, MN 55816-0083

Office: (218) 628-0248
Fax: (218) 628-0455

GROUND WATER SAMPLING FORM

SITE: Moose Junction Lounge
DATE: 08/26/93
WELL #: MW-1A
PROJECT #: 9308-0301

WELL CONDITION: Capped & Locked
WEATHER CONDITIONS: Sunny 80°
SAMPLED BY: RWB/JRW

WATER LEVEL MEASUREMENT AND WELL PURGING
Location of measuring point: Top of Casing
Height of measuring point above ground surface: _____ feet
Total depth of well below measuring point: _____ feet
Depth of water table from measuring point: _____ feet
Length of water column: _____ feet
Purge method: Dedicated Bailer
Required purge volume: _____ gallons

Volume Removed Gallons	pH	Cond. (um/cm)	Temp (F)	Color

SAMPLE COLLECTION
Collection method: Dedicated Bailer Time: 14:00

Analysis	Containers	Sample Prep/ Preservation
GRO/PVOC/MTBE	3-40 ml each	HCl

Chain of Custody form: [ ] No [X] Yes
Chain of Custody Tape: [X] No [ ] Yes

Shipping Container: Iced Cooler

NOTES: Duplicate of MW-1

EARTH REMEDIATION SERVICES

a division of Earth Burners, Inc.
500 Leisure St
PO Box 16083
Duluth, MN 55816-0083

Office: (218) 628-0248
Fax: (218) 628-0455

GROUND WATER SAMPLING FORM

SITE: Moose Junction Lounge
DATE: 08/26/93
WELL #: MW-2
PROJECT #: 9308-0301

WELL CONDITION: Capped & Locked
WEATHER CONDITIONS: Sunny 80°
SAMPLED BY: RWB/JRW

WATER LEVEL MEASUREMENT AND WELL PURGING

Location of measuring point: Top of Casing
Height of measuring point above ground surface: _____ feet
Total depth of well below measuring point: 15.41 feet
Depth of water table from measuring point: 7.01 feet
Length of water column: 8.40 feet
Purge method: Dedicated Bailer
Required purge volume: 1.37 gallons

Volume Removed Gallons	pH	Cond. (um/cm)	Temp (F)	Color
1.4	6.3	2300	56.3°	Tan
2.8	6.13	2150	56.6°	Dark tan
4.2	5.76	2160	54.0°	Brownish tan
5.6	5.88	1960	61.0°	Brown

SAMPLE COLLECTION

Collection method: Dedicated Bailer Time: 13:00

Analysis	Containers	Sample Prep/ Preservation
GRO/VOC's (465D)	3-40 ml each	HCl
Total Pb	1-250 ml plastic	*

Chain of Custody form: [ ] No [X] Yes
Chain of Custody Tape: [X] No [ ] Yes

Shipping Container: Iced Cooler

NOTES: * Unpreserved - will be preserved with HNO_3 after filtering by the analytical laboratory. Heavy petroleum odor with sheen.

EARTH REMEDIATION SERVICES

a division of Earth Burners, Inc.
500 Leisure St
PO Box 16083
Duluth, MN 55816-0083

Office: (218) 628-0248
Fax: (218) 628-0455

GROUND WATER SAMPLING FORM

SITE: Moose Junction Lnge
DATE: 08/26/93
WELL #: MW-3
PROJECT #: 9308-0301

WELL CONDITION: Capped & Locked
WEATHER CONDITIONS: Sunny 85°
SAMPLED BY: RWB/JRW

WATER LEVEL MEASUREMENT AND WELL PURGING

Location of measuring point: Top of Casing
Height of measuring point above ground surface: _____ feet
Total depth of well below measuring point: 15.41 feet
Depth of water table from measuring point: 3.86 feet
Length of water column: 11.55 feet
Purge method: Dedicated Bailer
Required purge volume: 1.88 gallons

Volume Removed Gallons	pH	Cond. (um/cm)	Temp (F) *	Color
1.9	6.2	680	60.9°	Medium brown
3.8	6.4	650	57.8°	Medium brown
5.7	6.5	640	56.5°	Medium reddish brown
7.6	6.7	670	55.3°	Dark red brown

SAMPLE COLLECTION

Collection method: Dedicated Bailer Time: 10:30

Analysis	Containers	Sample Prep/ Preservation
GRO/PVOC/MTBE	3-40 ml each	HCl
Total Pb	1-250 ml plastic	**

Chain of Custody form: [ ] No [X] Yes
Chain of Custody Tape: [X] No [ ] Yes

Shipping Container: Iced Cooler

NOTES: * Temperatures are skewed due to high air temperature.
** Unpreserved - will be preserved with HNO_3 after filtering by the analytical laboratory.

