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August 19, 1993

RECEIVED

AUG 20 1993

Mr. Mark Koplitz
Minnesota Pollution Control Agency
Hazardous Waste Division
Tanks and Spills Section
520 Lafayette Road North
St. Paul, Minnesota 55155

MPCA, HAZARDOUS
WASTE DIVISION

GME Project No. C-2373-B

RE: Project Status Report and Clean-up Strategy Discussion Request for the Dittmer Oil Company Property located at the intersection of Highways 4 and 19 in Fairfax, Minnesota (MPCA Leaksite #00001940)

Dear Mr. Koplitz:

We are writing on behalf of Mr. Robert Dittmer to provide you with project status information, per our recent telephone conversation with you. We also are writing to request a clean-up strategy conference call with you and/or the MPCA project hydrogeologist, Mr. Dittmer and ourselves, per MPCA Guidance Document 25 dated April, 1993.

As requested in Guidance Document 25, we have attached the following items to this letter (they are listed in their order of attachment):

- * Site Maps showing soil boring and monitoring well locations, above ground storage tank (AGST) and underground storage tank (UST) locations, and contaminant distributions,
- Groundwater Table Contour Maps,
- * Tables of Soil Boring Results, Soil Chemistry Results, Water Level Measurements, and Water Chemistry Results,
- Soil Boring and Monitoring Well Logs,
- * Groundwater Receptor Survey Information, and
- * A Hydrogeologic Setting and Groundwater Contamination Worksheet.

BACKGROUND

The site is located southeast of the intersection of Highways 4 and 19 in the City of Fairfax, Minnesota (Figure 1). The property is relatively level, and most of the site is either paved or is covered by buildings. The primary man-made structure on the property houses both Dittmer Oil and the 419 Cafe. There are three USTs on-site to store regular leaded gasoline and unleaded gasoline for commercial sale. There also are several other USTs and AGSTs on-site (Figure 2).

The site is bounded by the Fairfax Farmers Elevators to the south, an agricultural field to the east, Highway 19 to the north, and Highway 4 to the west. Farther to the east is a farmhouse and out buildings. Directly across Highway 19 to the north is a residence and out buildings. A feed and seed business (formerly a retail gasoline station) is located to the northwest of the site, on the northwest corner of the intersection of Highways 19 and 4. A cafe (also formerly a retail gasoline station) is located west of the property, just across Highway 4.

A UST leak was reported at the Dittmer Oil Company site in October 1989, when approximately 2,300 gallons of leaded gasoline were discharged into the subsurface from a loose fitting on a product pipe connected to the 12,000 gallon gasoline UST. Free product was recovered and contaminated soils were removed and disposed of at that time. The impacts from that release were deemed to be remediated and that release was "closed" by the MPCA.

However, during remediation of the leaded gasoline release, evidence was encountered that indicated that several previous petroleum releases had occurred in conjunction with the gasoline UST installations. For example, the 12,000 gallon gasoline UST replaced another UST which had been leaking. Further, the 8,000 gallon gasoline UST had been leaking and was patched with fiberglass in approximately 1985. Also, an apparent spill or overfill near the fill pipe of the 4,000 gallon unleaded gasoline UST was identified. When the tanks were replaced in the excavation and the excavation was backfilled, most of the remaining impacts were located along the eastern wall of the excavation. These impacts ranged up to 192 parts per million (ppm) total petroleum hydrocarbons (TPHCs) as (likely unleaded) gasoline. Additional information regarding the above releases from the gasoline UST installations is reported in our March 28, 1990 Gasoline Discharge Remediation Report.

The purpose of our remedial investigation (RI) is to assess the extent and magnitude of the remaining petroleum impacts associated with the gasoline USTs. Our scope of work has included completion of 27 environmental soil borings (Figure 3), installation of 7 groundwater table monitoring wells and 1 deep groundwater monitoring well, completion of soil and groundwater sampling and laboratory analyses, completion of slug tests, and completion of potential receptor surveys.

INVESTIGATION RESULTS

Geology and Hydrogeology

Soil boring results indicate that primarily glacial till soils with some thin interbedded sand seams underlie the site. Figures 4 and 5 illustrate geological cross-sections across the site, and Figure 6 shows the plan view of the cross-section locations. As shown on the cross-sections, we encountered three general stratigraphic units: a light gray to light brown silty clay with trace to little sand and many fractures to approximately 8 to 14 feet below grade; a brown to dark brown silty clay with little sand and some fractures to a maximum of approximately 16 feet below grade; and, a dark gray non-fractured silty clay with trace to little sand and our exploration final extent of gravel to the approximately 40 feet below grade. There also were sand seams identified in several of the borings; the thickest sand layers were encountered in the gray clay at approximately 20 to 30 feet below grade in boring B8.

A review of USGS Hydrologic Investigations Atlas HA-391 indicates that Pleistocene glacial till underlies the Fairfax area to a depth of approximately 200 feet. Underlying the glacial deposits are cretaceous shales and sandstones, and Precambrian granitic and metamorphic rocks, in turn. The top of the Precambrian rock apparently exists at an elevation of approximately 825 to 850 feet MSL. The primary aquifers in the Fairfax area are either the cretaceous sandstones or decomposed Precambrian granite, or sand seams within the glacial till. The well logs for two wells at the nearby Fairfax Farmers Elevators indicate that the overlying unconsolidated glacial materials are comprised primarily of clay with few sand seams. The wells are completed in a sand stratum located between 173 and 186 feet below grade.

The groundwater table currently exists at approximately 4 to 5 feet below grade, but was encountered at approximately 12 to 13 feet below grade in the excavation when the leaded gasoline release was remediated in November, 1989. According to Hydrologic Investigations Atlas HA-391, the regional shallow groundwater flow within the glacial deposits generally is to the south. The apparent regional discharge site for the groundwater underlying the Fairfax area is the Minnesota River, which is located several miles to the south of Fairfax.

Table 1 summarizes the 6 rounds of water level measurements from our monitoring wells. These measurements indicate that the shallow groundwater flow under the site generally is to the south and southeast (Figures 7 and 8). Our water level measurements also indicate that a relatively steep lateral gradient exists in the fine grained soils.

Table 2 summarizes slug test data collected from 3 of our groundwater table monitoring wells. The average hydraulic conductivity measured from these results was 0.022 ft/min. The estimated lateral groundwater flow velocity near the groundwater table is approximately 1 ft/day, based on our slug test results, an estimated porosity of 30% and the gradient estimated from our groundwater level measurements. These results are higher than would be expected for a clay and may indicate that the fractures in the upper two till units play a major role in controlling the groundwater flow at this site. Sand seams also will cause preferential groundwater flow where they are present in the clay tills.

Organic Vapors and Soil Chemistry

Tables 3 and 4 summarize the organic vapor concentrations and soil chemistry results for soil samples collected from our soil borings. The organic vapor concentrations also are on the attached soil boring logs.

As this information indicates, most of the significant soil impacts encountered in the borings are from approximately 6 to 14 feet below grade, and especially from 8 to 12 feet below grade. Therefore, it appears as if most of the impacts at the site are limited to the few feet below the groundwater table. Exceptions to this were soil samples collected from borings B8 (24 to 26 feet below grade), B21 (28 to 30 feet below grade) and MW8. The samples from borings B8 and B21, collected from a sand seam with an organic vapor detection of 4.5 ppm and from the gray clay with an organic vapor detection of 6 ppm, had slight petroleum parameter detections just above the laboratory method detection limits. The sample from

boring MW8, collected from near where the well was screened (in the gray clay at 37 to 39 feet below grade) also indicated relatively low petroleum parameter detections (but no organic vapor detections); these detections are further discussed in the following section.

Groundwater Chemistry

Groundwater chemistry results are summarized in Table 5. These data indicate that primarily unleaded gasoline has impacted the groundwater at the site. Leaded gasoline and fuel oil also may be source petroleum products for the petroleum parameters detected in our groundwater samples. Most of the impacts encountered in the groundwater monitoring wells appear to be related and do not appear to have been significantly affected by biodegradation (i.e., gasoline range organic (GRO) concentrations are higher than diesel range organic (DRO) concentrations and benzene concentrations are still moderate to high in 3 wells). Groundwater samples from well MW2 have contained the highest concentrations of petroleum product parameters. The concentrations in wells MW1, MW4 and MW7 also have been high and the Minnesota Department of Health (MDH) Recommended Allowable Limits (RALs) for at least one parameter have been exceeded on at least one sampling event in each of those wells.

Very low concentrations of benzene, toluene, and MTBE (volatile constituents) were detected just above the laboratory method detection limits in the water sample collected from deep monitoring well MW8. This sample was collected only approximately 1 day after the well had been installed (August 5). To reduce the potential for cross-contamination when installing that well, a 10 inch I.D. hollow stem auger was drilled to 20 feet below grade and then an 8 1/4 inch O.D. hollow stem auger was telescoped through the 10 inch Although this outer casing was casing to complete the boring. placed approximately 7 feet past the last known depth of impacts (based on HNU readings from adjacent well MW4), it is uncertain whether the groundwater impacts from the water table zone were completely sealed off from leakage into the advancing borehole. After the borehole was advanced to final depth (40 feet below grade), the well was installed into a very tight non-fractured gray clay. A small amount of water from the municipal water supply was required to be placed in the well to hold the well in place while removing the augers and grouting the borehole. The borehole around the well was pressure grouted with a tremie pipe from the top of the sand pack through the water table to near the ground surface. Upon completion, the 40 foot well had approximately 36 feet of water in it (most of it likely from the well installation procedure). We bailed the well dry twice and it recharged approximately 1 foot prior to our collecting the above mentioned

water sample.

We returned to the site on the evening of August 17 and rechecked the water level in deep monitoring well MW8 and found it to be approximately 24 feet below grade. Therefore, the water level in that well had recharged only 15 additional feet since our August 5 sampling event (approximately 1 foot per day). Although there may be downward vertical groundwater gradients, it is unlikely that they would be as steep as this water level would indicate (approximately 1 foot per foot). Therefore, the water level in well MW8 likely still was not stabilized as of August 17; this is an indication of the low permeability of the non-fractured gray clay. After measuring the water level in the well on August 17, we again bailed the well dry. On the morning of August 18, the well had recharged approximately 1 foot and we collected another water sample. The analytical results for this sample should be available by August 27. ** **Location** **Lo

In summary, the initial petroleum parameter detections in soil and groundwater samples collected from well MW8 should be re-evaluated after the well has been additionally purged and sampled. were no organic vapor detections or petroleum odors observed in soil samples from that boring. Also, there were no sand seams apparent in that boring, and field observations and recharge observations indicate that the gray clay has a very low permeability. Further, recharge observations indicate that the annulus has been grouted properly to eliminate borehole leakage into the well. However, some leakage of contaminated water from the fractured clays near the water table into the borehole may have occurred during drilling. This leakage would be magnified in the initial well sampling results from a well such as MW8 placed in a low permeability clay, because of the lack of recharge. Therefore, the well may have to be purged several times to flush out the slight impacts that may have leaked into the borehole from above. Alternatively, if steep downward vertical groundwater gradients or impacted sand seams near the well screen were to exist, the impacts detected in well MW8 would be expected to be stable or increase over time.

Figure 9 illustrates the estimated lateral extent of the groundwater impacts. Based on the soil boring and monitoring well sampling results, it appears that preferential groundwater flow through the fractures in the glacial till units has caused the gasoline impacts to have migrated upgradient, sidegradient and downgradient from the UST installations. Although the impacts have migrated upgradient to the north, northeast and northwest of the USTs, the plume primarily has migrated sidegradient and downgradient to the east, southeast and south of the USTs.

Besides affecting the speed of migration and the apparent extensiveness of the plume, the fractures in the till conjunction with significant water level fluctuations could further affect the groundwater chemistry. This possible affect is possibly illustrated by the data for wells MW1 and MW2 (Table 5). these wells were installed, the water levels have increased dramatically. These water table fluctuations or slug flow When they migration may explain the results for these two wells. soil sample chemistry and organic installed. measurements indicated that more impacts existed near well MW1. Initial water sampling results for that well confirmed these data. Results for monitoring well MW4, just downgradient from monitoring well MW1, also confirmed that gasoline impacts existed in that However, recent groundwater sampling results for well MW1 indicate that it is relatively clear of impacts. In the meantime, concentrations in well MW2 have increased until a dramatic decrease on the last round of sampling. Again, these results, coupled with the lateral extensiveness of the impacts at the groundwater table indicate that both groundwater table fluctuations and the fractures in the till likely play major roles in groundwater contaminant migration at the site.

Potential Receptors

As part of a vapor receptor survey for the site, we monitored for organic vapors in the small basement underneath the Dittmer Oil building. We encountered no petroleum related vapors in the basement.

Our groundwater receptor survey results indicate that the likely primary groundwater receptors in the area are the 2 wells located directly south of the site at the Fairfax Farmers Elevators. Those wells are approximately 183 and 186 feet deep, and have 4 to 8 foot long screens. Their well logs do not indicate any information regarding the casing or grouting characteristics of the wells. We sampled the Co-op well shown on Figure 2 in August, 1993 and no detections of BTEX or GRO were observed.

Based on the information obtained from the Minnesota Geological Survey (MGS) and Hydrologic Investigations Atlas HA-391, the City of Fairfax uses 2 municipal wells located to the west of Fairfax. Only one other water supply well is registered in Fairfax, at the Fairfax Flour Mill in the southwest portion of the city. Both the City wells and the flour mill well are completed in bedrock at over 200 feet below grade.

Although not registered, it is very likely that the residence located approximately 1000 feet east of Dittmer Oil also has a private well. The Dittmer Oil site and other nearby sites to the west are on the municipal water supply system.

CORRECTION ACTION ALTERNATIVES

Based on the petroleum parameter concentrations in groundwater samples from wells MW2, MW4 and MW7, the lateral extensiveness of the groundwater impacts, the apparent relatively fast migration of the impacts through the soil fractures, and the nearby locations of at least 2 potential groundwater receptors to the east and south of the site, it is our opinion that the on-site shallow groundwater should be remediated. Further, this groundwater remediation should be conducted in conjunction with source control measures (i.e., in this case, additional soil remediation).

The results to date are not clear as to whether natural biodegradation is occurring within the surficial soils. National research indicates that hydrocarbons are most amenable to natural biodegradation in shallow sands where oxygen is readily available. Therefore, based on the possible lack of success of natural biodegradation processes, the fine-grained characteristics of the soils, and the potential for large groundwater table fluctuations, in-situ remediation techniques likely would not be feasible. exception to this might be injecting bacteria to allow bioremediation to occur, especially in the fractured zones just above and within the upper portion of the groundwater table. been our experience that permitting it has Therefore, we recommend that bioremediation can be difficult. additional soil excavation be completed eastward from the eastern side of the UST excavation (in the unpaved area). We anticipate that approximately 300 to 500 cubic yards of petroleum impacted soil could be removed from that location. Disposal of this soil on nearby farmland should be relatively cost-effective.

A groundwater collection system appears to be the primary option for remediating the shallow groundwater. This could be accomplished at this site by a groundwater collection trench placed along the eastern property line and a portion of the southern property line. The trench could be installed to approximately 15 feet below grade, and perforated PVC pipe would be placed in the trench and it would be backfilled with pea gravel. The pipe and trench would be sloped to manholes which would be pumped. The trench installation and additional pumping would create a draw down and collect on-site groundwater as well as "pull back" some of the

impacted groundwater which has migrated off the site. A groundwater collection trench should work at this site, because it would intersect the fractures in the till and it would continue to work during the groundwater table fluctuations experienced at this site. Based on the results of the above recommended soil excavation, it also may be desirable to place another PVC lateral in that excavation and connect it with the main trench. This lateral could enhance clean-up of the groundwater near the UST installations.

Extracted groundwater either would be discharged directly into the sanitary sewer system or would be treated then discharged. An alternative would be to treat and oxygenate the extracted groundwater, then allow it to reinfiltrate upgradient of the plume to enhance plume attenuation and migration toward the collection trench.

An alternative to groundwater remediation, if you determine that the 2 nearby potential receptors are the primary reason remediation would be necessary, would be to hook-up both of these properties to the nearby municipal water supply. This likely would be more cost-effective than undertaking groundwater remediation solely for the purpose of protecting those two wells. If these properties were hooked-up to the municipal water supply instead of remediating the site's groundwater, on-going groundwater monitoring of the site monitoring wells still should be conducted for at least two years. Whether or not remediation is required at the site, we also would recommend that additional groundwater table monitoring wells be placed near the locations of borings B7 and B12 to monitor the migration of petroleum impacts to the south and east of the site.

CLOSURE

After your review of this letter, please contact me to advise us of a suitable time to schedule a conference call with ourselves and Mr. Dittmer. Please try to complete your review and schedule our conference call as soon as possible as Mr. Dittmer is very anxious to proceed with further work at the site.

If you have any questions regarding the information that we have provided, please telephone me at 218-546-6371. We appreciate your consideration and timely review of the data from this site.

Sincerely,

GME CONSULTANTS, INC.

