



Minnesota Pollution Control Agency

September 20, 1999

Mr. Gary Woodman
Avanti Petroleum, Inc.
3033 East 1st Avenue
Suite 202
Denver, Colorado 80206

RE: Petroleum Tank Release Site File Closure
Site: Avanti Store #5304, 640 Highway 7 East, Hutchinson, MN
Site ID#: LEAK00012008

Dear Mr. Woodman:

We are pleased to let you know that the Minnesota Pollution Control Agency (MPCA) Remediation Unit staff has determined that your investigation and/or cleanup has adequately addressed the petroleum tank release at the site listed above. Based on the information provided, the Remediation Unit staff has closed the release site file.

Closure of the file means that the Remediation Unit staff does not require any additional investigation and/or cleanup work at this time or in the foreseeable future. Please be aware that file closure does not necessarily mean that all petroleum contamination has been removed from this site. However, the Remediation Unit staff has concluded that any remaining contamination, if present, does not appear to pose a threat to public health or the environment.

The MPCA reserves the right to reopen this file and to require additional investigation and/or cleanup work if new information or changing regulatory requirements make additional work necessary. If you or other parties discover additional contamination (either petroleum or nonpetroleum) that was not previously reported to the MPCA, Minnesota law requires that the MPCA be immediately notified.

You should understand that this letter does not release any party from liability for the petroleum contamination under Minn. Stat. ch. 115C (Supp. 1997) or any other applicable state or federal law. In addition, this letter does not release any party from liability for nonpetroleum contamination, if present, under Minn. Stat. ch. 115B (1996), the Minnesota Superfund Law.

Mr. Gary Woodman
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Because you performed the requested work, the state may reimburse you for a major portion of your costs. The Petroleum Tank Release Cleanup Act establishes a fund which may provide partial reimbursement for petroleum tank release cleanup costs. This fund is administered by the Department of Commerce Petro Board. Specific eligibility rules are available from the Petro Board at (651) 297-1119 or (651) 297-4203.

If future development of this property or the surrounding area is planned, it should be assumed that petroleum contamination may still be present. If petroleum contamination is encountered during future development work, the MPCA staff should be notified immediately.

For specific information regarding petroleum contamination that may remain at this leak site, please call the Remediation Unit File Request Program at (651) 297-8587. The MPCA fact sheet #3.35 *Leak/Spill and Underground Storage Tank File Request Form* (August 1997) must be completed prior to arranging a time for file review.

Thank you for your response to this petroleum tank release and for your cooperation with the MPCA to protect public health and the environment. If you have any questions regarding this letter, please call us at (507) 280-2995 or (800) 657-3864.

Sincerely,



Denise A. Oakes, P.G.
Project Manager
Remediation Unit
South District

DAO:jfh

cc: Gary D. Plotz, City Administrator, Hutchinson
Brad Emans, Fire Chief, Hutchinson
Edwin Homan, McLeod County Solid Waste Officer
Mr. Paul Wiese, Terracon, White Bear Lake
Minnesota Department of Commerce Petrofund Staff

LIMITED SITE INVESTIGATION

**AVANTI STORE NO. 5304
604 HIGHWAY 7 EAST
HUTCHINSON, MINNESOTA
MPCA SITE ID #: LEAK00012008**

**Terracon Project No. 41985087
March 1, 1999**

Prepared for:

**MINNESOTA POLLUTION CONTROL AGENCY
St. Paul, Minnesota 55155**

Prepared by:

**TERRACON
White Bear Lake, Minnesota 55110**





3535 Hoffman Road East
White Bear Lake, Minnesota 55110-5376
(651) 770-1500 Fax: (651) 770-1657

March 2, 1999

Mr. Garry V. Woodman, A.I.A
Manager, Environment and Development
Avanti Petroleum, Inc.
3033 East First Avenue, Suite 202
Denver, Colorado 80206

RE: Limited Site Investigation
Avanti Store No. 5304
604 Highway 7 East
Hutchinson, Minnesota
Terracon Project No. 41987087
MPCA Site ID #: LEAK00012008

Dear Mr. Woodman:

Enclosed please find our Limited Site Investigation (LSI) report for the above referenced site. The report was completed consistent with Minnesota Pollution Control Agency (MPCA) Fact Sheet #3.24 and summarizes the results of assessment activities conducted at the site. The report recommends site closure. Upon your authorization we will forward a copy of this report to the Minnesota Pollution Control Agency. Please refer to the report for details.

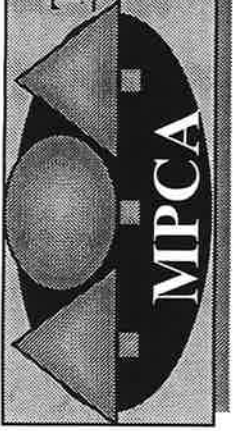
If you have questions or comments regarding this report, please do not hesitate to contact our office at 651-770-1500.

Sincerely,
TERRACON

Davison C. Nagle
Environmental Geologist

Paul J. Wiese
Project Manager/Hydrogeologist

DCN:PJW:pjw N:\98\98_7087\087LSICOV.DOC



Tanks and Emergency Response Section
Minnesota Pollution Control Agency

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 *afull 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 factsheet #3.4 "Free Product Recovery Report Worksheet."

Leak Number LEAK0000 12008 Date: March 1, 1999

Responsible Party: Avanti Petroleum, Inc. R.P. phone #: 303 320-0303

Facility Name: Avanti Store No. 5304

Facility Address: 640 Highway 7 East City: Hutchinson

County: McLeod Zip Code: 55350

Location of site: LAT: 44.89 LONG: 94.35 Circle one:

RI Report - Fact Sheet #3.24
Avanti Store No. 5304
Terracon Project No. 41987087
March 1, 1999

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Section 1: Emergency and High Priority Sites

- 1.1 Is an existing drinking water well impacted? NO
- 1.2 Are there existing vapor impacts? NO
- 1.3 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 ground water in a well located close to the surface water. NO
- 1.4 Has the release occurred in the last 30 days?. NO
- 1.5 Has free product been detected at the site? NO
- 1.6 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

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.

Actions taken to date to reduce the risk posed by this release include the repair of the loose leak detector that caused the release of product. A limited remedial investigation was conducted in regards to this release and it was determined to be minimal subsurface impact.

Background Information

Terracon prepared a Phase I and Limited Phase II Environmental Assessment report dated September 2, 1998 for this site. The following was concluded in this report: According to records maintained by Q-Midwest previous environmental assessments have not been conducted since they have occupied the subject property. The subject property was not listed as a petroleum leak site on the Minnesota Pollution Control Agency's electronic database.

A remedial assessment, which included soil sampling and excavation, was conducted on the property located to the east (Dunning Site) as well as portions of the subject property in 1988. This site was listed as MPCA LEAK00000620. Two USTs were located on the west side of the building located on the Dunning Site between 1961 and 1978. Eight soil borings, including five on the subject property, were advanced to a depth of 15 feet to determine the extent of soil contamination. A ground water sample was analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) from one of the borings advanced on the east side of the subject property. Laboratory analysis detected 9,070 micrograms per liter (µg/L) of benzene in this sample.

In November, 1988 approximately 2,500 cubic yards of soil were excavated from the Dunning Site and from portions of the subject property. The depth of excavation on the subject property ranged from 9 to 10 feet. The MPCA issued a closure letter for this site on September 26, 1989.

Phase II results

Soil Probes

Seven (7) soil probes (P-1 through P-7) were advanced to depths of 12 feet using a Geoprobe sampling vehicle. The probe locations are indicated in Figure 2 in Appendix A. As the samples were obtained in the field, they were classified by Terracon personnel in accordance with ASTM D-2488 based on visual observations, texture, and plasticity. The boring logs are located in Appendix D.

The surficial soils observed in the borings consisted predominantly of gray to brown lean clay with occasional sand and gravel seams. Ground water was encountered at depths of 6 to 10 feet below ground surface.

