

PHASE II ENVIRONMENTAL SITE ASSESSMENT

**The Transmission Shop
6958 Cedar Avenue South
Richfield, MN 55423**

File #2477B

August 27, 1997



1922 Helmo Avenue North
Oakdale, MN 55128
(612) 730-7886
(612) 730-7996 Fax

ENVIRONMENTAL SERVICES, INC

August 27, 1997

Mr. Roy Rytie
Dakota Bank
7055 Cahill Road
Inver Grove Heights, MN 55076

Re: Phase II Environmental Site Assessment
6958 Cedar Avenue South
Richfield, Minnesota
Concept File # 2477B

Dear Mr. Rytie:

Enclosed you will find two copies of the report summarizing the Phase II Environmental Site Assessment performed by Concept Environmental Services, Inc. and Ohman Environmental Consultants at the above referenced site.

As you are aware, the investigation resulted in the detection of gasoline contamination in two of the four soil borings performed at the site. As a result, further study is needed to determine the extent and severity of the contamination. The Minnesota Pollution Control Agency (MPCA) recognizes two varieties of remedial investigations (RI):

"Two types of RIs are used to evaluate petroleum contamination plumes: *limited site investigations (LSIs)* and *full RIs*. The purpose of a limited site investigation is to quickly evaluate the likely level of risk associated with a petroleum release site, and to identify those low risk sites that do not require further investigation or remedial actions. The LSI has five main components:

- Soil contamination assessment,
- Ground water contamination assessment,
- Water well survey,
- Vapor risk assessment, and
- Surface water contamination assessment."

"A full RI is different from a LSI in that it requires additional hydrogeologic information, including ground water monitoring data taken over a period of time. Also, full RIs should include an assessment of natural biodegradation..."

It is possible that a LSI will provide sufficient information for the MPCA to be comfortable gauging the risk factors of the site. If this is the case, considerable cost savings might be realized. A significant price difference exists between LSIs and full RIs. While a LSI might cost in the vicinity of \$4,000 to \$7,000, a full RI might cost roughly \$10,000 more. Therefore, it is our recommendation that a LSI be pursued.

However, please be aware that if certain parameters are not met, a full RI may be required by MPCA. Concept Environmental will follow this report with a proposal outlining those parameters in more detail, and a formal proposal for a LSI.

Should you have any questions regarding the contents of this report, or if we can be of further service, please call us at your convenience at 730-7886.

Sincerely,



Steven D. Carlson
Senior Environmental Specialist

Enclosures

***Environmental Site Assessment
Preliminary Subsurface Exploration***

for

***The Transmission Shop
6958 Cedar Avenue South
Richfield, MN 55423***

Submitted to

***Mr. Steve Carlson
Concept Environmental
1322 Helmo Avenue North
Oakdale, MN 55128***

August 18, 1997



OHMAN ENVIRONMENTAL CONSULTANTS

August 18, 1997

Mr. Steve Carlson
Concept Environmental
1322 Helmo Ave. North
Oakdale, MN 55128

Re: Preliminary Subsurface Exploration
The Transmission Shop, Richfield, MN

Dear Mr. Carlson:

We have completed our report for you regarding the exploratory subsurface drilling activities we conducted at The Transmission Shop, 6958 Cedar Ave. So. Within this document we also have included for you and Mr. Jensen of the Transmission Shop a brief overview of the Minnesota Pollution Control Agency (MPCA) response requirements and our suggested action plan.

The results of this subsurface exploration program directly addressed the concerns of the Phase I Property Assessment Report regarding the potential for petroleum contamination associated with the former gas station to exist on this property.

The results of this study identified elevated concentrations of petroleum contamination in the soils below the surface near the eastern border of the property where a gasoline dispenser island may have once been located.

Please contact us at 464-0188 if you have any questions or would like to discuss this report in greater detail. We look forward to the opportunity to be of continued service to you.

Sincerely,

Ross L. Ohman, PE,
President

GLOBAL ENVIRONMENTAL INNOVATION

ENVIRONMENTAL & INDUSTRIAL HYGIENE SERVICES

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OEC # 1042-0697

Transmission Shop, Richfield, MN

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1.0 INTRODUCTION

It is our understanding that the Phase I Site Assessment Report completed by Concept Environmental addressed concerns of potential contamination associated with the former gasoline service station operation at 6958 Cedar Ave. South., Richfield, MN. Therefore, a subsurface exploration program was developed for Concept Environmental intended to collect soil samples from accessible areas where petroleum contamination may still exist on the property.

Subsequent to receiving our authorization to proceed from Concept Environmental, we initiated our soil drilling activities to explore the possibilities for petroleum type contamination to exist in the ground around the former gasoline dispensing pump islands and as close as possible to the area where the former underground storage tanks allegedly where located.

2.0 BACKGROUND

The property's legal description is Lot 1, Block 1, 2nd Addition, Engberg-Waldon. This property was originally a flat low lying area comprised of organic soils such as peat and filled in with varying types of soil. According to Ms. Lisa McNamara, City of Richfield Inspections Dept., the following is a brief summary of the ownership and operation of the property:

Year of Operation	Name of Property Owner:
November, 1957	Engberg and Christian
1958	Conoco Oil
1973, Property remodeled	
1985 Building Expansion	The Transmission Shop
1985 to Present	The Transmission Shop

Based on our discussions with the neighbor living just to the west of the property, Mr. Trumen Holland; indicated that the gas station had a release of gasoline along the piping runs that ran from the tanks to the pump islands and pumps themselves sometime in the 1970's. Partial remediation was performed however, no report or records could be found to document this activity.

When the site was prepared for the new Transmission Shop building and expansion, the organic soils on the site were excavated by Bollig & Sons working for Engberg, Inc. According to the soil excavation reports completed by Subterranean Engineering Corp. black organic topsoil was excavated at depths ranging from 2 feet deep on the north end of the property to 9 feet deep at the southern edge of the new building expansion (within 5-10 ft. outside bldg. line).

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Transmission Shop, Richfield, MN
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3.0 EXPLORATION ACTIVITIES

Four (4) soil borings were placed to identify the potential for subsurface contamination to exist near the former gasoline pump islands and the former underground storage tank area. No previous reports of contamination had been documented at this site and the soil borings were conducted in general accordance with the American Society for Testing and Materials (ASTM) Auger Sampling Methods.

Four (4) inch diameter solid stem augers were advanced in five (5) foot intervals with a truck mounted CME-45 auger drill rig. Once the interlocked augers were advanced into the ground to a depth of 25 ft., the augers were vertically removed and select soil samples were collected directly off of the auger flutes.

Soil classification and general observations were recorded about the underlying soils and a composite sample was collected for laboratory testing. An HNU meter (Photoionizer Detector, PID), Petroleum Florescent Indicator (PFI) and olfactory methods were also used to quantify and qualify the potential for contamination in the soil samples.

The soil samples were chemically analyzed for contaminants typically associated with petroleum products. The chemicals tested were Benzene, Toluene, Ethylbenzene, Xylenes, and Gas Range Organics (GRO).

Upon completing the soil borings, the holes were backfilled and sealed. The dimensions used for locating the soil borings as indicted in Figure 1 of the appendix and were measured from the south west property corner marker.

The MPCA has set action levels for these chemicals as follows.

Chemical Parameter	Action Level Concentration
Benzene	0.01 ppm
Toluene	1.0 ppm
Ethylbenzene	0.7 ppm
m, p & o Xylenes	10 ppm
Gas Range Hydrocarbons (GRO)	1.0 ppm
Diesel Range Organics	1.0 ppm

Groundwater Sampling Sk-1000's

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4.0 EXPLORATION RESULTS

The soil borings one (SB-1) and two (SB-2) indicated elevated concentrations of petroleum product contamination near the eastern portion of the property. This was in the former vicinity of one of the eastern pump islands. Borings three (3) and four (4) and the quality control sample were non-detect for the same chemical contaminants.

Chemical	Soil Boring 1	Soil Boring 2	Soil Boring 3	Soil Boring 4	Field Blank
Benzene	11 ppm	29 ppm	Non Detect (ND)	ND	ND
Toluene	140 ppm	150 ppm	ND	ND	ND
Ethylbenzene	66 ppm	61 ppm	ND	ND	ND
Total Xylenes	380 ppm	222 ppm	ND	ND	ND
Gas Range Organics (GRO)	2200 ppm	990 ppm	ND	ND	ND

5.0 SUMMARY

The contamination levels indicate petroleum product contamination is present on the property. This contamination was likely the result of the marginal integrity of the pipe runs to the eastern pump island.

The full extent of the contamination is not known at this time. As indicated in Figure 1, the dissolved fraction of contamination may extend underneath Cedar Avenue to the east. The plume of gasoline hydrocarbon contamination may only extend out under the right-of-way where it may be easier to remediate if required.

Chemical contamination levels however do indicate to us an older release and therefore may have bio-degradation already acting on this contamination to minimize the environmental impacts.

This possibility for bio-degradation already taking place on the contamination may be a viable solution for the Transmission Shop. Once the MPCA has reviewed the required Limited Site Investigation (LSI) or Remedial Investigation (RI) reports for this site, the MPCA may close their file on this site and require no further action unless new information indicates otherwise.

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Transmission Shop, Richfield, MN
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5.0 DISCUSSION

The MPCCA requires the full extent horizontal and vertical of the contamination found at the site be characterized and its magnitude determined.

In the past this was accomplished by conducting a long and tedious study of the site complete with additional soil borings, monitoring wells and more chemical testing. However, in efforts to expedite the process of determining how large the contamination release is and to proceed with a clean-up plan the MPCCA has developed an alternative to beginning with a full Remedial Investigation (RI).

It is called a Limited Site Investigation (LSI) and can many times provide enough information without having to conduct a RI. The key is whether or not the ground water aquifer(s) are contaminated at concentrations at or above the MN Health Dept.'s action levels. If that is the case, then a full RI will be required as described below.

GROUND WATER CONTAMINATION ASSESSMENTS




A. Limited Site Investigations

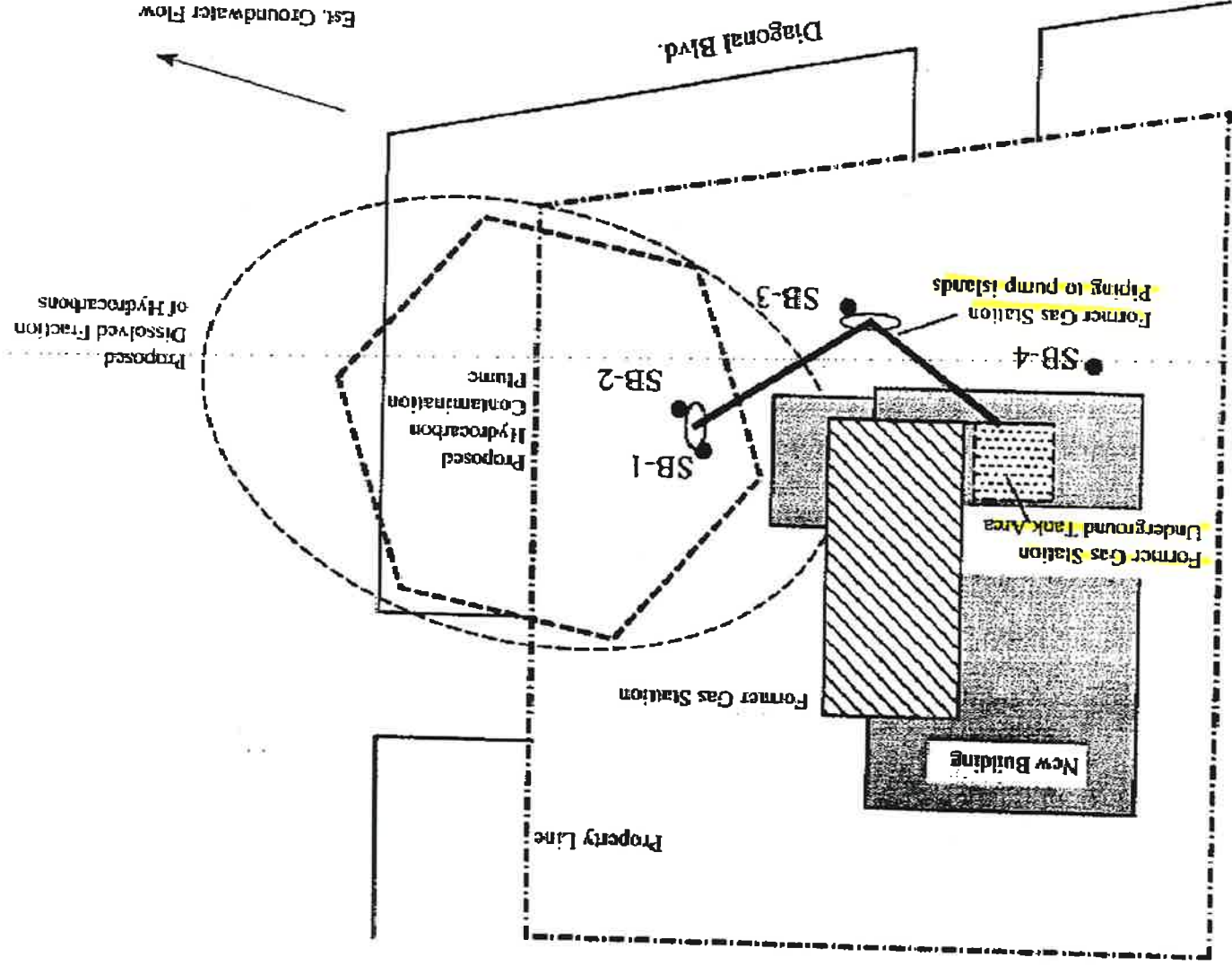
At sites where contaminated soil is in contact with ground water, or ground water contamination appears likely, a ground water contamination assessment is necessary as part of the LSI in order to determine if additional RI is necessary. If contamination levels in a resource aquifer are found to be above MDH Health Risk Limits, a full RI will be required. The minimum requirement of a LSI ground water assessment include the following:

Collect ground water samples from temporary monitoring wells (push probes or hollow stem augers). Analyze for the appropriate parameters (see fact sheet #3.23, "Ground Water Sample Collection and Analysis Procedures"). Collect and analyze ground water samples from the "worst case" temporary well and a sufficient number of other points to document contaminant concentrations and distribution at the site.

B. Full Remedial Investigations

Because monitoring data over a period of time and other hydrogeologic information will be required, monitoring wells will be needed if a full RI is performed. Following is guidance for the placement, completion and evaluation of data from monitoring wells. Guidance for assessment of natural bio-degradation is found in fact sheet #3.21, "Assessment of Natural Bio-degradation at Petroleum Release Sites").

 21190 Ideal Avenue North Forest Lake, MN 55025-9211	Prepared By: BCS Date: July 24, 1997	N 	Soil Boring Locations 	Legend 1" = 30'	Figure 1 Soil Boring Locations Bloomington Quadrangle 6958 Cedar Ave. South Richfield, MN 55423



RECEIVED

MAY 21 1998

**MPCA, HAZARDOUS
WASTE DIVISION**

**REMEDIAL INVESTIGATION REPORT
THE TRANSMISSION SHOP, INC.
RICHFIELD, MINNESOTA**

**GME PROJECT NO. 7272
MPCA LEAK NO. 10562
May 14, 1998**

GME CONSULTANTS, INC.

CONSULTING ENGINEERS

14000 21st Ave. No./Minneapolis, MN 55447

Phone (612) 559-1859 / Fax (612) 559-0720



May 14, 1998

Mr. Steve Jensen
Transmission Shop, Inc.
6958 Cedar Avenue South
Richfield, Minnesota 55423

GME Project No. 7272
MPCA Leak No. 10562

RE: Remedial Investigation Report (RI) for the Transmission Shop, Inc., located at 6958 Cedar Avenue South, Richfield, Minnesota

Dear Mr. Jensen:

We have completed our services for the above referenced project. Our RI report is attached; it was prepared on the MPCA-required form. We are submitting one copy of the RI report to you and one copy to the Minnesota Pollution Control Agency for their review.

Our initial work included drilling four soil borings and installing three shallow groundwater monitoring wells. These wells were installed on November 14 and 17, 1997, and December 1, 1997. After installation, these wells were developed and then sampled for laboratory analysis on December 15, 1997 and February 17, 1998. We also collected biodegradation data during the two sampling rounds to evaluate natural attenuation and we conducted a well receptor survey for the area. In addition, on February 17, 1998, we advanced seven geoprobes off-site and collected groundwater samples to further assess the horizontal extent of the petroleum plume.