EARTH REMEDIATION SERVICES

a division of Earth Burners, Inc.
500 Leisure St
PO Box 16083
Duluth, MN 55816-0083

Office: (218) 628-0248
Fax: (218) 628-0455

GROUND WATER SAMPLING FORM

SITE: Moose Junction Lnge
DATE: 08/26/93
WELL #: MW-4
PROJECT #: 9308-0301

WELL CONDITION: Capped & Locked
WEATHER CONDITIONS: Sunny 80°
SAMPLED BY: RWB/JRW

WATER LEVEL MEASUREMENT AND WELL PURGING

Location of measuring point: Top of Casing
Height of measuring point above ground surface: _____ feet
Total depth of well below measuring point: 14.38 feet
Depth of water table from measuring point: 4.12 feet
Length of water column: 10.26 feet
Purge method: Dedicated Bailer
Required purge volume: 1.73 gallons

Volume Removed Gallons	pH	Cond. (um/cm)	Temp (F)	Color
1.7	6.7	950	60.8°	Yellowish brown
3.4	6.7	970	60.5°	"
5.1	6.7	950	59.6°	"
6.8	6.7	950	59.7°	"

SAMPLE COLLECTION
Collection method: Dedicated Bailer Time: 12:00

Analysis	Containers	Sample Prep/ Preservation
GRO/VOC's (465D)	3-40 ml each	HCl
Total Pb	1-250 ml plastic	*

Chain of Custody form: [ ] No [X] Yes
Chain of Custody Tape: [X] No [ ] Yes

Shipping Container: Iced Cooler

NOTES: * Unpreserved - will be preserved with HNO_3 after filtering by the analytical laboratory.

Appendix D Groundwater and Hand Soil Boring Laboratory Analysis

LAKE SUPERIOR LABORATORIES

728 GARFIELD AVENUE • DULUTH, MINNESOTA 55802
MN (218) 722-1911 • FAX (218) 722-3295
A DIVISION OF TWIN PORTS TESTING, INC.

SERIAL NUMBER
№ 10778

LABORATORY REQUEST AND CHAIN OF CUSTODY RECORD

Project Name/No. Moose Junction Lounge 9308-0301 P.O. # _____

Client Earth Remediation Services Report To Roger Biebl

Address P.O. Box 16083

Duluth MN, 55816 Bill To FEBI

Phone 628-0248

Sampler Signature Roger W Biebl

Sampler (Print) Roger Biebl

Remarks
* NOTE: The lead water samples are not preserved as they need to be filtered.

Sample No./Location	Date	Time	Matrix: Air	Matrix: Liquid	Matrix: Solid	Number Of Containers	Preservative	Analyses: GRO/PVOC/MTBE	Analyses: Total Pb *	Analyses: Moisture/Total Pb	LSL No.
MW-3	8/26/93	10:30		✓		4	HCl	3	1		2504
MW-4		12:00		✓		4	HCl	3	1		2505
MW-2		13:00		✓		4	HCl	3	1		2506
MW-1		14:00		✓		4	HCl	3	1		2507
MW-1A		14:00		✓		3	HCl	3			2508
9308-HSB-2 (4)		15:00			✓	2	MeOH	1		1	2509
9308-HSB-3 (4)		15:35			✓	2	MeOH	1		1	2510
9308-HSB-4 (4)	✓	16:30			✓	2	MeOH	1		1	2511
DS-WW		11:00		✓		4	HCl	3	1		2512
MD-WW	✓	11:15		✓		4	HCl	3	1		2513

Relinquished By	Date/Time	Received By	Relinquished By	Date/Time	Received By
Roger W Biebl	8/27/93 10:55				

Turnaround Time: 24 Hour Rush _____ 2-5 Day _____ 2 Week ✓

LAKE SUPERIOR LABORATORIES

LABORATORY ANALYSIS REPORT
728 GARFIELD AVENUE ■ DULUTH, MINNESOTA 55802
MN (218) 722-1911 ■ FAX (218) 722-3295
A DIVISION OF TWIN PORTS TESTING, INC.