Soil Analytical Results

Soil samples were collected at various depths upon retrieval from each soil probe. The collected soil samples were screened for the presence of organic vapors using a photoionization detector (PID). The collected samples and the measured organic vapor concentrations are recorded on the boring logs located in Appendix D. Organic vapor levels in excess of the Minnesota Pollution Control Agency's (MPCA) field screening action level of 40 parts per million (ppm) were detected in the soil samples collected from probes P-5 and P-6.

Select soil samples were submitted for laboratory analysis. The laboratory analytical reports are located in Appendix E. The analytical results are presented in the following table.

RI Report - Fact Sheet #3.24
 Avanti Store No. 5304
 Terracon Project No. 41987087
 March 1, 1999

Sample	Depth (feet)	MTBE	Benzene	Toluene	Ethyl Benzene	Total Xylenes	GRO	DRO
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
P-1	6	ND	ND	ND	ND	ND	ND	13
P-2	5	ND	ND	ND	ND	ND	ND	5.8
P-3	7	ND	ND	ND	ND	ND	ND	ND
P-4	7	ND	ND	ND	ND	ND	ND	ND
P-5	7	0.056	ND	ND	1.40	0.640	74	20
P-6	7	1.5	6.7	7.2	21.0	52.0	820	190
P-7	8	ND	ND	ND	ND	ND	ND	-

Concentrations are expressed in milligrams per kilogram (mg/kg).

GRO - Gasoline Range Organics

MTBE - Methyl-tert-butyl-ether

ND - Not Detected at or above method detection limits (MDL). See reports for MDL.

DRO - Diesel Range Organics

Ground water Analytical Results

Ground water samples were collected from each soil probe and submitted for laboratory analysis. The laboratory analytical reports are located in Appendix E. The analytical results are presented in the following table.

Sample	MTBE	Benzene	Toluene	Ethyl Benzene	Total Xylenes	GRO	DRO
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
P-1	ND	ND	ND	ND	ND	ND	120
P-2	ND	ND	ND	ND	ND	ND	ND
P-3	ND	ND	ND	ND	ND	ND	ND
P-4	4.5	ND	ND	ND	ND	ND	170
P-5	100	ND	ND	1,600	460	37,000	33,000
P-6	210	14,000	2,300	4,400	8,400	76,000	760,000
P-7	ND	ND	ND	ND	ND	ND	-
HRLs	NE	10	1,000	700	10,000	NE	NE

Concentrations are expressed in micrograms per liter (µg/L).

GRO - Gasoline Range Organics

MTBE - Methyl-tert-butyl-ether

NE - Not Established

ND - Not Detected at or above method detection limits (MDL). See reports for MDL.

DRO - Diesel Range Organics

HRLs - Health Risk Limits

Soil borings P-5 and P-6 were advanced in the portion of the subject property that had contaminated soil excavated in 1988. The assessment conducted in 1988 did not include DRO

or an equivalent analysis of soil and water samples. The BTEX concentrations detected at P-5 and P-6 are similar to concentrations detected in a water sample collected in the same area in 1988.

On October 28, 1998 a release was reported for this site in regards to a loose leak detector within the premium-grade submersible-pump sump located on top of the premium unleaded UST. Terracon visited the site and observed strong gasoline odors and a visible sheen on a small puddle of water within the sump. A soil sample was collected from the sump area and it was screened for organic vapors using a photoionization detector (PID). A PID reading of 450 parts per million (ppm) was recorded for this soil sample. Terracon then conducted a limited site investigation.

Section 2: Site and Release Information

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

Commercial businesses and residential properties currently exist in the area. Highway 7 bounds the property to the North. The South Fork Crow River is located approximately ½ mile to the southwest of the site.

Table 1.

Provide the following for all tanks that have been at the site:

Tank #	UST or AST	Capacity in gallons	Contents	Age	Status*	Condition
001	UST	6,000	Diesel	~9	Active	Good
002	UST	10,000	Gasoline	~9	Active	Good
003	UST	10,000	Gasoline	~9	Active	Good
004	UST	8,000	Gasoline	~9	Active	Good

*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.
Associated UST system components are currently active.

2.3 Identify and describe the source or suspected source(s) of the release.
Reportedly, a loose leak detector located within the premium submersible pump sump resulted in the product release.

2.4 What was the volume of the release? (if known): ~8 Gallons. Based on S/R records.

2.5 When did the release occur? (if known): 10-28-98

Section 3: Excavated Soil Information

3.1 Was soil excavated for off-site treatment? **NO**

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

Date excavated: _____

Volume removed: _____ cubic yards

3.2 Indicate soil treatment type: *Not Applicable (N/A)*

_____	land treatment
_____	thermal treatment
_____	composting/biopiling
_____	other

Name and location of treatment facility: *N/A*

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 five feet below the water table or ten feet below the deepest measurable (field screening and visual observation) contamination, whichever is deeper. Were all soil borings completed to the required depth? **NO**

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**

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 Ground Water Investigations Performed During Remedial Investigations" regarding exceptions and MPCa approval for depth of drilling):

Elevated PID levels were not encountered while advancing the probes for this investigation and a confining clay till unit is present, therefore, a deep probe was not advanced.

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 2.

Complete the following table indicating jar headspace results (in ppm) for soil samples from soil borings.

ASTM soil classification	Depth (ft)	Soil Boring				
		8	9	10	11	
SW/CL	3-4	ND	1	ND	ND	
CL	7-8	ND	2	ND	ND	
CL	10-12	ND	ND	ND	ND	

Notes: (ND = non detect or less than 1 ppm, PID – OVM Model 530, refer to attached boring logs for more details on lithology)

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
P-8, (8')	1/18/99	<0.025	<0.025	<0.025	<0.075	<5	NA
P-9, (8')	1/18/99	0.053	0.046	<0.025	<0.075	<5	NA
P-10, (7.5')	1/18/99	<0.025	<0.025	<0.025	<0.075	<5	NA
P-11, (7.5')	1/18/99	<0.025	<0.025	<0.025	<0.075	<5	NA

Notes: (use less than symbols to show detection limits, NA = not analyzed)

Table 4. N/A

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

- 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 PID readings from the soil samples collected from probes P-8 through P-11, it appears that the vertical extent is limited to 10 feet below grade and the horizontal extent is limited to within 20 feet of the release.

Section 5: Aquifer Characteristics/Ground Water Contamination Assessment

5.1 Hydraulic conductivity is used to evaluate risk to present or potential ground water receptors. The level of potential risk determines the level of confidence required of the hydraulic conductivity values. Indicate average hydraulic conductivity and method used for measurement and estimation.

Measurement

Methods of measuring aquifer parameters are *aquifer* and *permeameter* tests. Aquifer tests such as pumping and slug tests are necessary to evaluate parameters of actual undisturbed aquifer material. Pumping tests evaluate the largest volume of aquifer material, providing the best measurement of in situ aquifer parameters. Slug tests provide in situ parameters representing a smaller portion of the aquifer. Permeameter test are laboratory methods used for the evaluation of discrete samples collected from the aquifer. Permeameter test require an adequate number of representative field samples, and, inherent sampling and analysis technique limitations must be considered when evaluating results.

Estimation

Methods of estimating hydraulic conductivity may involve grain size analysis or correlating a field description with a reference range of values. As with laboratory measurements, estimation methods require an adequate number of representative field samples. Use the most conservative value of a range when using estimates. If there is any question that sediment may be permeable enough to comprise a resource aquifer, confirm by conducting test(s).