The total petroleum hydrocarbon concentrations in the groundwater generally have been well above the MPCA action level of 1,000 parts per billion (ppb) in all three monitoring wells. However, the geoprobe groundwater samples detected no measurable levels of petroleum parameters off-site. Also, the natural attenuation data suggest that biodegradation of the contaminant plume is occurring, which would limit the plume's migration and provide contaminant mass reduction.

The well receptor survey revealed that many of the residents in the area had private wells at one time. However, all except one of these residents have capped their wells. This residence is located immediately west of the Property. The well water only is being used to water the lawn as the drinking water is supplied by the City. Also, this well is scheduled to be abandoned this year.

WILLIAM C. KWASNY, P.E.
GREGORY R. REUTER, P.E.
MARK D. MILLSOP, P.G.

THOMAS P. VENEMA, P.E.
CHARLES M. ALLGOOD, P.E.
TIMOTHY F. MCGLENNEN

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WILLIAM E. BLOEMENDAL, P.E.
MERVYN MINDESS, P.E.
STEVEN J. RUESINK, P.E.

Mr. Steve Jensen
GME Project No. 7272

2

May 14, 1998

Based on the above information and on MPCA LUST investigation and clean-up policy, continued quarterly groundwater monitoring for one year should be appropriate to confirm petroleum contaminant levels and demonstrate the plume's stability and biodegradation.

If you have questions regarding this report, please contact us.

Sincerely,

GME CONSULTANTS, INC.


Shawn W. Roskop,
Environmental Scientist



Timothy F. McGlennen
Senior Environmental Scientist/
Property Development Assistance Group Manager

Enclosure: MPCA Remedial Investigation Report

cc: Mr. Jeli Abdella, Project Manager - Minnesota Pollution Control Agency

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c:\SWRUENSEN.ltr

Remedial Investigation Report Form

Fact Sheet #3.24

April 1996

This form must be completed for all sites in which a remedial investigation (RI) is conducted--this includes either a *Limited Site Investigation (LSI)* or a *full RI*. Completing this form will provide the MPCA with the minimum amount of information necessary for a *full RI*. Additional information should be included if deemed important for making a site cleanup decision. If the consultant has concluded that a *Limited Site Investigation* is applicable to this site, Section 6 and Section 7 may be deleted from this report.

Refer to MPCA fact sheet #3.19 "Leaking Underground Storage Tank Investigation and Cleanup Policy" for guidance for the overall objectives of an RI and other MPCA fact sheets regarding investigations.

When a tank has been excavated, refer to fact sheets #3.6 "Excavation of Petroleum Contaminated Soil: and #3.7 "Excavation Report Worksheet for Petroleum Release Sites" for reporting requirements.

If free product is discovered the initial reporting should be done in accordance with fact sheet #3.3 "Free Product: Evaluation and Recovery" and fact sheet #3.4 "Free Product Recovery Report Worksheet."

Leak Number: LEAK_10562

Date: May 14, 1998

Responsible Party: Steve Jensen

R.P. phone#: (612) 861-1666

Facility Name: Transmission Shop, Inc.

Facility Address: 6958 Cedar Avenue South

City: Richfield

County: Hennepin

Zip Code: 55423

Location of site: LAT: 44.875521

LONG: 93.248014

Circle one: **State**

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Section 1: Emergency and High Priority Sites

1. Is an existing drinking water well impacted? NO
2. Are there existing vapor impacts? NO
3. Is there an existing surface water impact as indicated by 1) a product sheen on the surface water or 2) a product sheen or volatile organic compounds in the part per million range in groundwater in a well located close to the surface water. NO
4. Has the release occurred in the last 30 days? NO
5. Has free product been detected at the site? NO
6. Is sand or gravel aquifer impacted which is tapped by water wells within or potentially within 500 feet from the edge of the plume or does impacted soil overlie a Karsted limestone or fractured bedrock? If yes, explain: NO

The results of our well receptor survey have indicated that wells within 500 feet of the plume edge have been abandoned except for one which will be abandoned this year.

If you answered YES to any of questions 1 through 6 above describe below the actions taken to date to reduce or eliminate the risk posed by the release.

Section 2: Site and Release Information

2.1 Describe the land use and pertinent geographic features within 1000 feet of the site.

The gas station originally on the site was remodeled into a transmission shop in 1985. An addition to the original building has been recently constructed on the north end. The land use to the north and west is private housing. The land to the south is occupied by a large two-story apartment building followed by a small convenience store. Highway 77 is located just east of the site, followed by the Minneapolis Golf Course and Minneapolis Airport.

Table 1.

Provide the following for all tanks that have been at the site: **There are currently no known tanks on the Property.**

Tank #	UST or AST	Capacity Gallons	Contents	Age	Status*	Condition
1	UST	5000	Unknown	Unk	Removed 1984	Unknown
2	UST	5000	Unknown	Unk	Removed 1984	Unknown
3	UST	3000	Unknown	Unk	Removed 1984	Unknown
4	UST	500	Waste Oil	Unk	Removed 1984	Unknown

*Indicate: *removed (date), abandoned in place (date), or currently used*
Notes:

2.2 Describe the status of the other components of the tank system(s), (i.e., piping and dispensers) for those tanks listed above. **Unknown**

2.3 Identify and describe the source or suspected source(s) of the release.

According to a Phase II prepared by Concept Environmental Services, Inc. in August, 1997, the release was from tank piping and associated fuel pumps. This information was gathered from an adjoining neighbor to the west.

2.4 What was the volume of the release? (if known): **Unknown** _____ gallons.

2.5 When did the release occur? (if known): **During use of the tanks and dispensers from 1957 to 1984.**

Section 3: Excavated Soil Information

3.1 Was soil excavated for off-site treatment? **Unknown (Unlikely)**

There are no reports for when the tanks and pump islands were removed.

If YES then complete the fact sheet #3.7 "Excavation Report Worksheet for Petroleum Release Sites" and include it as an appendix.

Date excavated:

Volume removed:

Unknown _____ cubic yards

3.2 Indicate soil treatment type:

- land treatment
 thermal treatment
 composting/biopiling
 other (Unknown)

Name and location of treatment facility:

Section 4: Extent and Magnitude of Soil Contamination

4.1 Were soil borings conducted in or immediately adjacent to all likely source areas (e.g., UST basins, AST areas, piping, dispensers, remote fill pipes, known spill areas)? **YES**

4.2 To adequately define the vertical extent of contamination soil borings should be completed at least 5 feet below the water table or 10 feet below the deepest measurable (field screening and visual observation) contamination whichever is deeper. Were all soil borings completed to the required depth? **YES**

4.3 To adequately evaluate site stratigraphy at least one boring should be completed 20 feet below the water table, unless a confining layer is present. Was this done? **NO**

We were able to drill 12.5 feet below the groundwater table. We attempted to drill deeper during the well installation; however, artesia pressure of the water bearing sands caused the soil to rise in the augers, preventing deeper drilling. The sand is uniform and widespread, and drilling fluids should be avoided, we did not attempt to drill deeper.

If you answered NO to any of the three previous questions, explain why the borings were not conducted in the required locations or to the required depths (see fact sheet #3.19 "Soil and Groundwater Investigations Performed During Remedial Investigations" regarding exceptions and MPCA approval for depth of drilling):

4.4 Indicate the drilling method: hollow-stem auger
 sonic drilling
 push probes
 other ()

Note: contact MPCA staff hydro before use of flight augers

Table 3.

Indicate the laboratory analytical results for soil samples in mg/kg.

Well/Boring, Depth (ft)	Date Analyzed	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO
Concept Boring B-1 (20'-25')	7/15/98	11	140	66	380	2,200	N/A
Concept Boring B-2 (20'-25')	7/15/98	29	150	61	222	990	N/A
Concept Boring B-3 (25')	7/15/98	<0.2	<0.2	<0.2	<0.3	<1.0	N/A
Concept Boring B-4 (25')	7/15/98	<0.2	<0.2	<0.2	<0.3	<1.0	N/A
ME PH Trip Bank	7/15/98	<0.2	<0.2	<0.2	<0.3	<1.0	N/A
MW-2(14'-16')	12/3/97	<0.025	<0.025	<0.025	<0.025	<2.6	<3.2
MW-3(14-16')	12/3/97	<0.025	<0.025	<0.025	<0.025	<2.8	<3.2
MEOH Trip Blank	12/3/97	<0.025	<0.025	<0.025	<0.025	<2.5	N/A

Notes: (use less than symbols to show detection limits)

Table 4.

Indicate other notable contaminants (either petroleum or non-petroleum derived) detected in soil samples. Indicate contaminant and list in reported units mg/kg. N/A

Well/Boring, Depth (ft)	Date Analyzed						

Notes:

4.5 If any non-petroleum compounds were detected list them below and identify possible sources of these compounds. N/A

4.6 Describe the vertical and horizontal extent and magnitude of soil contamination.

Based on our four borings and seven Geoprobe, it appears that most of the petroleum impacts are in an area 140 feet in diameter at 17-18 feet below grade and centered around the former pump island. The highest headspace reading was measured in boring MW-3 (207ppm) at a depth of 20-22 feet below grade.

Section 5: Aquifer Characteristics/Groundwater Contamination Assessment

5.1 Indicate the hydraulic conductivity and the method used to determine it. Attach all supporting information for the determination in the Methodologies appendix:

1.0x10⁻¹ - 10x10⁻⁵ cm/sec estimate from reference (Groundwater-
(Freeze/Cherry)
 slug test
 permeability test
3.4x10⁻² cm/sec. Hazen approximation from grain-size distribution

5.2 Indicate the thickness of the aquifer. If the investigation does not provide enough information to determine the aquifer thickness, assume the aquifer is greater than 20 feet thick:

less than 10 feet
 between 10 and 20 feet
 20 feet or greater

5.3 Describe in detail the geology underlying the site including confining layers, bedrock formations and the lateral extent of these formations:

We encountered silty sands to a depth of 31 feet, the base of the deepest boring. Figure 7 presents a geologic cross-section through the site. The MGS Geologic Atlas of Hennepin County indicates that the sands extend to a depth of 150-200 feet below grade, and overlie St. Peter Sandstone.

The impacted aquifer or the aquifer that is likely to be impacted at the site is considered a resource aquifer if one of the following situations exist:

- The aquifer is a current water supply source.
- The water bearing unit has a hydraulic conductivity greater than 1×10^{-2} cm/sec and a minimum thickness of 10 feet.

- The water bearing unit has a hydraulic conductivity between 1×10^{-4} cm/sec and 1×10^{-2} cm/sec and a minimum thickness of 20 feet.

- The water bearing unit has a hydraulic conductivity less than 1×10^{-4} cm/sec and no other viable source of water supply is available. *(Bedrock may be considered a resource aquifer if it is the only water supply available)*

5.4 Based on the aquifer characteristics and water supply availability, is the aquifer at the site a resource aquifer? **YES**

5.5 If other water supplies are available, explain:

The area is serviced by municipal water and has been since the 1960's. The closest municipal well is located ~ 2 miles northwest of the site.

5.6 Are there any other reasons the impacted aquifer should not be considered a resource aquifer?

Yes. The impacted shallow aquifer is not being used as a drinking water source and it is unlikely that it will be used in the future based on the City of Richfield's existing municipal water system.

Table 5.

Indicate the water level measured in all of the soil borings.

	SOIL BORINGS			GEOPROBES							
	MW	MW	B								
	-1	-2	-4		P-1	P-2	P-3	P-4	P-5	P-6	P-7
Water Level Depth, Feet	19	17.5	17	17.5	21	20	20	20	20	22	20

CONCEPT BORINGS				
	B-1	B-2	B-3	B-4
Water Level Depth Feet	22	---	---	---

Notes: --- = No water level indicated

5.7 Is contaminated soil in contact with groundwater?

YES

If YES or if groundwater contamination appears likely then complete tables 6 and 7 below.

Table 6.

Indicate the laboratory analytical results for water samples collected from the borings, temporary wells or push probes.

Well/Boring Number	Date Analyzed	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylene (ppb)	GRO (ppb)	DRO (ppb)
P-1*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***
P-1	2/27/98	<1.0	<1.0	<1.0	<1.0	<50	<120
P-2*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***
P-3*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***
P-4*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***
P-5*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***
P-6*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***
P-6	2/27/98	<1.0	<1.0	<1.0	1.4	<50	<100
P-7*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***
P-7	2/27/98	<1.0	<1.0	<1.0	<1.0	<50	<100
Trip Blank	12/27/97	<1.0	<1.0	<1.0	<1.0	<50	---
Trip Blank	2/27/98	<1.0	<1.0	<1.0	<1.0	<50	---
PQL Trip Blank*	2/17/98	<1.0	<1.0	<1.0	<1.0	<100**	<250***

Notes:

* = Geoprobe On-site Laboratory Results

** = TPH as GRO

*** = TPH as Fuel Oil

Duplicate samples for P-1, P-6 and P-7 were analyzed by EnChem, Inc.

Table 7.

Indicate other notable contaminants (either petroleum or non-petroleum derived) detected in water samples collected from the borings, temporary wells or push probes. Indicate contaminant and report in units of ug/l(ppb). N/A

PETROLEUM COMPOUNDS					

Notes:

5.8 If any non-petroleum compounds were detected list them below and indicate whether they exceed the HRLs. Also, identify possible sources of these compounds. NA

5.9 If contaminated soil is not in contact with groundwater, what is the distance separating the deepest contamination from the surface of the water table? Was this distance measured during site activities, referenced from geologic information, or estimated based on professional opinion during a site visit? N/A feet

5.10 Describe observations of any evidence of a fluctuating water table and a seasonal high water table (e.g., mottling). Also, from other sources of information describe the range of natural water table fluctuations in the area. **We observed no groundwater mottling in the soil samples.**

5.11 In your judgement, is there a sufficient distance separating the petroleum contaminated soil (or an impacted non-resource aquifer) from the underlying resource aquifer to prevent petroleum contamination of the resource aquifer? Please explain in detail. In your explanation consider the data and information of this section as well as the nature of the petroleum release (i.e., volume, when it occurred, petroleum product).

YES

According to a Phase II prepared by Concept Environmental Services, Inc., in 1997, the release occurred sometime in the 1970's. Although the soils in the area are sands, it is unlikely that the petroleum would migrate deeper into the water table aquifer or into a deeper aquifer, because of the natural upward gradients and the apparent lack of nearby pumping wells. The surrounding area is older established houses serviced by a municipal well located approximately 2 miles to the northwest and is set in a Quaternary buried artesian aquifer. It is unlikely this well would influence the horizontal migration of the dissolved petroleum, because of its distance from the site.

Additional Groundwater Investigation

Complete Section 6 and Section 7 only if: 1) a resource aquifer has been impacted at or above Minnesota Department of Health Risk Limits (HRLs), 2) a resource aquifer has been impacted below the HRLs, but the levels are likely to reach the HRLs, or 3) there is an insufficient distance separating the petroleum contaminated soil (or an impacted non-resource aquifer) from the underlying resource aquifer. Regardless of whether you are submitting a Limited Site Investigation or a full RI, all sections following Section 7 must be completed.

Section 6. Extent and Magnitude of Groundwater Contamination

Monitoring well construction.

Table 8.

Well Number	Unique Well Number	Date Installed	Relative Surface Elevation	Riser Height Above Grade	Bottom of Well (Elev.)	Screen Interval (Elev.- Elev.)	Top of Casing Elev.
MW-1	587476	12/1/97	100.0	at grade	76.98	76.98-86.98	99.99
MW-2	587477	11/14/97	98.2	3.1	75.17	75.17-85.17	101.25
MW-3	587478	11/17/97	99.2	1.2	76.18	76.18-86.18	100.41

Notes:

A fire hydrant located at the corner of Diagonal Boulevard and Cedar Avenue South was used as a benchmark (assigned elevation 100.00) (See Figure 2)

Table 9.

Water table summary.

Well Number	Date	Depth of Water from Top of Casing	Product Thickness	Depth of Water Below Grade	Relative Groundwater Elevation
MW-1	12/15/97	18.64	None	18.6	81.35
	2/17/98	19.16	None	19.2	80.83
MW-2	12/15/97	19.94	None	16.9	81.31
	2/17/98	20.49	None	17.4	80.76
MW-3	12/15/97	19.04	None	17.8	81.37
	2/17/98	19.58	None	18.4	80.83

Notes: (GW above/below screen, etc.)

6.1 Were any deep monitoring wells completed at the site?

NO

If YES, which are deep wells?

Before a deep well is installed contact the MPCA project hydrologist for guidance on its necessity and placement. A deep monitoring well may be necessary if 1) contamination exist more than 10 feet below the water table or 2) the impacted aquifer is a resource aquifer or is hydraulically connected to a resource aquifer presently utilized by a water supply well located within 500 feet of the site.