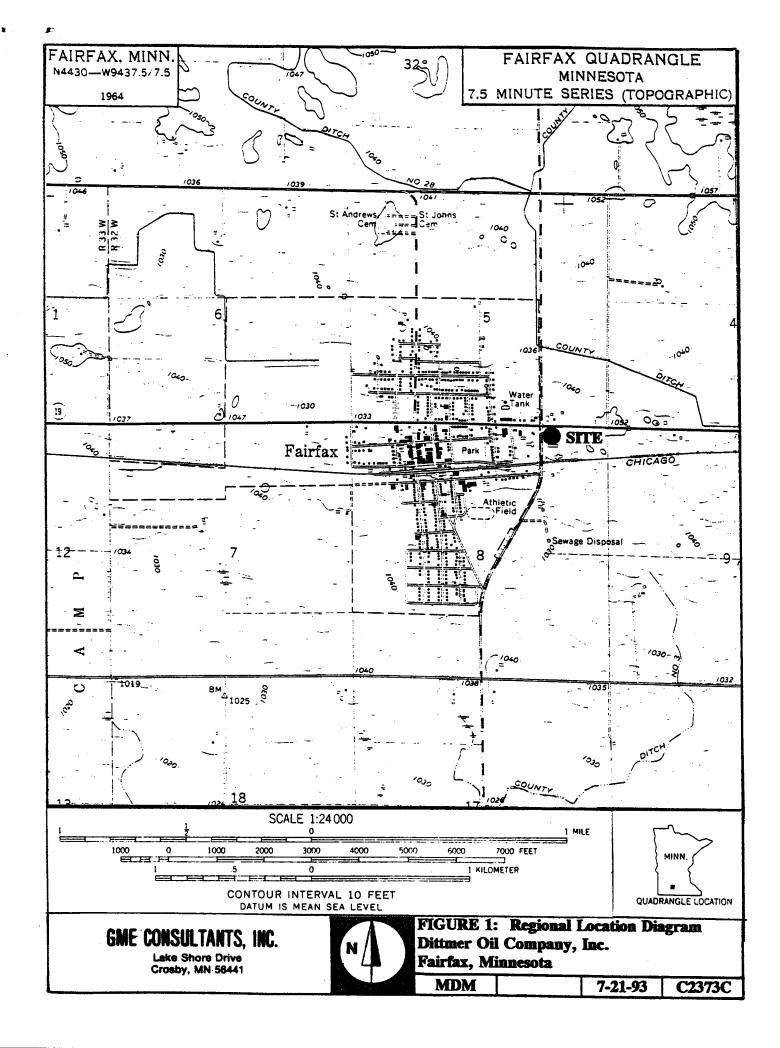
Mark D. Millsop

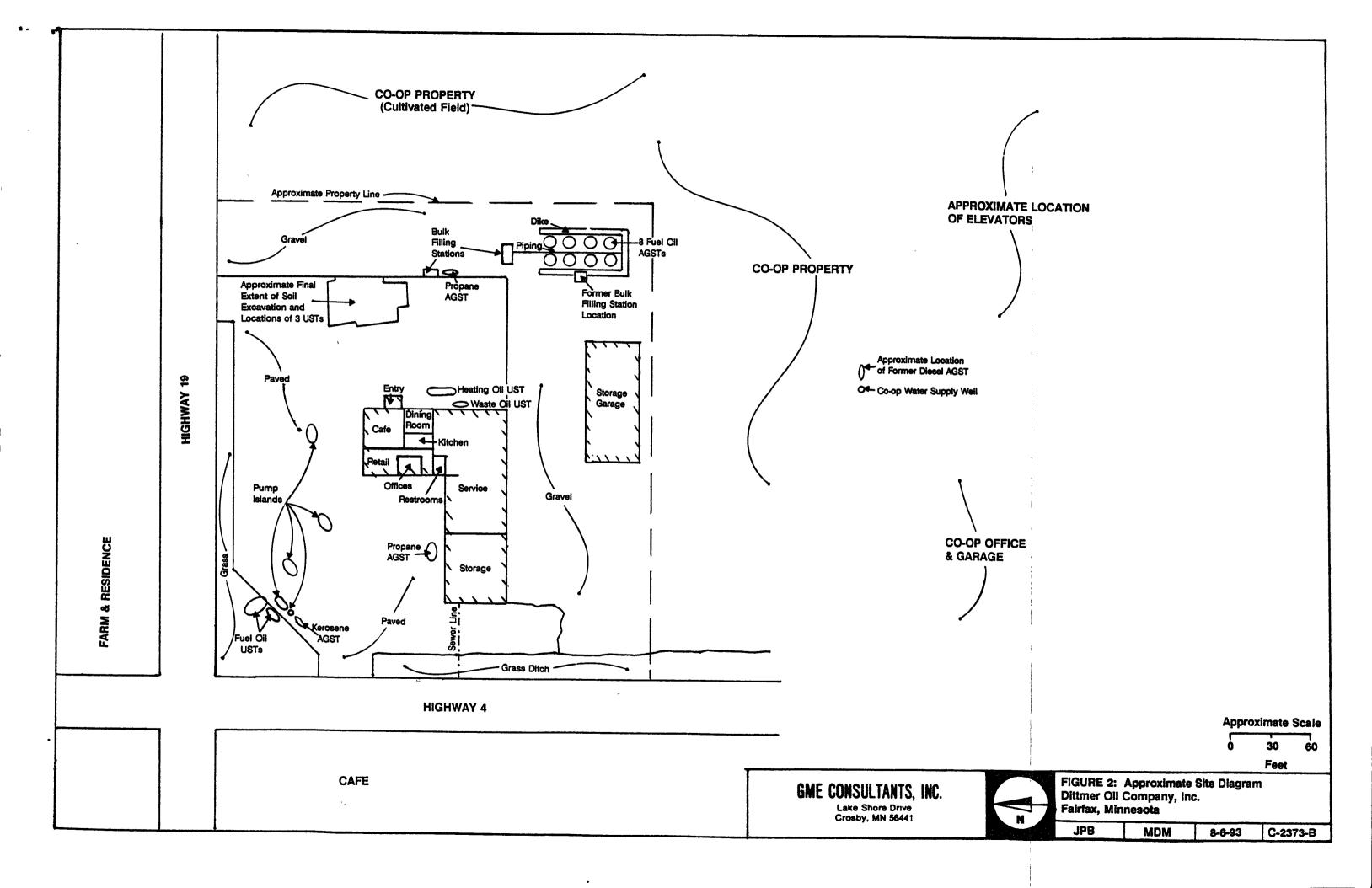
Senior Hydrogeologist

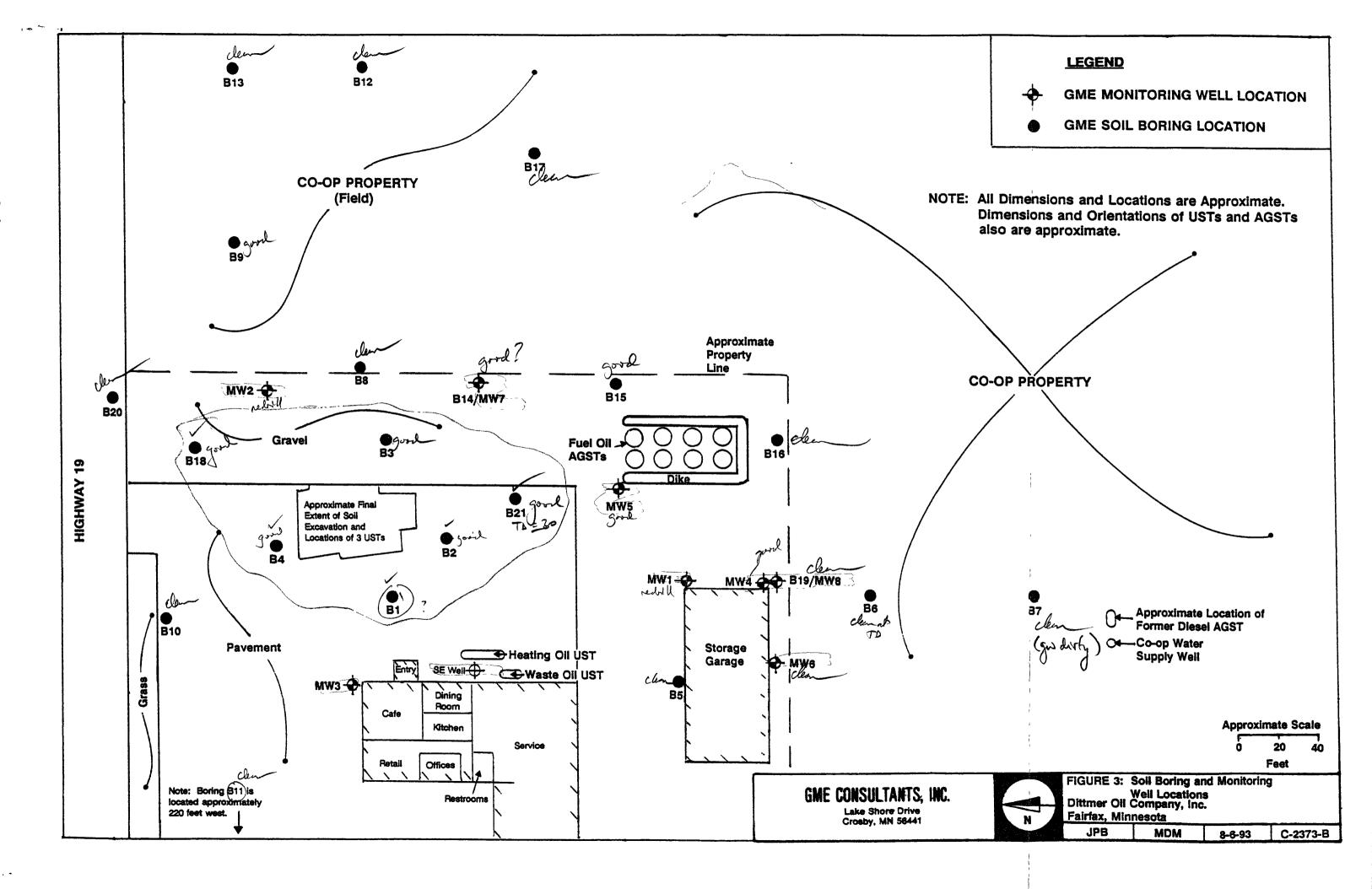
Corporate Environmental Division Manager

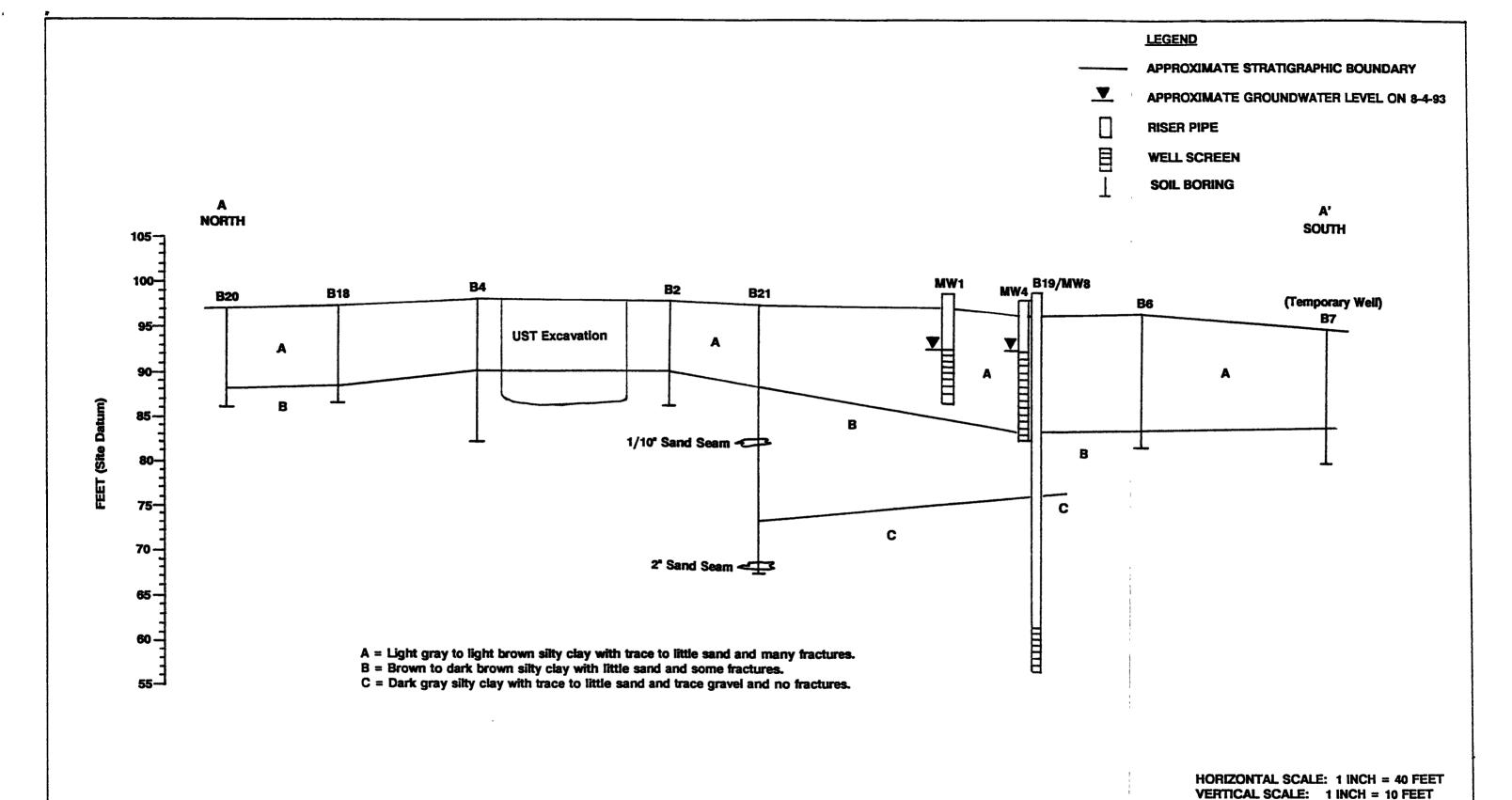
Attachments: As described on page 1 of text

C: Mr. Robert Dittmer
 Dittmer Oil Company
 Highways 4 & 19
 Fairfax, Minnesota









NOTES:

- Well elevations are referenced to site datum. The concrete slab in the doorway at the northeast entrance to the main building (cafe entrance) was used as the benchmark. 2.
- Stratigraphic boundaries are estimated. Actual boundaries may differ.

Topography is estimated.

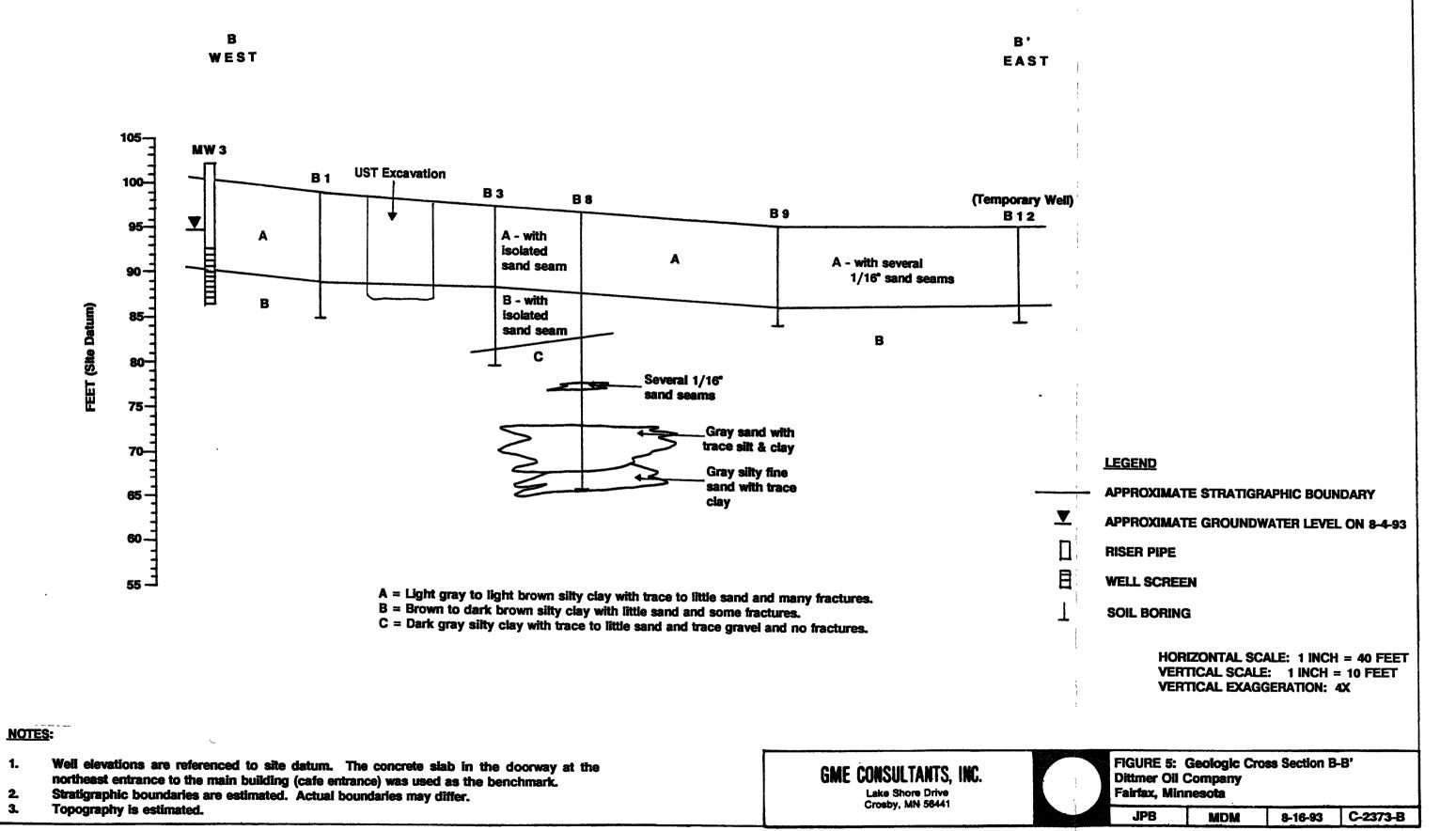
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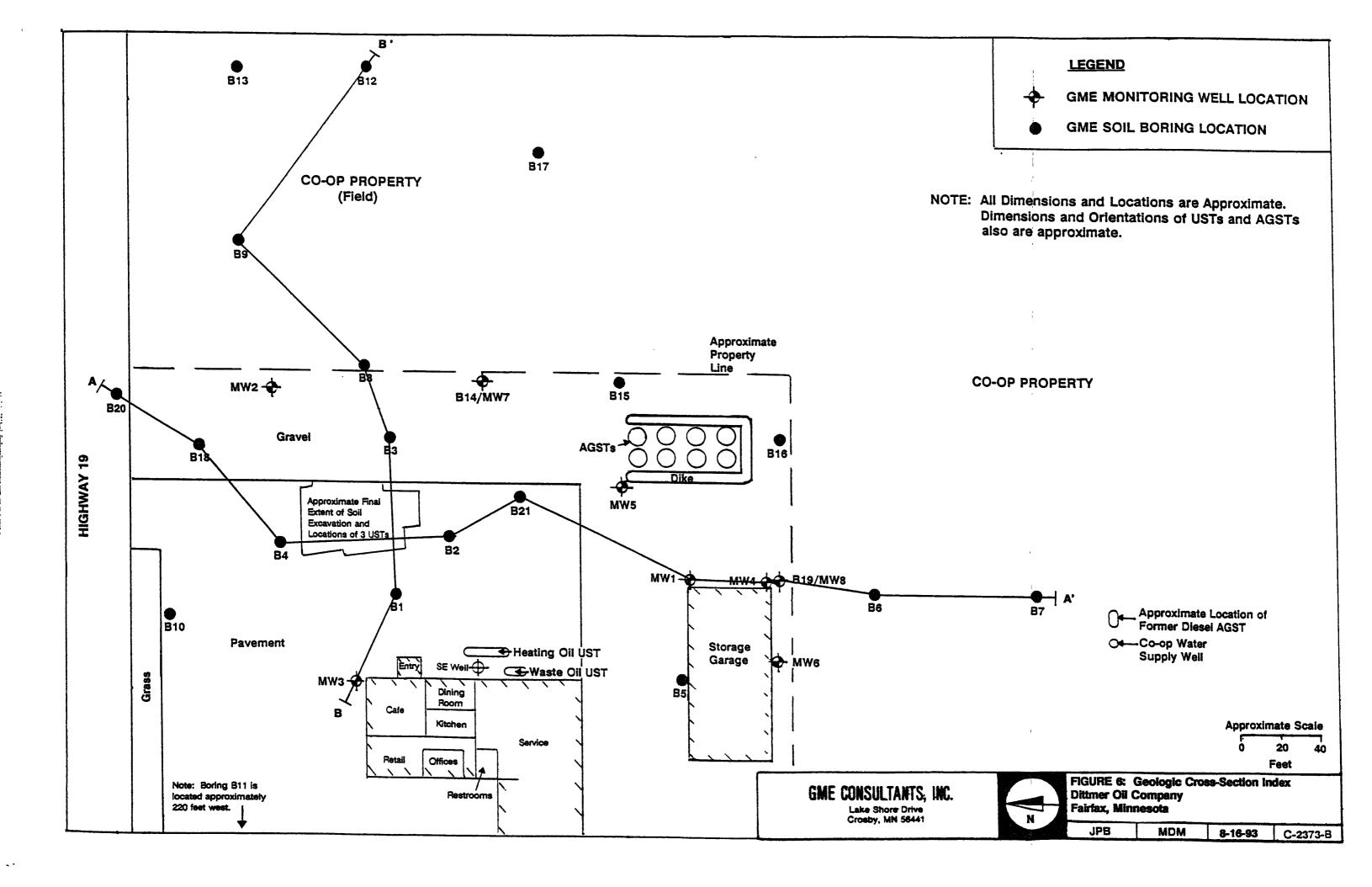
Lake Shore Drive Crosby, MN 56441

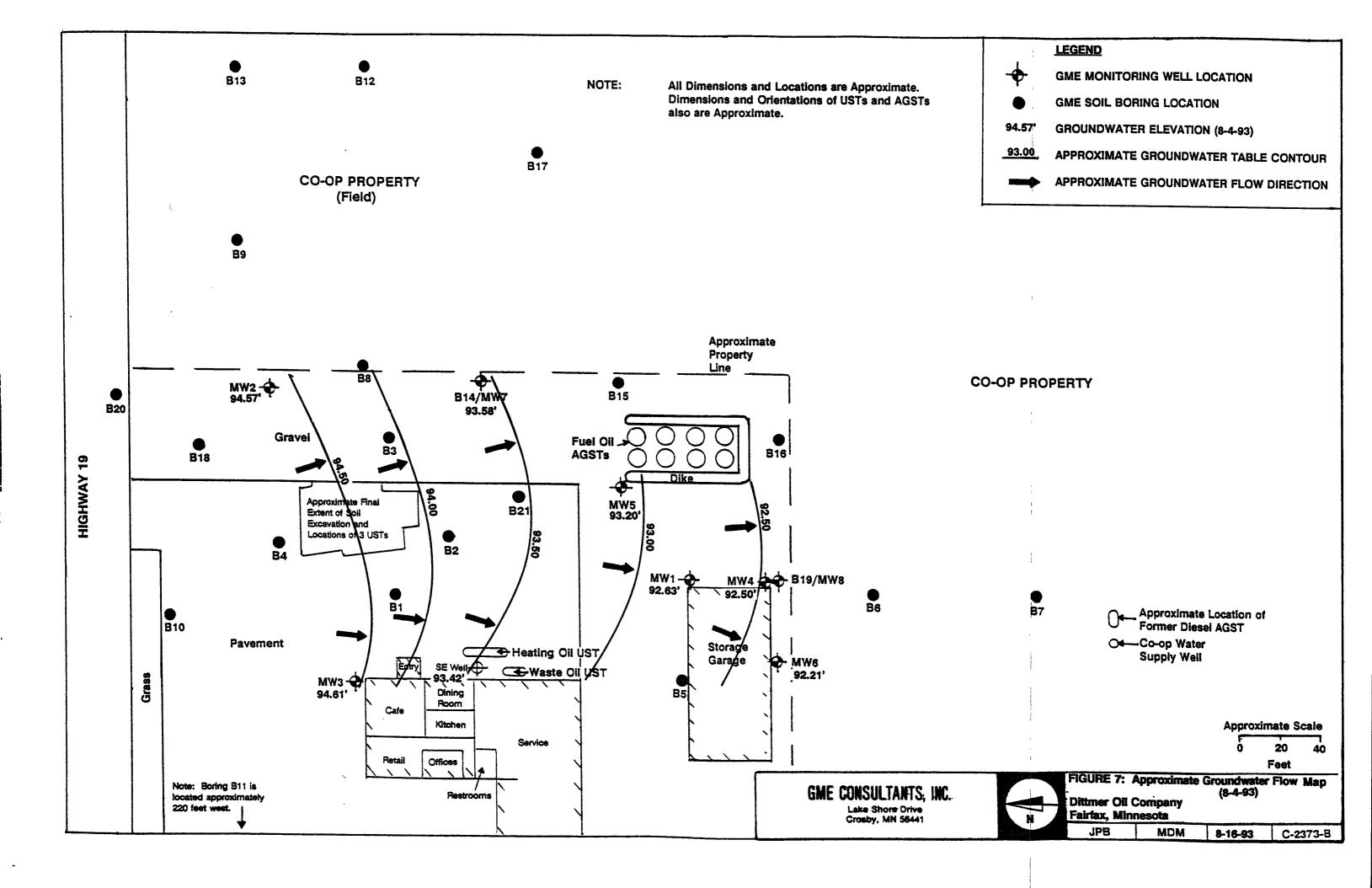
FIGURE 4: Geologic Cross Section A-A' **Dittmer Oil Company** Fairfax, Minnesota JPB MDM 8-16-93