Provide hydraulic conductivity values that support the level of investigation based on risk and remediation potential. Be sure to have test and estimations performed and analyzed by personnel trained and/or experienced in hydrogeologic investigations. Improperly performed or

analyzed tests may be returned as incomplete. Attach all supporting information for the determination in the Methodologies appendix:

N/A _____ cm/sec Pumping test analysis by _____ method(s).
10⁻³ _____ cm/sec Slug tests by _____ method(s).
_____ Permeability tests by _____ method(s)
_____ Grain size distribution approx. by _____ method(s).
X _____ *Reference from Freeze & Cherry, 1979
_____ *provide author(s), year published, title, publisher, and page(s)

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:

10⁻³ _____ cm/sec X _____ 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:

The Water Resources of the Crow River Watershed, South-Central Minnesota, Hydrologic Investigations Atlas, published by the United States Geological Survey (USGS) indicates the surficial geology consists of till plain deposits composed of gray, calcareous, silty till with buried sand and gravel units. Approximately 400 feet of unconsolidated sediments overlie undifferentiated igneous and metamorphic rocks consisting predominantly of gneiss, granite, and schist. The surficial water table is reportedly 30 feet below grade and the regional horizontal ground water flow direction is to the southeast. The local horizontal ground water flow direction appears to be to the southwest towards the South Fork of the Crow River.

The property is located at an approximate elevation of 1,070 feet above mean sea level according to the latest United States Geological Survey (USGS) 7.5 minute series topographic map. The terrain of the subject property and surrounding area is generally flat. The topographic map indicates that South Fork of the Crow River, situated at an approximate elevation of 1,020 feet, is located one-half mile southwest of the subject property.

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? **NO**

5.5 If other water supplies are available, explain.

In general, water wells in the area use a Pleistocene sand deposit that is encountered at depths greater than 100 feet below grade. Municipal water supply system is available in the area.

5.6 Are there any other reasons the impacted aquifer should not be considered a resource aquifer? **NO**

Table 5.

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

Water level depth, feet	Soil Boring			
	8	9	10	11
10	8	11	8	

Notes:

5.7 Is contaminated soil in contact with ground water? **YES**

If YES or if ground water 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	Toluene	Ethylbenzene	Xylene	GRO	DRO
P-8, (10')	1/15/99	<1	<1	<1	<2	<100	NA
P-9, (8')	1/15/99	85	80	7.3	32	360	NA
P-10, (11')	1/15/99	<1	1.2	<1	<2	<100	NA
P-11, (8')	1/15/99	<1	<1	<1	<2	<100	NA

Notes: Concentrations reported as $\mu\text{g/L}$ or ppb , NA = not analyzed.

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).

Well/Boring Number	Date Analyzed	MTBE			
P-8, (10')	1/15/99	4.5			
P-9, (8')	1/15/99	5.5			
P-10, (11')	1/15/99	34			
P-11, (8')	1/15/99	<4			

Notes: Concentrations reported as µg/L.

- 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. NO
- 5.9 If contaminated soil is not in contact with ground water, what is the distance separating the deepest contamination from the surface of the water table? N/A feet
- Was this distance measured during site activities, referenced from geologic information, or estimated based on professional opinion during a site visit? N/A

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.
Previous assessment activities and the most recent investigation encountered ground water at depths ranging from 6 to 11 feet below grade.

5.11 In your judgment, 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

Based on the release of approximately 8 gallons of gasoline; the lithology consisting mainly of clay till; and that water wells in the area tap a resource aquifer that is over 100 feet deep; it appears that there is sufficient distance separating the impacted non-resource aquifer from the resource aquifer.

Sections 6 and 7 have been deleted from this report because Terracon concluded that a Limited Site Investigation is applicable for this release.

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 ½ mile radius, 500 foot radius, water supply wells, other potential petroleum sources, and addresses for properties within 500 feet.

Table 13A.

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 ½ mile. The table below contains information obtained from the County Well Index (CWI) and the Minnesota Geological Survey (MGS). The first four wells listed below are reportedly within 500 feet of the site. These first four wells are reportedly active, however, these wells were not observed during the 500 foot walking survey. Either they are miss-located or they have been abandoned since the last update. The remaining wells listed below are reportedly located within ½ mile of the site. The reported location of the wells listed below are depicted on Figure 3A. The Hutchinson municipal wells are located more than ½ mile away from the site.

The attached Table 13B contains information obtained during the 500 foot walking survey. The location of the wells listed in Table 13B are depicted on Figure 3B.

Unique Well #	Ground Elevation	Total Depth (ft)	Base of Casing (ft)	Static Elevation	Aquifer	Use	Owner	Distance & Direction from site
210227	1070	108	unk	1045	PD	domestic	Clyde Greger	~300'N
210228	1075	114	unk	1053	PD	commer.	A+W Drive In	~400'W
210221	1075	113	unk	unk	PD	domestic	Clifford Betker	~350'SE
210224	1075	112	unk	1057	PD	domestic	Roy Thayer	~500'SE
210187	1070	114	111	1047	PD	domestic	Donald Wendorff	~1,400'NW
210225	1065	112	unk	1034	PD	domestic	Floyd Servin	~1,200'NW
210179	1065	112	unk	1041	PD	domestic	Hutch. Indus. Co.	~1,700'NW
210184	1075	113	unk	1040	PD	domestic	Rockite Silo Co.	~1,700'W
210222	1060	108	unk	1035	PD	domestic	Myron D. Ziemer	~1,000'NW
210435	1060	108	106	1031	PD	domestic	Ernst Lepel	~1,100'W
210430	1060	102	99	1044	PD	domestic	H. H. Lepal	~1,000'W
210072	1065	146	103	1042	PD	domestic	Marvin Grimm	~900'S
210267	1065	137	106	unk	PD	domestic	Francis Mott	~1,100'SE
210229	1065	132	108	1040	PD	domestic	Martin Plaude	~800'SE
210185	1075	102	unk	1060	PD	domestic	Eastside Mobile Horn	~1,500'E
102860	1080	105	101	1055	PD	domestic	Richard Larson	~1,900'E

Notes: unk = unknown, PD = Pleistocene deposit
 Well 210179 is listed as active in the CWI, however, a well log obtained from the MGS suggests that this well has been abandoned.

TABLE 13B
 500 FOOT - WELL SURVEY
 AVANTI STORE NO. 5304
 HUTCHINSON, MN
 TERRACON PROJECT NO. 41987087

<u>OWNER</u>	<u>ADDRESS</u>	<u>PHONE</u>	<u>WELL STATUS</u>	<u>CITY WATER</u>
A.	Valley Car Dealer 525 Hwy. 7 E.	320-587-2240	No Well	Yes
B.	Country Kitchen	320-587-4940	No Well	Yes
C.	Mr. & Mrs. McLain 524 Hwy. 7 E.	320-587-2728	Well abandoned ~10 yrs. ago was shared with res. to west.	Yes
D.	County Treatment Center 620 Hwy. 7 E.	NA	No Well	Yes
E.	Julie Jensen 715 Hwy. 7 E.	320-587-2024	Has Well-No Details	No
F.	Plumbing & Heating 680 Hwy. 7 E.	320-587-7437	No Well	Yes
G.	7 HI Motel 700 Hwy. 7 E.	320-587-2088	Has Well-No Details	No
H.	Elks Lodge 720 Hwy. 7 E.	320-587-3116	Has Well-No Details	Yes
I.	Becker Construction NA	NA	Left Mailing-No Response	Yes
J.	Kuskeske, J. 680 Lindy Ln. NE	320-587-7620	No Well	Yes
K.	Sibbel, S. 120 Paus Rd. NE	NA	No Well	Yes
L.	Duvall, L. 114 Paus Rd. NE	320-587-9517	No Well	Yes
M.	Wolff, W. 112 Mark Drive NE	320-587-3727	No Well	Yes
N.	Haas, R. 113 Mark Drive NE	320-587-3193	Has Well-used for lawn~180 ft. deep	Yes
O.	NA 114 Garden Dr. NE	NA	Left Mailing-No Response	Yes

NOTES: NA=Not Available, The listed letters (A through O) correspond to the locations shown on Figure 3B.

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 NO
contaminant plume successfully contacted to determine if water wells are
present? If No, please explain.

Two property owners were not available for comment on well status during the walking survey. A questionnaire was left at these properties, however, they have not responded. Evidence of outdoor wells was not observed at these properties during the walking survey.

8.3 Discuss the results of the ground water 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 ½ 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.)