Client
Earth Remediation Services
500 Leisure Street
Duluth, MN 55816
(218) 628-0248

Project Moose Junction, WI
Project No. 9308-0301

Collected By Roger W. Biebl
Delivered By Roger W. Biebl

Chem. Lab ID	2504-93LS	2505-93LS	2506-93LS	2507-93LS
Sample Type	Water	Water	Water	Water
Collected	08/26/93	08/26/93	08/26/93	08/26/93
Received	08/27/93	08/27/93	08/27/93	08/27/93
Analyzed	09/01/93	09/01/93	09/01/93	09/01/93
Reported	09/10/93	09/10/93	09/10/93	09/10/93
Sample Description	MW-3	MW-4	MW-2	MW-1
Analysis				
Gasoline Range Organics	<0.100 mg/L	<0.100 mg/L	36.8 mg/L	3.59 mg/L
Methyl Tertiary Butyl Ether	<0.005 mg/L	<0.005 mg/L	<0.005 mg/L	0.099 mg/L
Moisture	-	-	-	-
1,2,4-Trimethylbenzene	<0.005 mg/L	<0.005 mg/L	0.652 mg/L	0.069 mg/L
1,3,5-Trimethylbenzene	<0.005 mg/L	<0.005 mg/L	0.259 mg/L	0.045 mg/L
Benzene	<0.005 mg/L	0.146 mg/L	2.79 mg/L	0.228 mg/L
Ethylbenzene	<0.005 mg/L	<0.005 mg/L	0.551 mg/L	0.047 mg/L
Lead	<0.050 mg/L	<0.050 mg/L	0.058 mg/L	<0.050 mg/L
Toluene	<0.005 mg/L	<0.005 mg/L	2.77 mg/L	0.054 mg/L
Total Xylenes	<0.005 mg/L	<0.005 mg/L	2.65 mg/L	0.053 mg/L

Remarks
- Not tested for.

Judith Peterson 9/10/93
Analyzed By **Date**

9/15/93
Reviewed By **Date**

LAKE SUPERIOR LABORATORIES
A DIVISION OF TWIN PORTS TESTING, INC.
728 GARFIELD AVENUE ■ DULUTH, MINNESOTA 55802
MN (218) 722-1911 ■ FAX (218) 722-3295

LABORATORY ANALYSIS REPORT

Client
Earth Remediation Services
500 Leisure Street
Duluth, MN 55816
(218) 628-0248

Project Moose Junction, WI
Project No. 9308-0301

Collected By Roger W. Biebl
Delivered By Roger W. Biebl

Chem. Lab ID	2508-93LS	2509-93LS	2510-93LS	2511-93LS
Sample Type	Water	Soil	Soil	Soil
Collected	08/26/93	08/26/93	08/26/93	08/26/93
Received	08/27/93	08/27/93	08/27/93	08/27/93
Analyzed	09/01/93	09/01/93	09/01/93	09/01/93
Reported	09/10/93	09/10/93	09/10/93	09/10/93
Sample Description	MW-1A	9308-HSB-2(4)	9308-HSB-3(4)	9308-HSB-4(4)
Analysis				
Gasoline Range Organics	13.4 mg/L	<5.000 mg/kg	<5.000 mg/kg	<5.000 mg/kg
Methyl Tertiary Butyl Ether	0.621 mg/L	<0.200 mg/kg	<0.200 mg/kg	<0.200 mg/kg
Moisture	-	16.6%	18.0%	23.8%
1,2,4-Trimethylbenzene	0.417 mg/L	<0.200 mg/kg	<0.200 mg/kg	<0.200 mg/kg
1,3,5-Trimethylbenzene	0.369 mg/L	<0.200 mg/kg	<0.200 mg/kg	<0.200 mg/kg
Benzene	1.12 mg/L	<0.200 mg/kg	<0.200 mg/kg	<0.200 mg/kg
Ethylbenzene	0.455 mg/L	<0.200 mg/kg	<0.200 mg/kg	<0.200 mg/kg
Lead	-	9.08 mg/kg	11.3 mg/kg	9.87 mg/kg
Toluene	0.368 mg/L	<0.200 mg/kg	<0.200 mg/kg	<0.200 mg/kg
Total Xylenes	0.871 mg/L	<0.200 mg/kg	<0.200 mg/kg	<0.200 mg/kg

Remarks
- Not tested for.