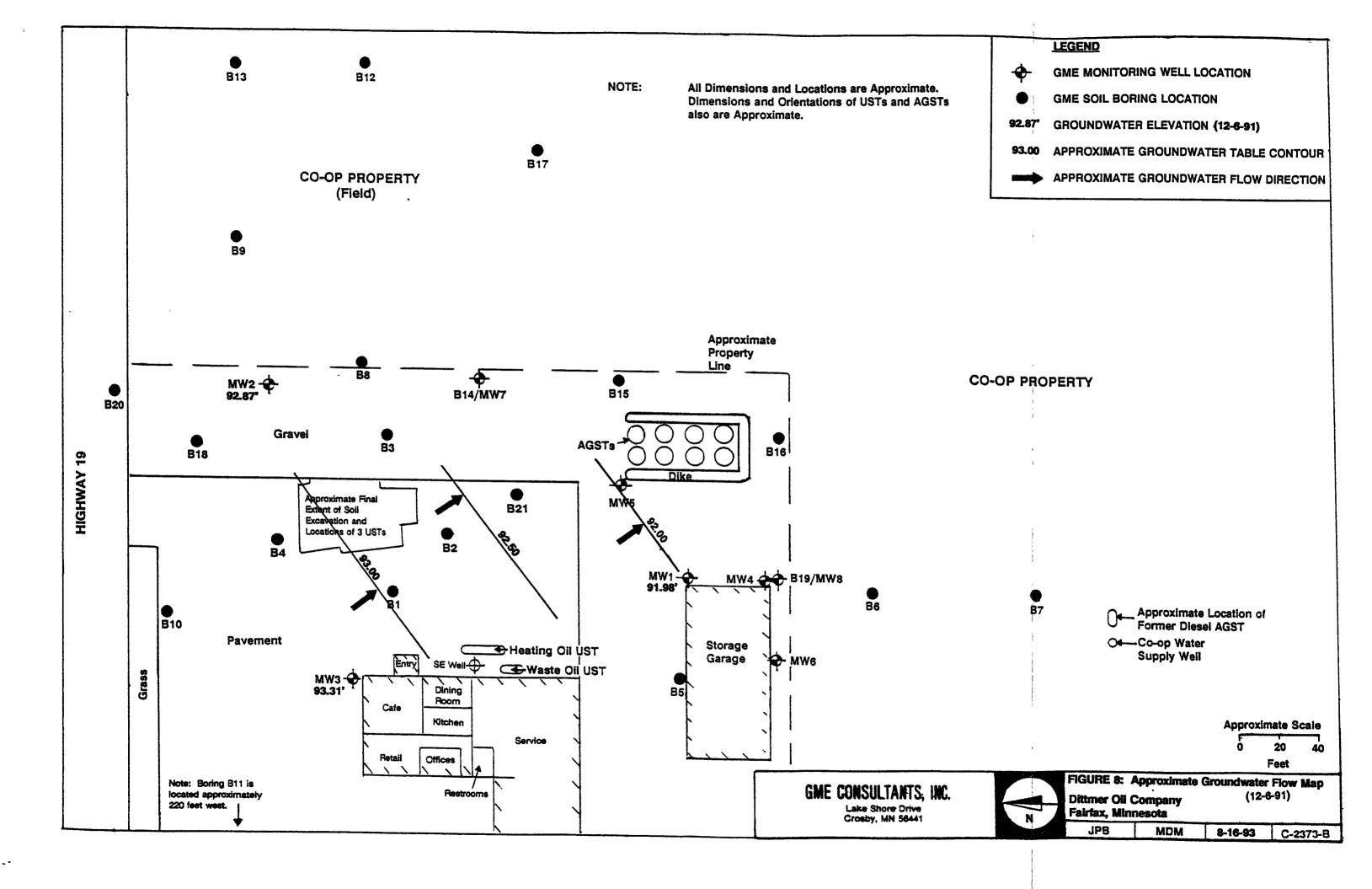
VERTICAL EXAGGERATION: 4X

C-2373-B









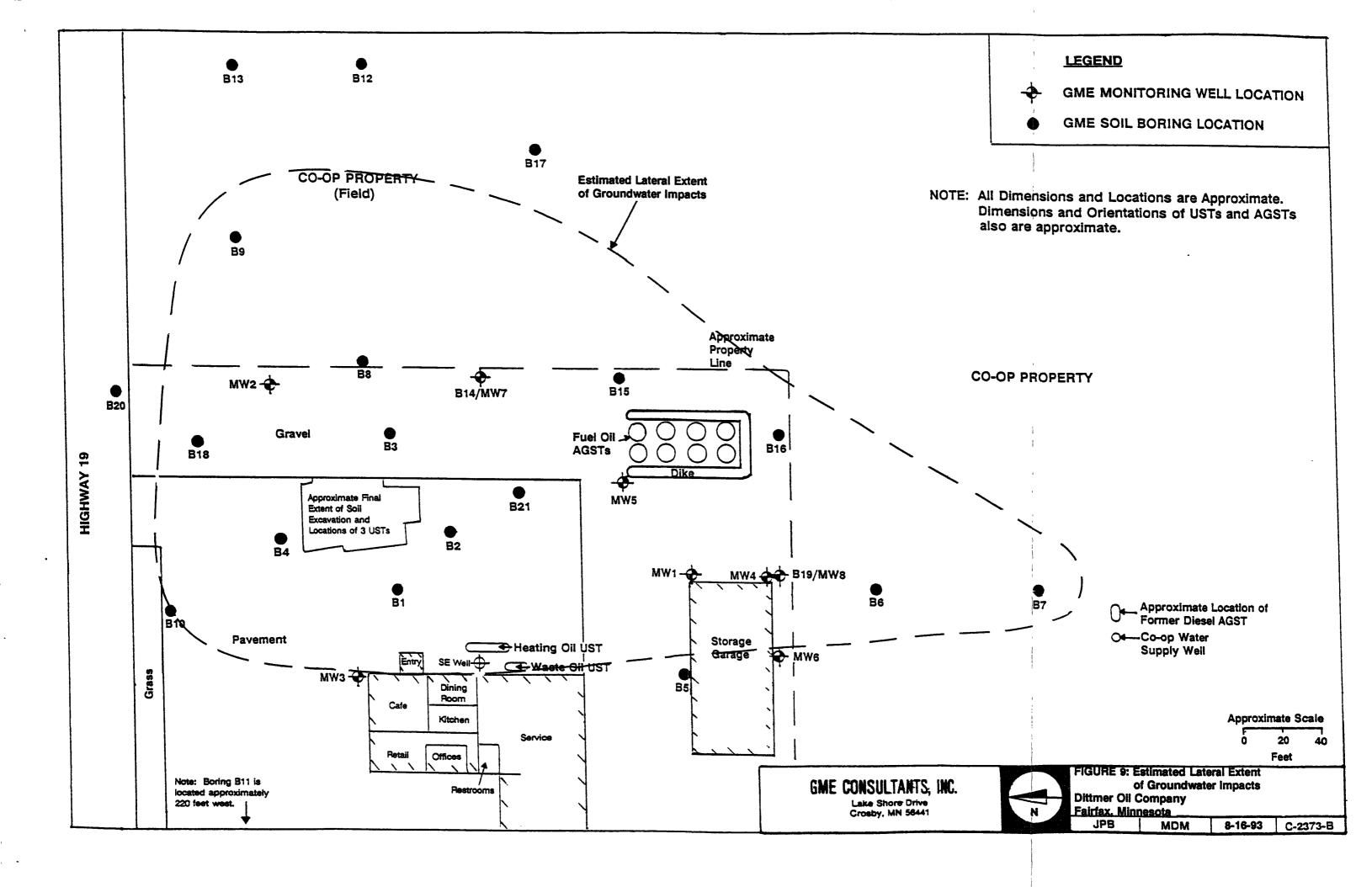


TABLE 1
GROUNDWATER ELEVATION SUMMARY
DITTMER OIL COMPANY
GME PROJECT NO. C-2373-B

Groundwater Elevations (Site Datum)

Monitoring Well Number	12-6-91	1-21-92	6-3-93	6-17-93	7-15-93	8-4-93	8-17-93
MW1	91.98	91.41	93.30	93.65	92.84	92.63	92.60
MW2	92.87	93.51	94.00	96.00	93.03	94.57	94.49
MW3	93.31	92.45	94.41	96.61	94.86	94.61	94.40
MW4			92.92	93.91	92.53	92.50	92.52
MW5			93.25	93.95	93.16	93.20	92.78
MW6			92.33	94.04	92.22	92.21	92.22
MW7						93.58	93.14
MW8							75.61*
TCT Well (SE Well)					93.43	93.42	93.48

Note:

Elevations referenced to concrete slab in doorway at northeast entrance to main building (cafe entrance).

*Water level is not yet stabilized.

TABLE 2 SLUG TEST DATA ANALYSIS RESULTS DITTMER OII COMPANY GME PROJECT NO. C-2373-B

Monitoring Well Number	Hydraulic Conductiv Slug In	ity (ft/min) Slug Out
MW1	0.0026	0.0436
MW2	0.0024	0.0801
MW3	0.0006	0.0005
Average	0.0019	0.0414

Total Average = 0.022 ft/min

Note: Average values calculated using the geometric mean.

Boring No.	Depth (feet)	OVA Reading (ppm)
MW1	0 - 2	26
	2 - 4	42
	4 - 6	50
•	6 - 8	320
	8 - 10	410 215 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
	10 - 12	215 N. X. (1)
MW2	0 - 2	5 15 24
	2 - 4	15
	4 - 6	15 24 32 41 21 redill
	6 - 8	/32 Weson 5.7)
	8 - 10	(41)
	10 - 12	21 redill
	12 - 14	75
MW3	0 - 2	6 8 3 20
	2 - 4	8
	4 - 6	3
	6 - 8	20
	8 - 10	42
	10 - 12	24
	12 - 14	20
	14 - 16	8
B1	0 - 2	0
	2 - 4	14
	4 - 6	46
	6 - 8	200
	8 - 10	415
	10 - 12	22.0
	12 - 14	110
B2	0 - 2	, 22
	2 - 4	34
	4 - 6	20
	6 - 8	120
	8 - 10	380
	10 - 12	10
		40

B3	Boring No.	Depth (feet)	OVA Reading (ppm)
### A	B3	0 - 2	40
MW4 A - 6 A - 8 B - 10 B - 12 B - 14 B - 16 B - 18 B - 10 B - 12 B - 14 B - 16 B - 18 B - 10 B - 12 B - 14 B - 16 B - 18 B - 10 B - 2 B - 3 B - 10 B - 2 B - 3 B - 10 B - 12 B - 14 B - 6 B - 8 B - 10 B - 12 B - 14 B - 16 B - 12 B - 14 B - 16 B - 12 B - 14 B - 16 B - 17 B - 9 B - 11 B - 15 B - 10 B - 11 B - 15 B - 10 B - 11 B - 15 B - 10 B - 11 B - 15 B - 10 B - 11 B - 15 B - 10 B - 11 B - 15 B - 10 B - 11 B - 15 B - 10 B - 11 B - 15 B - 10 B - 11 B - 15 B - 11 B - 11 B - 15			65
R - 10 260 10 - 12 220 12 - 14 19 14 - 16 11 11 16 11 18 3 3 3 3 3 3 3 3 3			
MW5 MW5 MW5 MW6 MW6 MW6 MW6 MW6			
### 14			
HNU Reading (ppm) MW4 4 - 6 5 - 8 8 - 10 46 10 - 12 320 12 - 14 4 - 16 11 3 HNU Reading (ppm) MW4 4 - 6 7 - 9 185 9 - 11 13 - 15 0 MW5 4 - 6 3 - 9 - 11 13 - 15 0 B5 4 - 6 7 - 9 9 - 11 10 B6 4 - 6 7 - 9 9 - 11 0 B6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 0 0 MW6			
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B4 0 - 2			
B4		10 - 18	
2 - 4	B4	0 - 2	
MW5 A - 6 A - 8 B - 10 A 460 10 - 12 BINU Reading (ppm) MW4 A - 6 A - 9 A - 9 A - 11 B - 15 B - 1			0
MW5 A - 6 B - 8 8 - 10 460 10 - 12 320 12 - 14 42 14 - 16 HNU Reading (ppm) MW4 A - 6 7 - 9 185 9 - 11 13 - 15 0 MW5 A - 6 9 - 11 13 - 15 0 B5 A - 6 7 - 9 0 - 11 0 B6 A - 6 7 - 9 0 - 11 0 B6 A - 6 7 - 9 0 - 11 0 B6 A - 6 7 - 9 0 - 11 0 MW6 A - 6 0 - 7 - 9 0 - 0 9 - 11 0 MW6 A - 6 0 - 0 9 - 11 0 - 0 MW6			5
MW4 10 - 12		6 - 8	8
MW4 4 - 6 7 - 9 185 9 - 11 13 - 15 0 MW5 4 - 6 9 - 11 25 13 - 15 0 MW5 4 - 6 9 - 11 25 13 - 15 0 B5 4 - 6 7 - 9 9 - 11 0 B6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 0 MW6			460
MW4			
MW4 4 - 6		12 - 14	
MW4 4 - 6 7 - 9 185 9 - 11 175 13 - 15 0 MW5 4 - 6 9 - 11 25 13 - 15 0 B5 4 - 6 7 - 9 9 - 11 0 B6 4 - 6 7 - 9 9 - 11 0 MW6 4 - 6 7 - 9 9 - 11 200 13 - 15 0 MW6		14 - 16	12
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			HNU Reading (ppm)
	MW4	4 - 6	0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		7 - 9	
MW5 $ \begin{array}{ccccccccccccccccccccccccccccccccccc$			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		13 - 15	0
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13 - 15 0 B5 4 - 6 0 7 - 9 0 9 - 11 0 B6 4 - 6 0 7 - 9 0 9 - 11 200 13 - 15 0 MW6 4 - 6 0 7 - 9 0 9 - 11 0			
B5			
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9 - 11 200 13 - 15 0 MW6 4 - 6 0 7 - 9 0 9 - 11 0			
13 - 15 0- MW6 4 - 6 0 7 - 9 0 9 - 11 0			200
7 - 9 9 - 11 0			
7 - 9 9 - 11 0	MW6	1 - 6	2
9 - 11	22110		
			0

Boring No.	Depth (feet)	HNU Reading (ppm)
В7	4 - 6 7 - 9 9 - 11 11 - 13 13 - 15	2 25 4 2.5 1
B8	0 - 4 (AS) 4 - 6 9 - 11 14 - 16 19 - 21 24 - 26 29 - 31	0.5 250 4 0.5 1.2 4.5 0.5
В9	0 - 4 (AS) 4 - 6 6 - 8 9 - 11	0.5 200 200 0.8
B10	0 - 4 (AS) 4 - 6 6 - 8 9 - 11	0.5 0 5 0.5
B11	0 - 4 (AS) 4 - 6 6 - 8 9 - 11	. 0 0 0 0
B12	0 - 4 (AS) 4 - 6 6 - 8 9 - 11	0 0 0 0
B13	0 - 4 (AS) 4 - 6 6 - 8 9 - 11	0 0 0 0

Boring No.	Depth (feet)	HNU Reading (ppm)
B14/MW7	0 - 4 (AS) 4 - 6 6 - 8 9 - 11 13 - 15	0.2 0.2 190 130 2.0
B15	0 - 4 (AS) 4 - 6 6 - 8 9 - 11 14 - 16	0 0.2 0.2 170 0.2
B16	0 - 4 (AS) 4 - 6 6 - 8 9 - 11	1.5 8.5 4.0 0
B17	0 - 4 (AS) 4 - 6 6 - 8 9 - 11	0 0 0 0
B18	0 - 4 4 - 6 6 - 8 9 - 11	30 200 250 2.0
B19/MW8	13 - 15 20 - 22 24 - 26 29 - 31 31 - 33 33 - 35 35 - 37 37 - 39	0 0 0 0 0 0

Boring No.	Depth (feet)	HNU Reading (ppm)
B20	0 - 4 (As	5) 0
	4 - 6	0
	6 - 8	0
	9 - 11	0
B21	0 - 4 (As	50
•	4 - 6	6.5
	9 - 11	150
	14 - 16	2.0
	19 - 21	2.5
	24 - 26	2.0
	26 - 28	2.0
	28 - 30	6.0

OVA = organic vapor analyzer
HNU = HNU Model PI-101 photoionization detector

ppm = parts per million
AS = auger sample

TABLE 4
SOIL CHEMISTRY RESULTS
DITTMER OIL COMPANY
GME PROJECT NO. C-2373-B

Boring Sample	#OVA PID	Depth (feet)	MDL	Parameter Analyzed	Concentration (ppm)
B1 (S-5)	415	8-10	1.6 1.4 0.059 0.063 0.041 0.18	TPHCs as Gasoline TPHCs as Fuel Oil Benzene Toluene Ethylbenzene Total Xylenes Lead	210 8.8 3.2 7.4 4.1 19
B1 (S-6)	220	10-12	1.6 1.4 0.059 0.063 0.041 0.18	TPHCs as Gasoline TPHCs as Fuel Oil Benzene Toluene Ethylbenzene Total Xylenes	3.3 7.2 0.072 0.23 0.077 0.38
B2 (S-5)	380	8-10	1.6 1.4 0.059 0.063 0.041 0.18	TPHCs as Gasoline TPHCs as Fuel Oil Benzene Toluene Ethylbenzene Total Xylenes Lead	160 130 1.9 1.5 0.80 10
B2 (S-6)	(0	10-12	1.4 5	TPHCs as Fuel Oil Lead	24 8
B3 (S-5)	J60	8-10	1.6 1.4 0.059 0.041 0.18	TPHCs as Gasoline TPHCs as Fuel Oil Benzene Ethylbenzene Total Xylenes Lead	140 100 1.0 2.4 4.6
B3 (S-6)	220	10-12	1.6 1.4 0.041 5	TPHCs as Gasoline TPHCs as Fuel Oil Ethylbenzene Lead	5.2 3.9 0.066 11

Boring Sample	* OVA	Depth (feet)	MDL	Parameter Analyzed	Concentration (ppm)
B3 (S-7)	Ì9	12-14	5	Lead	6
B4 (S-5)	460	8-10	1.6 1.4 0.059 0.063 0.041 0.18	TPHCs as Gasoline TPHCs as Fuel Oil Benzene Toluene Ethylbenzene Total Xylenes Lead	150 48 2.2 2.4 1.5 4.6
B4 (S-6)	320	10-12	1.6 1.4 0.059 0.041 0.18	TPHCs as Gasoline TPHCs as Fuel Oil Benzene Ethylbenzene Total Xylenes Lead	72 360 0.84 0.81 2.5
MW1 (S-6)	215	10-12	1.6 1.4 0.041 0.18	TPHCs as Gasoline TPHCs as Fuel Oil Ethylbenzene Total Xylenes Lead	40 38 0.32 2.8 9
MW2 (S-5)	21	8-10	1.4	TPHCs as Fuel Oil Lead	2.1
MW3 (S-7)	20	12-14	5	Lead	7
MW4 (SS2)	185	7-9	5.0 0.05 0.05 0.05 0.150 0.05 NL	Gasoline Range Orga Benzene Toluene Ethylbenzene Total Xylenes MTBE Lead	nics 109 * 1.62 0.69 2.59 3.68 8.58

Boring Sample		Depth (feet)	MDL	Parameter Cond Analyzed	centration (ppm)
MW5 (SS2)	25	9-11	NL	Lead	8.85
MW6 (SS2)	0	7-9	NL	Lead	11
B5 (SS3)	0	9-11	5.0 0.05 0.05 0.05 0.150 0.05 NL	Gasoline Range Organics Benzene Toluene Ethylbenzene Total Xylenes MTBE Lead	10.0 0.315 0.479 0.615 1.82 0.631 7.95
B6 (SS3)	200	9-11	5.0 0.05 0.05 0.05 0.150 0.05 NL	Gasoline Range Organics Benzene Toluene Ethylbenzene Total Xylenes MTBE Lead	55.3 0.265 0.546 1.01 3.45 0.20 8.41
B7 (SS2)	25	7-9	NL	Lead	18.6
B8 (SS2)	250	4-6	1.0 5.0 0.05 0.05 0.05 0.150 0.05	Gasoline Range Organics Diesel Range Organics Benzene Toluene Ethylbenzene Total Xylenes MTBE Lead	44.3 8.2 0.478 0.411 0.719 2.26 2.85

Boring Sample		Depth (feet)	MDL	Parameter Co Analyzed	oncentration (ppm)
B8 (SS6)	4.5	24-26	1.0 0.05 **	Gasoline Range Organio Toluene Lead	es 1.8 0.058 **
B9 (SS2)	4 200	9 4-6	1.0 0.05 0.05 0.05 0.150 0.05	Gasoline Range Organic Benzene Toluene Ethylbenzene Total Xylenes MTBE Lead	2S 70.6 0.406 0.439 1.29 2.34 7.0
B10 (SS3)		6-8	1.0 0.05 0.05 0.150 0.05	Gasoline Range Organic Toluene Ethylbenzene Total Xylenes MTBE Lead	0.312 0.076 0.563 1.03
B11 (SS3)	0	6-8	**	Lead	**
B13	Ō	6-8	**	Lead	**
B15 (SS4)	170	9-11	1.0 5.0 0.05 0.05 0.150 0.05	Gasoline Range Organic Diesel Range Organics Toluene Ethylbenzene Total Xylenes MTBE Lead	

Boring Sample		Depth (feet)	MDL	Parameter Conc Analyzed	entration (ppm)
B16 (SS2)	8.5	4-6	**	Lead	**
B17 (SS3)	0	6-8	**	Lead	**
B18 (SS3)	250	6-8	1.0 5.0 0.05 0.05 0.05 0.150	Gasoline Range Organics Diesel Range Organics Benzene Toluene Ethylbenzene Total Xylenes Lead	129 6.7 3.6 5.0 3.1 8.3
B19/MW8 (SS3)	s ()	20-22	0.05 0.05 0.05 0.150	Benzene Toluene Ethylbenzene Total Xylenes Lead	0.213 0.592 0.111 0.516
B19/MW (SS8)	8 0	37-39	0.05 0.05 0.150 **	Benzene Toluene Total Xylenes Lead	0.115 0.438 0.210 **
B20 (SS3)	0	6-8	**	Lead	**
B21 (SS3)	150	11	1.0 5.0 0.05 0.05 0.05 0.150 0.05	Gasoline Range Organics Diesel Range Organics Benzene Toluene Ethylbenzene Total Xylenes MTBE Lead	348 34.1 1.2 4.02 2.09 5.88 14.2

Boring & Sample &		Depth (feet)	MDL	Parameter Conc Analyzed	entration (ppm)
B21 (SS7)	2	26-28	**	Lead	**
B21 (SS8)	6	28-30	1.0	Gasoline Range Organics Lead	1.0

Notes:

MDL = method detection limit

TPHCs = total petroleum hydrocarbons
All results given in parts per million (ppm).
Results for analyzed parameters not detected above the MDLs

are not included in this table.

NL = not listed

* = Masked

** = Results not received as of August 18, 1993

TABLE 5 GROUNDWATER CHEMISTRY RESULTS DITTMER OIL COMPANY GME PROJECT NO. C-2373-B

Parameter Analyzed	12-6-92			6-17-93	8-3,4,5-93	
(Co	oncentrati	ons in par	ts per bi	llion)		
			<u></u>	<u></u>		
Garalina Danga Opponing	20000+	27000+	ND ND	мр	ND	
			1			
			1			
			\			
			1			
			14/			
			· MD			
Dissolved Lead	ND	ND	3	. 4	2.9	
Gasoline Range Organics	ND*	ND*	_A 35100	55400	41100	
			₩ 6600	4900	2100	
-		120	11300	7890	1390	
				6180	1040	
			1		386	
	_		1			
-		26	2620			
		אָס (עע	3	8		
DISSOIVEU DEUU	112	212		_		
Gasoline Range Organics	ND*	ND*	ND	ND	ND	
	ND**	ND**	ND	ND	ND	
- -	ND	ND	1.8	ND	ND	
	ND	ND	ND	ND	ND	
		ND	ND	ND	ND	
			ND	ND	ND	
				10.3	6.2	
Dissolved Lead	ND	ND	4	5		
	Gasoline Range Organics Diesel Range Organics Benzene Toluene Ethylbenzene Total Xylenes MTBE Dissolved Lead Gasoline Range Organics Diesel Range Organics Benzene Toluene Ethylbenzene Total Xylenes MTBE Dissolved Lead Gasoline Range Organics Diesel Range Organics Ethylbenzene Total Xylenes MTBE Dissolved Lead Gasoline Range Organics Diesel Range Organics Benzene Toluene Ethylbenzene Total Xylenes MTBE	Gasoline Range Organics 29000* Diesel Range Organics 20000** Benzene 7300 Toluene 3700 Ethylbenzene ND Total Xylenes 3000 MTBE ND Dissolved Lead ND Gasoline Range Organics ND* Benzene ND Toluene ND Ethylbenzene ND Total Xylenes ND Ethylbenzene ND Total Xylenes ND MTBE ND Gasoline Range Organics ND** Benzene ND Total Xylenes ND MTBE 25 Dissolved Lead ND Gasoline Range Organics ND* Benzene ND Total Xylenes ND Total Xylenes ND Toluene ND Total Xylenes ND MTBE ND MTBE ND	Gasoline Range Organics 29000* 27000* Diesel Range Organics 20000** 8500** Benzene 7300 6700 Toluene 3700 1700 Ethylbenzene ND 120 Total Xylenes 3000 2500 MTBE ND 68 Dissolved Lead ND ND Gasoline Range Organics ND* ND* Diesel Range Organics ND* ND* Benzene ND ND ND Toluene ND ND ND Total Xylenes ND ND ND Total Xylenes ND ND ND Gasoline Range Organics ND* ND* Total Xylenes ND ND ND Gasoline Range Organics ND ND ND Total Xylenes ND ND ND MTBE 25 26 Dissolved Lead ND ND Gasoline Range Organics ND* ND* Diesel Range Organics ND* ND MTBE 25 26 Dissolved Lead ND ND Gasoline Range Organics ND* ND* Diesel Range Organics ND* ND* Toluene ND ND ND Toluene ND ND ND Total Xylenes ND ND ND MTBE ND ND ND ND ND MTBE ND	Concentrations in parts per bi	Concentrations in parts per billion	Concentrations in parts per billion Concentrations in parts per billion

pampiing pace						
Well#	Parameter Analyzed (Co	12-6-92		6-17-93 Lllion)	8-3,4,5-93	
MW4	Gasoline Range Organics	11	900	700	16000	
2200-2	Diesel Range Organics	· 1	100	1800	1300	
	Benzene	9	9.6	37.8	78.3	
	Toluene		182	29.2	150.2	
	Ethylbenzene	3	7.1	8.2	31.8	
	Total Xylenes		309	154	425	
	MTBE		5.3	5.9	1281	
	Dissolved Lead		7	4	3.2	
MW5	Gasoline Range Organics		400	500	500	
	Diesel Range Organics		ND	ND	ND	
	Benzene		B.9	9.7	16.6	
	Toluene		2.9	4.8	3.7	
	Ethylbenzene		3.0	ND	1.6	
	Total Xylenes		9.4	ND	5.9	
	MTBE	3	3.5	5.3	88.7	
	Dissolved Lead		2	3	ND	
MW6	Gasoline Range Organics		ND	ND	ND	
	Diesel Range Organics		ND	ND	ND	
	Benzene		1.5	ND	ND	
	Toluene		ND	ND	ND	
	Ethylbenzene		ND	ND	ND	
	Total Xylenes		ND	ND	ND	
	MTBE		ND	1.2	ND	
	Dissolved Lead		2	4	0.0010	