Provide estimates of the following additional aquifer parameters:

Horizontal Gradient (dh/dl): 0.0012 ⁿ/ft = 0.00037 m/m

Vertical Gradient (dv/dl): Not Assessed

Porosity: 30% (estimate)

Flow direction: Southeasterly

Hydraulic Conductivity (K) 3.4×10^{-4} meters/second

Pore velocity: 13 meters/year

Table 10.

All groundwater monitoring data should be collected from a minimum of *two quarterly sampling events*.

Indicate the laboratory analytical results for water samples.

Well #	Date	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO
MW-1	12/27/97	<2.0	82	140	730	1600	500
	2/27/97	<1.0	1.8	18	68.7	200	170
MW-2	12/27/97	2200	1600	410	1,650	9200	2500
	2/27/98	9600	15000	1900	9,400	47000	4000
MW-3	12/27/97	74	1200	620	4,200	13000	3400
	2/27/98	250	3600	1100	7,700	20,000	3700

Notes: (e.g., free product, dry well, units, etc.)

Table 11.

Indicate other notable contaminants (either petroleum or non-petroleum derived) detected in water samples.

PETROLEUM COMPOUNDS	MW-1 (12/27/97)	MW-2 (12/27/97)	MW-3 (12/27/97)	MW-1 (2/27/98)	MW-2 (2/27/98)	MW-3 (2/27/98)	HRL
n-Butylbenzene	<2.0	<20	56	<1.0	<100	54	NE
TSO	8.2	40	61	1.7	<100	69	300
Opopylbenzene							
Naphthalene	42	190	270	5.8	400	350	300
n-Propylbenzene	21	53	190	3.6	180	180	NE
1,2,4 Trimethylbenzene	180	310	1400	23	1400	1700	NE
1,3,5 Trimethylbenzene	47	100	360	8.9	370	430	NE
1,2 Dichloroethane	<2.0	97	<10	<1.0	<100	<25	4
s-Butylbenzene	<2.0	<20	14	<1.0	<100	<25	NE
Tetrachloroethene	<2.0	<20	<10	1.8	<100	<25	NE
Dissolved Lead	NA	NA	NA	<4.9	<4.0	5.6	

Notes: NA = Not Analyzed for this Parameter

NE = Non established

6.2 If any non-petroleum compounds were detected list them below and indicate whether they exceed the HRLs. Also, identify possible sources of these compounds.

No non-petroleum compounds were confirmed; tetrachloroethene was detected at a low level only once in MW-1.

6.3 Is there a clean or nearly clean (below HRLs) downgradient monitoring well located along the longitudinal axis of the contaminant plume?
(approximately 20 degrees plus or minus the axis) **NO**

However, downgradient geoprobes showed no detections south of petroleum parameters.

6.4 Is there a worst case well completed through the source area of the release? **YES**

If you have answered NO to any of the above three questions, please explain why a well was not completed in the required location.

6.5 Provide an estimate of the longitudinal length of the dissolved contaminant plume: **Est. 140** feet

6.6 Describe the extent and magnitude of the groundwater contamination:

It appears from geoprobe data that the petroleum impacts do not extend beyond Cedar Avenue or Diagonal Boulevard. Also, no impacts were detected on the north part of this site. The highest petroleum levels were in monitoring well MW-2, located downgradient of the former tank and pump islands.

Section 7: Evaluation of Natural Attenuation

Table 12.

Complete the bioactivity data in the table below. Data should be from two quarterly rounds of sampling. Refer to the fact sheet #3.21 "Assessment of Natural Biodegradation at Petroleum Tank Release Sites: for acceptable methodologies and indicate the chosen method in the Methodologies appendix.

Monitoring Well	Date Signed	Temp. °C	pH	Dissolved Oxygen (mg/l)	Nitrate (mg/l)	(Fe II) (mg/l)	(H ₂ S, HS) (mg/l)
MW-1	12/15/97	14.0	7.01	0.93	0	10+	0
	2/17/98	13.0	6.54	1.03	0.1	3	0
MW-2	12/15/97	14.3	6.77	1.06	0	10+	0
	2/17/97	12.7	6.92	0.45	0	10+	0
MW-3	12/15/97	12.8	7.35	1.04	5+	10+	0
	2/17/97	12.3	7.08	0.98	1.5	10+	0

Notes:

7.1 Discuss the results of the bioactivity evaluation. Specifically, compare the concentrations of the inorganic parameters inside and outside the plume.

The bioactivity results support the assumption that natural biodegradation likely is occurring. The temperature (12° to 14°C) and PH values are optimal for degradation, and there is an abundant hydrocarbon supply at each well location. Dissolved oxygen (DO) and nitrate levels are low and ferrous iron levels are high. Although there are no wells outside of the plume for comparison data, the data from the impacted wells are indicative of anaerobic activity. The low sulfide levels may indicate that the other terminal electron acceptors are abundant and that sulfates are not yet necessary, as it is near the end of a series of compounds GME CONSULTANTS, INC. which are utilized as electron receptors.

7.2 In your judgement, is natural biodegradation occurring at this site? Please explain. YES

Based on the data above, indicating optimal conditions, we assume that biodegradation is occurring anaerobically within the petroleum plume, and likely aerobically along the margins of the plume. The sandy soils should be conducive to oxygen transport and there is an abundant petroleum hydrocarbon food supply. Additionally, the off-site sampling results have shown no petroleum detection.

Section 8: Well Receptor Information/Assessment

Include in the appendices of this report: 1) a list of addresses within 500 feet from the edge of the plume and confirmation of status of water supply from the city utility billing department; 2) well logs; and 3) map showing 1/2 mile radius, 500 foot radius, water supply wells, other potential petroleum sources, and addresses for properties within 500 feet.

Table 13.

Complete the following table for all water supply wells located within 500 feet of the edge of the plume and any municipal or industrial wells found within 1/2 mile.

Unique Well#	Ground Elevation	Total Depth (ft)	Base of Casing (ft)	Static Elevation	Aquifer	Use	Owner	Distance & Direction from site
218119	852	50	47	35	Quat	Dom	---	100' north
---	---	48	48	--	--	Dom	Truman Hollard	100' west

Notes:

- 8.1 Is municipal water available in the area? YES
- 8.2 Were all property owners within 500 feet of the nearest edge of the contaminant plume successfully contacted to determine if water wells are present? If NO, please explain. YES

8.3 Discuss the results of the groundwater receptor survey and any analytical results from sampling conducted at nearby water wells. Comment on the risks to water supply wells identified within 500 feet from the edge of the plume as well as the risk posed by or to any municipal or industrial wells found within 1/2 mile. Specifically indicate whether water supply wells identified utilize the impacted aquifer. (Note: an impacted aquifer separated from another aquifer by a clay lens is not considered a separate aquifer.)

The results of our groundwater receptor survey have indicated that many of the houses in the area had wells at one time; however, these wells have been abandoned except for the one at 7005 18th Avenue, located approximately 100 feet west of the plume. The resident has indicated that this well is only used for lawn watering and that potable

water is supplied from the City. The resident has also indicated that the well will be abandoned this year.

8.4 Are there any plans for groundwater development in the impacted aquifer within 1/2 mile of the site, or one mile downgradient of the site if the aquifer is fractured? Please give the name, title and phone number of the person that was contacted for this information. NO

Mr. George Atkinson - City Engineering Supervisor Phone 861-9191

Section 9: Surface Water Risk Assessment

9.1 Are there any surface waters or wetlands located with 1/4 mile of the site? NO

If YES, indicate its name: _____

9.2 If surface water is present downgradient of the site, is there a clean down gradient soil boring or monitoring well located between the site and the surface water? N/A

If NO, we assume that contamination discharges to surface water. Therefore, complete the following information.

Name of receiving water: _____

Plume width, (W): _____ feet

Plume thickness, (H): _____ feet

Hydraulic conductivity, (K): _____ gal/day/ft²

Horizontal gradient, (dh/dl): _____ unitless

Discharge, (Q) = $H*W*K*(dh/dl)/1440$ _____ gal/min

If YES, identify them and indicate the distance to these features and discuss the contamination risk potential.

Section 10: Vapor Risk Assessment/Survey

10.1 Is there a history of vapor impacts in the vicinity of the site? NO

If YES, describe:

10.2 Is there any indication that free product or highly contaminated groundwater may be traveling off-site within the utility corridors? If YES, have they been investigated with borings or push probes? **NO**

10.3 Discuss the potential for vapor migration/accumulation near the site. In your discussion consider: soil types, product types, presence and distribution of free product or high concentrations of dissolved product. Also, compare the depth of contamination with the location of underground utility lines, location and depth of storm and sanitary sewers and location of nearby basements.

The potential for vapor migration acculation appears low. The area soils are sandy and preferential pathway migration of possible vapors in utility line backfill is unlikely.

If the vapor risk assessment indicated a risk of vapor impacts to buildings or utilities, complete the following table with vapor monitoring data collected. Location numbers should be mapped on an accompanying figure of the surveyed data.

Table 14.

Location	Date Sampled	PID reading (ppm)	Percent of LEL
SS-1	3/11/98	0.0	0
SS-2	3/11/98	0.0	0
SS-3	3/11/98	0.0	0
SS-4	3/11/98	0.1	0
SS-5	3/11/98	0.0	0
SS-6	3/11/98	0.0	0
SS-7	3/11/98	0.0	0
MH-1	3/11/98	0.0	0
MH-2	3/11/98	0.0	0

Notes: SS = Storm Sewer

MH = Manhole Sanitary Sewer

10.4 Describe and interpret the results of the vapor survey.

We measured no elevated vapor readings in the utility manholes and catch basins located in the surrounding streets within 200 feet of the site (Figure 2).

Section 11: Discussion

11.1 Discuss the risks associated with the remaining soil contamination:

Impacted soils remain on-site at depths well below future shallow footings or typical

basements. The recent construction on-site did not report any contact with impacted soils. It is unlikely that the deeper impacted soils would be excavated for a future construction.

Petroleum remains in the soil and will continue to leach into the groundwater. However, the sandy soils are conducive to biodegradation and petroleum was not detected in the groundwater off-site, across the roadways. The site is covered by new bituminous pavement and the building. This cover will inhibit water infiltration and leaching of the petroleum from the soils.

11.2 Discuss the risks associated with the impacted groundwater:

It appears that the plume generally is limited to the site and is unlikely to be traveling in shallow utility corridors. Downgradient geoprobe water samples did not detect contaminants in the groundwater approximately 100 feet from the edge of the Property.

Although elevated petroleum levels exist, the bioactivity data suggests that natural attenuation is occurring. No municipal wells or private residential potable wells were identified in the area, and the area is serviced by municipal water and sewer. The surficial impacted aquifer is not used as a resource aquifer.

11.3 Discuss other concerns not mentioned above:

None

Section 12: Conclusions and Recommendations

Recommendations for site: ___ site closure
 ___ additional vapor monitoring
 ___ additional groundwater monitoring
 ___ active cleanup

The recommendations above should be based on fact sheet #3.1 "Leaking Underground Storage Tank Investigation and Cleanup Policy." Describe below how you applied the policy to support your recommendation.

We recommend initiating quarterly groundwater monitoring to further assess the plume's stability and evaluate petroleum concentrations. Data to date indicates that the estimated plume length is less than 200 feet. The total petroleum hydrocarbon concentrations have generally been well above the MPCA action levels on-site. However, groundwater samples collected off-site and downgradient detected no petroleum hydrocarbons, indicating that the plume attenuates just off-site in the road right-of-ways. The bioactivity data supports that natural biodegradation is occurring and sandy soils are conducive to biodegradation. Based on the above information and on the MPCA LUST Investigation and Cleanup Policy, and because ^{GWKS CONSULTANTS, INC.} the source tanks and pump islands have been removed, continued monitoring appears to be

appropriate.

If additional monitoring is recommended, indicate the proposed monitoring schedule and frequency: If active cleanup is proposed then MPCA staff will review this remedial investigation report at a higher than normal priority to determine if active cleanup is required. We will respond with either a request for proposal for additional monitoring or a corrective action design report. Please indicate below what cleanup technology you are considering at this time.

We recommend quarterly groundwater monitoring for one year, at which time the site will be evaluated and recommendations made for additional monitoring, additional investigation work, action cleanup, or site closure.

Section 13: Figures

Indicate attached figures:

- Figure 1, 5:** Site location map (*approximate scale is not acceptable*) and a large scale site map show all potential receptors within 300 feet of the site. The large scale site map should show those properties with basements and wells.
- Figure 2:** One or more site maps showing: structures; all past and present petroleum storage tanks, piping, and dispensers; extent of soil excavation; boring and well locations (including any drinking water wells on site); horizontal extent of soil contamination; horizontal extent of groundwater contamination; and location of end points for all geologic cross sections.
- Figure 3, 4:** Groundwater gradient contour maps (for sites with monitoring wells).
- Figure 5:** Well receptor survey map showing 1/2 mile radius, 500 foot radius, water supply wells, other potential sources of contamination.
- Figure 2:** Vapor survey map showing utilities and buildings with basements and monitoring locations (if a survey was required).
- Figure 6,F:** Geologic cross sections.

Section 14: Appendices

Indicate attached appendices.

- X *Appendix A* Concept Phase II Environmental Site Assessment.
- X *Appendix B* Laboratory analytical reports for soil and groundwater.
- X *Appendix C* Methodologies and procedures, including field screening of soil, other field analyses, soil boring, soil sampling, well installation, and water sampling.
- X *Appendix D* Geologic logs for each well or boring using attached template.
- X *Appendix E* Well construction diagrams and copies of the Minnesota Department of Health Well Record using attached template.
- X *Appendix F* Copies of water supply well logs with legible unique numbers.
- X *Appendix G* A list of addresses within 500 feet from the edge of the plume and confirmation of status of water supply from the city utility billing department.
- X *Appendix H* GME General Qualifications

Section 15: Consultant Information

Name and Title:

Shawn Roskop

Timothy F. McGlennen

Mark D. Millsop

Signature:

Shawn W. Roskop

Timothy F. McGlennen

Mark Millsop

Date signed:

5/19/98

5/19/98

5/19/98

Company and mailing address:

GME Consultants, Inc.

14000 - 21st Avenue N.

Plymouth, MN 55447

Phone:

(612) 559-1859

Fax:

(612) 559-7520

Upon request, this document can be made available in other formats, including Braille, large print and audio tape. TTY users call 612/282-5532 or Greater Minnesota 1-800-657-3864.

FIGURES

Figure 1: Regional Location Diagram

Figure 2: Site Map

Figure 3: Inferred Groundwater Flow Map (12/15/97)

Figure 4: Inferred Groundwater Flow Map (2/17/98)

Figure 5: Well Receptor Survey

Figure 6: A-A Geologic Cross Section

Figure 7: Geologic Cross Section

APPENDIX A

PHASE II ENVIRONMENTAL SITE ASSESSMENT

PHASE II ENVIRONMENTAL SITE ASSESSMENT

**The Transmission Shop
6958 Cedar Avenue South
Richfield, MN 55423**

File #2477B

August 27, 1997



1322 Helmo Avenue North
Oakdale, MN 55128
(612) 730-7886
(612) 730-7996 Fax

August 27, 1997

Mr. Roy Rytie
Dakota Bank
7055 Cahill Road
Inver Grove Heights, MN 55076

Re: Phase II Environmental Site Assessment
6958 Cedar Avenue South
Richfield, Minnesota
Concept File # 2477B

Dear Mr. Rytie:

Enclosed you will find two copies of the report summarizing the Phase II Environmental Site Assessment performed by Concept Environmental Services, Inc. and Ohman Environmental Consultants at the above referenced site.

As you are aware, the investigation resulted in the detection of gasoline contamination in two of the four soil borings performed at the site. As a result, further study is needed to determine the extent and severity of the contamination. The Minnesota Pollution Control Agency (MPCA) recognizes two varieties of remedial investigations (RI):

“Two types of RIs are used to evaluate petroleum contamination plumes: *limited site investigations (LSIs)* and *full RIs*. The purpose of a limited site investigation is to quickly evaluate the likely level of risk associated with a petroleum release site, and to identify those low risk sites that do not require further investigation or remedial actions. The LSI has five main components:

- Soil contamination assessment,
- Ground water contamination assessment,
- Water well survey,
- Vapor risk assessment, and
- Surface water contamination assessment.”

“A full RI is different from a LSI in that it requires additional hydrogeologic information, including ground water monitoring data taken over a period of time. Also, full RIs should include an assessment of natural biodegradation...”