Scott A. Peterson 9/10/93
Analyzed By **Date**

9/10/93
Reviewed By **Date**

LAKE SUPERIOR LABORATORIES

LABORATORY ANALYSIS REPORT

728 GARFIELD AVENUE ■ DULUTH, MINNESOTA 55802
MN (218) 722-1911 ■ FAX (218) 722-3295

A DIVISION OF TWIN PORTS TESTING, INC.

Client
Earth Remediation Services
500 Leisure Street
Duluth, MN 55816
(218) 628-0248

Project Moose Junction, WI
Project No. 9308-0301

Collected By Roger W. Biebl
Delivered By Roger W. Biebl

Chem. Lab ID	2512-93LS	2513-93LS		
Sample Type	Water	Water		
Collected	08/26/93	08/26/93		
Received	08/27/93	08/27/93		
Analyzed	09/01/93	09/01/93		
Reported	09/10/93	09/10/93		
Sample Description	DS-WW	MD-WW		
Analysis				
Gasoline Range Organics	<0.100 mg/L	<0.100 mg/L		
Methyl Tertiary Butyl Ether	<0.005 mg/L	<0.005 mg/L		
Moisture	-	-		
1,2,4-Trimethylbenzene	<0.005 mg/L	<0.005 mg/L		
1,3,5-Trimethylbenzene	<0.005 mg/L	<0.005 mg/L		
Benzene	<0.005 mg/L	<0.005 mg/L		
Ethylbenzene	<0.005 mg/L	<0.005 mg/L		
Lead	<0.050 mg/L	<0.050 mg/L		
Toluene	<0.005 mg/L	<0.005 mg/L		
Total Xylenes	<0.005 mg/L	<0.005 mg/L		

Remarks
- Not tested for.

Analyzed By — 9/10/93 Date

Reviewed By — 9/10/93 Date

LAKE SUPERIOR LABORATORIES 75

SAMPLE CONDITION UPON RECEIPT CHECKLIST

Client: Earth Remediation Services

Project: Moose Junction Lounge # 9308-0301

Date Received: 8/27/93

COC # 10778

Samples Received By: T. Harold

(Signature)