Three of the fifteen properties surveyed were identified to have a water well on-site. The three sites identified as having wells appear to be located side- or up-gradient from the release site relative to the assumed southwesterly horizontal ground water flow direction in the area. The risk to the identified water supply wells appears low, because of the minimal product lost, wells are generally greater than 100 feet in depth, and the distance and direction (side- and up-gradient) of the identified wells.

8.4 Are there any plans for groundwater development in the impacted aquifer NO
within one half mile of the site, or one mile down gradient 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.

Name: Dick Nagy – City Water Department Phone: 320-234-4222

Section 9: Surface Water Risk Assessment

9.1 Are there any surface waters or wetlands located within ¼ 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 YES
gradient soil boring or monitoring well located between the site and the
surface water?

If *NO*, we assume that contamination discharges to surface water. Therefore, complete the following information: *N/A*

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.

The nearest downgradient surface water is the South Fork Crow River which is located approximately ½ mile to the southwest from the site. PID readings and chemical analysis of samples collected from probe P-11 located in an assumed downgradient position relative to the release do not indicate impact. The risk potential of this release impacting the Crow River appears low.

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 offsite within the utility corridors? If *YES*, have they been investigated with borings or push probes? *N/A* NO

10.3 Discuss the potential for vapor migration/accumulation near the site. In your discussion consider: soil types, product type, 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.

Based on the absence of nearby basements, sewer lines not present near the tank basin, clay lithology, low PID readings, low concentrations of dissolved product, and limited area of impact, the concern of potential for vapor migration/accumulation appears low.

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 area. N/A

Table 14. N/A

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

Notes:

10.4 Describe and interpret the results of the vapor survey. N/A

Section 11: Discussion

11.1 Discuss the risks associated with the remaining soil contamination?

Based on the limited area of impact, the risk associated with the remaining soil contamination appears low, however, the impacted soil could be considered a source of contamination that could continue to impact ground water even though the area is paved. Underground utilities were not identified in the immediate vicinity of the release.

11.2 Discuss the risks associated with the impacted ground water?

Based on the limited area of impact, low concentrations of the dissolved petroleum detected in the ground water and the distance and direction to nearby water wells, the risk associated with the impacted ground water appears low.

11.3 Discuss other concerns not mentioned above: N/A

Section 12: Conclusions and Recommendations

Recommendation for site: site closure
 _____ Additional vapor monitoring
 _____ Additional ground water monitoring
 _____ active cleanup

The recommendation 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.

The recommendation for site closure is based on the following criteria: contaminated soil and ground water have not impacted nor do they appear to pose a threat to human health or the

environment; the impacted water bearing unit is not a resource aquifer, subsurface contamination has not led to vapor impacts to people or structures; and contamination has not impacted surface water.

If additional monitoring is recommended, indicate the proposed monitoring schedule and frequency: N/A

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. N/A

Section 13: Required Figures

Indicate attached figures:

X *Figure 1*, 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.

X *Figure 2*, One or more site map 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 ground water contamination; and location of end points for all geologic cross sections.

Figure 3, Ground water gradient contour maps (for sites with monitoring wells).
3a:

X *Figure 4* Well receptor survey map showing 1/2 mile radius, 500 foot radius, water supply wells, other potential sources of contamination.

Figure 5: Vapor survey map showing utilities and buildings with basements and monitoring locations (if a survey was required).

Section 14: Appendices

Indicate attached appendices.

X *Appendix A* Figures

X *Appendix B* Laboratory analytical reports for soil and ground water.

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.

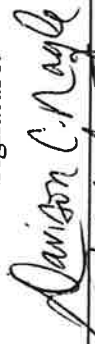

General Comments

The analysis and opinions expressed in this report are based upon data obtained from the soil borings and laboratory chemical analysis at the indicated locations or from other information discussed in this report. This report does not reflect variations in subsurface stratigraphy, hydrogeology, and contaminant distribution which may occur across the site. Actual subsurface conditions may vary and may not become evident without further assessment.

This report is prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted environmental engineering practices. No warranties are intended or made. In the event any changes in the nature or location of suspected sources of contamination as outlined in this report are observed, the conclusions and recommendations contained in this report shall not be valid unless these changes are reviewed and the opinions of this report are modified or verified in writing by Terracon.

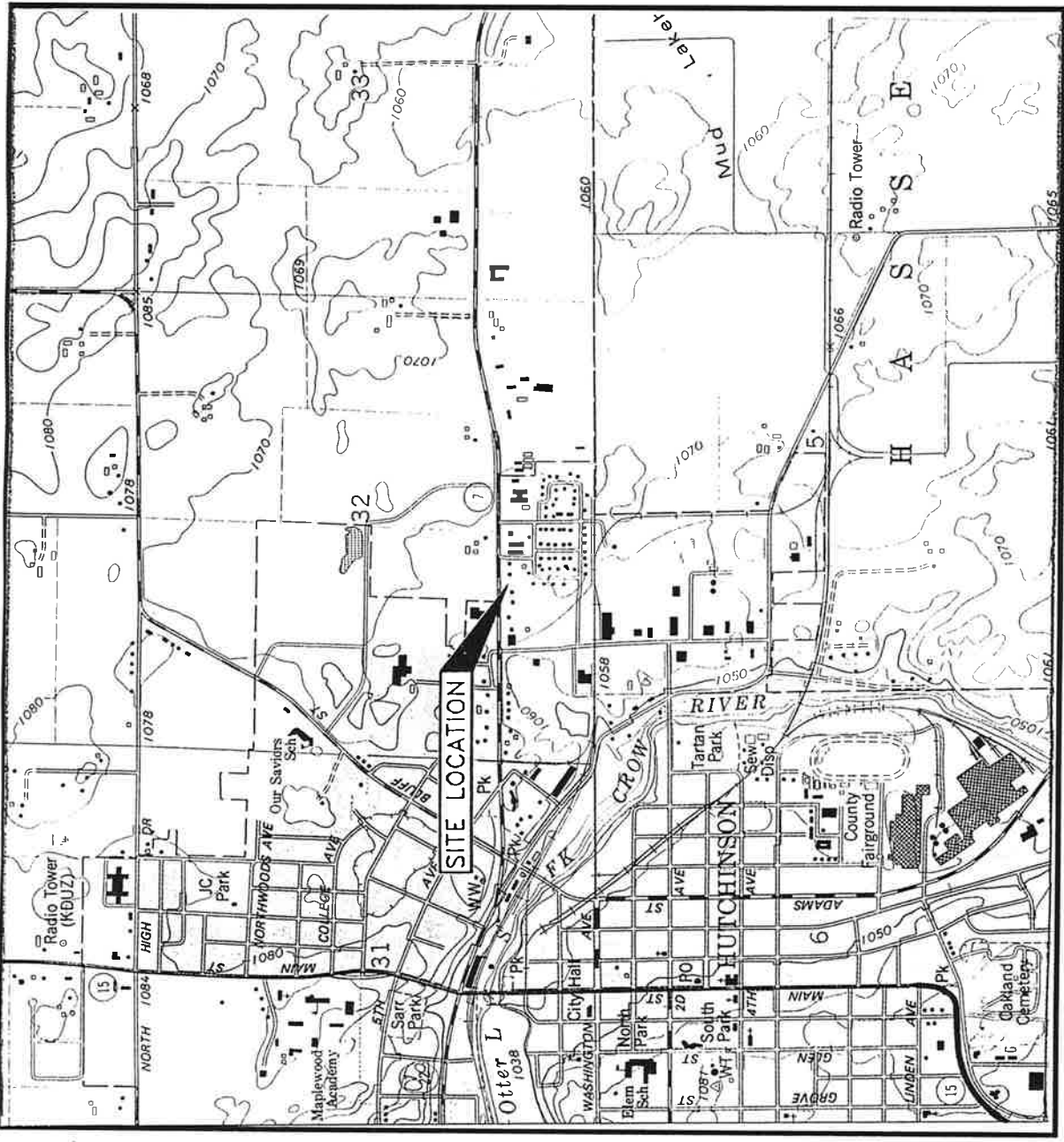
Section 15: Consultant (or other) information

By signing this document, I/we acknowledge that we are submitting this document on behalf of ~~and as agents~~ of the responsible person or volunteer for this leaksite. I/we acknowledge that if information in this document is seriously inaccurate or incomplete, it may ~~will~~ delay the completion of remediation and may harm the environment and may result in reduction of reimbursement awards. In addition, I/we acknowledge on behalf of the responsible person or volunteer for this leaksite that if this document is determined to contain a false material statement, representation, or certification, or if it intentionally omits material information, the responsible person or volunteer may be found to be in violation of Minn. Stat. § 115.075 (1994) or Minn. Rules 7000.0300 (Duty of Candor), and that the responsible person or volunteer may be liable for civil penalties.