Sampling Date							
Well #	Parameter Analyzed (C	12-6-92 oncentrati	12-21-92 ons in par		6-17-93 llion)	8-2,3,4-93	A. 10. 5.00.
MW7	Gasoline Range Organics					28900	
	Diesel Range Organics					2300	
	Benzene					74.9	
	Toluene					62.2	
	Ethylbenzene					556 608	
	Total Xylenes					4770	
	MTBE					2.4	
	Dissolved Lead					2.4	
MW8	Gasoline Range Organics					ND	
	Diesel Range Organics					ND	
	Benzene					2.9	
	Toluene					2.8	
	Ethylbenzene					ND	
	Total Xylenes					ЙD	
	MTBE					9.4	
	Dissolved Lead					7	
B12-WS	Gasoline Range Organics					ND	
(Temp.	Diesel Range Organics					ND	
Well)	Benzene					ND	
	Toluene					ND	
	Ethylbenzene					ND	
	Total Xylenes					ND	
	MTBE					ND	
	Dissolved Lead					ND	

Sampling Date					
Well #	Parameter Analyzed 12-6 (Concent	-92 12-21-92 6-3-93 6-17-93 8-2,3,4-93 rations in parts per billion)			
SE-WS	Gasoline Range Organics	1200			
(TCT	Diesel Range Organics	2700			
Well)	Benzene	ND			
•	Toluene	5.5			
	Ethylbenzene	ND			
	Total Xylenes	5.4			
	MTBE	ND			
	Dissolved Lead	2.3			
Eleva-	Gasoline Range Organics	ND			
tor-WS	Diesel Range Organics	ND			
(Co-op	Benzene	ND.			
Well)	Toluene	ND			
,	Ethylbenzene	ND			
	Total Xylenes	ND			
	MTBE	ND			
	Dissolved Lead	7.2			

TABLE 5 (CONTINUED) GROUNDWATER CHEMISTRY RESULTS DITTMER OIL COMPANY GME PROJECT NO. C-2373-B

Sampling Date

Well # Parameter Analyzed 5-20-93 (Concentrations in parts per billion)

B7-WS	Gasoline Range Organics	960
(Temp.	Diesel Range Organics	ND
Well)	Benzene	***
	Toluene	19.0
	Ethylbenzene	5.83
	Total Xylenes	18.6
	MTBE	155
	Dissolved Lead	2

Definitions:

MTBE = methyl tertiary butyl ether

ND = no detections

= Total Petroleum Hydrocarbons as Gasoline
 = Total Petroleum Hydrocarbons as Fuel Oil

*** = masked

	<u>.</u>				LOG OF E	ORING	MWL							
)JECT	ial	Tma	estigation		SITE Dittme	ar O		omnar	mz E's	irfor	- MINT		
CLI	ENT					ARCHITEC				ц, га	TITAX	r' Tall		
Ι	Dittm	er	Oil	Company								**		
			EET				HNU	a	UNCO	NFINED CO		IVE STRE	NGTH TO	ONS/FT. ²
	Œ		STRATA CHANGE, FEET	DECOR	OTION OF MATERIA		(ppm			1 2		3	4	5
ы	JMBE	Ä	Ž	DESCRI	PTION OF MATERIA	NL	ST	ILOV		•		TER ENT %	•	
1, FEI	E NE	3 LE	Ď V				AL TE	JE (E			-(D -		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	RAT	SURFACE ELEVATION	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		SPECIAL TEST RESULTS	VALI	STA	NDARD F		NTION (B	SLOWS/F	OOT)
a	Ø ₹	*	ဖ	SORPAGE ELEVATION	97.	L4'	SH	Ż	1	0 2			40	50
	155			Light gray to lig			26	7						
				(CL) - trace to 1 mottled fractures		many								
	2SS			vertical) - soft	- moist		42	7						ļ.
5				·										
	3SS						50	6						
	455						320	7						
	200						<u> </u>							
	555						410	10						
10														
	6SS		12				215	12						
	1													
	1			7-3-53-4	30.5									
15	1			End of boring at 8.25 inch O.D. ho	12 feet. 11ow stem au	ger								
	}			used full depth.		,								
				HNU measurements million (ppm).	in parts per									
	1			Soil Sample DOMWI	-S6 (10 - 12	feet)								
	1			submitted for lak Installed monitor										
	1					•								
	}		ļ											
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	WA	ER	LEVEL	OBSERVATIONS .			<u>.l</u>		BORI	NG STA	RTED	10-1		
W.L.	V		MUTT	e drilling	Geotechnic	ONSULTA Materials • Er	-		1	NG COM			<u>-17-9</u>	
W.L.					14000 21s Minnespois Office (612	t Avenue No. , MN 55447] 559-1859			RIG DRAV	CME VN .TP			ILLER PROVE	
									PROJ	ECT #C	-2373			
					The stratification between soil type									

,					LOG OF I	BORING	MW	2						
	JECT emeio	la]	Inve	estigation		SITE	~~ ^			n., T.	i ve for	, RAINT		
CLIE						Dittm ARCHITE		_		ily, E.c	ıırıa	Z MIN		
D:	ittme	r		Company										
			FEET				HNU ppm)	£	UNCO	NFINED CO	OMPRESS — C		NGTH TO	NS/FT. ²
	ЗЕЯ		IGE,	DESCRI	PTION OF MATERIA			WS/F		1 2				5
EET	OM.	EVEL	CHANGE,				rest	(BLO			CONT			
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	TA (IAL 1	LUE	STA	NDARD F	 ENETRA	D- TION (B	LOWS/F	00Т)
DEP	SAMI	WAT	STRATA	SURFACE ELEVATION	DN 97	.14'	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)		0 2	- 6	3-		50
	1ss			Light gray to lig	ht hown sil	by olay	5	7			Ĭ	Ì		
	T20			(CL) - trace to li	ttle sand - 1	nany	3	′						
	2SS			mottled fractures vertical) - soft			15	8					:	
	೭ವವ			vertical) - sort	- morse		1.0	-						
5	355		6				24	9						
	455	_	,	Brown to dark bro			32	7			ĺ			
	Fee	_		little fine to co gravel - some red	dish brown m	ottled	43	Ĺ						
10	588			fractures (vertice) -soft to medium f			41	9						:
	6SS			to wet			21	8]			
	7SS						75	, ,						
		-	14			· · · · · · · · · · · · · · · · · · · 	/3	<u>++</u>						
15				End of boring at	14 feet									
			•	8.25 inch O.D. ho		ger							:	
				used full depth. HNU measurements	in parts per									
				million (ppm).										
			<u>.</u> 1	Soil Sample DOMW submitted for lake										
				Installed monitor										
F														
						٠								
										'				
	1													
	1		LEVE	ODOEDWATIONS		· · · · · · · · · · · · · · · · · · ·	<u> </u>	<u>L</u>				10. 1	7 77 27	
W.L.				OBSERVATIONS . drilling		CONSULTA	-			NG STAI		10-1	/ <u>-9⊥</u> 17–91	
W.L.					14000 21s Minnespois	al e Materials e El It Avenue No. I, MN 55447	nvironment	iei	RIG	CME	55	DRI	LLER	
W.L.	<u> </u>				Office (612	559-1859			PRO	WN JI JECT #€	PB -2373-		ROVED	
					The stratification between soil type				imate b	oundari	es			

11	-				LOG OF E	BORING	1	MW3	7.					
	JECT	al	Inve	stigation		SITE Dittme	r Oi	1 C	moan	v. Fa:	irfax	. MPJ		
CLIE D:	NT Lttme	r	Oil C	Company		ARCHITE				•				
			FEET			<u> </u>	HNU (ppm)/FT.)	UNCO	NFINED C	-(SIVE STRE		NS/FT. ²
FEET	SAMPLE NUMBER AND TYPE	LEVEL	CHANGE,	DESCRI	PTION OF MATERIA	AL	L TEST 'S	N-VALUE (BLOWS/FT.)		<u> </u>	WA	TER ENT %	<u> </u>	
DEPTH, FEET	SAMPLE AND TY	WATER	STRATA	SURFACE ELEVATION	DN	24'	SPECIAL TEST RESULTS	N-VALU		NDARD F	-0	8-		DOT) 50
	lss			Light gray to lic (CL) - trace to 1			6	5			,			
	2SS			mottled fractures vertical) - soft	s (primarily	жий	8	10						
5	3SS						3	8						
	4SS						20	8		:				
10	5SS	V	10				42	12						
	655			Brown to dark bro	oarse sand -	trace	24	15						
	little fine to grayel - some r fractures (vert				cal and horiz		20	19						
1.5	8SS	L	16	-medium firm - w			8	23			·			
				End of boring at	16 fæt.									
	4			8.25 inch 0.D. h used full depth.	ollow stem au	•								
				HNU measurements million (ppm) Soil Sample DOMW										
				submitted for la Installed monito	boratory anal	ysis.								
									*					
				0000004										
W.L.	WATER LEVEL OBSERVATIONS ▼ 10' while drilling				GMF (ONSULTA	NTR	INC		NG STAI		10-1		.7
W.L.	▼ 10' while drilling				Geotechnic	el e Materials e Er	•		RIG	NG COME			<u>-17-9</u>	
W.L.					Minnespoie Office (612	E Avenue No. , MN 55447) 559-1859			DRAV	NN JP	B.	APF	LLER K	MDM
					The stratification				imate b		es	-Alshe	ET1 C	f 1
					between soil type							_		

				LOG O	F BORING	R1					
PRC	DJECT				SITE						
				tigation				ompany, Fa	irfax,	MN	
Dit	tmer	Oi	1 Com	npany	ARCHITE	CT-EN	GINE	ER			
		П	FEET			HNU		UNCONFINED (+ TONS/FT. ²
	, r		E. FE		ı	(ppm)	N-VALUE (BLOWS/FT.)	1	2 3	- 4 .	5
	ABE!	ᆲ	CHANGE,	DESCRIPTION OF MATE	RIAL	<u> </u>) Mo		WATE		-
H	١١	Ē	용			TES	<u>B</u>		CONTEN	NT %	
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA			무용탕	, LC	STANDARD	PENETRATI	- ION (BLOW	(S/FOOT)
DEP	SAM	WAT	STR,	SURFACE ELEVATION 99.0	14 '	SPECIAL TEST RESULTS	Ž	10	- ⊗ . 20 30		50
		H				1	8		1 1	- 1	30
	1SS		, 1	Light gray to light brown s		4	ľ				
	2SS			(CL) - trace to little sand mottled fractures (primaril							
	200			vertical) - soft - moist	- <u>y</u>	14	8				
5	3SS										
				·		46	8				
	4SS					200	8				
		V				200	Щ				
	5 S S		. !		•	415	11				
10	 		_10_	<u> </u>		↓					
	6SS		1	Brown to dark brown silty collittle fine to coarse sand		1					
	-	1		gravel - some reddish brown		220	Τg				
	7SS		'	fractures (vertical and hor:		110	20		1 1		
	 	┦	14			+	╂╌┥	•			
15	1		1								
F	-		!	End of boring at 14 feet. 8.25 inch O.D. hollow stem							
	1		1	used full depth.	auger						
	}			HNU measurements in parts	per						
	₫	'		million (ppm). Soil Sample DOB1-S5 (8 :- :	10 feet)						
	1			and DOB1-S6 (10 - 12 feet)		d		1			
	‡			for laboratory analysis.							
—	-			Boring backfilled with cem	ent grout	+					
	-										
	}	'				1					
	1										
	_										
	‡										
	4										
	-										
	}										
	<u> </u>	L	<u> </u>	<u> </u>			<u> </u>		<u> </u>		
W.L.				OBSERVATIONS GM	E CONSULTA	AMTS.	INC.	BORING STA			01
W.L.	 	<u>'</u> —	M17	Geotec	chrical • Materials • E 3 21st Avenue No.				MPLETED : 55	10-17-	-91 R KJB
W.L.	<u> </u>			Mirmer	apolia, MN 55447 (612) 559-1859				PB		VEDMDM
<u></u>								PROJECT		SHEET	l of l
\vdash				• • • • • • • • • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·			kimate boundar may be gradua			

					LOG OF	BORING		B2						
	JECT emedi	al	Inve	estigation		SITE Dittme:	r Oi	1 Cc	mpany	y, Fai	rfax	, MN		
				company	,	ARCHITEC	CT-EN	GINE	ER					
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	A CHANGE, FEET	DESCRI	PTION OF MATERIA	AL	SPECIAL TEST 연변 RESULTS 결건	N-VALUE (BLOWS/FT.)		NFINED CO	WA' CONT	TER ENT %	4	5
DEPTH	SAMPL AND T	WATEF	STRATA	SURFACE ELEVATION	DN98	3.1 <u>6</u> '	SPECI/ RESUL	N-VALI		NDARD F	-6	8 -		00T) 50
	lss			Light gray to lig (CL) - trace to l			22	9				-		
	2SS			mottled fractures vertical) - soft	(primarily	menty	34	6				**		
- 5	3SS					•	20	7						
	4SS	V	_				120							
	5SS		8-	Brown to dark bro little fine to co	arse sand - 1	trace	380	11						
10	6SS		12	gravel - some red fractures (vertice medium firm - ver	al and horizo	ontal)-	10	23						
	WA	ER			in parts per -S5 (8-10 fee eet) submitte	t) and d for			BORI	NG STAI	ATED	10-1		
W.L. W.L.	WATER LEVEL OBSERVATIONS ▼ 10' while drilling 7' after boring				Geotechnic 14000 21s Minnespoli	COMSULTA al • Materials • Er at Avenue No. a. MN 55447 2) 559-1859	•		BORI	NG COM	PLETE	DRI	-17-9: LLER I	KJB
					The stratification	lines repres			PRO.	ECT €- oundari	·2373- es			

				LOG C	F BORING	В3			···-				
	JECT			The state of the s	SITE								
		<u>al</u>	. Inve	estigation					ny, Fa	<u> irfa</u>	x, MN		-
CLIE D:	NT ittm∈	er	Oil (Company	ARCHITE	CT-EN	GINE	ĒR					
		П	la la		<u> </u>	ETATT		UNCO	NFINED CO	OMPRESS	IVE STRE	NGTH TO	NS/FT. ²
			, FEET			(ppm) (MHUU	N-VALUE (BLOWS/FT.)			-0) -	_	_
	BER		NGE.	DESCRIPTION OF MATE	ERIAL)WS		+	<u> </u>	TER		
E	Ž	LEVEL	CHANGE,			FEST	(BLC				ENT %		
H H	Ze.	H	¥.			AL I	J.	STA	NDARD F	•	D-	U OME/E	201
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER	STRATA	SURFACE ELEVATION 9	7.65'	SPECIAL TEST RESULTS	-VA	31.	NUANU.		8)-	LUWSA]
	ა ∢	5	Š	,		SO EE	Z	1	0 2			10 5	50
	155			Light gray to light brown s	ilty clay	40	12						
	لـــــا			(CL) - trace to little sand	- many	 							
	255			mottled fractures (primarily vertical) - soft - moist -		65	8						
			. 1	sand seam	ISOIaceu	100	\dashv			1		i	
5	355					38	6					<u> </u>	i
			1	1			H						
	4SS		'			34	6						
口		Ť	ا ن							1			
10	5SS			Brown to dark brown silty c	Iay (CL) -	260	9			1			
				little fine to coarse sand gravel - some reddish brown		200							
	6SS		,	fractures (vertical and hor		220	14						
	700	'		soft to medium firm - very									
	7SS		1	wet - isolated sand seam		19	8						
15	855	'				111	11						
	055		16_										
	988		ļ	Dark gray silty clay (CL) - little fine to coarse sand		3	21						
		╀	 	gravel - no fractures - sti								1	
	ł		ļ			1						'	
20	1			End of boring at 18 feet.								'	
	1			8.25 inch O.D. hollow stem	auger use	đ							
	1			full depth.									
	1			HNU measurements in parts p million (ppm).	er								
	1			Soil Samples DOB3-S5 (8-10									
	1			DOB3-S7 (12-14 feet) submit	ted for								
	}			laboratory analysis. Boring backfilled with ceme	ent grout.						ĺ		
]				y								
	‡												
	1												
	1								1				
	‡							•					
	1 WA	TEF	I EVEL	OBSERVATIONS .		Щ_	<u> </u>	BORI	NG STA	PTED	10-17	<u> </u> 7_01	<u> </u>
W.L.	_				IE COMSULT/	INTS,	INC.		ING STAI			<u>/-91</u> 0-17-	91
W.L.				Geotz 1400	echnical e Materials e (IC 21st Avenue No.	Swronnen	tel	RIG	CME	55	DRI	LLER 3	KJB
W.L.	<u>. </u>			Office	espois, MN 55447 (612) 559-1859			DRA				PROVED	
-				The stratifies	tion lines room		22501		JECT #-		-A ISHE	ET 1	of 1
 		_			tion lines repre types; insitu th								

					LOG OF B	ORING	В4	<u> </u>						
	JECT	, ,	r	-iantion		SITE		011						
CLIE		4 4	Liivesi	tigation		ARCHITE			. Comp	any		- ,		
		0:	il Ca	mpany										
			FEET				HNU	_	UNCO	NFINED C		SIVE STRE	NGTH TO	NS/FT. ²
	er.		3E, F	75000			ppm	N-VALUE (BLOWS/FT.)		1 2		3	4	5
<u> </u>	JMBE	VEL	+ANC	DESCRIP	TION OF MATERIA	· L .	ST	LOW				TER ENT %		
DEPTH, FEE1	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE,				SPECIAL TEST RESULTS	JE (B			-(D -		
ЕРТЬ	MAP.	ATEF	RAT	SUBSACS SUSVATION	1		SUL SUL	VALI	STA	NDARD F		ATION (E 8 -	BLOWS/F	OOT)
۵	Ş.₹	<u>`</u>	ST	SURFACE ELEVATION	98.	L8'	SE	Ż	1	0 2			40	50
	1SS			Light gray to ligh			3	7						
				(CL) - trace to li mottled fractures	ttle sand -	many							,	
	2SS			vertical) - soft -			0	7						
	3SS						5	5						
	200													
	4SS						8	10						
		•	- 8	Brown to dark brow	m silty cla	v (CT.) –		\vdash						
10	5SS		1	little fine to coa	arse sand -	trace	460	7						
10	6SS			gravel - some redo fractures (vertica			320	8						
	033			soft to medium -			320	L						
	7SS						42	9						
15		1										i		
Ë	8SS		16				12	13			1			
	1			End of boring at 1	l6 feet.				1					
		ľ		8.25 inch O.D. ho		ger								
二	1			used full depth. HNU measurements:	in narts ner				1					
	}			million (ppm).										
<u> </u>	1		i	Soil Samples DOB4 DOB4-S6 (10-12 fe					•			Ċ		
-	1	١.		laboratory analys	•	d IOL								
	1			Boring backfilled	with cement	grout.								
	1		:											
	1		ŀ											
]													
	1		:											
	1													
]													
				OBSERVATIONS .			1	L	BORI	I NG STAI	RTED	10-1	7-91	<u> </u>
W.L.	▼ 9	<u> </u>	while	drilling		ONSULTA I • Materials • Er	-			NG COM			-17-91	
W.L.	-			l	14000 21st	Avenue No. MN 55447			RIG	CME NN JP			ILLER F	
									PRO	JECT #C	-2373			
-		,			The stratification between soil type									

					LOG OF I	BORING	MW	4						
	JECT upple	me	ntal	Remedial Investig	gation	SITE Dittm	er O	il (Compa	ny, Fa	airfa	x, MN		
<u> </u>				Company		ARCHITE							······································	
						1			UNCO	NFINED C	OMPRESS	IVE STRE	NGTH TO	NS/FT. ²
-	Œ		iE, FEET			(HNU ppm)	N-VALUE (BLOWS/FT.)	•	1 4)- 3 4		,
ET	UMBE	VEL	CHANGE,	DESCRI	PTION OF MATERIA	AL		3LOW		1		TER ENT %		
DЕРТН, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL					IAL TI	LUE (F	STA	NDARD F	-() -	OWS/F	OT)
DEPT	SAME	WATE	STRATA	SURFACE ELEVATION	96.3	2'	SPECIAL TEST RESULTS	N-VA		0 2	-6	3 -		60
				Light gray to lig	tht brown sil	ty clay								
				(CL) - trace to] mottled fractures	little sand -	many	,							
				- soft - very moi		V C. 2 G. 2 G. 2								
-5	1SS			•			0	5						
			•											
	255						185	7						
10														
	3SS						175	7						
			13							:				
	455			Brown to dark by			0	12						
15			15	gravel - some re fractures (vert			 							
			·	-medium firm - v										
	1													
	1			End of boring at 8 inch O.D. holle		used								
				full depth. HNU measurements	_		ŀ							
				million (ppm). Soil Sample MW4-	_									
				submitted for la	boratory anal	ysis.	1							
				Installed monito	ттку метт шм4	:•								
]													-
				OBSERVATIONS .			1	<u> </u>		NG STAI	RTED		-93	
W.L.	▼ 8' while sampling				Geotechnic	COMSULTA al • Materials • E				NG COM				TC
W.L.	 				14000 21s Minnespois	st Avenue No. s, MN 55447 !) 559-1859			RIG DRA				ROVED	
	-				•	- 			PRO	JECT €-	-2373-	B SHE	ET 1	of 1
					The stratification between soil type									

					LOG OF E	ORING	MW5	5						
	DIECT Plem	ent	al Re	emedial Investigat	tion	SITE Di tt r	er (oil	Compa	ny, F	airfa	x, MN		
CLU	nt tmer	Oi	il Cor	mpany	· · · · · · · · · · · · · · · · · · ·	ARCHITE	CT-EN	GINE	ER					
БЕРТН, FEET	SAMPLE NUMBER AND TYPE	R LEVEL	A CHANGE, FEET	DESCRI	IPTION OF MATERIA	NL	SPECIAL TEST 전 된 RESULTS	~		NFINED C	WA CONT	TER ENT %		5
DEPT	SAMPI AND T	WATER	STRATA	SURFACE ELEVATION	ON + 97.96'		SPECI/ RESUL	N-VAL		NDARD F	-6	3 -		50 50
				Light gray to lic (CL) - trace to mottled fracture - soft - very mo	little sand - s (primarily '	many	.)							
5	1SS						3	6						
		•												
10	2SS		- 9	Brown to dark bro little fine to o gravel - some re	oarse sand — ddish brown m	trace ottled	25	6						·
	3SS		7.5	fractures (verti- soft to medium f		ontal). ·	0	9				:		
	WA	TER	LEVEL	End of boring at 8 inch O.D. holl full depth. HNU measurements million (ppm). Soil Sample MW5-submitted for la Installed monito	ow stem auger in parts per SS2 (9 - 11 f boratory anal	eet)			BORI	NG STA	RTED.	5-19-	93	
W.L. W.L.				le sampling	Geotachnica 14000 21st	CONSULTA Notarials • Er Avenue No. MN 55447 959-1859	-		BORI RIG DRAV	NG CON CME WN J	PLETER 750 PB	DRII	0-93 LLER K	MDM
					The stratification between soil type				imate b		es	-BISHE	ET 1	of 1