It is possible that a LSI will provide sufficient information for the MPCA to be comfortable gauging the risk factors of the site. If this is the case, considerable cost savings might be realized. A significant price difference exists between LSIs and full RIs. While a LSI might cost in the vicinity of \$4,000 to \$7,000, a full RI might cost roughly \$10,000 more. Therefore, it is our recommendation that a LSI be pursued.

However, please be aware that if certain parameters are not met, a full RI may be required by MPCA. Concept Environmental will follow this report with a proposal outlining those parameters in more detail, and a formal proposal for a LSI.

Should you have any questions regarding the contents of this report, or if we can be of further service, please call us at your convenience at 730-7886.

Sincerely,



Steven D. Carlson
Senior Environmental Specialist

Enclosures

*Environmental Site Assessment
Preliminary Subsurface Exploration*

for

*The Transmission Shop
6958 Cedar Avenue South
Richfield, MN 55423*

Submitted to

*Mr. Steve Carlson
Concept Environmental
1322 Helmo Avenue North
Oakdale, MN 55128*

August 18, 1997



OHMAN ENVIRONMENTAL CONSULTANTS

August 18, 1997

Mr. Steve Carlson
Concept Environmental
1322 Helmo Ave. North
Oakdale, MN 55128

Re: Preliminary Subsurface Exploration
The Transmission Shop, Richfield, MN

Dear Mr. Carlson:

We have completed our report for you regarding the exploratory subsurface drilling activities we conducted at The Transmission Shop, 6958 Cedar Ave. So. Within this document we also have included for you and Mr. Jensen of the Transmission Shop a brief overview of the Minnesota Pollution Control Agency (MPCA) response requirements and our suggested action plan.

The results of this subsurface exploration program directly addressed the concerns of the Phase I Property Assessment Report regarding the potential for petroleum contamination associated with the former gas station to exist on this property.

The results of this study identified elevated concentrations of petroleum contamination in the soils below the surface near the eastern border of the property where a gasoline dispenser island may have once been located.

Please contact us at 464-0188 if you have any questions or would like to discuss this report in greater detail. We look forward to the opportunity to be of continued service to you.

Sincerely,

Ross L. Ohman, PE_w
President

GLOBAL ENVIRONMENTAL INNOVATION

ENVIRONMENTAL & INDUSTRIAL HYGIENE SERVICES

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1.0 INTRODUCTION

It is our understanding that the Phase I Site Assessment Report completed by Concept Environmental addressed concerns of potential contamination associated with the former gasoline service station operation at 6958 Cedar Ave. South., Richfield, MN. Therefore, a subsurface exploration program was developed for Concept Environmental intended to collect soil samples from accessible areas where petroleum contamination may still exist on the property.

Subsequent to receiving our authorization to proceed from Concept Environmental, we initiated our soil drilling activities to explore the possibilities for petroleum type contamination to exist in the ground around the former gasoline dispensing pump islands and as close as possible to the area where the former underground storage tanks allegedly were located.

2.0 BACKGROUND

The property's legal description is Lot 1, Block 1, 2nd Addition, Engberg-Waldon. This property was originally a flat low lying area comprised of organic soils such as peat and filled in with varying types of soil. According to Ms. Lisa McNamara, City of Richfield Inspections Dept., the following is a brief summary of the ownership and operation of the property.

Year of Operation	Name of Property Owner:
November, 1957	Engberg and Christian
1958	Conoco Oil
1973, Property remodeled	
1985 Building Expansion	The Transmission Shop
1985 to Present	The Transmission Shop

Based on our discussions with the neighbor living just to the west of the property, Mr. Trumen Holland; indicted that the gas station had a release of gasoline along the piping runs that ran from the tanks to the pump islands and pumps themselves sometime in the 1970's. Partial remediation was performed however, no report or records could be found to document this activity.

When the site was prepared for the new Transmission Shop building and expansion, the organic soils on the site were excavated by Bollig & Sons working for Engberg, Inc. According to the soil excavation reports completed by Subterranean Engineering Corp. black organic topsoil was excavated at depths ranging from 2 feet deep on the north end of the property to 9 feet deep at the southern edge of the new building expansion (within 5-10 ft. outside bldg. line).

3.0 EXPLORATION ACTIVITIES

Four (4) soil borings were placed to identify the potential for subsurface contamination to exist near the former gasoline pump islands and the former underground storage tank area. No previous reports of contamination had been documented at this site and the soil borings were conducted in general accordance with the American Society for Testing and Materials (ASTM) Auger Sampling Methods.

Four (4) inch diameter solid stem augers were advanced in five (5) foot intervals with a truck mounted CME-45 auger drill rig. Once the interlocked augers were advanced into the ground to a depth of 25 ft., the augers were vertically removed and select soil samples were collected directly off of the auger flutes.

Soil classification and general observations were recorded about the underlying soils and a composite sample was collected for laboratory testing. An HNU meter (Photoionizer Detector, PID), Petroleum Florescent Indicator (PFI) and olfactory methods were also used to quantify and qualify the potential for contamination in the soil samples.

The soil samples were chemically analyzed for contaminants typically associated with petroleum products. The chemicals tested were Benzene, Toluene, Ethylbenzene, Xylenes, and Gas Range Organics (GRO).

Upon completing the soil borings, the holes were backfilled and sealed. The dimensions used for locating the soil borings as indicted in Figure 1 of the appendix and were measured from the south west property corner marker.

The MPCA has set action levels for these chemicals as follows.

Groundwater Drinking Standards

Chemical Parameter	Action Level Concentration
Benzene	0.01 ppm
Toluene	1.0 ppm
Ethylbenzene	0.7 ppm
m, p & o Xylenes	10 ppm
Gas Range Hydrocarbons (GRO)	1.0 ppm
Diesel Range Organics	1.0 ppm

4.0 EXPLORATION RESULTS

The soil borings one (SB-1) and two (SB-2) indicated elevated concentrations of petroleum product contamination near the eastern portion of the property. This was in the former vicinity of one of the eastern pump islands. Borings three (3) and four (4) and the quality control sample were non-detect for the same chemical contaminants.

Chemical	Soil Boring 1	Soil Boring 2	Soil Boring 3	Soil Boring 4	Field Blank
Benzene	11 ppm	29 ppm	Non Detect (ND)	ND	ND
Toluene	140 ppm	150 ppm	ND	ND	ND
Ethylbenzene	66 ppm	61 ppm	ND	ND	ND
Total Xylenes	380 ppm	222 ppm	ND	ND	ND
Gas Range Organics (GRO)	2200 ppm	990 ppm	ND	ND	ND

5.0 SUMMARY

The contamination levels indicate petroleum product contamination is present on the property. This contamination was likely the result of the marginal integrity of the pipe runs to the eastern pump island.

The full extent of the contamination is not known at this time. As indicated in Figure 1, the dissolved fraction of contamination may extend underneath Cedar Avenue to the east. The plume of gasoline hydrocarbon contamination may only extend out under the right-of-way where it may be easier to remediate if required.

Chemical contamination levels however do indicate to us an older release and therefore may have bio-degradation already acting on this contamination to minimize the environmental impacts.

This possibility for bio-degradation already taking place on the contamination may be a viable solution for the Transmission Shop. Once the MPCA has reviewed the required Limited Site Investigation (LSI) or Remedial Investigation (RI) reports for this site, the MPCA may close their file on this site and require no further action unless new information indicates otherwise.

5.0 DISCUSSION

The MPCA requires the full extent horizontal and vertical of the contamination found at the site be characterized and its magnitude determined.

In the past this was accomplished by conducting a long and tedious study of the site complete with additional soil borings, monitoring wells and more chemical testing. However, in efforts to expedite the process of determining how large the contamination release is and to proceed with a clean-up plan the MPCA has developed an alternative to beginning with a full Remedial Investigation (RI).

It is called a Limited Site Investigation (LSI) and can many times provide enough information without having to conduct a RI. The key is whether or not the ground water aquifer(s) are contaminated at concentrations at or above the MN Health Dept.'s action levels. If that is the case, then a full RI will be required as described below.

GROUND WATER CONTAMINATION ASSESSMENTS

A. Limited Site Investigations

At sites where contaminated soil is in contact with ground water, or ground water contamination appears likely, a ground water contamination assessment is necessary as part of the LSI in order to determine if additional RI is necessary. If contamination levels in a resource aquifer are found to be above MDH Health Risk Limits, a full RI will be required. The minimum requirement of a LSI ground water assessment include the following:

Collect ground water samples from temporary monitoring wells (push probes or hollow stem augers). Analyze for the appropriate parameters (see fact sheet #3.23, "Ground Water Sample Collection and Analysis Procedures"). Collect and analyze ground water samples from the "worst case" temporary well and a sufficient number of other points to document contaminant concentrations and distribution at the site.

B. Full Remedial Investigations

Because monitoring data over a period of time and other hydrogeologic information will be required, monitoring wells will be needed if a full RI is performed. Following is guidance for the placement, completion and evaluation of data from monitoring wells. Guidance for assessment of natural bio-degradation is found in fact sheet #3.21, "Assessment of Natural Bio-degradation at Petroleum Release Sites").

Monitoring well placement

Worst case monitoring wells: A monitoring well should be completed in or immediately adjacent to all likely source areas (e.g., underground storage tank basins, aboveground storage tank areas, lines, pump islands, remote fill pipes, known spill areas).

Lateral and down gradient monitoring wells: Monitoring wells should be placed lateral to and down gradient from the source area(s) such that they define the margins of the contamination plume.

Off site monitoring wells: If difficulty is encountered in securing access to off site monitoring well locations, contact the MPCA project manager for assistance. However, prior to contacting the MPCA, a minimum of two written attempts should be made to secure access.

Deep wells - vertical definition of ground water contamination: A deep monitoring well may be required if soil borings show that petroleum contamination, as measured with your field instrument, occurs at a depth greater than five feet below the water table. Before a deep well is installed, contact the MPCA project Hydrogeologist for guidance on its necessity and placement. Be prepared to discuss site stratigraphy and potential receptors during this call.

Deep monitoring wells should be installed at sites where nearby receptors may be at risk or where site conditions indicate the likelihood of downward migration of contaminants.

If the deep well indicates that contamination is present at depth in the aquifer or in deeper aquifers, additional deep wells will be required, as necessary, to define the full extent of the contamination plume and determine flow direction and velocity.

Screen placement

- Water table monitoring wells should be installed so the screen is intersected by the water table. Exceptions to this should be documented and justified in the RI report.
- Deep monitoring well screens will not intersect the water table. Screen placement in deep wells depends on the purpose of the well. If the well is installed to check for a vertical gradient, the top of the screen should be at least twenty feet below the bottom of the water table monitoring wells at your site. If the well is installed to monitor water quality in a lower, confined aquifer, the screen should be placed entirely within that aquifer.

- At sites where geologic conditions are such that it is difficult to determine the depth of the water table, the following procedures should be followed during well construction:

- * The borehole for the monitoring well should remain open at least 24 hours to allow water level stabilization.
- * A slightly longer well screen (15-20 feet) should be installed to compensate for water table fluctuations.
- Phased well installation may be appropriate. This allows for determination of the approximate water table depth in one or two wells, and then the remaining wells could be installed with proper screen placement.

Monitoring well construction

- Well construction must be completed in accordance with the MDH water well construction code and must be permitted by the MDH.
- All monitoring well materials should be properly cleaned prior to installation.
- In general, avoid the use of liquid drilling fluids. However, they may be approved by the MPCA on a site-specific basis.
- Properly develop all wells to ensure adequate hydraulic connection with the aquifer and to remove any drilling fluid if used. Document the development procedures and results.

Complete as-built monitoring well construction diagrams for every monitoring well constructed. The minimum information required includes, but is not limited to:

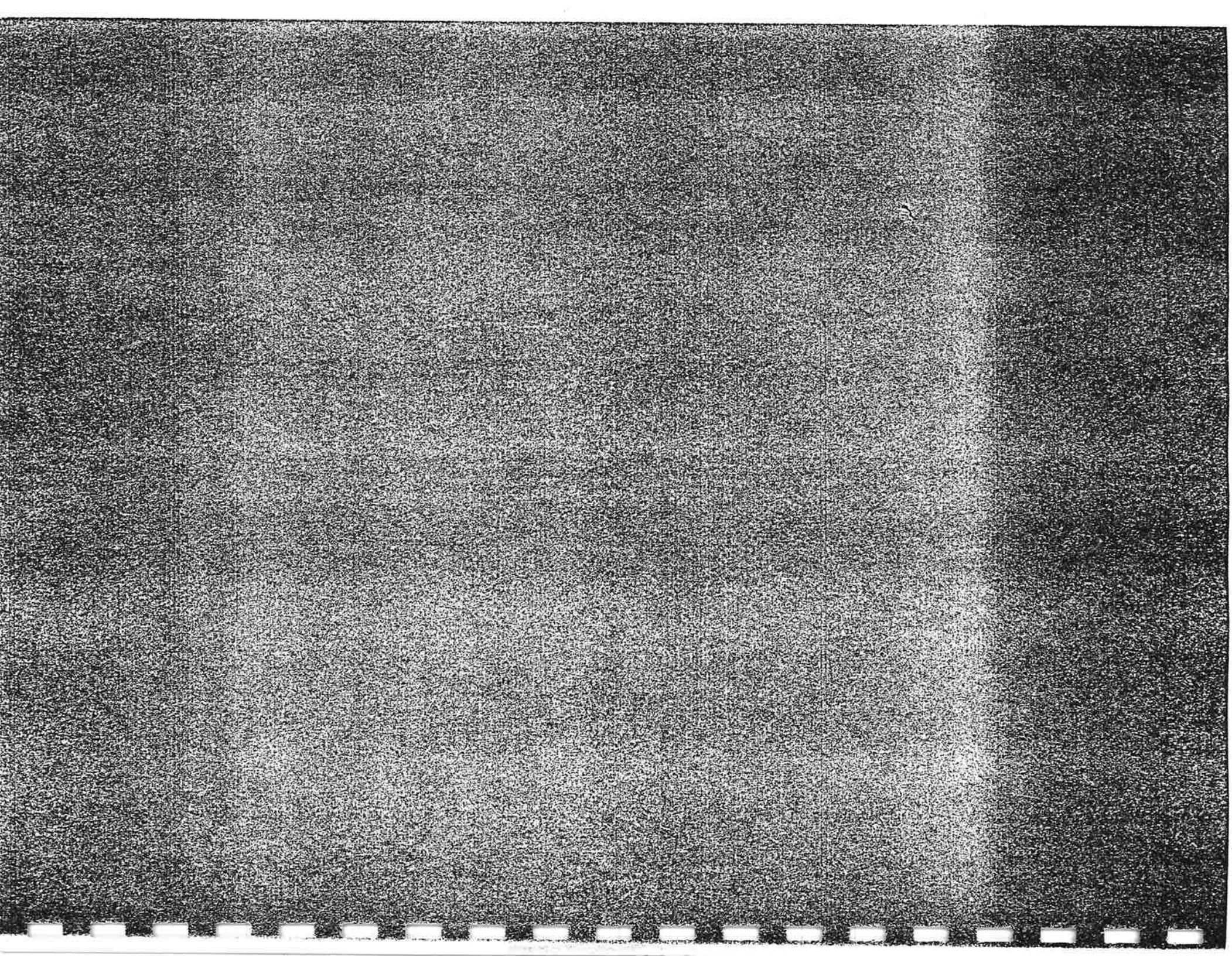
1. Diagram of major well features (borehole annulus, screen, casing/riser, sand pack, pack seal, grout, surface seal, protective casing, etc.)
2. Depth from ground surface to all major well features.
3. Well screen slot size.
4. Sand pack size.
5. Inner diameters of riser, screen, protective casing, and borehole.
6. Well construction materials.

7. Unique well number and project identification number.
8. Date well begun and completed.
9. Driller and consultant names.
10. Elevation of ground surface and riser.

Sampling frequency

- As a general guideline, a Remedial Investigation Report Form should be submitted after two quarterly rounds of ground water sampling. Ground water monitoring should continue from all monitoring wells on a quarterly schedule until site closure is granted or a new schedule is approved by the MPCA site Hydrogeologist.

To determine if a LSI can be utilized for this site we suggest first determining if the water table aquifer that is present in soil boring one (SB-1) is a resource aquifer. If it is, a full RI will be required and a proposal will be developed for you. However, if an LSI can be used, we suggest the use of hollow stem augers placed around the periphery of the dissolved fraction area presented in Figure 1 and ground water samples be collected and analyzed subsequent to installing long term monitoring wells.



SPECTRUM LABS, INC.