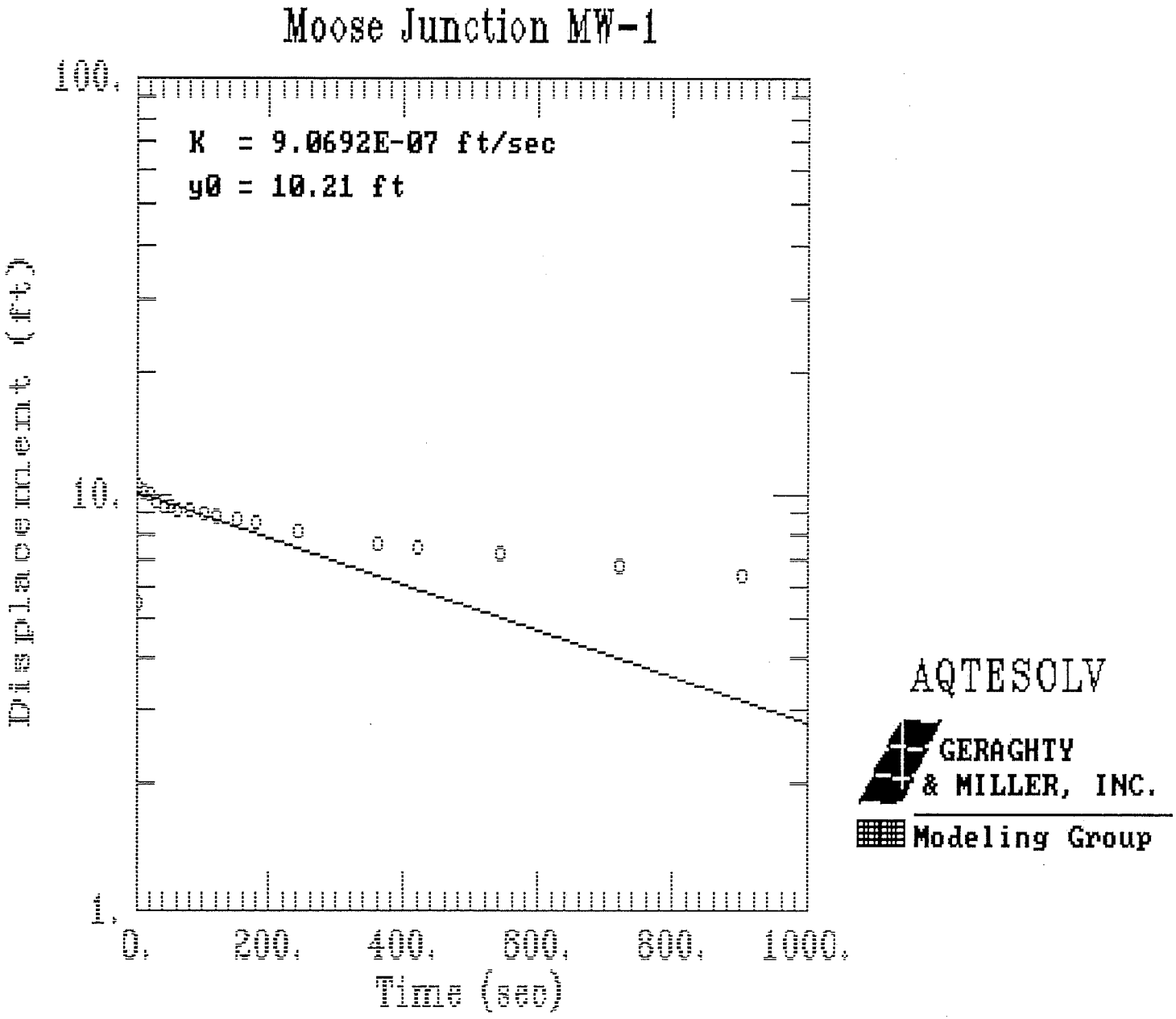
		Yes	No
1.	Is there a chain of custody (COC) or letter stating information contained on a COC?	X	
2.	Is the date and time relinquished in agreement with that written on the letter or COC?	X	
3.	Do the samples received agree with the COC or accompanying paperwork (i.e. number of samples, matrices, sample tags, sample containers, analyses, etc.)?	X	
4.	Are all the samples within the holding times for requested analyses? Communicate any lapse of greater than 4 days beyond date of collection for VOA analysis.	X	
5.	Are all the sample containers intact (i.e., not broken, leaking, etc.)?	X	
6.	Did the samples arrive on ice? a) Are the samples at the proper temperature?	X X	
7.	Is there enough sample to do all the analyses?	X	
8.	Are the samples preserved correctly?	X	
9.	Are the VOA vials head-space free?	X	X