	,				10005	COLNC	B5							
PRO	JECT				LOG OF B	SITE		<u> </u>						\dashv
l .		nen	tal F	Remedial Investigat	tion		mer	Oil	Comp	any, 1	Fairfa	x. M	ı	
CLIE	NT		··· <u>·</u>			ARCHITE							`	
Di	ttme	0	il Co	mpany										
			FEET				HNU		UNCO	NFINED C			IGTH TOP	NS/FT.2
			FE				bbw)	/FT.		1 9	- C 2 3		£	.
	SAMPLE NUMBER AND TYPE	ایرا	CHANGE,	DESCRIF	TION OF MATERIA			N-VALUE (BLOWS/FT.)			WAT			<u>'</u>
EET	Ž,	LEVEL	Ę.				TES	(BL			CONTI	ENT %		
Ŧ	TYP.	8	ĕ		····		IAL ILTS	LUE	STA	NDARD F	- ● Penetra	D- TION (BI	OWS/FC	ודסנ
DEPTH, FEET	ND	WATER	STRATA	SURFACE ELEVATIO	N _1 97.68'	,	SPECIAL TEST RESULTS	-\ -\			-6		.0 110/1	,, l
	Ø ₹	۶	S		7 37.00		SH	z	1	0 2	0 3) 5	i0
				Light gray to lig								1		
	ļ			clay (CL) - trace										
				many mottled fractivertical) - soft										ļ
				wet	very more	- ω					1			
5	1SS						0	4			1	1		
								H						
						!	 							
	2SS	Y	_				0	6						
			9	Brown to dark bri little fine to o	own silty cla	Y (CL) -		\vdash						l
10	355			little fine to co gravel - some rea	oarse sañd — Adish brown r	trace	0	7						
		H	_11	fractures (verti			<u> </u>					- 1	1	1
	ĺ			-soft - wet										
<u> </u>	1			End of boring at	11 feet.									
15	ĺ			8 inch O.D. holl		r used								
	1			full depth.	• - >===•								1.	
	1			HNU measurements million (ppm).	ın parts per	r								
	1			Soil Sample B5-S	S3 (9-11 fee	t)							1	
				submitted for la										
	1			Backfilled borin	g with cement	t grout.	•							
												l		
	1]	:						
	1													
	1													
	1						1					ŀ		
	}													
	}						<u> </u>	ĺ						
	1													
	1			! .								l		
	1													
	WA.	TER	LEVEL	OBSERVATIONS			1	<u> </u>	BORI	NG STAI	TED	5-19-	93	
W.L.	▲ 8	.5	whi	le sampling		ONSULTA	-			NG COM		5-2	0-93	
W.L.	 		-		14000 21st Minneapois.	MN 55447	wronmene	.81	RIG	CME			LER K	
W.L.	<u> </u>				Office (612)				DRAV PRO	VN JECT#(APPI	ROVED	MUM T
					The stratification	lines repres	sent ac	prox				LONE	<u>=1 </u>	
					between soil type									

	,				LOG OF E	ORING	B6							
PRO	JECT				100 U	SITE					 -			
Sur	plen	en	tal F	Remedial Investigation	on	Dittme	r Oi	1 C	mpan	y, Fa	irfax	, MN		
CLIE	int Ltmei	c C	il Cc	mpany		ARCHITEC	CT-EN	GINE	ER					
		Г			<u> </u>	1			LINCO	MEIMED C	OMPRESS	WE STREM	TO HTO	NO/ET 2
			CHANGE, FEET		-		HNU	ΥË	01100	MULTINES C) -	IGIH IC.	NS/F1.
	E I		GE.	DESCRIPTI	ION OF MATERIA	AL.	(ppm	WS/I		1 2	2 3	3 4		<u>;</u>
<u> </u>	CME	KEL	HA.	:		_	EST	BLO			CONT			
F. F.	YPEN	1	N N		=		AL T) E			-() -		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA	CUREACE ELEVATION	06	741	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)	STA	NDARD F	PENETRA 6 -	ATION (BL 🔊 –	.OWS/F0	эот)
۵	ॐर	≥	S	SURFACE ELEVATION_	7 90.	.74'	20 55	Ż	1	0 2			0 5	50
	† 		'	Light gray to ligh								1		
	i		'	(CL) - trace to li		- many								
	1			mottled fractures vertical) - soft -		- to							1	
	لـــــا		'	wet	vong men.	- ~		\vdash						
5	lss						0	3						1
		'				†								
				1		,								1
	255						0	5				1		
10	355	Ť						-						.
-10							200	4				Ī]
			13_				l						1	
	455			Brown to dark brow			1	12						
15	100	<u> </u>	15	little fine to coa				14					. 1	
	1			fractures (vertical								. 1		
	1			-medium firm - wet	• •									
							1							
	1			End of boring at 1	15 feet.								.	,
	1			8 inch O.D. hollow		r used							.	
	1			full depth. HNU measurements i	in narts ne	~							.	
	1			million (ppm).	nı barca be	L							.	
F	-			Soil Sample B6-SS3									, 1	
	}			submitted for labo		_			1					
	1			Boring backfilled	with cemen	t grout.	4							
	₫			+		•								
	1													
	1													i !
	1						1							
	1													İ
—	1													
	L WA	L TEF	 EVEL	OBSERVATIONS			<u></u>		BOB	NG STAI		5 20-	-03	
W.L.	▼ 9	1 1	while	sampling	GME (CONSULTA	NTS,	INC.			APLETEC			
W.L.	<u> </u>				14000 21s	el e Materials e Er t Avenue No. 1, MN 55447	nvironment	tel	RIG	CME 7	750		LLER F	
W.L.	<u> </u>	—			Office (612	i, MN 55447 i) 559-1859			DRA	7714	JPB			
-					The stratification	lines renre	cent ar	22501			- <u>2373</u> -	SHE	ET 1 C	<u>년 1</u>
 					ne stratification between soil type									

,		-			LOG OF B	ORING	MW6							
	JECT	mo:	ntal	Remedial Investig		SITE Dittm		:1 (37.7				
				ompany	acton	ARCHITE				ТУ				
D	Lttme	r	OIT C	ompany										
			FEET	;			HNU	Ę.	UNCO	NFINED C	OMPRESS — (NGTH TO	NS/FT. ²
	3ER		IGE, I	DESCR	IPTION OF MATERIA	.L	(ppm	WS/F		1 :		3 4		5
EET	NOME	EVEL	CHANGE,	·			rest	(BLO			CONT	TER ENT %		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA			· · · · · · · ·	JAL JLTS	N-VALUE (BLOWS/FT.)	STA	NDARD F	− ENETRA	D ATION (BI	LOWS/F	оот)
DEP	SAM	WAT	STR/	SURFACE ELEVATION	on 97.1	2'	SPECIAL TEST RESULTS	N-V	1	0 2		3)- 0 4	0	50
							-					Ī		
	•			Light gray to li (CL) - trace to							i			
				mottled fracture	es (primarily		1)				ļ			
ч	1SS			- soft - very mo	ist to wet		0	5						
5	135	ļi					0	3	!					
	2SS						0	7						
10	355			,		:		,						
	333						0	8						
	1													
			_3.4	;										
15-	400		14	Brown to dark by little fine to	rown silty cla coarse sand -	y (CL)- trace	â							
	4SS		16	gravel - some re fractures (vert			0	7						
				-soft - wet		,								
				Total of bassians at	16 5									
				End of boring at 8 inch O.D. holl		used								
				full depth. HNU measurements	s in parts per									
				million (ppm).										
				Soil Sample MW6- submitted for la										
				Installed monito			ļ							
				:										
	•]				
	10/07		1 EVE	OBSERVATIONS						10.0=:		E 72	02	
W.L.	WYA.	31	while	sampling		ONSULTA	-			NG STAI		5-20- 5-2	93 0-93	
W.L. W.L.					14000 21st Minnespois	MN 55447	wironment	al	RIG	CME	750	DRII	LER I	
VV.L.					Office (612)	559-1859				VN JP			ROVED	
				···	The stratification between soil type				imate b	oundari	es .			

200	ICOT			LOG O	BORING	В7							
_	ipple	me	ntal	Remedial Investigation	SITE Ditt	mer C	il (Compai	ny, F	airfa	x, M	N	
CLIE			oil c	Company	ARCHITE				:	•			
	. cuik			Curpany		1		LINCOL	NEINED C	OMBBES	CIVE OTE	RENGTH TO	NE (ET 2
			FEE			HNU (ppm)	FT.)	011001			0-	·	JN3/F1.
	IBER	ابرا	NGE	DESCRIPTION OF MATE	RIAL		SWC		 	2 W.A	ATER	4	5
FEET	NUN F	LEVEL	S. C.			TES	(BL)			CON	TENT %	6	
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER	STRATA CHANGE, FEET		 _	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)	STA	NDARD			(BLOWS/F	OOT)
8	SA	۸×	STF	SURFACE ELEVATION 95.	17'	SPE	^ <u>-</u> Z	1	0 2		⊗ - 30	40	50
				Light gray to light brown si									
				(CL) - trace to little sand mottled fractures (primarily		<u> </u>							
_				- soft - very moist to wet		<u> </u>							
-5	155					2.0	5						
		V											
=	2SS					25.0	4						
	3SS					4.0							
10	JUU		11			4.0	١						
	100			Brown to dark brown silty cilittle fine to coarse sand		1							
	4SS 5SS	1		gravel - some reddish brown	mottled	2.5	- 6						
15	200		. 15	fractures (vertical and horself to medium firm - wet	.zontal) –	1.0	13				İ		
			13					:					
				End of boring at 15 feet. 8 inch O.D. hollow stem aug	x:ucod					ł			
				full depth.								İ	
				HNU measurements in parts pomillion (ppm).	er			÷					
				Soil Sample B7-SS2 (7 - 9 fe									
				submitted for laboratory and Water Sample B7-WS submitted	-								
				laboratory analysis.									
				Installed temporary monitor Boring backfilled with ceme				·					
			<u>.</u>										
							L						
W.L.	WAT	ER	while	OBSERVATIONS GM	E CONSULT	ants,	INC.		NG STA			0 -93 -20-93	
W.L.				Geotes 14000 Minne	hnical e Materials e l 21st Avenue No. polis, MN 55447	-		RIG	CME	750	DI	RILLER K	IJS
W.L.	<u> </u>			Office	612) 559-1859			DRAV	<u> </u>	JPB		PPROVED	
				1				PROJ	ECT #	-2377	}–PR ler	HEET 1	of 1

,			·	· · · · · · · · · · · · · · · · · · ·	LOG OF B	ORING	1	B8						
	JECT					SITE							· · · · ·	
		me	ntal	Remedial Investigat	tion	Dittm				ny, Fa	urfa	K, MN		
CLIE D:	NT L ttn e	r	oil c	ompany		ARCHITEC	CT-EN	GINE	ER					
	-		. 7						UNCO	NFINED CO	OMPRESS	IVE STREE	NGTH TO	NS/FT. ²
			CHANGE, FEET				HNU	FT.)		_	-) -		_
	BER		ĞE	DESCRIPT	TION OF MATERIA	\L	(bbu) <u>(</u>		1 2		TER		5
EET	D.	LEVEL	Ϋ́	•			EST	(BLC			CONT			
Ħ.	'LE N		TA (IAL 1	E.	STA	NDARD P		D-	OWE/E	001
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER	STRATA	SURFACE ELEVATION	l		SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)	317	NUANU F		8)-	LOWS/F	001)
	O 4	5	S		→ 96.77'		SE		1	0 20 T) 3	0 4	0	50
				Light gray to ligh							ŀ	1		
	LAS			(CL) - trace to li mottled fractures		any	0.5				1			
				vertical) - soft -	very moist	-						1		1
		_		petroleum odor at	4-6 feet						-			İ
-5	2SS						250	6	1		l			
			_ a		151	(OT)								
10	3SS			Brown to dark brow little fine to coa							ł			
	355			gravel - some redd	ish brown mo	ottled	4.0	10			l			
				fractures (vertica	l and horizo	ontal)-								
				medium firm - wet										
			14								- 1			
15	4SS	١		Dark gray silty cl			0.5	8						
				little fine to coa gravel - no fractu			0.5	°						
				- very moist - sev	reral 1/16" o	gray								
			,	fine to medium gra at 19-21 feet	ined sand se	eams						·		
				at 19-21 1 00 t										
-20	5SS						1.2	19	:					
				·										
						÷				ł				
			24				<u> </u>							
25	ecc			Gray fine to media			4.5	24						
	6SS	-		silt and trace cla	ay - medium o	dense -								
]			#GC										
	}													
	 		- 2 9	Gray silty very fi	ne sand (SM)-trace	-							
30	7SS			clay - medium dens			0.5	28						
		十	31				+	F						
		L	<u></u>											
	WA"	ER	LEVEL	OBSERVATIONS sampling		00101::				NG STAF		3-2-93		
W.L. W.L.	▼ 4		witte	southtnid	Geotechnica	ONSULTA • Materiels • Er	-			NG COM				V TD
W.L.	<u> </u>		· · · · · · · · · · · · · · · · · · ·		14000 21st Minnespotis Office (612)	Avenue No. MN 55447 559-1859			RIG DRAV	<u>CME</u> VN JE		$\overline{}$	ROVED	
										ECT #2-				
<u> </u>					The stratification									
L					between soil type	s, insitu the	trans	ition	may be	gradual.				

	-				LOG OF E	ORING	B8							
i	DJECT				· · · · · · · · · · · · · · · · · · ·	SITE			<u>.</u>					
		≥me	<u>mtal</u>	Remedial Investig	<u>jation</u>	Dittme	-			y, Fa	<u>irfax,</u>	, MN		_
CLI	ENT D itt me	er	Oil (Company		ARCHITE	SI-EN	SINC	EH	-				
		П	ĮĮ,			<u> </u>	HNU		UNCO	FINED CO		VE STRENG	TH TONS	3/FT. ²
	_		E, FEET				bbw)	×ΕΤ.	1	1 2	-C 2 3		5	1
_	MBEF	ᇜ	CHANGE,	DESCRI	IPTION OF MATERIA	AL		OWS		 	WAT	TER .	Ť	\dashv
FEE		E	퓽				STES	E (81			CONTE	ENT %		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA				SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)	STA	NDARD F		TION (BLO	ws/Foc	OT)
DE	SA	¥	STR	SURFACE ELEVATION	on→ 96.	77 '	SPE	> 2	1	0 2	- ⊗ 0 30		50	,]
		П			<u></u>					-				
	'			End of boring at										
	1			8 inch O.D. holl used full depth.		r								
			'	HNU measurements		r					, 			
	(1	million (ppm).										
	1			Soil Samples B8- B8-SS6 (24-26 fe										
				laboratory analy	ysis.									
	1			Boring backfille			4							Ī
	1			Shelby tube ST-1 ST-2 (11 - 13 fe	l (6-8 feet) : eet) collecte	and d for								1
	1			falling head per										
	1			_	_									-
	}													1
	}													
	1	!												1
	1													
	‡											ŀ		
<u> </u>	4													
	1													
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	1	1												
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	1													
]	'												1
]	'	1										1	
	_													
	‡						}							
	‡													
	1													
	1 WA	TER	LEVEL	OBSERVATIONS	T	, -		<u></u>	BORI	NG STAI	RTED	8-2-9	- <u>-</u>	·
W.L.		4'	whil	le sampling		CONSULTA	_			NG COM	IPLETED			
W.L.	 				14000 21s Minneapois	al e Matarials e E st Avenue No. s, MN 55447	nvironment	al	RIG	CME !	· · · · · · · · · · · · · · · · · · ·		ER KJ	
W.L.	<u> </u>] 559-1859				VN JP		APPRO	OVEDM	<u> </u>
 					The stratification	lines repre	sent ar	nrox				DISHEEL	. 2 0.	<u>r 2</u>
					between soil type									

•	,	-	·		LOG OF E	ORING	BS)						
PRO	JECT			· · · · · · · · · · · · · · · · · · ·	LOG OF L	SITE								
Su	pple	mer	ntal 1	Remedial Investiga	ation	Dittme	er Oi	<u> 11 C</u>	cmpar	ıy, Fa	irfax	MN		1
CLIE				-		ARCHITE	CT-EN	GINE	ER					
Dı	.tune	r (DIT C	ompany		<u> </u>								
			EET				HNU	_	UNCO	NFINED C	OMPRESSI O	VE STREN	GTH TO	NS/FT. ²
	œ		E I				mgg)	S/FT		1 2	 2 3		5	,]
	ABE!	닒	CHANGE, FEET	DESCRI	PTION OF MATERIA	\L	-	ŇO		 	WAT			
	Σ'n	LEVEL	용				TES	(BL			CONTE	ENT %		
DEPTH, FEET	P.E.	EB	Ϋ́				FX	L	STA	NDARD F	ENETRA) - TION (BL	OWS/F0	эот)
DEP	SAMPLE NUMBER AND TYPE	WATER	STRATA	SURFACE ELEVATION	ON_		SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)			-@)-		- 1
		_	- 0,		<u> </u>	.20'	0,12	_	1	0 2	0 30 T	40) 5	50
	-		i	Light gray to li	ght brown sil	tv clav							ł	
	las			(CL) - trace to	little sand -		0.5						1	
				mottled fracture		_							1	- 1
		*		vertical) - soft some 1/16" fine		-		:						1
_5	2SS			petroleum odor a		•	200	7						
	355						200	7						
			_											
			9	Brown to dark br	own silty cla	y (CL) -		\vdash						ŀ
10	4SS		77	little fine to c	oarse sand -	trace	0.8	12						
				gravel - some re fractures (verti										
				medium firm - we		ontal) –							j	
1.5														
12														
				End of boring at	11 feet.									
	<u> </u>			8 inch O.D. holl	.ow stem auger	used								
	1			full depth. HNU measurements	in narte ner							ļ		
	1			million (ppm).	mi parts per							1		
	1			Soil Sample B9-S										
	1			submitted for la	boratory anal	ysis.								
	1			Boring backfille	a with cement	grout.								1
	1						ł		Ì					
	}						ļ							
<u> </u>														
	1													
	1						İ							
	1						1		1					
	1													
	1								İ					i
	1											İ		
				OBSERVATIONS			!	1		NG STAI	RTED	8-2-	93	
W.L.	V 4	<u>'</u>	wnile	sampling		CONSULTA of Materials • Er	-				PLETED			
W.L. W.L.	-				14000 21s Minneapois	Avenue No. MN 55447 1 559-1859	nar q	-	RIG	OME VN JP:	_ <u>550</u> B	DRIL		KJB MDM
₹¥.L.					Umca (612				PROJ	ECT #C	- <u>2373</u> -	B SHEE	OVED	f 1
			·········		The stratification				imate b	oundari	es	UI ILL		
					between soil type									

•					LOG OF E	ORING	Blo)						
	JECT		-4-7 1	D3:-1 T		SITE								
CLI			ntal .	Remedial Investiga	ation	Dittme				ıy, ra	ırıax	c, MN		
Di	ttme	r	Oil C	ompany										
			FEET				HNU	<u> </u>	UNCO	NFINED CO		IVE STRE	NGTH TO	NS/FT. ²
	ec.		JE, FI	25000			(ppm	N-VALUE (BLOWS/FT.)		1 2		3	4 :	5
 	IMBE	VEL	CHANGE,	DESCHI	PTION OF MATERIA	\L	ST	δ		•		TER ENT %		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	₽				SPECIAL TEST RESULTS	JE (B			-(D-		
Į.	MPL	ATEF	STRATA	CUREAGE ELEVATIO	~~	_	ECIA	VALL	STA	NDARD F		NTION (E	LOWS/F	00Т)
△	Ş.δ.	``	ST	SURFACE ELEVATION	97.	07 '	SP	Ż	1	0 2			40	50
	_		·	Light gray to lie										
	las			(CL) - trace to mottled fracture		many	0.5							1
				vertical) - soft	- very moist	-								
5	255			trace petroleum	odor at 6 - 8	fæt	0.0	7						
	200	V					0.0							
	3SS						5 . 0	8						
							3.0	- 0						
10														
	4SS		-11				0.5	10						
	1													
	1													
	}			End of boring at 8 inch O.D. holl		. 11003								
15	1		İ	full depth.										
]			HNU measurements million (ppm).	in parts per	•								
	_			Soil Sample Blo-										
	1			submitted for la	boratory anal	ysis.								
	1			Boring backfille	a with cement	grout.								
	1						ļ							
	1													
]													
	1												ļ	
	1													
	1													
	1													
]													
	1													
	1													
	T WA	TER	LEVEL	OBSERVATIONS .	1		<u> </u>		BORI	NG STA	RTED	8-2-	93	<u> </u>
W.L.				sampling		ONSULTA	-			NG COM	PLETE	9 – 2	-93	
W.L.					14000 216	t Avenue No. , MN 55447) 559-1859			RIG DRAV		_ <u>550</u> PB		PROVED	KJB MDM
77.5.					Unite (6)	, 300-1008				JECTC-			EET1 C	
		-			The stratification between soil type	-		-						

*,				LOG OF I	BORING	B1.1							
	JECT				SITE					_			
		ent	tal	Remedial Investigation	Dittm				ny, Fa	irfax	, MN		
CLIE	nt Limer	· O:	il Ca	mpany	ARCHITE	CT-EN	GINE	ER					
			15		<u> </u>	HNU		UNCO	NFINED C	OMPRESSI	VE STREN	IGTH TO	NS/FT. ²
			, FEET			(bbm) Ę		. ,	-C 2 3			5
	IBER	یر	CHANGE,	DESCRIPTION OF MATERIA	AL	1	OWS		 	WAT		-	
EET	N N N	LEVEL	CHA			TES	(BL			CONTE			
DEPTH, FEET	SAMPLE NUMBER AND TYPE		STRATA			SAL ULTS	N-VALUE (BLOWS/FT.)	STA	NDARD F	●- ENETRA	•	OWS/F	рот)
DEP	SAM	WATER	STR/	SURFACE ELEVATION 96.00) '	SPECIAL TEST RESULTS	/\-N	1	0 2	- ⊘ 0 30		0 :	50
				Light gray to light brown si	lty clay								
	las			(CL) - trace to little sand	- many								
				mottled fractures (primarily vertical) - soft to medium -	verv	0.			·		į		
				moist to wet - 1" sand seams							l		
5	2SS			5.5 feet and 7 feet		0.	8						
	3SS			•		0 0	10						
			_ 0_	·								Į	
10	4SS			Brown to dark brown silty classifier to coarse sand -									
È	400		11	gravel - some reddish brown		0	10						
	1.			fractures (vertical and hori	zontal)								
]			-medium firm - wet - several thin (1/16") sand seams	very								
	1			TIME (1/10) SAME (SEALES		┨							
15	1												
	1												
	}												
	1			End of boring at 11 feet. 8 inch O.D. hollow stem auge	wyneod								
	‡			full depth.	ruseu			1					
	1			HNU measurements in parts pe	r								
	}			million (ppm). Soil Sample Bll-SS3 (6-8 fee	t)								
	1			submitted for laboratory ana	lysis.								
	1			Boring backfilled with cemen	t grout	•		Ì					
	†												
	}					1							
	1												
	1												
	1							1					
	1												
	-												
				OBSERVATIONS .		1	<u> </u>	BOR	NG STA	RTED	8-2	-93	<u></u>
W.L.	V	6'	whil		COMSULTA	•				PLETED	8-2	-93	
W.L.	 	·		14000 21 Minnespol	st Avenue No. s, MN 55447	UN WE FORE		RIG DRA	OME VN J			LLER]	
LAA.T.				Office (61)	2) 559-1859				-	-2373-			
				The stratification	-		-	imate t	oundar	es			
<u> </u>				between soil typ	es; insitu th	e trans	ition	may be	gradua	l.			