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(612) 633-0101 • FAX (612) 633-1402

LABORATORY ANALYSIS REPORT

DATE: July 15, 1997 PAGE: 1 Of 6

CLIENT: Ohman Environmental
21990 Ideal Ave. N
Forest Lake, MN 55025

CONTACT: Kristin Frederickson

Sample No.: L974350-1(d)
Sample ID.: B-1, 20-25'
MDL POL RESULT

ANALYSIS UNITS

EPA 8021/GRH

Date Analyzed: 7/11, 12/97

Compound	Units	MDL	POL	Result
Benzene	mg/kg	2.0	10	11
Toluene	mg/kg	40	200	(r) 140
Ethylbenzene	mg/kg	2.0	10	66
m,p-Xylene *	mg/kg	60	200	260
o-Xylene	mg/kg	40	200	(r) 120
Gasoline Range Hydrocarbons	mg/kg	200	400	(p) 2200
Moisture Content	%	0.1	---	15.8

7/11 Surrogate Recovery
4-Fluorochlorobenzene
4-Fluorochlorobenzene

Detector
FID
PID

% Recovery
(s) 999%
(s) 350%

7/12 Surrogate Recovery
4-Fluorochlorobenzene
4-Fluorochlorobenzene

Detector
FID
PID

% Recovery
(s) 156%
119%

(d) A dilution was necessary due to levels present; therefore, detection limits were raised.

(r) Result is above MDL, but below POL.

(p) Significant peaks detected outside GRO window.

(s) High surrogate recovery due to matrix interference.

* means Coeluting Compounds

ND means Not Detected or below reported MDL

MDL means Method Detection Limit

POL means Practical Quantification Limit

mg/kg means Milligrams Per Kilogram which is equivalent to Parts Per Million (ppm)

SPECTRUM

L A B S . N C

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LABORATORY ANALYSIS REPORT

DATE: July 15, 1997

PAGE: 2 Of 6

CLIENT: Ohman Environmental
21990 Ideal Ave. N
Forest Lake, MN 55025

CONTACT: Kristin Frederickson

Sample No.: L974350-2(d)
Sample ID.: B-2, 20-25'
MDL POL RESULT

ANALYSIS UNITS

EPA 8021/GRH

Date Analyzed: 7/11,12/97

Benzene	mg/kg	2.0	10	29
Toluene	mg/kg	40	200	(r)150
Ethylbenzene	mg/kg	2.0	10	61
m,p-Xylene*	mg/kg	60	200	(r)160
o-Xylene	mg/kg	40	200	(r)62
Gasoline Range Hydrocarbons	mg/kg	200	400	(p)990
Moisture Content	%	0.1	--	20.9

7/11 Surrogate Recovery

4-Fluorochlorobenzene	Detector	% Recovery
	FID	(s)1070%
4-Fluorochlorobenzene	PID	(s)362%

7/12 Surrogate Recovery

4-Fluorochlorobenzene	Detector	% Recovery
	FID	118%
4-Fluorochlorobenzene	PID	112%

(d) A dilution was necessary due to levels present; therefore, detection limits were raised.
(r) Result is above MDL, but below PQL.

(p) Significant peaks detected outside GRO window.

(s) High surrogate recovery due to matrix interference.

* means Coeluting Compounds

ND means Not Detected or below reported MDL

MDL means Method Detection Limit

PQL means Practical Quantification Limit

mg/kg means Milligrams Per Kilogram which is equivalent to Parts Per Million (ppm)

LABORATORY ANALYSIS REPORT

DATE: July 15, 1997

PAGE: 3 Of 6

CLIENT: Oliman Environmental
21990 Ideal Ave. N
Forest Lake, MN 55025

CONTACT: Kristin Frederickson

ANALYSIS

EPA 8021/GRH

Date Analyzed: 7/11/97

	<u>UNITS</u>	<u>MDL</u>	<u>POL</u>	Sample No.: Sample ID:
Benzene	mg/kg	0.2	1.0	L974350-3
Toluene	mg/kg	0.2	1.0	B-3, 2S'
Ethylbenzene	mg/kg	0.2	1.0	<u>RESULT</u>
m,p-Xylene*	mg/kg	0.3	1.0	
o-Xylene	mg/kg	0.2	1.0	
Gasoline Range Hydrocarbons	mg/kg	1.0	2.0	
Moisture Content	%	0.1	—	

Surrogate Recovery4-Fluorochlorobenzene
4-FluorochlorobenzeneDetector
FID
FID% Recovery
104%
97.0%

* means Coeluting Compounds

ND means Not Detected or below reported MDL

MDL means Method Detection Limit

POL means Practical Quantification Limit

mg/kg means Milligrams Per Kilogram which is equivalent to Parts Per Million (ppm)

SPECTRUM LABS INC

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(612) 633-0101 • FAX (612) 633-1402

LABORATORY ANALYSIS REPORT

DATE: July 15, 1997

PAGE:

4 Of 6

CLIENT: Ohman Environmental
21990 Ideal Ave. N
Forest Lake, MN 55025

CONTACT: Kristin Frederickson

ANALYSIS

EPA 8021/GRH

Date Analyzed: 7/11/97

	<u>UNITS</u>	<u>MDL</u>	<u>PQL</u>	Sample No.: L974350-4
Benzene	mg/kg	0.2	1.0	B-4, 25'
Toluene	mg/kg	0.2	1.0	<u>RESULT</u>
Ethylbenzene	mg/kg	0.2	1.0	ND
m,p-Xylene*	mg/kg	0.3	1.0	ND
o-Xylene	mg/kg	0.2	1.0	ND
Gasoline Range Hydrocarbons	mg/kg	1.0	2.0	ND
Moisture Content	%	0.1	--	18.7

Surrogate Recovery

4-Fluorochlorobenzene
4-Fluorochlorobenzene

Detector
FID
PID

% Recovery
113%
106%

* means Coeluting Compounds

ND means Not Detected or below reported MDL

MDL means Method Detection Limit

PQL means Practical Quantification Limit

mg/kg means Milligrams Per Kilogram which is equivalent to Parts Per Million (ppm)

LABORATORY ANALYSIS REPORT**DATE:** July 15, 1997**PAGE:**

5 Of 6

CLIENT: Ohman Environmental
21990 Ideal Ave. N
Forest Lake, MN 55025**CONTACT:** Kristin FredericksonANALYSIS

EPA 8021/WIS DNR GRO

Date Analyzed: 7/11/97

Benzene
Toluene
Ethylbenzene
m,p-Xylene*
o-Xylene
Gasoline Range OrganicsUNITSmg/kg
mg/kg
mg/kg
mg/kg
mg/kg
mg/kg

Sample No.:

Sample ID:

MDLPQLL974350-5
Field Blank
RESULT1.0 ND
1.0 ND
1.0 ND
1.0 ND
1.0 ND
2.0 NDSurrogate Recovery4-Fluorochlorobenzene
4-FluorochlorobenzeneDetector
FID
PID

% Recovery

115%
110%

* means Coeluting Compounds

ND means Not Detected or below reported MDL

MDL means Method Detection Limit

PQL means Practical Quantification Limit

mg/kg means Milligrams Per Kilogram which is equivalent to Parts Per Million (ppm)



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LABORATORY ANALYSIS REPORT

DATE: July 15, 1997

PAGE: 6 Of 6

CLIENT: Ohman Environmental
21990 Ideal Ave. N
Forest Lake, MN 55025

CONTACT: Kristin Frederickson

ANALYSIS

EPA 8021/WIS DNR GRO

Date Analyzed: 7/11/97

	<u>UNITS</u>	<u>MDL</u>	<u>POL</u>	Sample No.: Sample ID.: <u>RESULT</u>
Benzene	mg/kg	0.2	1.0	ND
Toluene	mg/kg	0.2	1.0	ND
Ethylbenzene	mg/kg	0.2	1.0	ND
m,p-Xylene *	mg/kg	0.3	1.0	ND
o-Xylene	mg/kg	0.2	1.0	ND
Gasoline Range Organics	mg/kg	1.0	2.0	ND

Surrogate Recovery

4-Fluorochlorobenzene

4-Fluorochlorobenzene

Detector

FID

PID

% Recovery

113%

108%

* means Coeluting Compounds

ND means Not Detected or below reported MDL

MDL means Method Detection Limit

PQL means Practical Quantification Limit

mg/kg means Milligrams Per Kilogram which is equivalent to Parts Per Million (ppm)

This report has been reviewed by me for technical accuracy and completeness. The analyses were performed using EPA or other approved methodologies and the results were reported on an "as received" basis unless otherwise noted. Organic soil analyses were reported on a dry weight basis. The results reported relate only to the items tested. Please contact me if you have any questions or comments regarding this report. Spectrum Labs, Inc. appreciates the opportunity to provide this analytical service for you.

Report Submitted By,

Thomas L. Halverson
Laboratory Manager

TLH:wmc
oh196-1

APPENDIX D

BORING LOGS

LOG OF BORING MW- 2

PROJECT
Transmission Shop, Inc.

SITE 6958 Cedar Avenue South
Richfield, Minnesota

CLIENT

ARCHITECT-ENGINEER

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	PD READINGS (ppm)	N-VALUE (BLOWS/FT.)	STANDARD PENETRATION (BLOWS/FOOT)	
							Op (tsf)	WATER CONTENT %
				SURFACE ELEVATION 98.2				
				No sample taken				
5	1SS		4.0	Light brown fine SAND, trace silt, gravel - loose to dense - damp - (SP) (FILL)	0	6		
10	2SS				0	14		
15	3SS				0	35		
19.0			19.0	Dark brown fine to medium SAND, trace silt, gravel - loose - wet - (SP)	50	4		
20	4SS				40	5		
23.0	5SS		23.0	End of boring at 23 feet Hollow stem auger used full depth Monitoring well set at 23 feet below grade				

WATER LEVEL OBSERVATIONS

W.L. 17.5 feet while drilling

W.L.

W.L.



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14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED 11/14/97

BORING COMPLETED 11/14/97

RIG CME-55D DRILLER RK

DRAWN TLW APPROVED SWR

JOB # 7272 SHEET 1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING MW- 3

PROJECT
Transmission Shop, Inc.
CLIENT

SITE 6958 Cedar Avenue South
Richfield, Minnesota
ARCHITECT-ENGINEER

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	PD READINGS (ppm)	N-VALUE (BLOWS/FT.)	Qp (tsf)	WATER CONTENT %	STANDARD PENETRATION (BLOWS/FOOT)
				SURFACE ELEVATION 99.2					
				No sample taken					
5	1SS		9.0	Brown fine to medium SAND, trace silt, roots, organics - very loose to loose - moist - (SP) (FILL)	4.2	5	2		
10	2SS				5.1	5			
15	3SS				4.5	4			
20	4SS				6.5	4			
	5SS		20.0	Gray brown fine to medium SAND, trace silt - loose - wet - (SP) (Petroleum odor noted)	207	6			
	6SS		22.0						
				End of boring at 22 feet Hollow stem auger used full depth Monitoring well set at 22 feet below grade					

WATER LEVEL OBSERVATIONS		BORING STARTED	11/17/97
W.L. <input checked="" type="checkbox"/> 17 feet while drilling		BORING COMPLETED	11/17/97
W.L.		RIG	CME-55D DRILLER RK
W.L.		DRAWN	TLW APPROVED SWR
		JOB #	7272 SHEET 1 of 1



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Minneapolis, Minnesota 55447
(612) 559-1859

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 4

PROJECT
Transmission Shop, Inc.
CLIENT

SITE 6958 Cedar Avenue South
Richfield, Minnesota
ARCHITECT-ENGINEER

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	PD READINGS (ppm)	N-VALUE (BLOWS/FT.)	Qp (tsf)	WATER CONTENT %	STANDARD PENETRATION (BLOWS/FOOT)
				SURFACE ELEVATION ∇ 99.8					
				No sample taken					
5	1SS		4.0	Dark brown and brown fine SILTY SAND, trace gravel - loose - moist - (SM)	0	4			
10	2SS		9.0	Brown fine to medium SAND, trace silt - loose to very loose - damp - (SP)	0	6			
15	3SS				0	4			
20	4SS		21.0	Gray brown fine to medium SAND, trace silt - loose to medium dense - wet - (SP)	0	2			
	5SS				0	5			
25	6SS		25.0	End of boring at 25 feet Hollow stem auger used full depth	-	14			

WATER LEVEL OBSERVATIONS

W.L. 17.5 feet while drilling

W.L.

W.L.



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14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED 11/14/97

BORING COMPLETED 11/14/97

RIG CME-55D DRILLER RK

DRAWN TLW APPROVED SWR

JOB # 7272 SHEET 1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

FIGURES

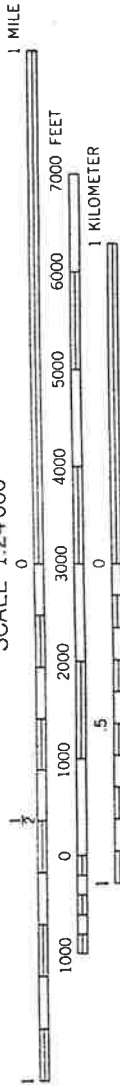
- FIGURE 1: REGIONAL LOCATION DIAGRAM**
- FIGURE 2: HYDROGRAPHS**
- FIGURE 3: GRO CONCENTRATIONS VS TIME**
- FIGURE 4: DRO CONCENTRATIONS VS TIME**
- FIGURE 5: INFERRED GROUNDWATER FLOW MAP (10/15/99)**

ST. PAUL WEST QUADRANGLE
MINNESOTA

7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 ST. PAUL 15' QUADRANGLE



SCALE 1:24 000



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



Figure 1: Regional Location Diagram
TSI
Richfield, Minnesota

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Minneapolis, MN 55447

Richfield, Minnesota

EPS

TFM

Jan 00

7272

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14000 21st Avenue North
Minneapolis, Minnesota 55447