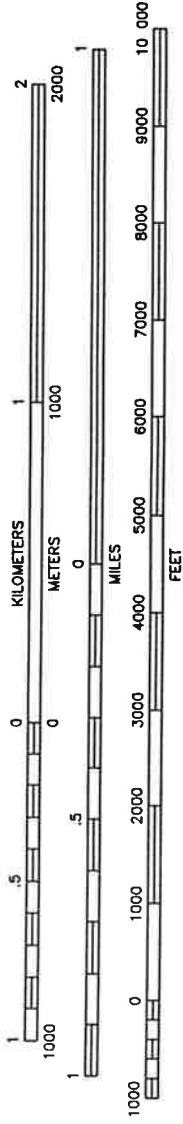
Name and Title:	Signature:	Date signed:
Davison C. Nagle/ Envr. Geologist		3-1-99
Paul J. Wiese/ Project Manager		3-1-99

Company and mailing address: **TERRACON**
3535 HOFFMAN ROAD EAST
WHITE BEAR LAKE, MN 55110
Phone:651-770-1500
Fax:651-770-1657

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SCALE 1:24 000



CONTOUR INTERVAL 10 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929
 DOTTED LINES REPRESENT 5-FOOT CONTOURS



HUTCHINSON EAST QUADRANGLE
 MINNESOTA-MCLEOD COUNTY
 7.5 MINUTE SERIES (TOPOGRAPHIC)

Terracon

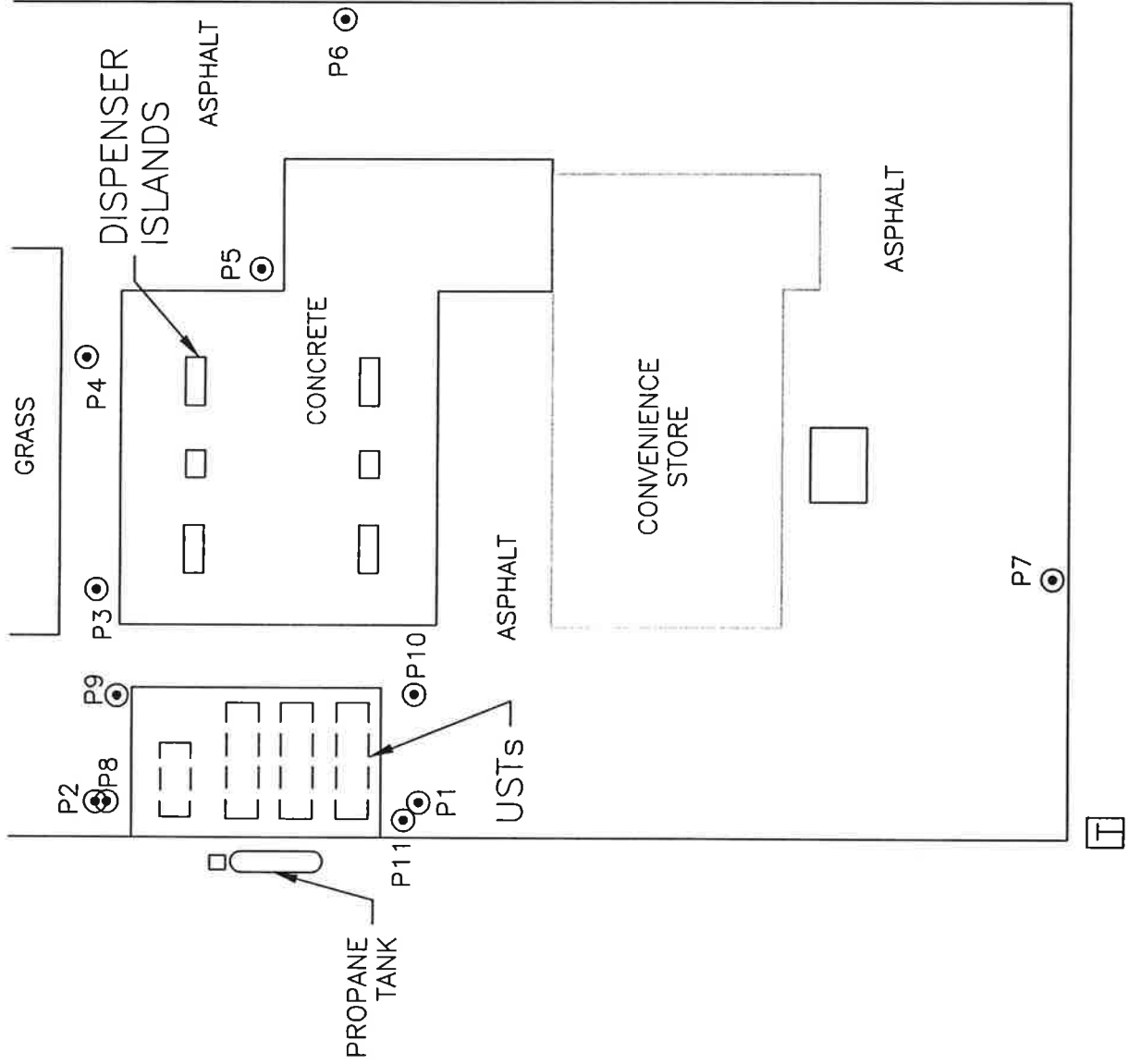
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 TERRACON PROJECT NO. 41987087