	,				LOG OF B	ORING	B12				·			
1	JECT Supp]	em	enta]	. Remedial Investi	gation	SITE	or C	.i.	~~~~	ny, F	ai w£ar	- 1 <i>6</i> 18.T		
CLIE	NT				- 3	ARCHITE				IIY, F	arria	C, PHN		
	Ditta	er		Company		· "								
			FEET				HNU	E.	UNCO	NFINED C	OMPRESS -C		NGTH TO	NS/FT.
	E		GE,	DESCRI	IPTION OF MATERIA	.L ((mgq	NS/F		1 :	2 3		4	5
Щ	UMB	VE.	CHANGE.				EST	BLO)			CONT			
H	LEN	A L	Z C				AL T	UE (-() -		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA	SURFACE ELEVATION	ON OF	201	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)	SIA	NDARD F	PENETHA - Q		LOWS/F	001)
	ა ∢	5	S		7 95.		SH	Z	1	0 2	0 3		10	50
				Light gray to lig (CL) - trace to l							1			
	las	V		mottled fractures		menty.	0		:					
		Ť		vertical) - soft		-								
1	2SS						0	5						
	355						0	5						ł
10			9	Brown to dark bro				-						
10	4SS		11	little fine to co gravel - some red			0	12						
			<u> </u>	fractures (vertice										
				medium firm - wet	t	· · · · · ·								
											İ			
15														
				End of boring at	11 feet.								,	
				8 inch O.D. hollo		used	l							
				full depth. HNU measurements	in parts por									
				million (ppm).	m parts per									
	•			Water Sample Bl2		for								
				laboratory analys Temporary monitor		in-								
	İ			stalled.	-		1							
				Boring backfille	d with cement	grout.								
	}													
	1	-												
	1											,		
											<u> </u>			
W.L.	WAT			OBSERVATIONS . er boring	GMF C	ONSULTA	NTR	INC		NG STAI		8-2-9		
W.L.	Ľ	<u> </u>	ar c		Geotechnica 14000 21st	e Materials e E Avenue No.	•		RIG	NG COME				KJB
W.L.					Minnespolis, Office (612)	MN 55447 559-1859			DRAV	WN S	JPB	APP	ROVED	MDM
<u> </u>					The stratification	linee renn	sent a			ECT #		B SHE	ET 1	of 1
					between soil type									

	,				LOG OF B	ORING	B13	₹						
PRC	JECT					SITE		<u></u>	 -			·		
Sur	plem	en	tal R	emedial Investiga	tion	Dittm				ıy, Fa	irfax,	MN		
CLIE		0	il Cor	mpany		ARCHITE	CT-EN	GINE	ER					
	-41001	$\stackrel{\circ}{\sqcap}$	····.	in the state of th		<u></u>				VEINED OF	NADDE0011			2
			CHANGE, FEET				HNU	£	UNCO	NEINED CO	OMPRESSIV O		GTH TO	NS/FT.
	8		G.	DESCRI	IPTION OF MATERIA	.i	(bbw	VS/F		1 2	3	4		<u> </u>
L	JMB	KE	A A	5250		· -	TS:	SCO.			WATI			
2	F N	픠	ō ✓				TS TS	JE (E				-		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA				SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)	STA	NDARD F	ENETRAT		.OWS/F0	DOT)
ă	S A	×	ST	SURFACE ELEVATION	^{ON} → 94	.81'	용품	Ż	1	0 2	- ⊗ 0 30) 5	io
				Light gray to li	ght brown sil	tv clav								
	1AS			(CL) - trace to	little sand -		ا ہ							
				mottled fracture vertical) - soft										
				vertical) - sort	very moist								ļ	l
-5	2SS 1	\mathbf{V}										1		
							0	9				1		
	355						0	8]		
				•			-				1			
10			9_	Brown to dark br										
10	4SS		11	little fine to c			0	10						
			<u></u>	gravel - some re fractures (verti			-				1	İ	İ	ļ
				medium dense - w		Olical,								
					****		1							
15														
		:		End of boring at		-							İ	
	}			8 inch O.D. holl full depth.	.ow stem auger	used								
				HNU measurements	in parts per	•	l					1		
				million (ppm).	002 /C 0 51									
二	1			Soil Sample Bl3- submitted for la	boratory anal	ysis.								
	1			Boring backfille								Ì		
	1						ŀ							
	1													
	1											- 1		
	1												·	
 	1											1		
	1													
F	1							1						
E	}													
	1											l		
				OBSERVATIONS				1	BORI	NG STAF	RTED	-8- 1	2-93	
W.L.				e sampling		ONSULTA	-				PLETED		2-93	
W.L.				:	14000 21st Minneapolis	MN 55447	wronment	20	RIG		550		LER K	
W.L.	i				Office [612]	559-1859			DRAV PROJ		PB 2373-B		ROVED	
					The stratification	lines repre	sent ar	prox				ISHE	<u>=1 </u>	OF T
					between soil type									

					LOG OF E	ORING	B14	/MW	7					
	JECT Supp]	em	· enta]	. Remedial Investi		SITE Ditta				nv. F	airfa	×. MN		
CLIE	NT			Company		ARCHITE							· · · · · · · ·	
	J1 C U.			Campany		<u> </u>			UNCO	NFINED C	OMPRESS	SIVE STRE	NGTH TO	NS/FT ²
	~		E, FEET			(ppm)	3/FT.)		1 :		O- 3 4	1 5	,
ı.	MBE	핃	CHANGE,	DESCRI	PTION OF MATERIA	L	ST	LOWS		1		TER	·	
1, FEE	E NU	1 LEVEL	A				AL TE	JE (B			-(ENT % ●-		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER	STRATA	SURFACE ELEVATION	ON 96.90'		SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)			-0	ATION (B		1
				Light gray to lig	tht brown silt	v clav				0 2	0 3	30 4	10 5 1	50
	las			(CL) - trace to 1 mottled fractures	ittle sand -		0.2							İ
		V		vertical) - soft	- very moist	-								
				petroleum odor at	: 6-8 feet									l
	2SS						0.2	5				ı		
	388						190	7						
			a											
10	4 SS		-	Brown to dark bro little fine to co										
				gravel - some red	dish brown mo	ottled	130	7						
				fractures (vertices soft to medium de			k m							
			¢	odor at 9-11 feet		•								
15	5SS						2.0	15						
		_	-16											
									-					
				End of boring at		_								
				8 inch O.D. hollo full depth.	ow stem auger	used								
				HNU measurements million (ppm).	in parts per									
				Grain size analys		ollecte	\$							
				at 4-8 feet and I Installed monitor		•								
					-									
					-			<u> </u>						·
W.L.				OBSERVATIONS. le sampling	GME C	ONSULTA	NTS,	INC.		NG STAI NG COM		8-3-	- <u>93</u> -3–93	
W.L.	3	.5	aft	er boring	14000 21st Minneapois	l e Materials e E Avenue No. MN 55447	nviranment	æl	RIG	CME	550	DRI	LLER F	
W.L.	<u> </u>				Office (612)	559-1859			PRO	NN JECT C	-2373·	-B _{SHE}	ROVED ET 1 C	of 1
					The stratification between soil type				imate b	oundari	es			

•,					LOG OF E	ORING		B15						
	JECT		- <u>-</u> 1	Demodial Investig		SITE				- 70	·	307		
CLIE	NT			Remedial Investig	ation	Dittme				y, Fa	LITAX	MIN		-
D:	ittme	r	Oil C	Company										
			EET				HNU	<u>-</u>	UNCO	NFINED C	OMPRESS		NGTH TO	NS/FT. ²
	Œ		GE, F	DESCRI	IPTION OF MATERIA	. T	(bbu	VS/FI		1 2	2 3	_	1 :	5
Ed	SAMPLE NUMBER AND TYPE	VEL	CHANGE, FEE	DESCRI	IFTION OF MATERIA		EST	N-VALUE (BLOWS/FT.)			WA		•	
DEPTH, FEET	LE N	WATER LEVEL		·			SPECIAL TEST RESULTS	UE (E			-() -		
EPT!	AMPI ND 1	/ATE	STRATA	SURFACE ELEVATION	ON_ 96.65		PECL	-VAL	STA	NDARD F	PENETRA • •		LOWS/F	оот)
	ა ∢	>			-		∞ ∝	Z	. 1	0 2			10 :	50
				Light gray to lig (CL) - trace to l					·					
	las			mottled fractures	s (primarily	_	0							
				vertical) - soft very moist	to medium fir	m –								
-5	255			vory merse			0.2	7				;		
	255													
	355			·			0.2	10						
			۵											1
10	400			Brown to dark bro little fine to co										
	4SS			gravel - some red			170				1			
				fractures (vertic										
				soft to medium fi odor at 9-11 feet		ecrorean								
1	F00													
15	588		16				0.2	19						
<u> </u>					•									
				End of boring at										
• • • •				8 inch O.D. hollo full depth.	-	usea								
				HNU measurements million (ppm).	in parts per									
				Soil Sample Bl5-9										
				submitted for lab Boring backfilled										
			į	Burns backrine	a with cenemic	grout.								
					-									
<u> </u>								ļ	ļ					
	}						}							
	<u> </u>	L		·										
W.L.				OBSERVATIONS . sampling	GME 0	ONSULTA	NTS.	INC		NG STAI		8-3-9		
W.L.					Geotechnica 14000 21st	i e Materiels é Er : Avenue No.	-		RIG	NG COME			-3-93 LLER]	KJB
W.L.					Minnespolis, Office (612)	MN 55447 559-1859				NN JE	B	APF	ROVED	MDM
-					The stratification	lines renres	ent ar	prov		ECT #_		BISHE	ET 1	of 1
					between soil type									

-	,				LOG OF B	OPING	D	 1					
PRO	JECT					SITE	D	16					
Su	plem	en	tal F	Remedial Investiga	tion	Dittme	r Oi	1 C	mpan	y, Fa	irfax,	MN	
CLIE	ENT Etmer	. ი	il Co	mpany		ARCHITEC	CT-EN	GINE	ER			_	
				I I I I I I I I I I I I I I I I I I I	_ 				:::::::::				TH TONS/FT. ²
			CHANGE, FEET				***	Ę.	UNCO	NHINED C	OMPRESSI C		TH TONS/F1.
	Ë		GE,	DESCRI	IPTION OF MATERIA	.L	UVH (DOM	NS/F		1 2	2 3		5
ш	UMB	VEL	IAN			-	EST	31.0			WAT		
<u>+</u>	YPE	7					AL TI	UE (I			-0)	
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA	SURFACE ELEVATION	ON.		SPECIAL TESTO RESULTS 19	N-VALUE (BLOWS/FT.)	STA	NDARD F	ENETRA'		WS/FOOT)
۵	Ø ₹	3	ဖ	SOM ACE ELEVATION	95.60	1	S E	Ż	1	0 2			50
				Light gray to lig		1							
	las			(CL) - trace to 1 mottled fractures		many	1.5						
				vertical) - soft	- very moist	- trace							
	_	V		petroleum odor at	: 4-6 feet								
-5	2SS	Ť					8.5	5			l		
	3SS												
	200		•				4.0	6					
			9			····			:				
10	4SS		•	Brown to dark bro									
		Н	11	gravel - some red			p	10					
				fractures (vertic		ontal)-							
				medium firm - we	t 								
7.5													
15													
				End of boring at	11 feet.	-							
				8 inch O.D. hollo full depth.	w stem auger	usea							
	}			HNU measurements	in parts per								
				million (ppm). Soil Sample Bl6-S	SS2 (4-6 feet)								
	1			submitted for lak	coratory analy	sis.	1						
				Boring backfilled	d with cement	grout.							
									i				
<u> </u>									:				
	1						1						
Ė	1												
	1												
	1							l					
W.L.		ER	LEVEL while	OBSERVATIONS.	GMF C	ONSULTA	NTS	INC		NG STAI		8-3-93	
W.L.					11	• Materials • En	-		RIG	NG COME		8-3-	-93 ER KJB
W.L.			-		Mirmespois, Office (612)	MN 55447			DRAV	wn J	PB	APPRO	OVED MDM
<u> </u>			-		The causaid	!						B SHEET	1 of 1
					The stratification between soil type								

LOG OF BO						ORING	B17	,						
l)JECT	nar	I	Remedial Investiga	ation	SITE Dittme	~ Oi	1 0	- Tana	·· Fa		MAT		
CLIE	ENT				ICIO!I	ARCHITE				<u>y, ra</u>	TTTOV	PEN		
D1	ttmer	: 0		ompany I			1							
			CHANGE, FEET				HNU	Ę.	UNCO	NFINED C		SIVE STRE	NGTH TO	NS/FT.
	SER.		Š Ř	DESCRI	IPTION OF MATERIA	i	ppm)	WS/F		1 2		3 4	<u> </u>	5
ËET	NO.	LEVEL	CHA				TEST	(BLO				ENT %		1
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER L					CIAL	N-VALUE (BLOWS/FT.)	STA	NDARD F	− PENETR	●- ATION (B	LOWS/F	00Т)
DEP	SAM	WAT	STR	SURFACE ELEVATION	ON— 96.34	1'	SPECIAL TEST RESULTS	y-′Z			-6	⊗ -		50
	:	П		Light gray to lig	tht hour silt	-v clav								
	las			(CL) - trace to 1	little sand -	many	0							
				mottled fractures vertical) - soft		m -								l
		Y		very moist		,								
	2SS					!	0	4						
	3SS						0	10						
							-						, ,	
10	4SS			Brown to dark bro little fine to co	own silty clay	/ (CL) -	0	13						
	 -	\vdash	11	gravel - some red	ddish brown mo	ottled .								ĺ
	1 1		'	fractures (vertice medium firm - wet		ontal) -	†							
			'	RECEIVED FAIR STOCK			}							
15	1		<u> </u>											
10	'													i l
				End of boring at										
	'			8 inch O.D. hollo full depth.	W Stell auger	usea								
	 		•	HNU measurements	in parts per									
<u> </u>	! '			million (ppm). Soil Sample Bl7-9	SS3 (6-8 feet)								
	'			submitted for lak	boratory analy	ysis.								
	ļ '			Boring backfilled	d with cement	grout.								
	1		!											
	1					-							!	
	4		'											
	<u> </u>												'	
	 													
<u> </u>]		'	
	<u> </u>		!							<u> </u>			'	
				OBSERVATIONS			<u></u>	1		NG STAI	RTED	8-:	3-93	
W.L. V4.5' while sampling W.L. Gentechnical • Materiels • Ervin 14000 21st Avenue No.				-			NG COM			3-93				
W.L. 14000 21st Averue No. Minneepois, MN 55447 Office (812) 559-1839				MN 55447			RIG DRAV		<u>550</u> PB		LLER]			
						· · · · · · · · · · · · · · · · · · ·			PROJ	ECT #E-	-2373			
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.														

					LOG OF E	ORING	B18							
	JECT					SITE								
CLIE		me	ntal	Remedial Investig	ation	Dittme				, Fai	rfax,	MN		
		r	oil c	company		ARCHITE	SI-EN	GINE	EH					
			FEET			l	HNU	<u></u>	UNCO	NFINED CO	OMPRESSI	VE STREN	GTH TON	IS/FT. ²
	E		GE, F	DESCRI	PTION OF MATERIA		(ppm	VS/F		1 2	2 3		5	
╽ᡖ╽	JMB	VEL	CHANGE,	DESCRI	IF I TON OF WATERIA		TEST 3	SLO _V		•	WAT CONTE		•	
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	ت ح				AL TE	N-VALUE (BLOWS/FT.)			-	-		
鼠	MPI VD T	ATE	STRATA	CUREA OF ELEVATION	201		SPECIAL TI RESULTS	VALI	STA	NDARD F	ENETRA D-	TION (BL	OWS/FO	(ТОТ)
ā	S/	χ.	ST	SURFACE ELEVATION	^{ON} → 97.4	9'	\$ ₹	ż	1	0 2) 5	0
	las			Light gray to li (CL) - trace to mottled fracture vertical) - soft	little sand - es (primarily	- many	30							
- 5	2SS	▼		petroleum odor a petroleum odor a			200+	7						
	3SS						250	9						
			a											
10	4SS			Brown to dark by		-		11			Ì			
				gravel - some re			2.0							
				fractures (verti		zontal)								
	1			-medium firm - v	vet						l			
15	<u> </u> -													
	1			End of boring at	- 11 feet									
	1			8 inch O.D. hol	low stem auge:	r							ł	
]			used full depth HNU measurements		,							1	
				million (ppm).								ŀ		
				Soil Sample Bl8-							. [1	
	}			submitted for la Boring backfille								1		
	1					-	l					İ		
	‡												ŀ	
	1						ł							
											1			
	-													
	1													
	1													
	1													
	1													
	WAT	L_	LEVEL	OBSERVATIONS .			<u> </u>	<u> </u>	PORI	NC STAF	7750	0 2 0		
W.L.		7	while	sampling		ONSULTA	-			NG STAF	PLETED	8-3-9 8-3		
W.L. Geotechnical e Md 14000 21st Aven. Minnespots, MN 5.				Avenue No. MN 55447	nvironment	æi	RIG	CME	550	DRIL	LER KJ			
W.L.	<u> </u>		<u> </u>		Office [612	559-1859			DRAV PROJ		IPB -2373-	APPE B SHEE	OVED	MDM of 1
					The stratification	lines repres	sent ar	prox				~ 12HE		, <u>.</u>
					between soil type									

_	-				LOG OF I	ROPING	חות	Αστο	,				······································	
PRO	JECT				LOGOFI	SITE	BTA'	<u>SWM1</u>						
St	pple	mei	ntal	Remedial Investig	ation	Dittme	r Oi	l Co	mpany	, Fai	rfax,	MN		
CLI		•				ARCHITE	CT-EN	GINE	ER					
D:	ittme	r (ompany	 		r							
			FEET				HNU	2	UNCO	NFINED C		IVE STREI	NGTH TO	NS/FT.
	æ			0500			(bbw	S/F		1 :	2 3	3 4		5
	MBE	필	CHANGE,	DESCR	IPTION OF MATERIA	AL.	ST	δ				TER		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	호 소				SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)			CON1	ENT %		
H	MPL D T	E	STRATA		·	 — · · ·	SUL	/ALL	STA	NDARD F		TION (B	LOWS/F	00Т)
🛎	SA	×	ST	SURFACE ELEVATION	^{ON} → 96.66	; 1	SP	ź	1	0 2		3 9- 10 4	0 :	50
													Ī	
				Dark gray silty										
				to little fine										
				trace gravel - n soft - very mois										
5		V		boring M74	·						1		ŀ	1
			:											
	l													
<u> </u>							Ì							
10														
	1		10											
			1.5	Brown to dark b	marm ciltur al	277 (CT.)								
15	lss			little fine to			T 0	12						
	1			gravel - some r	eddish brown	mottled								
	1			fractures (vert		zontal)	1.							
	1			MOSTOR LITTE	wec									
	1													
20	 		-20				ļ							
	255			Dark gray silty			0	22						
	 			to little fine			-							
	1			trace gravel - 1 stiff - moist	no iractures	- very								
25														
23	3SS						0	23						
	1								İ					
	1			·										
	 	-		·			<u></u>							
30	4SS						0	23						
	455	1					-	 						
	1													
	WA	TER	LEVEL	OBSERVATIONS .			<u> </u>		BORI	NG STA	RTED	8-4-	93	<u>l</u>
W.L.	_			e sampling		CONSULTA				NG COM			-93	
W.L.					14000 21s	el e Materials e E t Avenue No. I, MN 55447	nwrohmeni	28 3		CME 5			LLER T	
W.L.	L				Office (612	559-1659			DRAV PRO		IPB	APP -ESHE	ROVED	
					The stratification	lines repre	sent ar	prox				-HOHE	211	<u> </u>
				······································	between soil type									

**	1				LOG OF E	ORING	В19	9/MW	18	· ·				
	JECT		1 D			SITE								
CLIE		en	сал к	emedial Investiga	tion	Dittm				ny, Fa	urtax	c, MN		
Di	tmer	0:	il Ca	mpany		AROMITE	51-EN	GIIVE	L II					
			ΈT				HNU	-	UNCO	NFINED C			NGTH TO	NS/FT. ²
	ac		CHANGE, FEET				(ppm	_		1 :	2 -C	O- 3 4	\$ 5	,
_	MBE	亘	ANG	DESCRI	IPTION OF MATERIA	NL .	ST	ŇO				TER		·
FEE	SAMPLE NUMBER AND TYPE	WATER LEVEL					L TEST 'S	E (B)			CONT	ENT %		
PTH	MPLI	TER	STRATA				SPECIAL T RESULTS	/ALU	STA	NDARD F			LOWS/F	рот)
В рертн, геет	S A	WA	STI	SURFACE ELEVATION	^{ON} → 96.6	6 '	SP	ź	1	0 2		3 0 4	10 5	50
30	4SS			Dark evar ailtr	class (CT) +									
	5 <i>S</i> S			Dark gray silty to little fine t	o coarse sand	race	0	11			l			
				trace gravel - n										
	6SS			stiff - moist			10	13						
35							-							
	7SS						0	27						
	8SS						0	18						
40			40											
40			40											
	1			End of boring at Drilled with dou		inch	l							
	1			I.D. hollow stem	auger advanc	ed to								
	1			20 feet; 8 inch auger advanced t		tem	ĺ							
	1			HNU measurements		•								
	1			million (ppm).										
	1			Soil Sample Bl9- Bl9-SS8 (37-39 f										
	}		·	laboratory analy	sis.									
	1			Grain size analy at 33-39 feet.	sis sample co	llected	4							
	1			Installed monito	ring well MW8	3.								
	1				-				,					
]		<u> </u>											
	1						İ							
	1													
	}	1												
	1			1										
	1													
E	-													
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	1													
	WA	TER	LEVEL	OBSERVATIONS .			4	<u> </u>	BOR	NG STA	RTED	8-4-9	3	
Geotachnica				CONSULTA of • Materials • E	_				COMPLETED 8-4-93					
W.L. 14000 21st Minnespois.				t Avenue No. , MN 55447] 559-1859			RIG DRAI				KJB MDM			
								JECT #C						
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.														
L					L potracen son type	~,	- uaii3		Hay De	gradud	14			