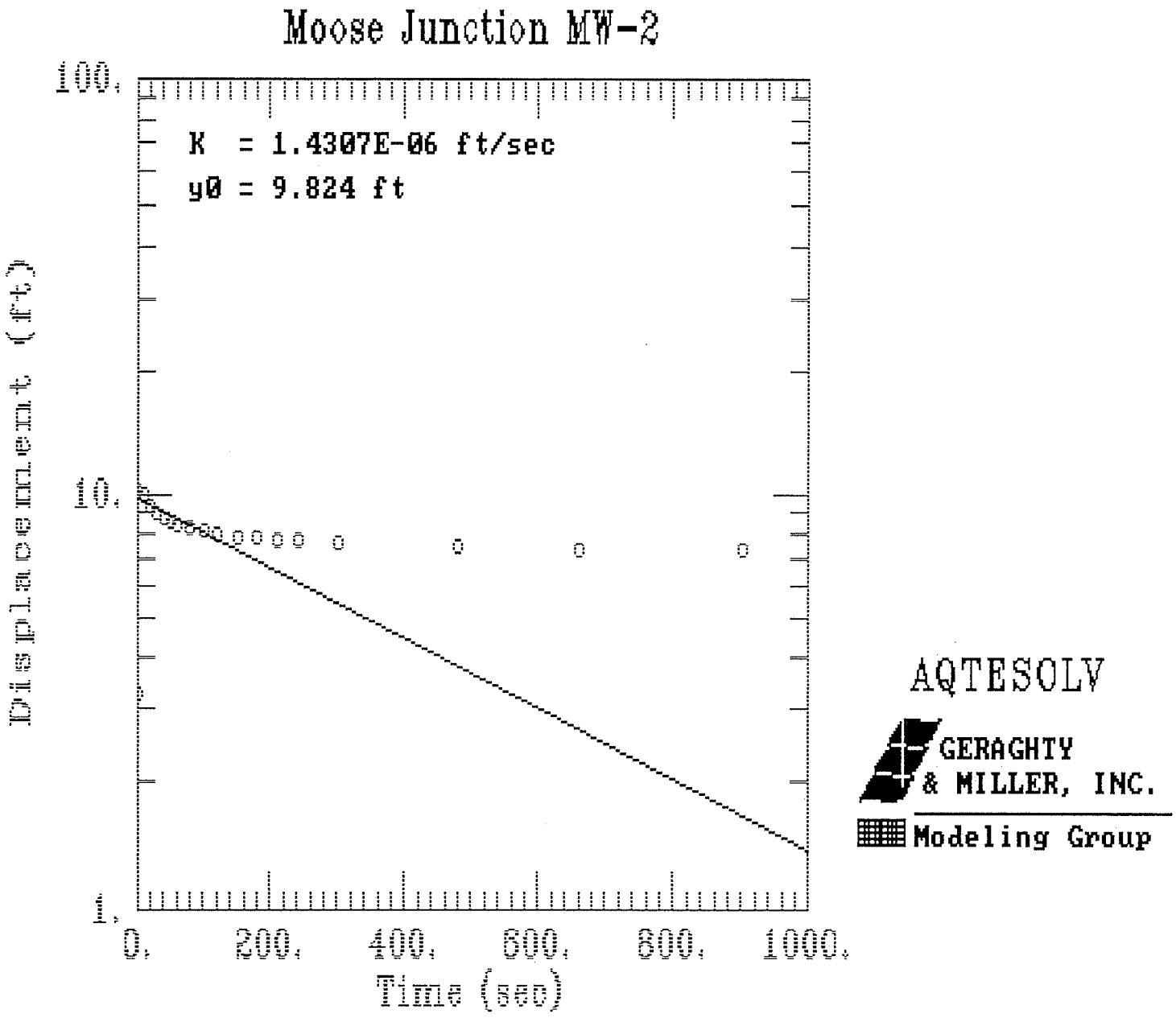
'NO' Items Explained:

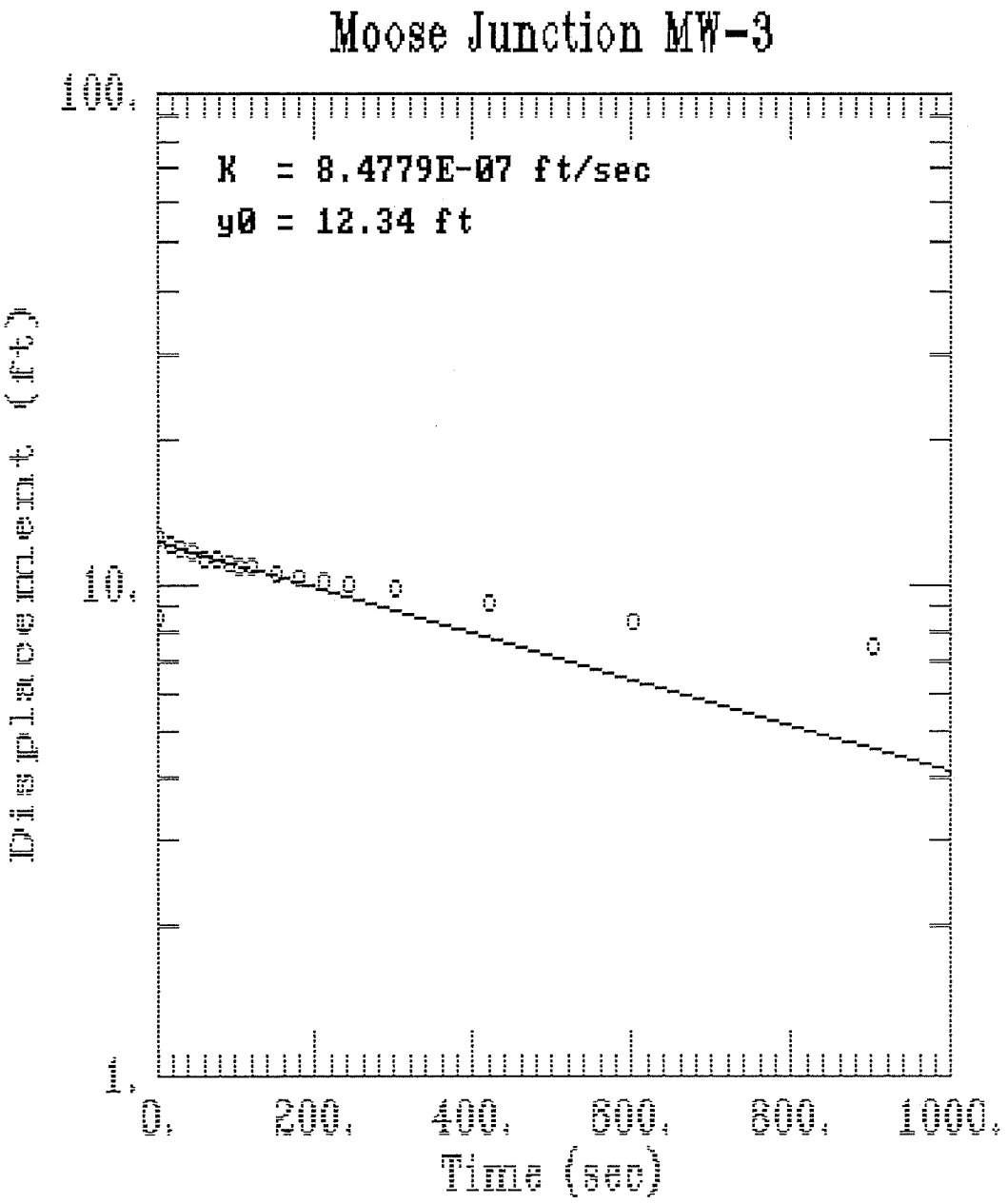
One of the Vials for Sample #2512-93LS (DS-WW) had An air bubble

NA = Not Applicable.

Appendix E Aquifer Testing Graphs


Moose Junction MW-1
K = 9.0692E-07 ft/sec
y0 = 10.21 ft
100.
10.
1.
Displacement (ft)
0.
200.
400.
600.
800.
1000.
Time (sec)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