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DATE:	1/7/99

SITE LOCATION MAP

FIGURE 1



LEGEND

- PROBE LOCATIONS
- TRANSFORMER



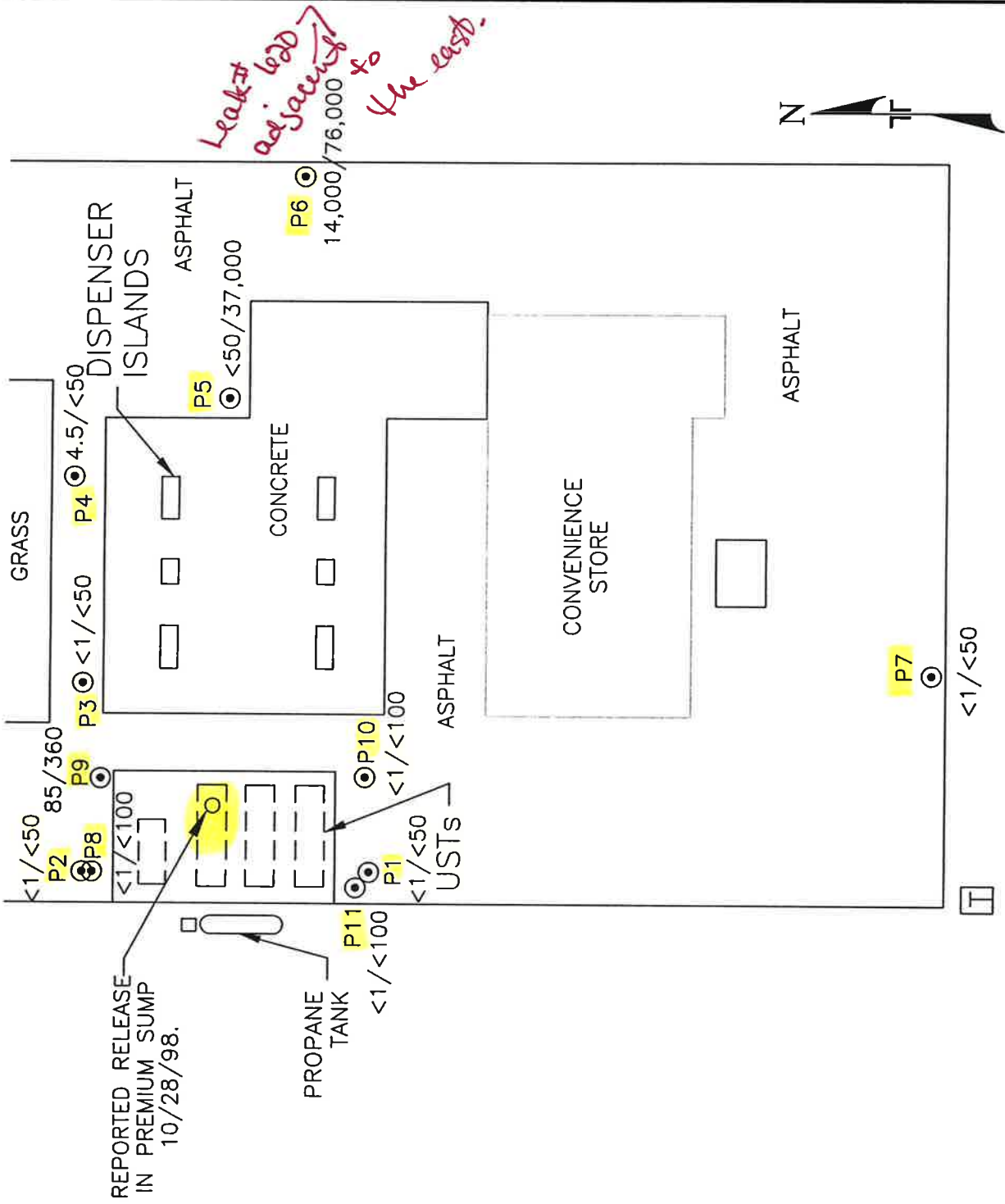
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FIGURE
2A

SITE MAP



NOTE: P1 THROUGH P7 ADVANCED ON 8/10/98. P8 THROUGH P11 ADVANCED ON 1/6/99.

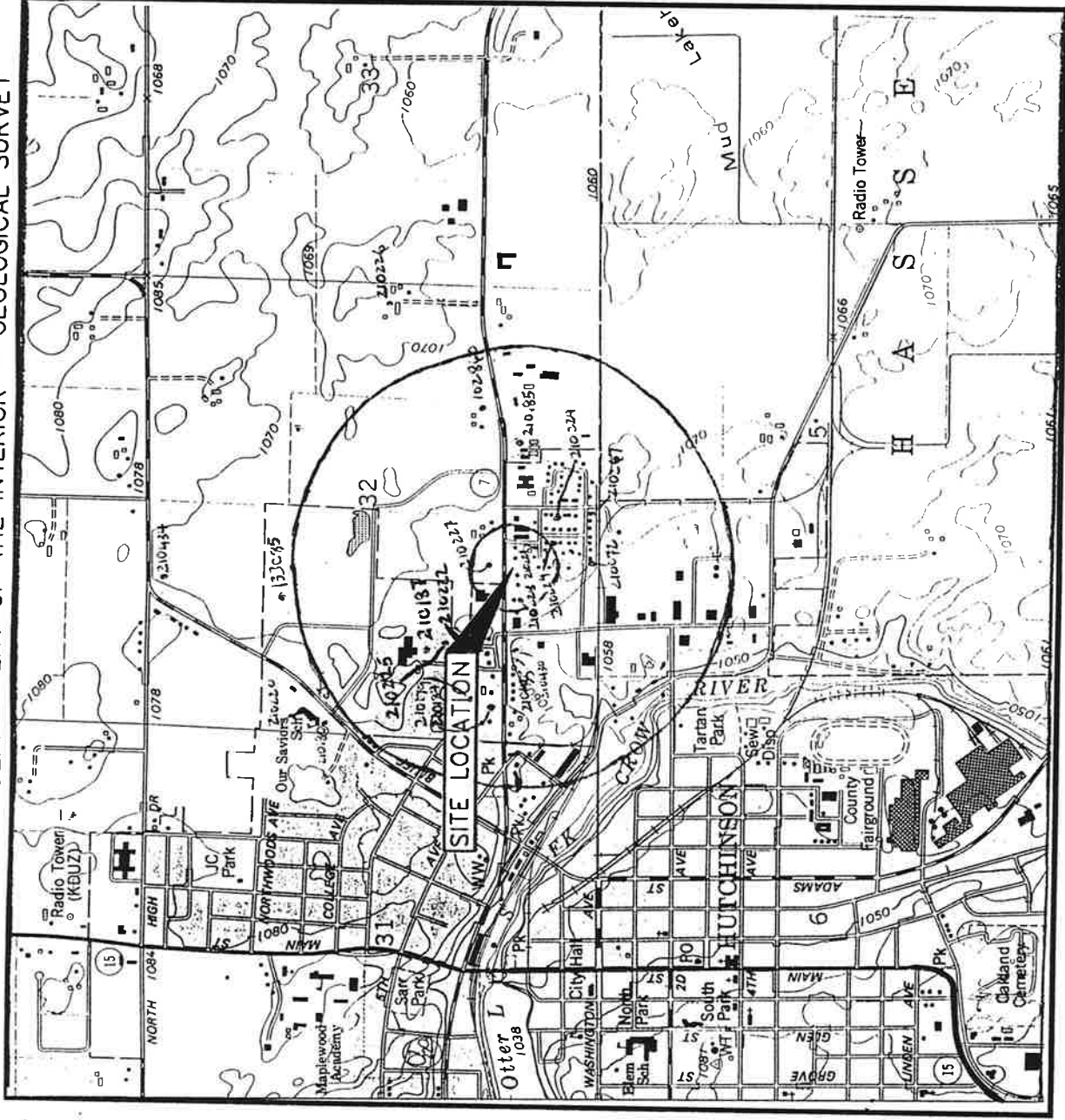
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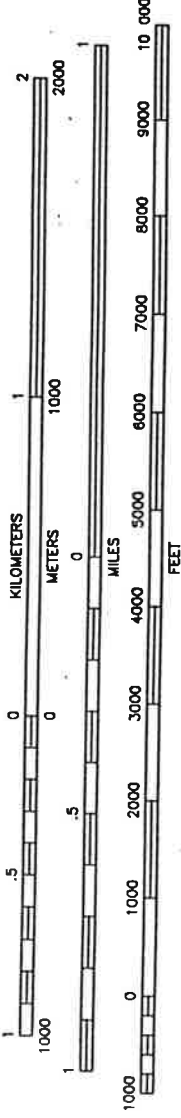
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DATE:	2/13/99

GROUND WATER ANALYTICAL RESULTS

FIGURE 2B



SCALE 1:24 000



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 DOTTED LINES REPRESENT 5-FOOT CONTOURS