					LOG OF I	ORING	B20	`				· · · · · ·		
PRC	JECT				20001	SITE	DZC	<u>'</u>		······································	· · · · · · · · · · · · · · · · · · ·		···	
Su	pple	ner	ntal I	Remedial Investiga	ation	Dittme	er Oi	1 C	ampan	y, Fa	irfax	, MN		
CLI			11 C			ARCHITE	CT-EN	GINE	ER					
דת	cuie			ompany	· · · · · · · · · · · · · · · · · · ·	L							· · · · · · · · · · · · · · · · · · ·	
			FEET				HNU	[]	UNCO	NFINED C	OMPRESSI C		NGTH TO	NS/FT.
	Œ		3E. F	prop	DT:01: 05 141 TEO:		ppm)	IS/F		1 2	2 3			5
 	MBE	Æ	CHANGE,	DESCRI	PTION OF MATERIA	AL.	ST	Ν			WAT			
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	ᅌ				SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)			CONTE	:NI%)		
H	MPLI D TY	TER	STRATA				CLA	ALU	STA	NDARD F	ENETRA		_OWS/F	00Т)
DE	SAN	WA	STF	SURFACE ELEVATION	ON 97.0	7'	SE	ż	1	0 2	- ⊚ 0 30		0 !	50
				Light gray to lie	what have a sil	L. alas					Ĭ	i	Ť	
	las			(CL) - trace to										
				mottled fractures	s (primarily	-							1	
				vertical) - soft	to medium fi	rm -	l							
-5	255			very moist									ł	
		Y					0	7						
	355						0	12						
]
			9											
10	455			Brown to dark bro little fine to co			lo	10						
			11	gravel - some re								- 1		
				fractures (verti	cal and horiz									
	1			medium firm - we	t									
													i	
15												ŀ		
	1						1							
			•	End of boring at	ll feet.									
	1			8 inch O.D. holl		used								
	}			full depth.	•		l							
				HNU measurements million (ppm).	in part per									
	1			Soil Sample B20-	SS3 (6-8 feet	:)								
	1			submitted for la	boratory anal	ysis.		ļ						
<u> </u>	1			Boring backfille	a with cemet	grout.								
	1								ĺ					
	1													
	1													
	1													
]								l					
	}													
	1			1										
	1								I					
	WA			OBSERVATIONS .	l		1	Ь	BORI	NG STAI	RTED	8-4-	3	
W.L.	V	6'		e sampling		CONSULTA	-				PLETED			
W.L.	!			-	14000 21s Minnespois	al • Materials • E st Avenue No. s, MN 55447	nvronmen		RIG		E 550		LER	
W.L.	<u> </u>		··		Office (612	559-1859			PRO.		JPB			MDM
					The stratification	lines repre	sent a	pprox				- ISHE	ET 1	ot l
	· · · · · · · · · · · · · · · · · · ·				between soil type									

					LOG OF E	ORING	B	21						
	JECT	com.	ont a I	Remedial Investi	antion	SITE Dittme	r Oil	. <i>Ce</i>	****>> ***	. Poi	refor	MINT	,	
CLIE	NT				gacion	ARCHITEC				y, Fall	TTAX,	, MIN	·	
I	Dittm	er	Oil	Company					,					
			FEET				TINT!	$\overline{}$	UNCO	NFINED C		IVE STRE	NGTH TO	NS/FT. ²
	ec.		3E, FI	25000	DT:01:05 AAATES:		HNU (ppm)	N-VALUE (BLOWS/FT.)		1 2	} :	3 4	4	5
	JMBE	ΛEL	CHANGE,	DESCRI	PTION OF MATERIA	VL.		Ϋ́				TER ENT %		•
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	Ď ∀				SPECIAL TEST RESULTS	JE (8)		
PTH	MPL ID T	TER	STRATA				ECIA	VALL	STA	NDARD F		NTION (B	LOWS/F	оот)
ă	& &	<u>``</u>	ST	SURFACE ELEVATION	oN- → 9	7.55'	용품	ż	1	0 2			10	50
				Light gray to lig	ht brown silt	y clay								
	1AS			(CL) - trace to 1	ittle sand -		50				l			l
				mottled fractures vertical) - soft	<pre>- (primarily - very moist</pre>	_								
				petroleum odor in	auger cuttin									
	255	V		approximately 7-9	feet		6.5	9						
				·							1			
			9											
10	3ST			Brown to dark bro little fine to co	wn silty clay arse sand - t	(CL) -	1.50+						:	
				gravel - some red	dish brown mo	ttled								
				fractures (vertic medium firm — wet	al and horizo	ontal)-		1						
				at 15 feet	- 1/10" Sanc	seam								·
15			-				2.0	11						
	4SS		ŀ											
	}													
			:											
													!	
20	5SS						2.5	19						
	1													
	 	1	24			·								
25	6SS			Dark gray silty o			2.0	17						
		1		little fine to co gravel - no fract										
	7SS			very stiff - mois			2.0	35						
	855			at 29 feet			6.0	21						
30	4		30			·· ·- ·-	6.0							
	1													
	1													
		ER	LEVEL	OBSERVATIONS .						NG STA	RTED	8-5-		L
W.L. W 6' while sampling W.L. Geotechnical • Meterials • En 14000 21st Avenue No.				-			NG COM			-93				
W.L. 14000 21st Avenue No. Minnespots, MN 55447 Office (812) 559-1859						RIG DRAV	_CME_ WN .TP			LLER 1				
									PRO	ECT #C	<u>-2373</u>	-B SHE	ET 1	of 2
					The stratification between soil type									

	LOG OF BORING B21													
PRC	JECT				LOG OF	SITE	لكظ							
		com/	anta I	Remedial Investi	antion	Dittm	or 0 1	1 0	~~~	. Ta	i weav	MNT		
CLIE		CITE	<u> </u>	Relieutat Investi	gaciui	ARCHITE				y, ra	TTTAX	, PHA		
		er	Oil	Company					,					
						<u> </u>			UNCON	FINED CO	OMPRESSI	VE STRE	NGTH TO	NS/FT. ²
			FEET				HNU	Ę.			-C			
	E		GE,	DESCR	IPTION OF MATER	ΙΔΙ	(bbm	VS/			2 3	4	ļ 	5
ь.	IMB	/EL	Ž	020011	III HOROT WATER	IAE	TEST	Š			WAT			
121	N H	E	Ö				E _S	E (B			CONTE	:N 1 % 1		
DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE,				SPECIAL TI RESULTS	N-VALUE (BLOWS/FT.)	STAP	NDARD F	PENETRA	TION (B	LOWS/F	00Т)
DEF	SAN	×	STR	SURFACE ELEVATION	ON 97	.55'	SPE	> 2			-8		•	
									1(T) 2 ⁻	0 30	1	0	50
								1			1			.
				End of boring a			i '				- 1			
				8 inch O.D. hol	.low stem aug	er used								
				full depth.										
	HNU measurements in p					er				İ				
\vdash				million (ppm). Soil Sample B21	-553 (from t	ip of				1				1
	I			Shelby Tube at										
]		·	(26-28 feet) an			ŧ)					1		
				submitted for 1							1			
	1			Shelby Tube ST-										
				for falling hea										
	}			Boring backfill	led with ceme	nt grout	'				1			
	1						İ							
	1	1	ļ								ļ			
	1								1					
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E	1													
	14/4-	L	LEVE	OBSERVATIONS .	T			L	PCC!	10 0T+		0 F	<u></u>	1
W.L.	▼ 6			sampling	GME	CONSULTA	NTS.	INC.		NG STAI		8-5-		
Gestechnical e Mesterials e Environmental						8-5	<u>-93</u> LLER	מדע						
Minnespois, MN 55447					ROVED	KJB MDM								
											2373- ¹	B SHE	ET 2	of 2
					The stratificatio	n lines repre	sent ar	prox						
					between soil typ									

7;	
<pre>Λ = total length of well 12.25' Β = length of well screen 6' C = length of riser pipe 6.25' D = stick-up at surface 1.6'</pre>	MONITORING WELL MW1 DATE INSTALLED 10-17-91 DRILLER/RIG KJB/CME 55 GROUND SURFACE ELEV. 97.14'
Minnesota Unique Well No. 475173	WATER LEVELS 93.65' (6-17-93) 92.63' (8-4-93)
ELEVATION OF TOP OF RISER PIPE PROTECTION PIPE	5" diameter steel
TILICKNESS AND TYPE OF SURFACE	E SEAL Neat Cement
DIAMETER AND TYPE OF RISER P.	IPE 2" steel
A TYPE OF BACKFILL AROUND RISE	R PIPE Ne <u>at Cement Gro</u> ut
THICKNESS AND TYPE OF SEAL	10" bentonite
DEPTH TO TOP OF FILTER SAND	4'
TYPE OF FILTER AROUND SCREEN	#30 Red Flint
TYPE OF WELL SCREEN	Johnson PVC
B SLOT SIZES	10 Slot
DINABIER AND LENGTH OF SCREEN	EN 2" / 6'
DEPTH TO BOTTOM OF MONITORIA	NG WELL 10.7'
DEPTH TO BOTTOM OF FILTER S.	MID <u>12'</u>
THICKNESS AND TYPE OF SEAL	NA
K / DIV-HELEK VND DELAU OE BOKEN	OLE 8" / 12'
P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	r Oil Company x, Minnesota
JPB	MDM 8-11-93 C-2373-A

• • • • • • • • • • • • • • • • • • • •	
Λ = total length of well 13.30° B = length of well screen 6°	NONITORING WELL MW2 DATE INSTALLED 10-17-91
C = length of riser pipe 7.39' D = stick-up at surface 1.96'	DRILLER/RIGKJB/CME 55 GROUND SURFACE ELEV. 97.14
Minnesota Unique Well No. 475174	WATER LEVELS 96.00' (6-17-93) 94.57' (8-4-93)
ELEVATION OF TOP OF RISER PIDE PROTECTION PIPE	99.10' 5" diameter steel
THICKNESS AND TYPE OF SURFAC	E SEAL <u>Neat Cement</u>
DIAMETER AND TYPE OF RISER P	PIPE 2" Steel
TYPE OF BACKFILL AROUND RISE	ER PIPE Neat Cement Grout
TILICRNESS AND TYPE OF SEAL	1.0! Bentonite
DEPTH TO TOP OF FILTER SAND	4.9'
TYPE OF FILTER AROUND SCREE	N #30 Red Flint
TYPE OF WELL SCREEN	Johnson PVC
B SLOT SIZES	10 Slot
DINABLER AND LEAGHT OF SCRE	EN 2"/6'
DEPTH TO BOTTOM OF MONITORI	ING WELL 11.34'
DEPTH TO BOTTOM OF FILTER S	SAND 14'
THICKNESS AND TYPE OF SEAL	NA
H H DIAHETER AND DEPTH OF BORE	OLE <u>8" / 14"</u>
	er Oil Company ax, Minnesota
JPB	MDM 8-11-93 C-2373-A

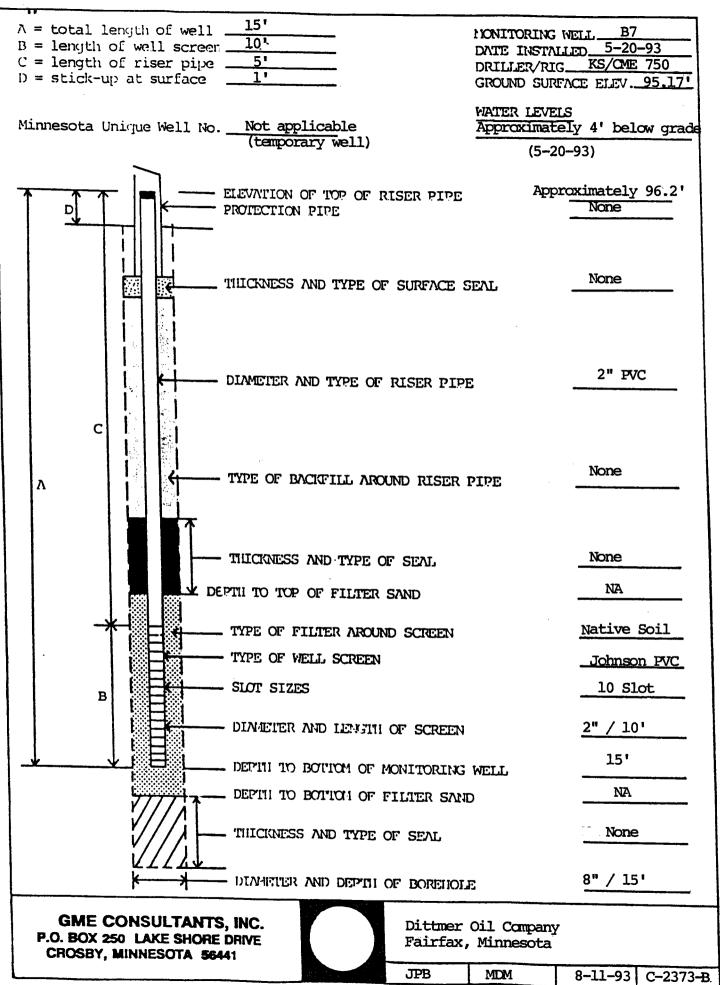
λ = total length of well B = length of well screen	15.39'	NONITORING WELL MW3 DATE INSTALLED 10-17-93
C = length of riser pipe		
D = stick-up at surface	1 92!	DRILLER/RIG_KJB/CME_55
is a seren up at surrace		GROUND SURFACE ELEV.100.24'
Minnesota Unique Well No	. 475175	WATER LEVELS 96.61' (6-17-93)
		94.61' (8-4-93)
	ELEVATION OF TOP OF RISER PIPE PROTECTION PIPE	102.16' 5" <u>diameter ste</u> el
	THICKNESS AND TYPE OF SURFACE	SEAL Neat Cement
C	- DIAMETER AND TYPE OF RISER PIR	PE <u>2" Steel</u>
Λ	- TYPE OF BACKFILL AROUND RISER	PIPE Neat Cement Grout
	- THICKNESS AND TYPE OF SEAL	1.0' bentonite
D 74 D	EPTH TO TOP OF FILTER SAND	6.7'
	_ TYPE OF FILTER AROUND SCREEN	#30 Red Flint
	- Type of Well Screen	Johnson PVC
В В	- SLOT SIZES	10 Slot
	— DIAMETER AND LENGTH OF SCREEN	24 / 61
	DEPUT TO BOTTOM OF MONITORINA	3 WELL 13.47'
7/// 4-	_ DEPTH TO BOTTOM OF FILTER SAM	ND
	- THICKNESS AND TYPE OF SEAL	NA
k + +	- DIMHETER AND DEPTH OF BOREHO	8" / 16'
GME CONSULTANT P.O. BOX 250 LAKE SHORI CROSBY, MINNESOTA 56	Fairfax	Oil Company , Minnesota
	JPB	MDM 8-11-93 C-2373-A

~ ~

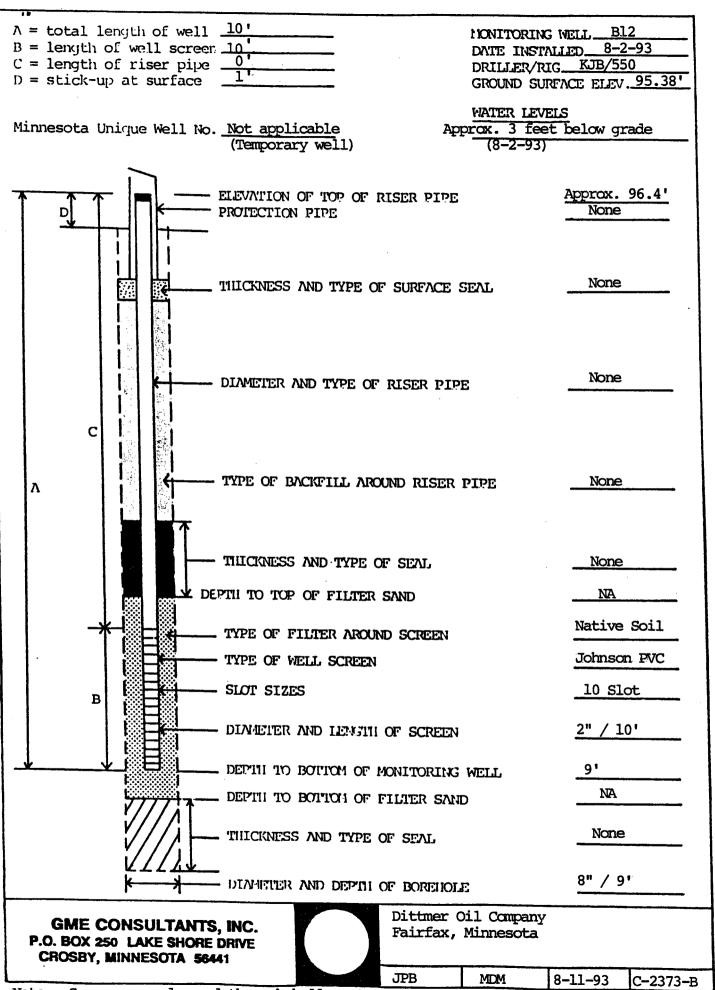
<pre>Λ = total length of well</pre>	DATE INSTALLED 5-20-93 DRILLER/RIG_KS/CME 750 GROUND SURFACE ELEV. 96.32'
Minnesota Unique Well No. 524148	WATER LEVELS 93.91' (6-17-93)
	92.50' (8-4-93)
ELEVATION OF TOP OF RISER PIP PROTECTION PIPE	5 98.24' 5 diameter steel
THICKNESS AND TYPE OF SURFACE	SEAL 2.79' neat cement
DIAMETER AND TYPE OF RISER PI	IPE 2" PVC
C TYPE OF BACKFILL AROUND RISE	
THICKNESS AND TYPE OF SEAL DEPTH TO TOP OF FILTER SAND	0.5' bentonite 3.29'
TYPE OF EXHIBIT ADDING CONTRACT	#30 Red Flint
TYPE OF FILTER AROUND SCREEN	Johnson PVC
TYPE OF WELL SCREEN	
B SLOT SIZES	10 Slot
DINAETER AND LENGTH OF SCREE	
DEPTH TO BOTTOM OF MONITORIA	WELL 13.79'
DEPTH TO BOTTOM OF FILTER ST	VID
THICKNESS AND TYPE OF SEAL	None
DIA-HETER AND DEPTH OF BOREIG	OLE 8" / 15'
	Oil Company , Minnesota MDM 8-11-93 C-2373-R
OFB	MDM 8-11-93 C-2373-B

A = total length of well 15.48' B = length of well screen 10' C = length of riser pipe 5.48' D = stick-up at surface 2.09' Minnesota Unique Well No. 524149 Minnesota Well Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Mell No. 524149 Minnesota Unique Mell No. 524149 Minnesota Unique Mell No. 524149 Minnesota Unique Mell No. 524149 Minnesota Unique Mell No. 524149 Min	1)		
B = length of well screen: 10' C = length of riser pipe 5.48' D = stick-up at surface D = stick-up at surface Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 Minnesota Unique Well No. 524149 MINNESOTA Unique Mell No. 524149 MINNESOTA Unique Mell No. 524149 MINNESOTA Unique Mell No. 524149 MINNESOTA Unique Mell No. 524149 MINNESOTA Unique Mell No. 524149 MINTESOTA Unique Mell No. 52414		MONTTORTNO	WELL MW5
C = length of riser pipe	B = length of well screen 10'		
Minnesota Unique Well No. 524149 Secult Surface ELEV. 97.96 Mater Levels 93.95' (6-17-93) 93.20' (8-4-93) ELEVATION OF TOP OF RISER PIPE ELEVATION PIPE DIAMETER AND TYPE OF SURFACE SEAL THICKNESS AND TYPE OF RISER PIPE DIAMETER AND TYPE OF RISER PIPE THICKNESS AND TYPE OF SEAL DEPTH TO TOP OF FILTER SAND TYPE OF WELL SCREEN DIAMETER AND LEVELS DIAMETER AND LEVELS DIAMETER AND LEVELS DIAMETER AND LEVELS DIAMETER AND LEVELS DIAMETER AND DEPTH OF SCREEN DIAMETER AND DEPTH OF SCREEN DIAMETER AND DEPTH OF SCREEN DIAMETER AND DEPTH OF BOREFOLE BM DIAMETE	$C = length of riser pipe \underline{5.48}'$	DRILLER/R	G KS/CME 750
Minnesota Unique Well No. 524149 93.95' (6-17-93) 93.20' (8-4-93) ELEVATION OF TOP OF RISER PIPE 100.05' 5" diameter steel THICKNESS AND TYPE OF SURFACE SEAL 2.39' neat cement THICKNESS AND TYPE OF SURFACE SEAL 2.39' neat cement THICKNESS AND TYPE OF SEAL DEPTH TO TOP OF FILTER SAND TYPE OF FILTER AND SCREEN DIAMETER AND LEVITH OF SCREEN DIAMETER AND LEVITH OF SCREEN DIAMETER AND LEVITH OF SCREEN DIAMETER AND LEVITH OF SCREEN DIAMETER AND TYPE OF SEAL DEPTH TO BOTTOM OF MONITORING WELL THICKNESS AND TYPE OF SEAL DIAMETER AND DEPTH OF SCREEN DIAMETER AND TYPE OF SEAL OBJECT TO BOTTOM OF MONITORING WELL THICKNESS AND TYPE OF SEAL DIAMETER AND DEPTH OF BOREIOLE B	D = stick-up at surface $\frac{2.09}{}$		
ELEVATION OF TOP OF RISER PIPE 100,05' 5" diameter steel	Minnesota Unique Well No. 524149		
THICKNESS AND TYPE OF SURFACE SEAL THICKNESS AND TYPE OF SURFACE SEAL THICKNESS AND TYPE OF RISER PIPE THICKNESS AND TYPE OF RISER PIPE THICKNESS AND TYPE OF SEAL THICKNESS AND TYPE OF SEAL THICKNESS AND TYPE OF SEAL THICKNESS AND TYPE OF SEAL THE OF BACKFILL AROUND RISER PIPE Neat Cement Grout THE OF BACKFILL AROUND RISER PIPE Neat Cement Grout THICKNESS AND TYPE OF SEAL THE OF FILITER AROUND SCREEN TYPE OF WELL SCREEN Johnson PVC 10 Slot DIAMETER AND LENSTH OF SCREEN DIAMETER AND DEPTH OF BOTTOM OF MONITORING WELL THICKNESS AND TYPE OF SEAL OCHOROLOGY THICKNESS AND TYPE OF SEAL DIAMETER AND DEPTH OF BOTTOME BUT OF BOTTOM OF PILITER SAND THICKNESS AND TYPE OF SEAL DIAMETER AND DEPTH OF BOTTOME BUT OF BOTTOME OF SEAL DIAMETER AND DEPTH OF BOTTOME BUT OF BOTTOME OF SEAL DIAMETER AND DEPTH OF BOTTOME BUT OF BOTTOME OF SEAL DIAMETER AND DEPTH OF BOTTOME BUT OF BOTTOME BUT OF BOTTOME OF BOTTOME BUT OF BOTTOME OF BOTTOME BUT OF BOTTOME OF BOTTOME BUT OF BOTTOME OF BOTTOME BUT OF BOTTOME OF BOTTOME BUT OF BOTTOME OF BOTTOME BUT OF BOTTOME OF BOTTOME B		93.20' (8-4-93)
DIAMETER AND TYPE OF SURFACE SEAL TYPE OF BACKFILL AROUND RISER PIPE Neat Cement Grout THICKNESS AND TYPE OF SEAL DEPTH TO TOP OF FILITER SAND TYPE OF WELL SCREEN DIAMETER AND LEWSHI OF SCREEN DIAMETER AND LEWSHI OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILITER SAND DEPTH TO BOTTOM OF FILITER SAND DEPTH TO BOTTOM OF FILITER SAND DEPTH TO BOTTOM OF FILITER SAND DEPTH TO BOTTOM OF FILITER SAND DIAMETER AND DEPTH OF SEAL None GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA \$6441		E	
TYPE OF BACKFILL AROUND RISER PIPE THECKNESS AND TYPE OF SEAL DEPTH TO TOP OF FILTER SAND TYPE OF WELL SCREEN SLOT SIZES DIAMETER AND LEWSTH OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILTER SAND TILICKNESS AND TYPE OF SEAL DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL DIAMETER AND DEPTH OF BOREHOLE BY / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	THICKNESS AND TYPE OF SURFACE	SEAL	2.39' neat cement
THE OF BACKFILL AROUND RISER PIPE Neat Cement Grout THICKNESS AND TYPE OF SEAL DEPTH TO TOP OF FILTER SAND TYPE OF FILTER AROUND SCREEN TYPE OF WELL SCREEN DIAMETER AND LENSIN OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF MONITORING WELL DIAMETER AND DEPTH OF SEAL OLIVETER AND DEPTH OF BOREHOLE BY / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441		PE	2" PVC
DEPTH TO TOP OF FILTER SAND TYPE OF FILTER AROUND SCREEN TYPE OF WELL SCREEN SLOT SIZES DIMMETER AND LEWSTH OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL DIAMETER AND DEPTH OF BOREHOLE S" / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	TYPE OF PACKETLY APOUND PLOTE	R PIPE	Neat Cement Grout
TYPE OF FILTER AROUND SCREEN TYPE OF WELL SCREEN SLOT SIZES DIAMETER AND HENGTH OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL OND OND OND OND OND OND OND ON	THICKNESS AND TYPE OF SEAL		
TYPE OF WELL SCREEN SLOT SIZES DINAETER AND LEVELL OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL OLIVIETER AND DEPTH OF BOREHOLE B" / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	DEPTH TO TOP OF FILTER SAND		2.89'
B SLOT SIZES DINABIER AND LEVELT OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL None B W / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	TYPE OF FILTER AROUND SCREEN		#30 Red Flint
DIMETER AND LENGTH OF SCREEN DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL None OLAMETER AND DEPTH OF BOREHOLE B" / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA \$6441	TYPE OF WELL SCREEN		Johnson PVC
DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF MONITORING WELL DEPTH TO BOTTOM OF FILTER SAND None None DIAMETER AND DEPTH OF BOREHOLE B" / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	B SLOT SIZES		10_Slot
DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL None DIAMETER AND DEPTH OF BOREHOLE B" / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	DIMMETER AND LEWSTH OF SCREE	N	
DEPTH TO BOTTOM OF FILTER SAND THICKNESS AND TYPE OF SEAL None BY / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	DEPTH TO BOTTOM OF MONITORIN	G WELL	13.39'
THICKNESS AND TYPE OF SEAL OLAMETER AND DEPTH OF BOREHOLE B" / 15' GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	1		15'
GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441 INC. P.O. SEAL DIAMETER AND DEPTH OF BOREHOLE B" / 15' Dittmer Oil Company Fairfax, Minnesota	DEPTH TO BOTTOM OF FILTER SA	I)D	
GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441 Dittmer Oil Company Fairfax, Minnesota	THICKNESS AND TYPE OF SEAL		None
P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	K H DIVHELEK VND DELLI OE BOKENO	DLE	8" / 15'
MDM 8-11-93 C-2373-B	P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	, Minnesota	
	JPB JPB	MOM	8-11-93 C-2373- B