EPS
TFM
Dec-99

Project No. 7272

Figure 2: Monitoring Well Hydrographs
TSI
RICHFIELD MINNESOTA

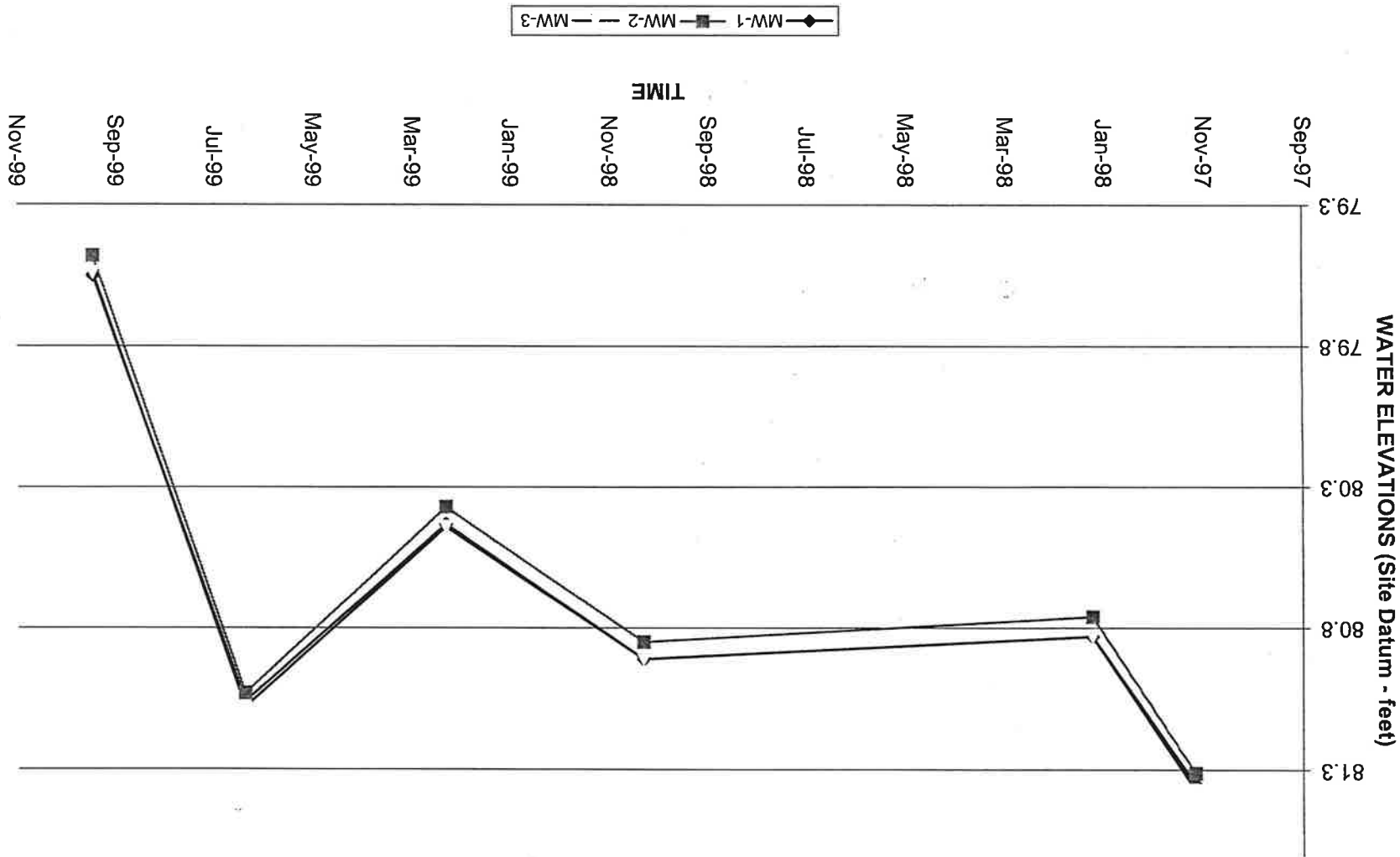




Figure 3: GRO Concentrations vs. Time

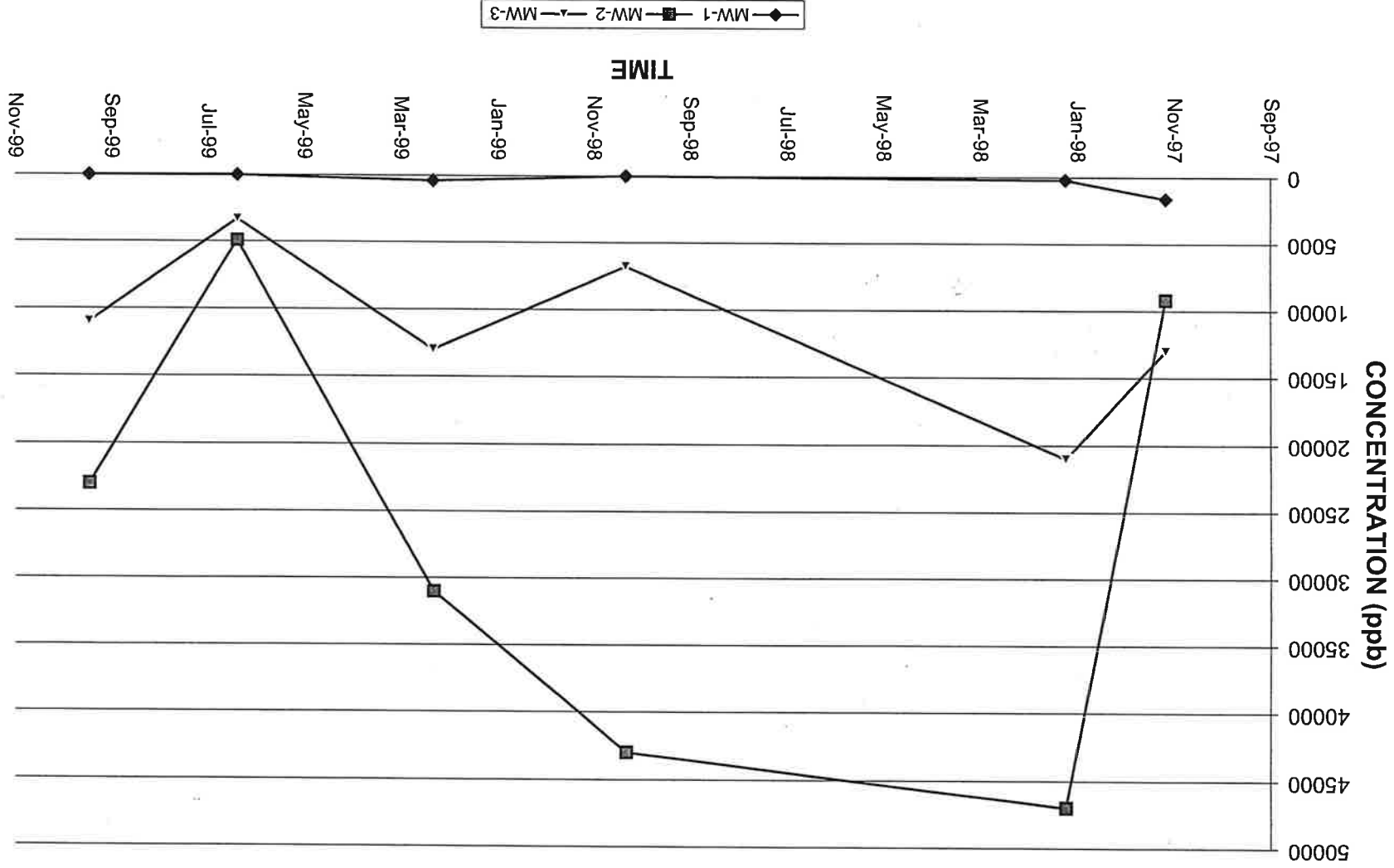
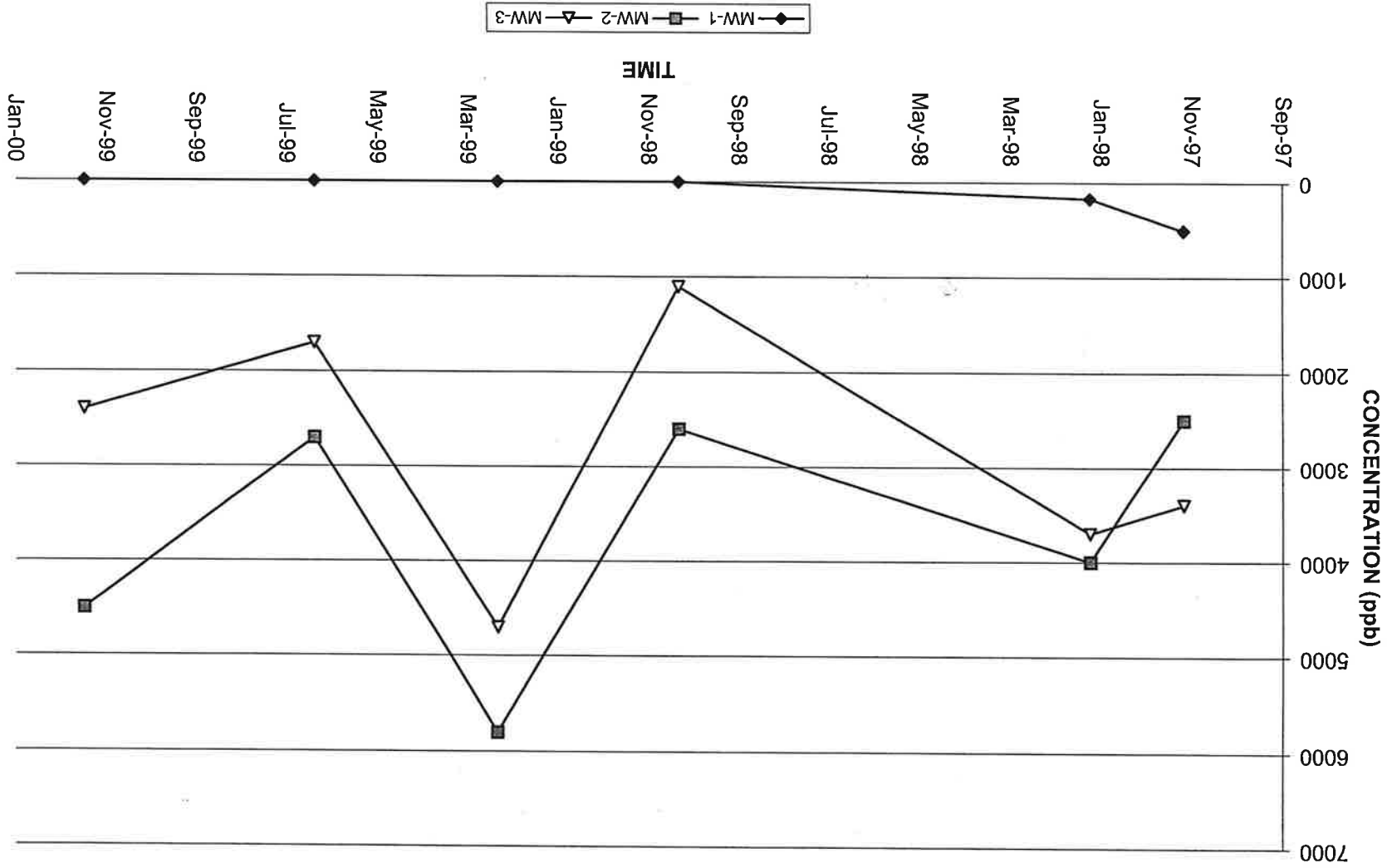
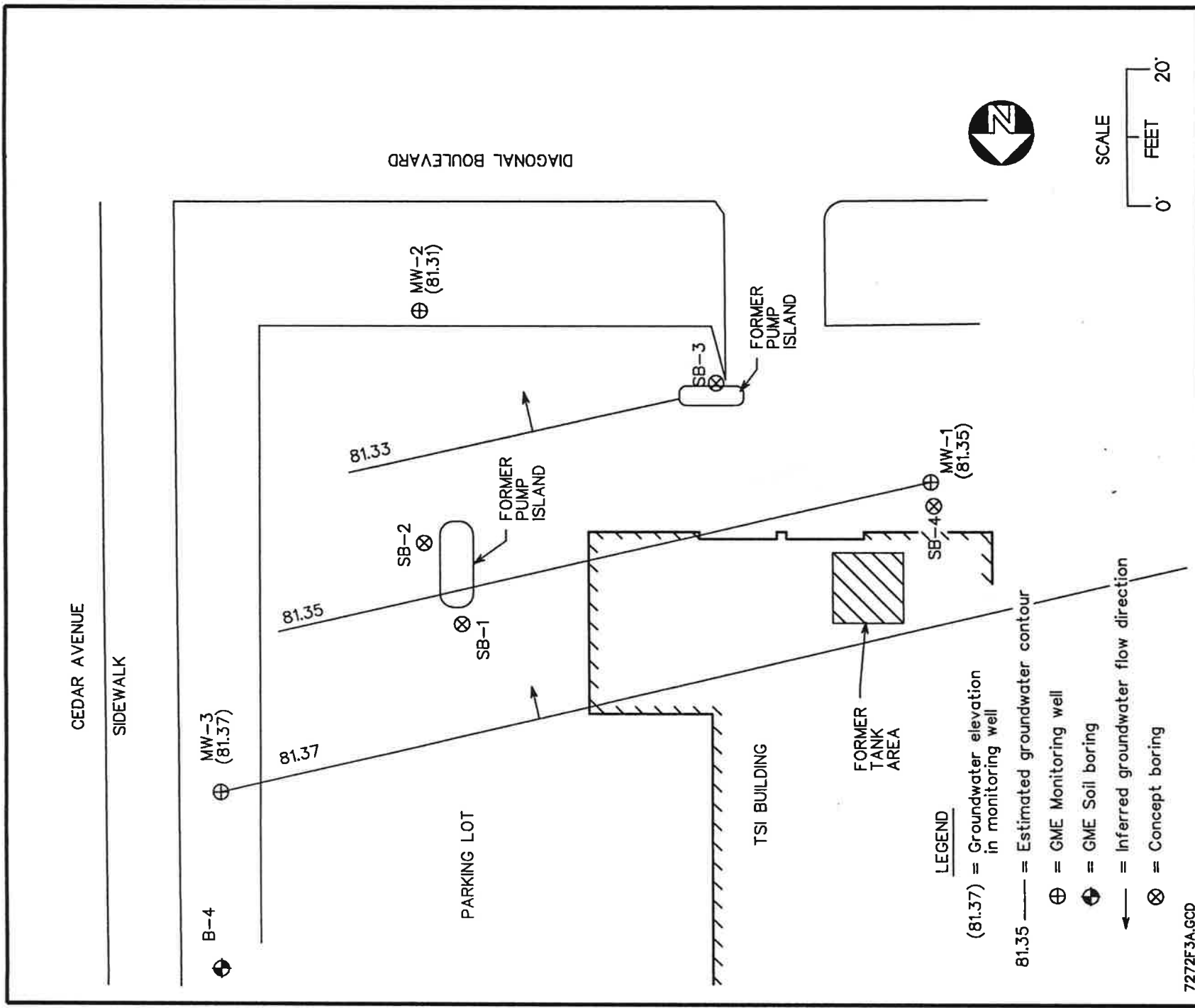




Figure 4: DRO Concentrations vs. Time
 TSI





7272F3A.GCD

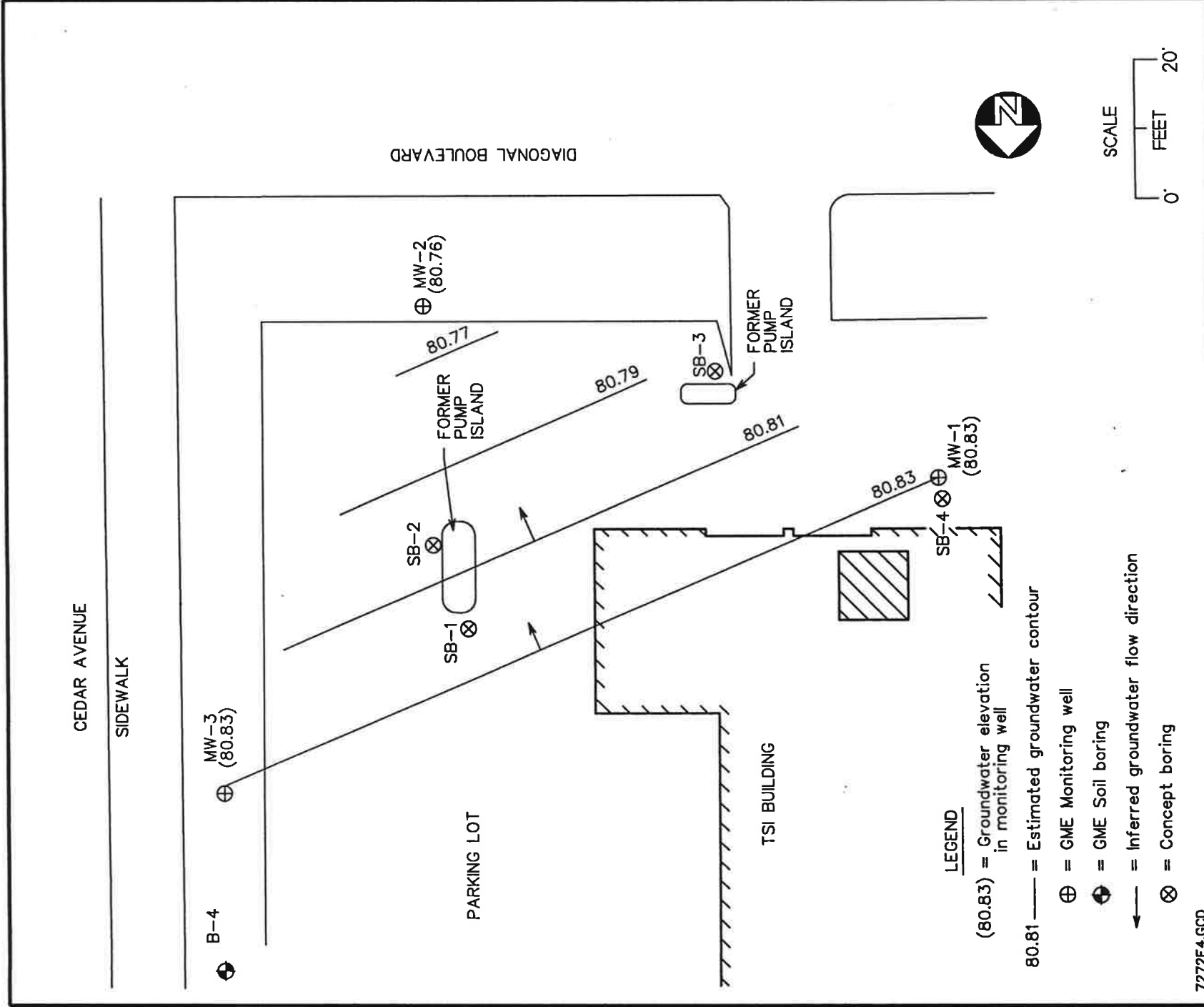
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 Minneapolis, Minnesota 55447
 (612) 559-1850



FIGURE 3: INFERRED GROUNDWATER FLOW MAP
 (02/15/97)

TRANSMISSION SHOP, INC.
 RICHFIELD, MINNESOTA

VJL	SWR	APRIL 98	GME Project No. 7272
-----	-----	----------	----------------------



7272F 4.GCD



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FIGURE 4: INFERRED GROUNDWATER FLOW MAP
(2/7/98)

TRANSMISSION SHOP, INC.
RICHFIELD, MINNESOTA

VJL SWR APRIL 98 GME Project No. 7272

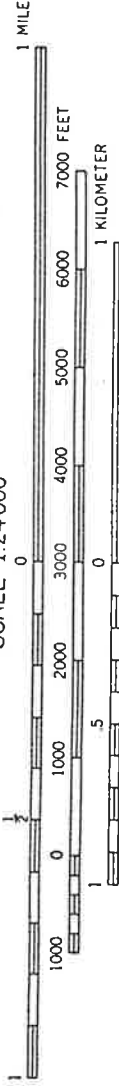
**ST. PAUL WEST QUADRANGLE
MINNESOTA**

7.5 MINUTE SERIES (TOPOGRAPHIC)

NW/4 ST. PAUL 15' QUADRANGLE



SCALE 1:24,000



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



FIGURE 5: WELL RECEPTOR SURVEY

**TRANSMISSION SHOP, INC.
RICHFIELD, MINNESOTA**

GME CONSULTANTS, INC.