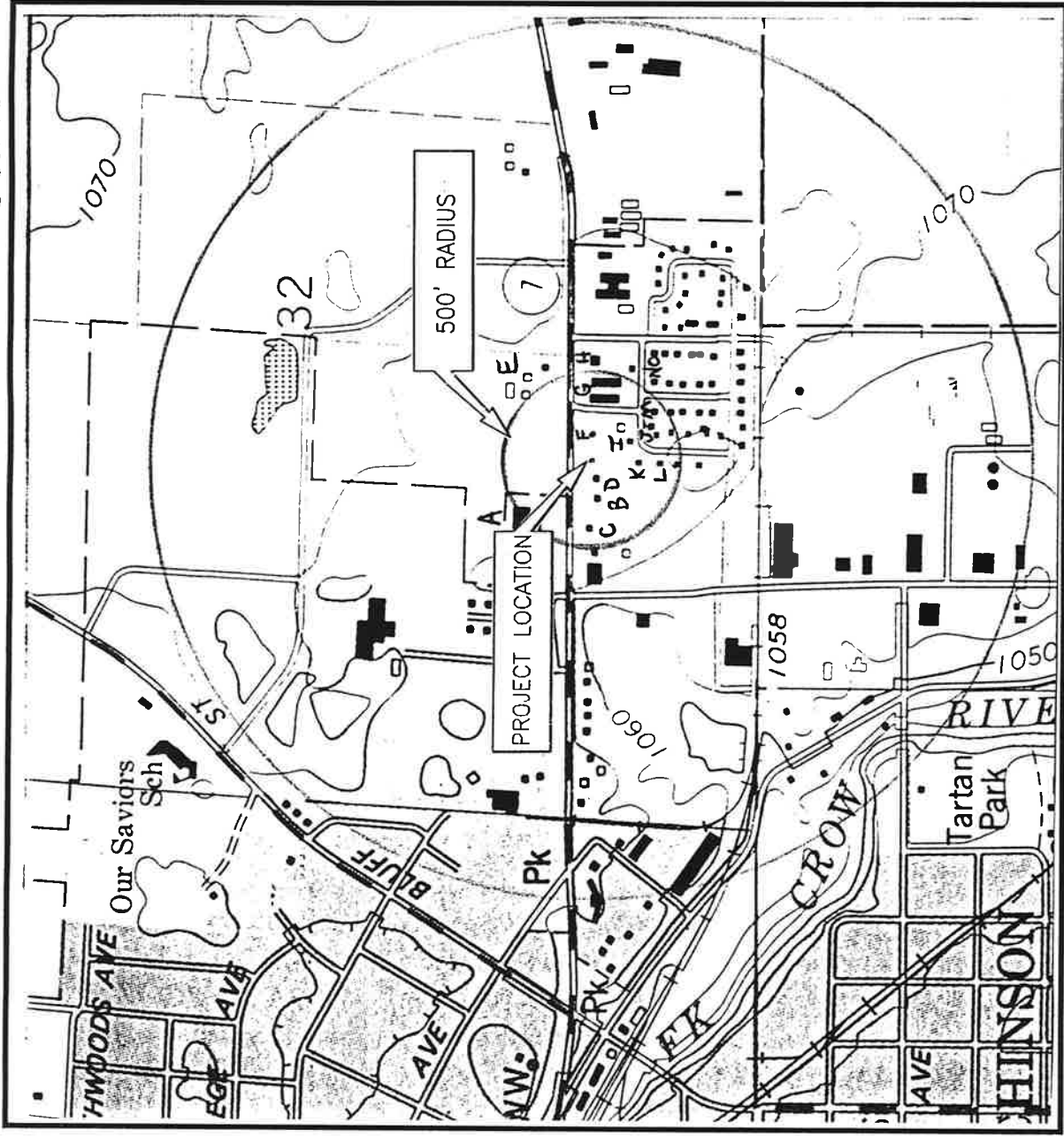
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SITE LOCATION MAP



THE LABELS SHOWN CORRESPOND TO THE WELL SURVEY TABLE



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DRAWING:	
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WELL SURVEY MAP

FIGURE
 3B

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Fax: 612-607-6444

January 20, 1999

Mr. Davison Nagle
Terracon Environmental, Inc.
3535 Hoffman Road East
White Bear Lake, MN 55110

RE: Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

(Account No. 5308)

Dear Mr. Nagle:

Enclosed are the results of analyses for sample(s) received on January 7, 1999. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Carolynne Trout
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

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DATE: 01/20/99
PAGE: 1

Pracon Environmental, Inc.
3535 Hoffman Road East
White Bear Lake, MN 55110

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Attention: Mr. Davison Nagle
Phone: 612-770-1500

Solid results are reported on a wet weight basis

Pace Sample No: 101049815
Client Sample ID: P8-10

Date Collected: 01/06/99
Date Received: 01/07/99
Matrix: Water

Parameters Results Units Analyzed Analyst CAS# Footnotes

Volatiles

WI GRO and PVOC	Method: TPH GRO/PVOC WI	Prep Method: TPH GRO/BTEX
Benzene	ND ug/L 1	01/15/99 EKB 71-43-2
Ethylbenzene	ND ug/L 1	01/15/99 EKB 100-41-4
Toluene	ND ug/L 1	01/15/99 EKB 108-88-3
Xylene (Total)	ND ug/L 2	01/15/99 EKB 1330-20-7
Methyl-tert-butyl Ether	4.5 ug/L 4	01/15/99 EKB 1634-04-4
Gasoline Range Organics	ND ug/L 100	01/15/99 EKB
Fluorobenzene (S)	104 %	01/15/99 EKB 462-06-6

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DATE: 01/20/99
PAGE: 2

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Pace Sample No: 101049823
Client Sample ID: P9-8

Date Collected: 01/06/99
Date Received: 01/07/99

Matrix: Water

Parameters Results Units Analyzed Analyst CAS# Footnotes

Volatiles

Method:	TPH GRO/PVOC WI	Method:	TPH GRO/BTEX
WI GRO and PVOC			
Benzene	85 ug/L 1	01/15/99 EKB	71-43-2
Ethylbenzene	7.3 ug/L 1	01/15/99 EKB	100-41-4
Toluene	80 ug/L 1	01/15/99 EKB	108-88-3
Xylene (Total)	32 ug/L 2	01/15/99 EKB	1330-20-7
Methyl-tert-butyl Ether	5.5 ug/L 4	01/15/99 EKB	1634-04-4
Gasoline Range Organics	360 ug/L 100	01/15/99 EKB	
Fluorobenzene (S)	111 %	01/15/99 EKB	462-06-6

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Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Pace Sample No: 101049831
Client Sample ID: P10-11

Date Collected: 01/06/99
Date Received: 01/07/99

Matrix: Water

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
------------	---------	-------	-----	----------	---------	------	-----------

Volatiles

Method: TPH GRO/PVOC WI	Method: TPH GRO/BTEX
ND	01/15/99 EKB 71-43-2
ND	01/15/99 EKB 100-41-4
1.2	01/15/99 EKB 108-88-3
ND	01/15/99 EKB 1330-20-7
34	01/15/99 EKB 1634-04-4
Gasoline Range Organics	01/15/99 EKB
Fluorobenzene (S)	01/15/99 EKB 462-06-6

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PAGE: 4

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Pace Sample No: 101049849
Client Sample ID: P11-8

Date Collected: 01/06/99
Date Received: 01/07/99

Matrix: Water

Parameters Results Units Analyzed Analyst CAS# Footnotes

Volatiles

Method: TPH GRO/PVOC WI	Prep Method: TPH GRO/BTEX
ND	01/15/99 EKB 71-43-2
ND	01/15/99 EKB 100-41-4
ND	01/15/99 EKB 108-88-3
ND	01/15/99 EKB 1330-20-7
ND	01/15/99 EKB 1634-04-4
ND	01/15/99 EKB
106	01/15/99 EKB 462-06-6

Method: TPH GRO/PVOC WI
1
1
1
2
4
100
%

WI GRO and PVOC
Benzene
Ethylbenzene
Toluene
Xylene (Total)
Methyl-tert-butyl Ether
Gasoline Range Organics
Fluorobenzene (S)

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Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Trace Sample No: 101049864
Client Sample ID: TRIP BLK

Date Collected: 01/06/99
Date Received: 01/07/99

Matrix: Water

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
------------	---------	-------	-----	----------	---------	------	-----------

Volatiles

WI GRO and PVOG	Method: TPH GRO/PVOC WI	ug/L	TPH GRO/PVOC WI	Prep Method: TPH GRO/BTEX
Benzene	ND	1	1	01/15/99 EKB 71-43-2
Ethylbenzene	ND	1	1	01/15/99 EKB 100-41-4
Toluene	ND	1	1	01/15/99 EKB 108-88-3
Xylene (Total)	ND	2	2	01/15/99 EKB 1330-20-7
Methyl-tert-butyl Ether	ND	4	4	01/15/99 EKB 1634-04-4
Gasoline Range Organics	ND	100	100	01/15/99 EKB
Fluorobenzene (S)	106	%		01/15/99 EKB 462-06-6