17	
Λ = total length of well	MONITORING WELL, MW6
B = length of well screen 10' C = length of riser pipe 5.75'	DATE INSTALLED 5-20-93
D = stick-up at surface 2.11'	DRILLER/RIGKS/CME 750 GROUND SURFACE ELEV. 97.12
	GROUND SURFACE ELEV. 97.12.
Minnesota Unique Well No. 524150	WATER LEVELS
rithesoca unicide well No. 324130	94.04' (6-17-93)
	92.21' (8-4-93)
ELEVATION OF TOP OF RISER PIR	PE 99.23'
D PROTECTION PIPE	5" diameter steel
THICKNESS AND TYPE OF SURFACE	E SEAL 2.64' neat cement
III CAMES AND TIPE OF SURFACE	E SEAL 2.04 Heat Called
DIAMETER AND TYPE OF RISER P	TDE 2" PVC
DIVILIER AND THE OF RISER P.	IPE
TVDE OF PACTURE ADORNO DECE	Nort Court C
A TYPE OF BACKFILL AROUND RISE	R PIPE Neat Cement Grout
	·
TITOTHE AND THE STATE OF THE ST	
THICKNESS AND TYPE OF SEAL	<u>0.5' bentoni</u> te
DEPTH TO TOP OF FILTER SAND	3.14'
I I I I I I I I I I I I I I I I I I I	
TYPE OF FILTER AROUND SCREEN	N #30 Red Flint
1	
TYPE OF WELL SCREEN	Johnson PVC
B SLOT SIZES	10 Slot
DIMETER AND LENGTH OF SCREE	EN 2" / 10'
DEPTH TO BOTTOM OF MONITORIE	NG WELL13.64"
DEPTH TO BOTTOM OF FILTER S	
P///AT DEETH TO BOTTOM OF FILTER SA	VIID 70
V///I MITCHATECE AND TERMS OF STATE	None
THICKNESS AND TYPE OF SEAL	TAGIE.
<u> </u>	
BIAHETER AND DEPTH OF BOREI	OLE 8" / 16'
GME CONSULTANTS, INC. Dittmer	Oil Company
P.O. BOX 250 LAKE SHORE DRIVE Fairfax	, Minnesota
CROSBY, MINNESOTA 56441	
JPB	MDM 8-11-93 C-2373-1

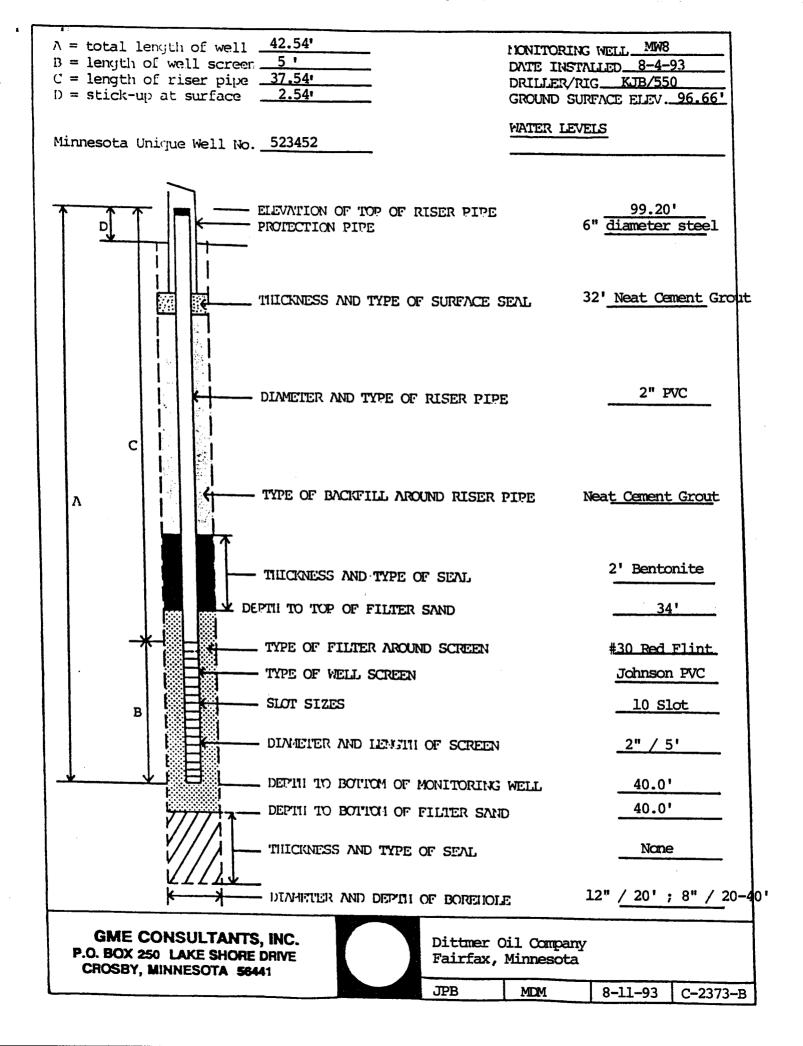


Note: Screen and riser were advanced through hollow stem auger; auger was removed; well was sampled, and screen and riser were removed 5-20-93.



Note: Screen was advanced through hollow stem auger; auger was removed; well was sampled, and screen was removed 8-2-93.

A = total length of well $B = length of well screen$ $C = length of riser pipe$ $D = stick-up at surface$ $C = length of riser pipe$	DATE INSTALLED 8-3-93 DRILLER/RIG KJB/550 GROUND SURFACE ELEV. 96.90'
Minnesota Unique Well No. 523451	WATER LEVELS 93.58' (8-4-93)
ELEVATION OF TOP OF RISER PIP PROTECTION PIPE	99.97' 6 diameter steel
THICKNESS AND TYPE OF SURFACE	SEAL Cement Grout
DIAMETER AND TYPE OF RISER PI	IPE 2" PVC
A TYPE OF BACKFILL AROUND RISE	R PIPE Neat Cement Grout
TILICINESS AND TYPE OF SEAL	l" Bentonite
	4.2'
DEPTH TO TOP OF FILTER SAND	
TYPE OF FILTER AROUND SCREEN	#30 Red Flint
TYPE OF WELL SCREEN	Johnson PVC
B SLOT SIZES	10 Slot
DIAMETER AND LENGTH OF SCREE	EN <u>2" / 10'</u>
DEP'IN TO BOTTOM OF MONITORIN	WG WELL 14.23'
DEPTH TO BOTTOM OF FILTER SA	V1D 16'
THICKNESS AND TYPE OF SEAL	NA
DIAMETER AND DEPTH OF BOREIN	OLE 8" / 16'
GME CONSULTANTS, INC. P.O. BOX 250 LAKE SHORE DRIVE CROSBY, MINNESOTA 56441	r Oil Company x, Minnesota
JPB	MDM 8-11-93 C-2373-B



Date installed

112-32-8adbbac

FREDERICKSON'S, INC.

Phone (612) 897-3111 HUTCHINSON, MINNESOTA 55350 Owner Name Fairfax Grain & Supply Co. Telephone__ Date City_Fairfax _ County XXXXXX State Minnesota Section 55332 Location If occupied by renter, list name Change of ownership, name Well diameter inside Depth of well____186 * Screen diameter 4" Length 8" Screen slot Screen fittingsturned coupling, lead water stainless steel Static level_ Pumping level 140 * ___ G. P. M. tested_ Additional information pertaining to well_ Driller Raymond O. Nass Date completed February 24, 1964 Type of pump <u>Submersible</u> Make <u>Berkeley</u> 4Am11 Model Serial No. Size of motor 5 h.p. Voltage____ 930 Pump installed by Don Length of drop pipe 126 Size and type material of drop pipe 1" galv. Total pump setting Cylinder size_ Pump rod length____ Size of tank_ _____ Air charging system_ Frost proof house_____Pitless unit size____4** Pitless make <u>Duplex</u> Pitless type_ Pitless bury depth_ tional information pertaining to pump and system_____

____ Installed by Frederick Sch's Inc.

Frederickson's, Inc. Hutchinson, Minnesota . West Fargo, North Dakota

le No		Well No			nship
FOR	MATIONS PASS	ED THRO	UGH		asnip
Kind of Formation	Color of Formation	Started at What Depth	Ended at What Depth	Total Thickness of Formation	
Soil QUIV 50	PHOCC D		2_	. 2	
" (ITUU CLAY	Yellow	2	17	15	
-OTUU CLAY	Blue	17	55	38	
- MEULI	Blue	55	77	22	
· man OFUI)	SAND SILT	77	80	3	Length 8
v. Sandy QFUU	CHAY SAND	80	136	56	11
v. Soft & Sandy	IFHIR CLY!	11P36	170	34	al Marian
· man OFILL	SAND, SIL	170	173	3	With what?
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一〇丁リン	BlueCL1Y	186	1		•
V (V 1 V)	1. 0		1 6/8	Y'	
	Aunto	Obow	- QBB	W	<u> </u>
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					Serial No
	Signed	Ray Nass		Drille	r (by
	<u></u> -	-			: pump setting
				.•	
der size	Type		_ Pump rod le	ngth	Rod size
of tank	Air	harging system	m		
. 	rost proof house		Pitless un	t size	Pitless make
ess type			truess or	. J. GENIU	



FREDERICKSONS, INC. 112-32 (65, 4;

Phone (612) 897-3111
HUTCHINSON, MINNESOTA 55350

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yan.	c+

State Minnesota Section 55332 112-32-8 AARBDB ELEVIOUS 1042-5 occupied by renter, list name name of ownership, name	
occupied by renter, list name nange of ownership, name	
occupied by renter, list name	·
occupied by renter, list name	
nange of ownership, name	
·	
ell diameter inside 5" Depth of well 183' Screen diameter	4" Length 4'
reen slot 18 Screen fittings Coupling	a de la companya de la companya de la companya de la companya de la companya de la companya de la companya de
- 1001 -	Material Everdur
atic level 42 Pumping level 120 G. P. M. tested 5	With what? air
ditional information pertaining to well 5" well with hanging shoe for 4	"_screen
	•
iller Clarence Pulkrabek Date completed July 2	1 100
Date completed July 2	1, 1961
pe of pump submersible Make Berkeley Model 4SOL10	Serial No. 6155572
e of motor 5 h.p. Voltage 230 Pur	
Pur	mp installed by <u>James Pessek</u>
agth of drop pipe126 . Size and type material of drop pipe1" galv.	Total pump setting 132°
inder size Pump rod length	Rod size
e of tank 120 gallon Air charging system Perma Pressure	TOU SIZE
Frost proof house Pitless unit size 6"	Pitless make Quplex
ess type Submersible Pitless bury depth 6	•
litional information pertaining to pump and system	-
to bank min statem	
e installed August 3, 1961 Installed by Free	derickson's Inc

Frederickson's, Inc.

Hutchinson, Minnesota

nainfa	x Grain and Sup	ply Coop.			6-22-61
ed for			1		3hip
Hole No1		Well No			·
FO!	RMATIONS PASS	ED THROU	JGH 	. = 1.1	
Kind of	Color of Formation	Started at What Depth	Ended at What Depth	Total Thickness of Formation	-
Formation		G.L.	21	21	
opsoilQUUU SOIL		21	231	211	
124 QTUU COTT	yellow	23'	1091	861	· .
Tay QTUU CUT	blue		162'	531	H'
clay, soft OTUV	blue & brown		1681	61	Length 4
Clay, hard TUU	blue	1621	1721	41	The same Children
Sand, clean FU	Colored	168	1731	1'	Vith what?
Clay QTUU CO	blue	172		10'	y "sereen
CI COULL SA	wil brown	1731	1831	91	7
Sandy	Ayblue	1831	1921		
av VIO	·		-1-010	(D)	_
Aziiler (1D-wode	50 21	8/0		F1 - 10
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					13:00
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					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
					erial No.
					- Frederickons
					127
	Sign	ed Cla	arence Pulk	rabek	Driller nump setting 3
	-			<u> </u>	Rod size
	-,	course t	and muy rou	TenRett -	·,
Size of tank	at yeurna ?	Air charging sy		unit size 6	Doolex
Size of tank	Frost proof house		Pitless	unit size6	Pitless make Day REX
it			Pitless	bury depth	C!
Pitless type	<u>a 5</u>		I ILIGO		
Additional information	pertaining to pump ar	nd system			
4					im \$Bi-//
	,	•			m Will

laste, color, erc.

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	Well 100.
WRD Exp. (M) April 1955	WELL SCHEDULE
	The community SURVACE
t. S. D OF 1107	Fill 12
MASTER CARD	This This I Date 5FR 668 was Fairfay 72 [6:5]
example Jeral	[2] 7] Court Renville
State Mir	masota
14.4	13:113 4 N Lansitudes to destres to des
<u> </u>	112 0 32 0 5 8 8 bad . Cther SER
vall marbers 1:	1 2 3 2 8 8, A Sinfax Four Mill
Loual .:se:	tairfax
	FLOUR MILLE
C3-55 OL 12-6	32 (2) Grate Azency, Water Dist
Ownership: County,	Fed Cov't, City, Corp or Co, Private, State, (N) (N) (P) (R) (C) (D) (E) (F) (H) (I) (M) (N) (P) (R) (C) (D) (E) (F) (H) (II) (M) (N) (P) (R)
(A) .	(b) Towater, Power, Fire, Day
Use of Air cone,	Bottling, Lamb (V) (V) (W) (X) (X) (X) (Y) (Y) (Y) (Y) (X) (X) (X) (X) (X) (X) (X) (X) (X) (X
Stock, In	(U) (C) (E) Desal-P S,
Use of (A) (D) (G): sain, Seismic, Reat Res, Obs, Oil-sas Beenerge, Labor Field squifer char.
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DATA AVAILABLE:	Well data 70 Freq. w/o
Hyd. lab. daca:	
	1 405
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)) post Sinish: cone	ous gravel v. States, allery, ena, (g) (T) (V)
<u>المعامد (مُ</u>	(8) (C) (D) (E) (J) (F) reverse trenching, driven, wash, other bored, cable, dug, nyd jetzed, percussion, rotary, percussion, rotary,
Drilled: rot	(8) (C) (D) avd letzed, percussion, rotary, port, soc., percussion, rotary, percussion, rotary, soc.,
<u>Date</u> Dr <u>illed:</u>	address (3) Deep
priller:	
	(a) (!) trials miliple, none, piston, to
(type): al	r. Sucket, Commy
(c <u>vpe)</u> : di	eser, elec, gas, gasoline, hand, gasewind; H.Pabove ft below LSD, Alc. MP
Descrip.	Accuracy: Fair fax 7/7
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1.

Well No.

GPO 857-700

HYDROGEOLOGIC SETTING AND GROUND WATER CONTAMINATION WORKSHEET Fact Sheet #24 Minnesota Pollution Control Agency LUST Cleanup Program April 1993

Complete this worksheet for all sites with ground water contamination. The worksheet has several purposes. It summarizes remedial investigation (RI) results and conclusions for use by Minnesota Pollution Control Agency (MPCA) staff when reviewing the site to determine whether corrective action will be required to remediate ground water contamination. It also provides supplementary information on investigation, design and reporting requirements (presented in **bold type**) for sites with groundwater contamination. Review this worksheet and all other relevant MPCA documents when developing RI work plans to ensure the investigation meets all RI requirements.

Base answers to the following questions on the results of the ground water receptor survey, RI activities, and published geologic literature. Answer the questions in the space provided, and attach additional sheets if necessary.

Include this worksheet as an appendix to the RI/corrective action design (CAD) report. RI/CAD reports submitted without this worksheet or with an incomplete worksheet will be rejected as inadequate.

LEAK # 00001940 SITE NAME Dittmer Oil Company SITE LOCATION Fairfax, Minnesota	
1. Geology. Describe the geologic units in which ground water has been impacted by the petroleum release, the thickness, and estimated lateral extent of the impacted unit.	
Geologic description: Glacial till. Fractured silty clay to approximately 2 below grade and then gray nonfractured silty clay with some sand seams.	0
Thickness of impacted unit: Approximately 200'	
Estimated lateral extent: <u>Miles in all directions</u>	
2. Aquifer parameters. At all sites with ground water monitoring wells, include an estimate of hydraulic conductivity, and provide estimates of the ground water velocity in the impacted unit. Explain how you arrived at these estimates. Also provided estimated values for porosity, flow direction, and horizontal and	

$K = \underbrace{0.022 \text{ ft/min}}_{V = \sim 1 \text{ ft/day}}$	porosity =311 flow direction: S-SE	$\frac{dh/dl = 0.011 \text{ ft/ft}}{dv/dl = }$
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vertical gradients.

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3.	<u>Maxi</u>	mum	concent	rations	(on-sit	<u>:e).</u>	Pleas	se list	the	following
maxi	mum o	cont	aminant	concent	rations	(ppb)	for	contami	nants	detected
on-s	ite:									

Benzene_11300	Total Hydrocarbons 55440 (GRO)	
(Well No.MW2 , Date6-3-93)	(Well No. MW2 , Date 6-17-93)	•

4. Maximum concentrations (off-site). Please list the following maximum contaminant concentrations (ppb) for contaminants detected off-site:

Benzene was "masked"

Benzene Ethylbenzene 5.83 Total Hydrocarbons 960 (GRO)

(Well No. B7 , Date5-20-93) (Well No. B7 , Date5-20-93)

Compound_	Benzene	(Well	No.	MW2	Date)
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- If you answered No to questions 8 AND 9, please skip to question 10 and continue.

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If you answered Yes to question 8 OR 9, AND Yes to question 5, corrective action will likely be required to remediate ground water contamination at the site. The RI report should include a proposed corrective action design to meet the following cleanup goal and compliance point.

Cleanup goal:

The RALs for volatile organic compounds (VOCs) and 1 part per million total hydrocarbons. Collect free product where technically feasible.

Compliance point: At and beyond the site boundaries.

At some LUST sites corrective actions may not be technically capable of achieving remediation to RALs. For a discussion of the options which should be considered when designing corrective actions for sites of this type please se "LUST Program Cleanup Strategy" (fact sheet #16).

Benzene,	Ethylbenzene,	Toluene,	Xylenes,
Total Hydroca	rbons		•

- If the answer to question number 11 is yes, determine and report the use category of the surface water body, in accordance with Minn. Rules ch. 7050. Call______ for help.

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Ιf	you	answ	ered	yes	to	question	12,	the	RI	report	should
chai	cacte	erize	the hy	droge	eolo	gīc condit	ions	and 1	and 1	use betw	een the
site	and	d the	surfa	ce wa	ter	body, and	sho	uld as	ssess	the po	tential
for	the	plume	to di	ischa:	rge	to surface	wat	er and	d the	e likeli	hood of
futi	re ç	ground	wate	use	in	the vicini	ity c	f the	plur	ne.	

idure ground water use in the vicinity of the plume.
13. If the impacted unit a bedrock aquifer? (Yes/No)[No]
14. Has contamination from the site impacted a quaternary surficial or buried aquifer that is presently used as a drinking water aquifer anywhere within two miles of the site? (Yes/No)
15. Uppermost drinking water aguifer.
geologic description Sand
depth to top Approximately 180'
water level
karst? (yes/no)[<u>No</u>]
sole source? (yes/no)[<u>No</u>]
16. <u>Confining unit</u> . Is there a confining unit between the impacted unit and the uppermost drinking water aquifer? (Yes/No)
If yes: thickness Approximately 180'
extentMiles
formation name or material description Glacial till (silty clay)
17. Are there any abandoned wells within approximately 1,000 feet downgradient of the site? (Yes/No)[Unkngw

If yes, describe:

Hydrogeologist Setting and Ground Water Contamination Worksheet Page 5 April 1993

18. List other site specific conditions which increase the risk of cross contamination from the impacted unit to a drinking water aguifer.

Fractures and sand seams in the till.

19. Based on the answers to questions 14 through 17 and any other site specific information available, summarize and assess the risk of cross contamination from the impacted unit to the uppermost drinking water aquifer.

The risk to wells screened 180 feet below grade would seem to be low, if the wells are properly grouted and cased.

Upon request, this document can be made available in other formats, including Braille, large print and audio tape. TDD Users, call the Minnesota State Relay Service, 612/297-5353 or Greater Minnesota TDD 1-800-627-3529.