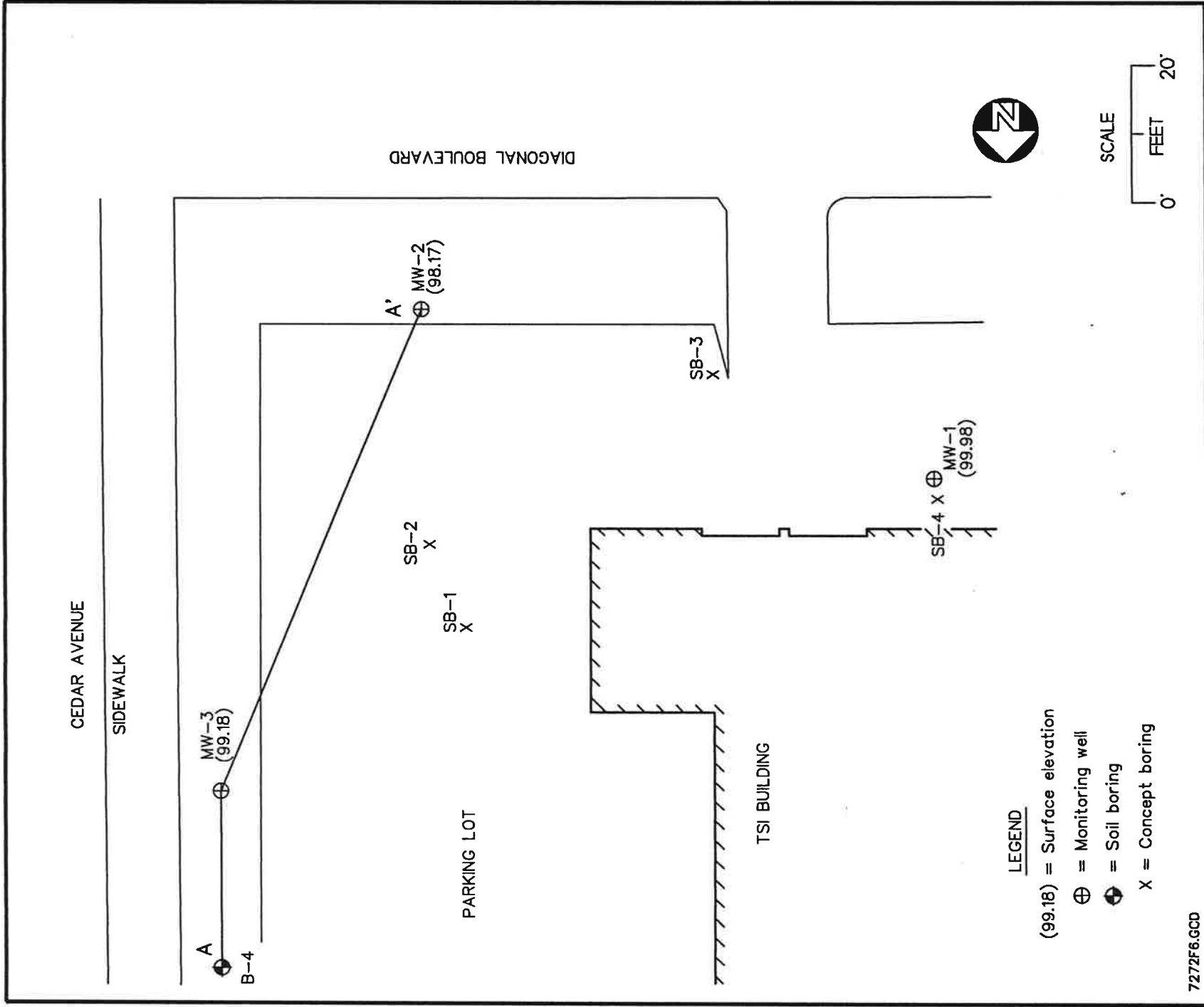
14000 21st Avenue North
Minneapolis, MN 55447

SWR

TFM

4/98

7272



LEGEND

- (99.16) = Surface elevation
- ⊕ = Monitoring well
- ⊙ = Soil boring
- X = Concept boring

7272F6.GCD

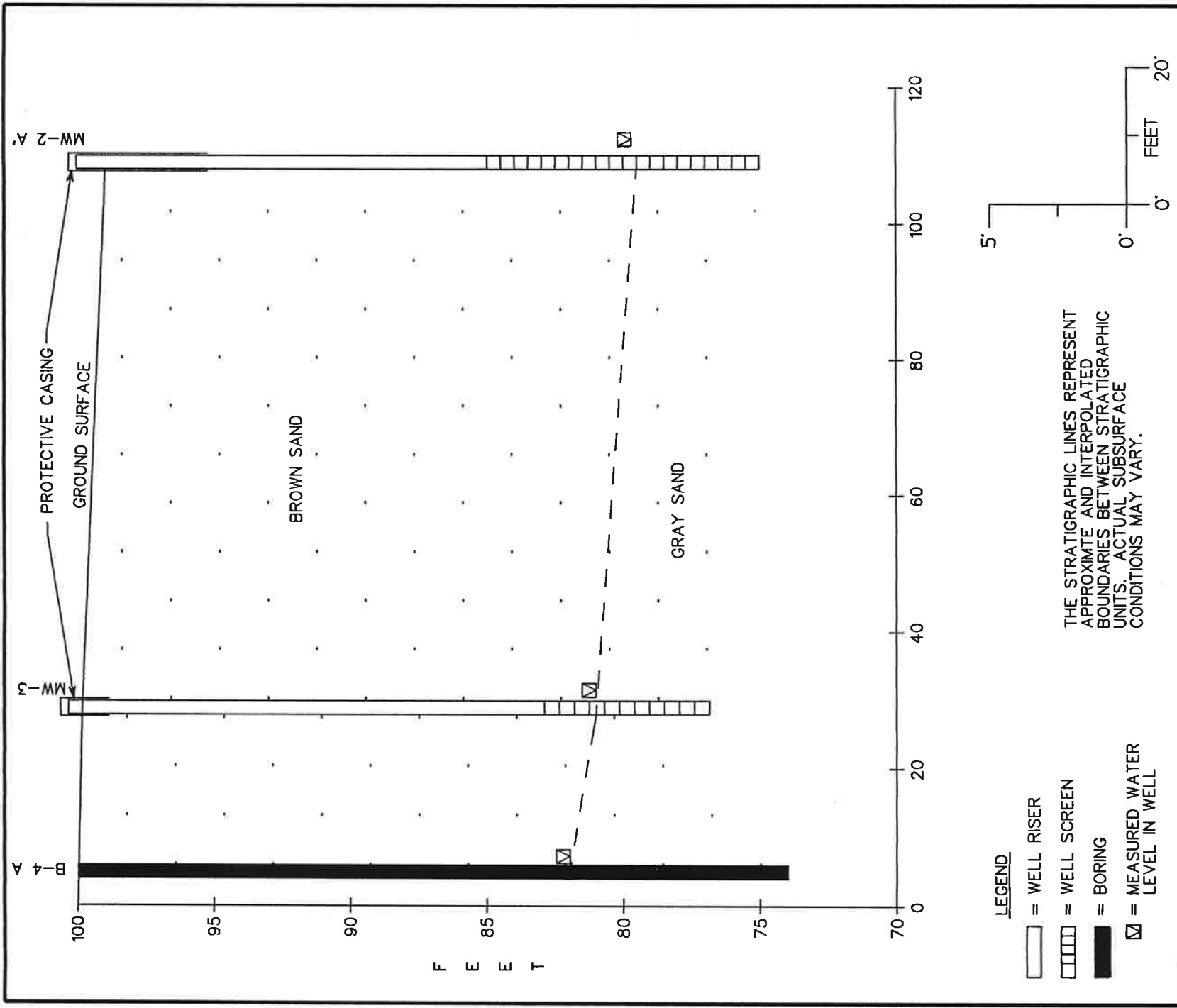
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FIGURE 6: A-A' GEOLOGIC CROSS SECTION

TRANSMISSION SHOP, INC.
 RICHFIELD, MINNESOTA



7272F7.GCD

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FIGURE 7: GEOLOGIC CROSS SECTION

TRANSMISSION SHOP, INC.
 RICHFIELD, MINNESOTA

VJL	SWR	APRIL 98	GME Project No. 7272
-----	-----	----------	----------------------

21190 Ideal Avenue North
Forest Lake, MN 55025-9211

OHMAN ENVIRONMENTAL CONSULTANTS



Prepared By: BCS

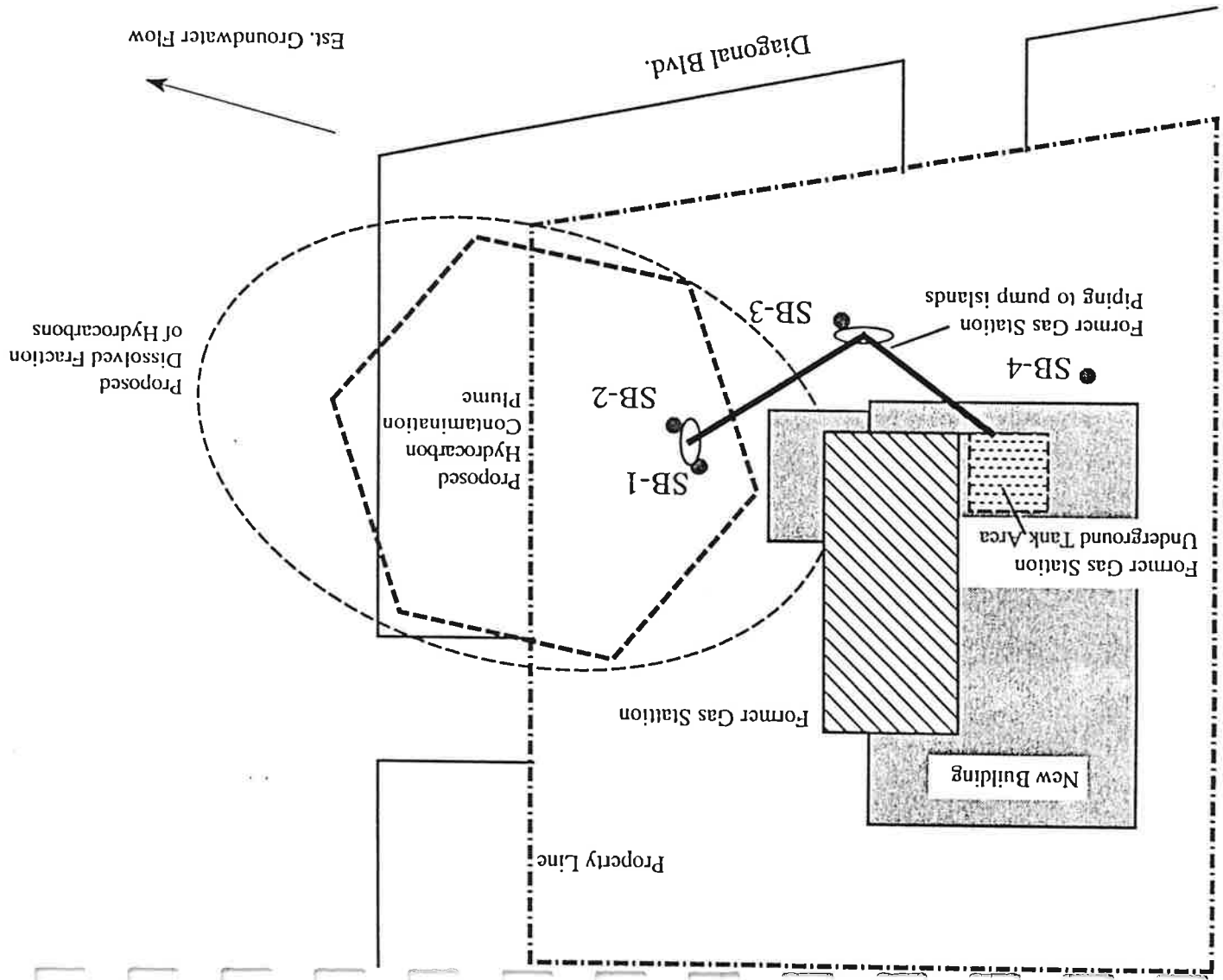
Date: July 24, 1997

Legend
1" = 30'

Soil Boring Locations



Figure 1
Soil Boring Locations
Bloomington Quadrangle
6958 Cedar Ave. South
Richfield, MN 55423



ANNUAL GROUNDWATER MONITORING REPORT
THE TRANSMISSION SHOP
RICHFIELD, MINNESOTA
GME PROJECT NO. 7272

January 31, 2000

Prepared for:

Mr. Steve Jensen
The Transmission Shop
6958 Cedar Avenue South
Richfield, Minnesota 55423

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GME CONSULTANTS, INC.
CONSULTING ENGINEERS

14000 21st Ave. No. / Minneapolis, MN 55447
Phone (612) 559-1859 / Fax (612) 559-0720

January 31, 2000

Mr. Steve Jensen
The Transmission Shop, Inc.
6958 Cedar Avenue South
Richfield, Minnesota 55423

GME Project No. 7272
MPCA Leak No. 10562

RE: Annual Groundwater Monitoring Report for the Transmission Shop in
Richfield, Minnesota

Dear Mr. Jensen:

Enclosed is the Annual Groundwater Monitoring Report for the above referenced site. This report follows MPCA fact sheet 3.26. Our work was completed in accordance with our October 6, 1998 contract, and the MPCA's approval of our Corrective Action Design, dated November 6, 1998.


The latest sampling round was conducted in October, 1999. The long-term results show that petroleum concentrations have fluctuated over time with no apparent long-term trend.

For the site to be eligible for closure, plume stability must be documented; our earlier results established that natural biodegradation is likely occurring and that the plume appeared to be less than 200 feet. However, the downgradient monitoring wells has shown increases in petroleum concentrations that may be migrating off-site. To document plume stability at the MPCA compliance point (i.e., 200 feet from the source), we recommend an additional downgradient monitoring well and four additional rounds of groundwater sampling. We also recommend a vapor survey of the nearby utilities, based on the high volatile petroleum concentrations in the groundwater. The next sampling round would occur after installing the downgradient monitoring well.

If you have questions regarding this report or if we can be of further assistance, please contact us.

Sincerely,

GME CONSULTANTS, INC.


Eric P. Stommes
Environmental Scientist
Project Manager



Timothy F. McGlennen
Senior Environmental Scientist
Property Development Assistance
Group Manager

Enclosures: MPCA Annual Groundwater Monitoring Report

cc: Mr. Jelil Abdalla
Minnesota Pollution Control Agency

EPS: smc

WILLIAM C. KWASNY, PE.
GREGORY R. REUTER, PE.
MARK D. MILLSOP, PG.
BRYAN J. RIPP, PE., PG.

THOMAS P. VENEMA, PE.
CHARLES M. ALLGOOD, PE.
TIMOTHY F. MCGLENNEN

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WILLIAM E. BLOEMENDAL, PE.
TAMMY A. LANDERS, PE.
STEVEN J. RUESINK, PE.
ERIN J. O'BRIEN, PE.



Tanks and Emergency Response Section
Minnesota Pollution Control Agency

Annual Monitoring Report

Fact Sheet #3.26
January 31, 2000

Use this worksheet to report quarterly site monitoring results for the period of time after the Remedial Investigation Report Form (fact sheet #3.24) is submitted until that form is reviewed by Minnesota Pollution Control Agency (MPCA) staff. Assume that the Remedial Investigation (RI) Report Form will take up to 120 days for review. Following RI/corrective action design approval, report site monitoring annually using the *Annual Monitoring Report (fact sheet #3.26)*, unless directed otherwise by MPCA staff.