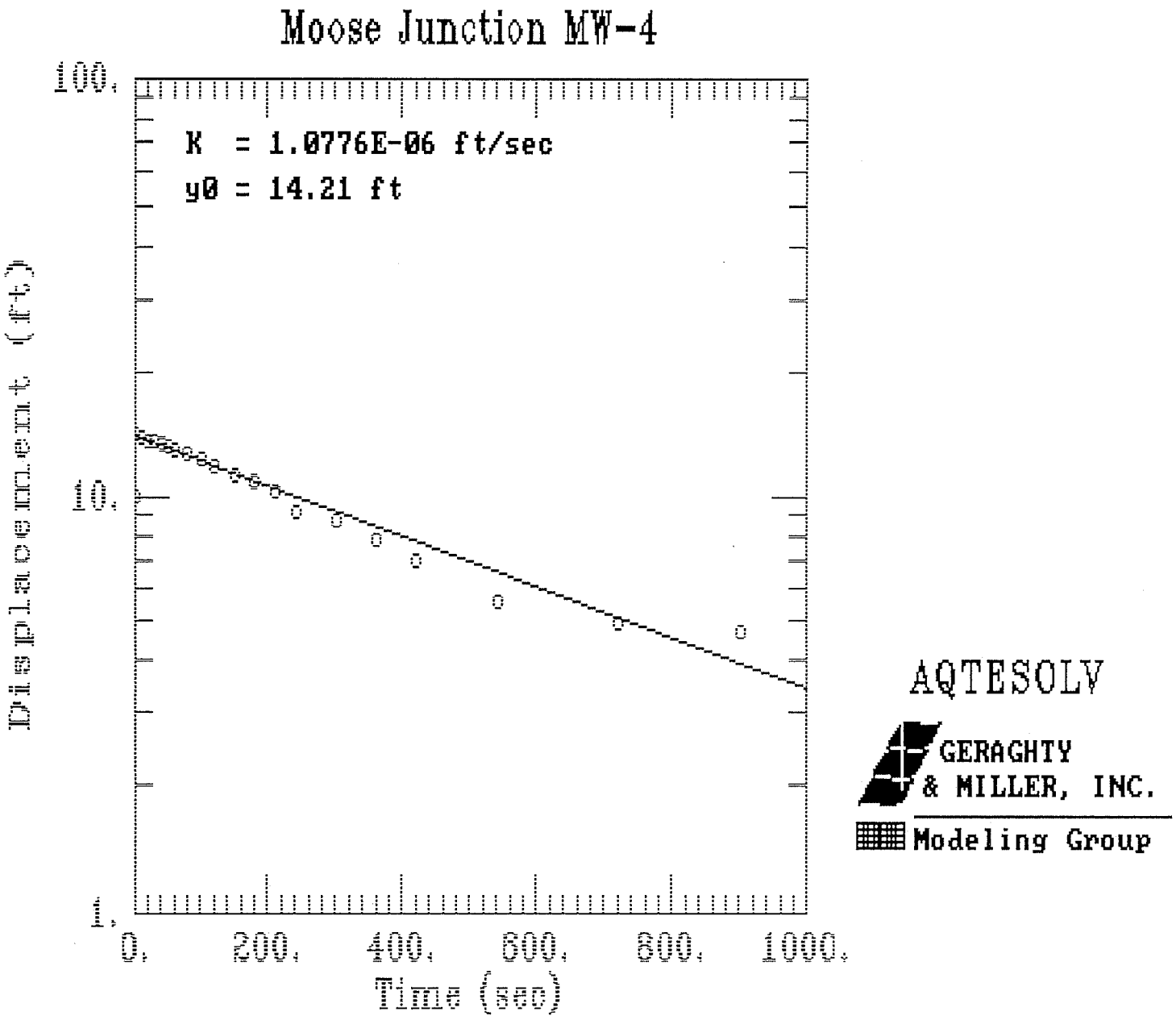

Moose Junction MW-2
K = 1.4307E-06 ft/sec
y0 = 9.824 ft
100.
10.
1.
Displacement (ft)
0.
200.
400.
600.
800.
1000.
Time (sec)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group



AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group


Moose Junction MW-4
K = 1.0776E-06 ft/sec
y0 = 14.21 ft
100.
10.
1.
Displacement (ft)
0.
200.
400.
600.
800.
1000.
Time (sec)
AQTESOLV
GERAGHTY
& MILLER, INC.
Modeling Group

Appendix F Wisconsin Department of Health and Social Services
Concentrations at Which DHSS Requests Notification

CONCENTRATIONS AT WHICH DHSS REQUESTS NOTIFICATION
March 1992
(LEVELS ARE FOR CONTAMINATED DRINKING WATER)

Chemical	Concentration (ug/l)	Chemical	Concentration (ug/l)
Alachlor	40	Aldicarb	10
Arsenic	50	Atrazine	50
Barium	5000	Benzene	100
Bromodichloromethane	179	Butylate	350
Cadmium	20	Carbaryl	1000
Carbofuran	50	Carbon Tetrachloride	30
Chloramben	200	Chromium	200
Cyanazine	20	Cyanide	200
Dibromochloropropane	3	Dibromochloromethane	215
Dicamba	300	o,m-Dichlorobenzene	9000
p-Dichlorobenzene	750	1,1-Dichloroethane	1700
1,2-Dichloroethane	40	1,1-Dichloroethylene	7
1,2-Dichloroethylene	200	Dichloromethane	500
2,4-D	100	Dimethoate	7
Dinoseb	13	Dioxins	.00002
Endrin	3	EPTC	500
Ethylenedibromide	.04	Ethylbenzene	1360
Fluoride	10000	Fluorotrichloromethane	3490
Lead	50	Lindane	0.2
Mercury	10	Methoxychlor	500
Metolachlor	100	Metribuzin	300
Nitrogen(Nitrate+Nitrite)	20000	Pentachlorophenol	300
Selenium	50	Silver	200
Simazine	50	Tetrachoroethylene	70
Tetrahydrofuran	500	Toluene	3000
Toxaphene	3	1,1,1-Trichloroethane	1000
1,1,2-Trichloroethane	60	Trichloroethylene	300
2,4,5-Trichlorophenoxy-propionic acid	800	Trifluralin	30
Vinyl Chloride	1.5	Xylene	10000