I. SITE INFORMATION

Site name and address:

The Transmission Shop, Inc.

6958 Cedar Avenue South

Richfield, Minnesota 55423

MPCA Leak Number:

LEAK #: 10562

Date submitted:

January 28, 2000

II. DISCUSSION

Discuss the results of the monitoring performed since the remedial investigation (RI) report or the last progress report has been submitted. Include any notable trends in the discussion.

Diesel range organics (DRO) and gasoline range organics (GRO) have been detected in monitoring wells MW-2 and MW-3; there have been no significant detections in MW-1 since 1997. The DRO concentrations have been relatively consistent, ranging between approximately 1,000 µg/L and 6,000 µg/L. The GRO concentrations have been relatively stable in monitoring well MW-3, but more erratic in monitoring well MW-2. After showing a decreasing trend from about 47,000 µg/L in June, 1998, to about 1,000 µg/L GRO in June, 1999, the GRO concentrations increased to about 23,000 µg/L in October, 1999.

Benzene levels in monitoring well MW-2 continue to be well above the MDH HRL, fluctuating from between 990 and 10,000 µg/L. Benzene levels in monitoring well MW-3 are also above MDH HRLs, fluctuating from between 19 and 250 µg/L. Toluene and ethylbenzene concentrations in monitoring wells MW-2 and MW-3 also have exceeded MDH HRLs. The overall trends for these VOC constituents are similar to the GRO trends.

Low levels of tetrachloroethene have been detected in monitoring well MW-1 since December, 1997, ranging from 1.4 to 2.0 µg/L; the MDH HRL is 7 µg/L. Elevated levels of 1,2-dichloroethane have been detected in monitoring well MW-2, from 39 to 290 µg/L since December, 1997; the MDH HRL is 4 µg/L. Naphthalene also was detected in all monitoring wells during the monitoring period; the levels have exceeded the MDH HRL in monitoring wells MW-2 and MW-3. The other VOC detections were below MDH HRLs, or no HRL has been established.

If vapor impacts were reported during the RI, discuss the results of the vapor monitoring survey completed during this reporting period. Include in your discussion the sampling equipment and sampling method.

No vapor impacts to underground utilities or structures were reported during the RI, but we recommend another survey at this time.

Note: if vapor concentrations exceed 10 percent of the lower explosive limit, exit the building and contact the local fire department immediately. Then contact the Minnesota Duty Officer (24 hours) at 612/649-5451 (metro and outside Minnesota) or 1-800-422-0798 (Greater Minnesota). TTY users call 612/297-5353 (V/TTY) or 1-800-627-3529 (V/TTY).

III. RECOMMENDATIONS

The recommendation section should present recommendations for additional corrective action, modifications to corrective action, additional monitoring or site closure. If cleanup goals have been achieved at the site, recommendations for termination of corrective actions may be presented.

Petroleum levels in the groundwater continue to fluctuate, possibly the result of changes in groundwater elevations. GRO, DRO and VOC constituents continue to be above MPCA action levels or MDH HRLs. Groundwater flow has been consistently south-southeasterly. Our push-probes completed off-site in February 17, 1998 (in the inferred downgradient direction) indicate no significant petroleum detections at that time. Additionally, the bioactivity indicator parameters indicated that natural biodegradation was occurring.

Based on current MPCA guidance documents, for the site to be eligible for site closure, the petroleum plume has to be less than 200 feet, stable, and site data must suggest that natural biodegradation is occurring. Thus far, the data has suggested that natural biodegradation is occurring and the plume is likely less than 200 feet. However, plume stability has not been established because of the high and erratic contaminant concentrations in the two perimeter monitoring wells.

To establish plume stability, we recommend that one downgradient monitoring well be installed and the four wells be sampled an additional four quarters, to establish that contaminant concentrations are below the HRLs for two consecutive monitoring events at the downgradient monitoring well, or a declining contamination concentration trend is documented with a minimum of three consecutive monitoring events. The groundwater samples would be analyzed for GRO, DRO and VOCs. We also recommend that a vapor survey be completed in the nearby utilities, based on the high contaminant concentrations in the groundwater.

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IV. GROUND WATER MONITORING

Indicate the cumulative water table data for each monitoring well.

Well Number	Date	Depth of Water from Top of Casing	Product Thickness	Depth of Water Below Grade	Relative Groundwater Elevation
MW-1	12/15/97	18.64	None	18.6	81.35
	2/17/98	19.16	None	19.2	80.83
	11/30/98	19.08	None	19.1	80.91
	3/23/99	19.56	None	19.6	80.43
	7/1/99	18.93	None	18.9	81.06
MW-2	10/15/99	20.44	None	20.4	79.55
	12/15/97	19.94	None	16.9	81.31
	2/17/98	20.49	None	17.4	80.76
	11/30/98	20.40	None	17.3	80.85
	3/23/99	20.88	None	17.8	80.37
MW-3	7/1/99	20.22	None	17.2	81.03
	10/15/99	21.77	None	18.7	79.48
	12/15/97	19.04	None	17.8	81.37
	2/17/98	19.58	None	18.4	80.83
	11/30/98	19.50	None	18.3	80.91
	3/23/99	19.97	None	18.8	80.44
	7/1/99	19.33	None	18.1	81.08
	10/15/99	10.87	None	19.7	79.54

Notes:

Depth in feet.

Elevations in feet, site datum; the benchmark is the top nut of the fire hydrant located at the southeast corner of the Property (100 feet)

Tabulate the cumulative laboratory analytical results for water samples for each monitoring well (include sample blanks) using the format shown below. Also, attach 1) copies of most recent laboratory reports for ground water analyses, including a copy of the Chain of Custody and 2) a ground water contour map based on the most recent ground water elevation data.

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Well #	Date	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO
MW-1	12/27/97	<2.0	82	140	730	1600	500
	2/27/98	<1.0	1.8	18	68.7	200	170
	11/30/98	<1.0	<1.0	1.4	<2.0	<50	<100
	3/23/99	<1.0	5.3	12	52	380	<100
	7/1/99	<1.0	<1.0	<1.0	<2.0	<50	<100
	10/15/99	<1.0	<1.0	<1.0	<2.0	<50	<100
MW-2	12/27/97	2200	1600	410	1650	9200	2500
	2/27/98	9600	15,000	1900	9400	47,000	4000
	11/30/98	10,000	2000	2000	8700	43,000	2600
	3/23/99	8200	9700	1800	7600	31,000	5800
	7/1/99	990	620	170	580	4900	2700
	10/15/99	4400	2000	880	2150	23,000	4500
MW-3	12/27/97	74	1200	620	4200	13,000	3400
	2/27/98	250	3600	1100	7700	21,000	3700
	11/30/98	110	1600	550	3300	6800	1100
	3/23/99	130	2100	880	4900	13,000	4700
	7/1/99	19	300	140	890	3300	1700
	10/15/99	84	1600	580	3270	11,000	2400
Trip Bank	11/30/98	<1.0	<1.0	<1.0	<2.0	<50	--
	3/23/99	<1.0	<1.0	<1.0	<2.0	<50	--
	7/1/99	<1.0	<1.0	<1.0	<2.0	<50	--
	10/15/99	<1.0	<1.0	<1.0	<2.0	--	--

Note: Results in ug/L (ppb)

-- = Not tested for this parameter

< = Less than detection limits

Other Constituents Detected

Petroleum Compounds	HRL	12/27/97			2/27/98			11/30/98		
		MW-1	MW-2	MW-3	MW-1	MW-2	MW-3	MW-1	MW-2	MW-3
Acetone	700	<20	<200	<100	<10	<1000	<250	<10	5100	<100
n-Butylbenzene	NE	<2.0	<20	56	<1.0	<100	54	<1.0	<100	26
s-Butylbenzene	NE	<2.0	<20	14	<1.0	<100	<25	<1.0	<100	<10
1,2-Dichloroethane	4	<2.0	97	<10	<1.0	<100	<25	<1.0	290	<10
Dissolved Lead	--	NT	NT	NT	<4.9	<4.0	5.6	NT	NT	NT
Isopropylbenzene	300	8.2	40	61	1.7	<100	69	<1.0	<100	43
Naphthalene	300	42	190	270	5.8	400	350	<1.0	390	250
n-Propylbenzene	NE	21	53	190	3.6	180	180	<1.0	170	91
Tetrachloroethene	7	<2.0	<2.0	<10	1.8	<100	<25	1.5	<100	<10
1,2,4-Trimethylbenzene	NE	180	310	1400	23	1400	1700	1.2	1400	700
1,3,5-Trimethylbenzene	NE	47	100	360	8.9	370	430	1.0	380	160

Results in ppb

HRL = Health Risk Limits

NE = Not established

NT = Not tested

Other Constituents Detected - Continued

Petroleum Compounds	HRL	3/23/99			7/1/99			10/15/99		
		MW-1	MW-2	MW-3	MW-1	MW-2	MW-3	MW-1	MW-2	MW-3
Acetone	700	<10	<1000	<250	<10	<100	<20	<10	<250	<200
n-Butylbenzene	NE	<1.0	<100	<25	<1.0	<10	16	<1.0	27	23
s-Butylbenzene	NE	<1.0	<100	<25	<1.0	<10	4.9	<1.0	<25	<20
1,2-Dichloroethane	4	<1.0	<100	<25	<1.0	39	<2.0	<1.0	190	<20
Dissolved Lead	--	NT	NT	NT	NT	NT	NT	NT	NT	NT
Isopropylbenzene	300	<1.0	<100	54	<1.0	19	16	<1.0	60	31
Naphthalene	300	4.5	520	330	<1.0	76	77	<1.0	500	210
n-Propylbenzene	NE	2.3	190	140	<1.0	18	38	<1.0	140	77
Tetrachloroethene	7	1.5	<100	<25	2.0	<10	<2.0	1.4	<25	<20
1,2,4-Trimethylbenzene	NE	16	1400	1000	<1.0	110	280	<1.0	680	620
1,3,5-Trimethylbenzene	NE	4.7	360	260	<1.0	32	75	<1.0	240	150
P-Isopropyltoluene	NE	<1.0	<100	<25	<1.0	<10	2.7	<1.0	<25	<20

Results in ppb

HRL = Health Risk Limits

NE = Not established

NT = Not tested

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V. VAPOR IMPACT MONITORING

If vapor impacts were detected during the remedial investigation, complete the following table with cumulative vapor monitoring data collected. Also, attach a map of the surveyed area that includes the locations of all vapor monitoring points from the previous table.

Vapor monitoring was not conducted.

Location #	Date	PID reading (ppm)	Percent of the LEL
#1			
#2			

Notes: (sample methodology, instrument types used, etc.)

NOTE: If vapor concentrations exceed 10 percent of the lower explosive limit, exit the building and contact the local fire department immediately. Then contact the Minnesota Duty Officer (24 hours) at 612/649-5451 (metro and outside Minnesota) or 1-800/422-0798 (Greater Minnesota). TTY users call 612/297-5353 (V/TTY) or 1-800/627-3529 (V/TTY).

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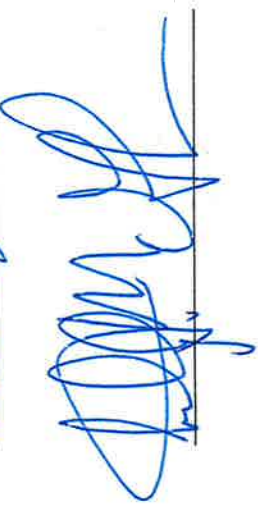
Name and Title:

Date signed:

Eric P. Stommes
Environmental Scientist
Project Manager


1/31/00

Timothy F. McGlennen
Senior Environmental Scientist
Property Development Assistance
Group Manager


1/31/00

Mark D. Millsop
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GRASS
MEDIAN

P-3

P-2

P-4

P-5

P-6

APARTMENT
BUILDING

HOUSES
↓

LEGEND

- ⊕ STORM SEWER
- ⊗ CONCEPT BORING
- ⊕ MONITORING WELL (270) - GME PID reading
- ⊕ BORING [55] - Concept FID reading
- PROBE
- MANHOLE

FIGURE 2: SITE MAP

TRANSMISSION SHOP INC.
RICHFIELD, MINNESOTA

JLH

SWR

APRIL 98

GME Project No. 7272

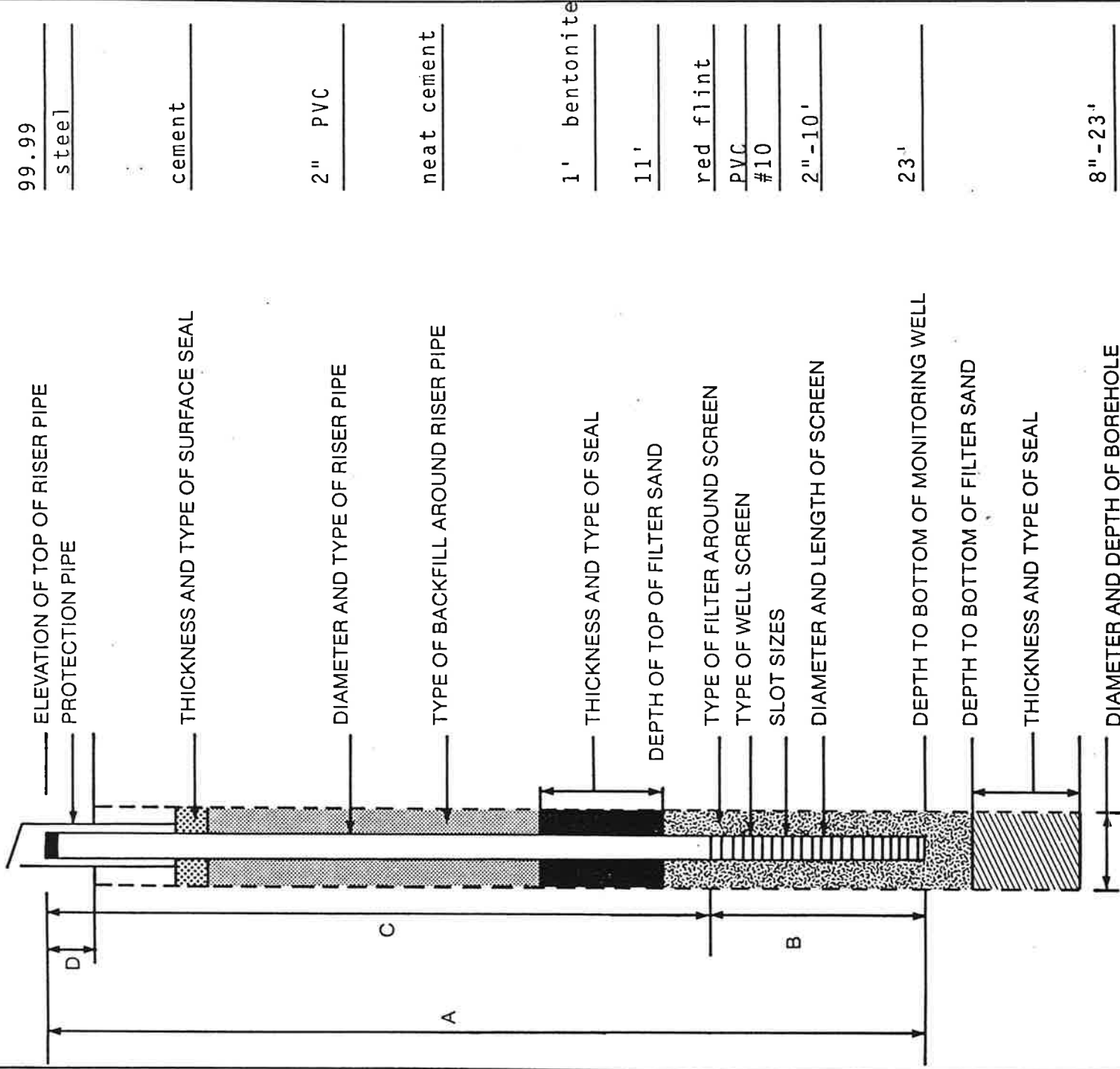
APPENDIX E
MONITORING WELL RECORDS

A = total length of well _____
 B = length of well screen _____
 C = length of riser pipe _____
 D = stick-up at surface _____

MONITORING WELL mw-1
 DATE INSTALLED 12/1/97
 DRILLER/RIG GME 750
 GROUND SURFACE ELEV. 99.98

Minnesota Unique Well No. 587476

WATER LEVELS 81.35



99.99
steel

cement

2" PVC

neat cement

1' bentonite

11'

red flint

PVC

#10

2" - 10'

23'

8" - 23'



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