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Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Pace Sample No: 101049872
Client Sample ID: P8-8

Date Collected: 01/06/99
Date Received: 01/07/99

Matrix: Soil

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
------------	---------	-------	-----	----------	---------	------	-----------

Organics, Prep

Percent Moisture	Method:	
Percent Moisture	15.9	%

Prep Method:	
01/08/99	JMZ

GC Volatiles

NI GRO and PVOC, soil

	Method: TPH GRO/PVOC WI	Prep Method: TPH GRO/PVOC WI ext
Benzene	mg/kg 0.025	EKB 71-43-2
Ethylbenzene	mg/kg 0.025	EKB 100-41-4
Toluene	mg/kg 0.025	EKB 108-88-3
Xylene (Total)	mg/kg 0.075	EKB 1330-20-7
Methyl-tert-butyl Ether	mg/kg 0.025	EKB 1634-04-4
Gasoline Range Organics	5	EKB
Fluorobenzene (S)	108	EKB 462-06-6

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DATE: 01/20/99
PAGE: 7

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Pace Sample No: 101049880
Client Sample ID: P9-8

Date Collected: 01/06/99
Date Received: 01/07/99

Matrix: Soil

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
------------	---------	-------	-----	----------	---------	------	-----------

Organics, Prep

Percent Moisture	15.7	%		01/08/99	JMZ		
------------------	------	---	--	----------	-----	--	--

GC Volatiles

WI GRO and PVOC, soil

	Method:	TPH	GRO/PVOC	WI		Prep Method:	TPH	GRO/PVOC	WI	ext
Benzene	0.053	mg/kg	0.025		01/18/99	EKB	71-43-2			
Ethylbenzene	ND	mg/kg	0.025		01/18/99	EKB	100-41-4			
Toluene	0.046	mg/kg	0.025		01/18/99	EKB	108-88-3			
Xylene (Total)	ND	mg/kg	0.075		01/18/99	EKB	1330-20-7			
Methyl-tert-butyl Ether	ND	mg/kg	0.025		01/18/99	EKB	1634-04-4			
Gasoline Range Organics	ND	mg/kg	5		01/18/99	EKB				
Fluorobenzene (S)	116	%			01/18/99	EKB	462-06-6			

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DATE: 01/20/99
PAGE: 8

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Trace Sample No: 101049898
Client Sample ID: P10-7.5

Date Collected: 01/06/99 Matrix: Soil
Date Received: 01/07/99

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
------------	---------	-------	-----	----------	---------	------	-----------

Organics, Prep

Percent Moisture
Percent Moisture

Method: %
18.8

Prep Method:
01/08/99 JMZ

GC Volatiles

MI GRO and PVOC, soil

Benzene
Ethylbenzene
Toluene
Xylene (Total)
Methyl-tert-butyl Ether
Gasoline Range Organics
Fluorobenzene (S)

Method: TPH GRO/PVOC WI
mg/kg 0.025
mg/kg 0.025
mg/kg 0.025
mg/kg 0.075
mg/kg 0.025
mg/kg 5
%

Prep Method: TPH GRO/PVOC WI ext
01/18/99 EKB 71-43-2
01/18/99 EKB 100-41-4
01/18/99 EKB 108-88-3
01/18/99 EKB 1330-20-7
01/18/99 EKB 1634-04-4
01/18/99 EKB
01/18/99 EKB 462-06-6

REPORT OF LABORATORY ANALYSIS

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Pace Analytical

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

DATE: 01/20/99
PAGE: 9

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Trace Sample No: 101049906
Client Sample ID: P11-7.5

Date Collected: 01/06/99
Date Received: 01/07/99
Matrix: Soil

Parameters Results Units Analyzed Analyst CAS# Footnotes

Organics, Prep

Percent Moisture

Percent Moisture 6.1 Method: %

01/08/99 JMJ

Prep Method:

GC Volatiles

WI GRO and PVOC, soil

	Method: TPH GRO/PVOC WI	Method: TPH GRO/PVOC WI ext
Benzene	ND mg/kg 0.025	01/18/99 EKB 71-43-2
Ethylbenzene	ND mg/kg 0.025	01/18/99 EKB 100-41-4
Toluene	ND mg/kg 0.025	01/18/99 EKB 108-88-3
Xylene (Total)	ND mg/kg 0.075	01/18/99 EKB 1330-20-7
Methyl-tert-butyl Ether	ND mg/kg 0.025	01/18/99 EKB 1634-04-4
Gasoline Range Organics	ND mg/kg 5	01/18/99 EKB
Fluorobenzene (S)	108 %	01/18/99 EKB 462-06-6

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DATE: 01/20/99
PAGE: 10

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Pace Sample No: 101053940
Client Sample ID: MEOH BLANK

Date Collected: 01/06/99 Matrix: Soil
Date Received: 01/07/99

Parameters	Results	Units	PRL	Analyzed	Analyst	CAS#	Footnotes
------------	---------	-------	-----	----------	---------	------	-----------

Organics, Prep

Percent Moisture	0	%		01/15/99	HMJ		
------------------	---	---	--	----------	-----	--	--

GC Volatiles

WI GRO and PVOC, soil

	Method: TPH GRO/PVOC WI	Method: TPH GRO/PVOC WI ext
Benzene	ND mg/kg 0.025	01/18/99 EKB 71-43-2
Ethylbenzene	ND mg/kg 0.025	01/18/99 EKB 100-41-4
Toluene	ND mg/kg 0.025	01/18/99 EKB 108-88-3
Xylene (Total)	ND mg/kg 0.075	01/18/99 EKB 1330-20-7
Methyl-tert-butyl Ether	ND mg/kg 0.025	01/18/99 EKB 1634-04-4
Gasoline Range Organics	ND mg/kg 5	01/18/99 EKB
Fluorobenzene (S)	108 %	01/18/99 EKB 462-06-6

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Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

PARAMETER FOOTNOTES

Not Detected
Not Calculable
Pace Reporting Limit
Surrogate

PRL

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QUALITY CONTROL DATA

DATE: 01/20/99
PAGE: 12

Tracon Environmental, Inc.
3355 Hoffman Road East
White Bear Lake, MN 55110

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Attention: Mr. Davison Nagle
Phone: 612-770-1500

QC Batch ID: 20678
Analysis Method: Percent Moisture
QC Batch Method:
Analysis Description: Percent Moisture
Associated Pace Samples: 101049872 101049880 101049898 101049906

Method Blank: 101050029
Associated Pace Samples:

101049872 101049880 101049898 101049906

Parameter	Units	Method Blank Result	PRL	Footnotes
Percent Moisture	%	0		

Sample Duplicate: 101050037

Parameter	Units	101049872	Dup. Result	RPD	Footnotes
Percent Moisture	%	15.90	16.60	4	

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QUALITY CONTROL DATA

DATE: 01/20/99
PAGE: 13

Praccon Environmental, Inc.
365 Hoffman Road East
White Bear Lake, MN 55110

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Attn: Mr. Davison Nagle
Phone: 612-770-1500

QC Batch ID: 20815
Analysis Method:
Associated Pace Samples: 101053940
QC Batch Method:
Analysis Description: Percent Moisture

METHOD BLANK: 101056976
Associated Pace Samples:

101053940

Parameter	Units	Method Blank Result	PRL	Footnotes
Percent Moisture	%	0		

DUPLICATE: 101056992

Parameter	Units	Dup. Result	RPD	Footnotes
Percent Moisture	%	98.30 98.50	0	

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QUALITY CONTROL DATA

DATE: 01/20/99
PAGE: 14

Pracon Environmental, Inc.
5355 Hoffman Road East
White Bear Lake, MN 55110

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

Analyst: Mr. Davison Nagle
Phone: 612-770-1500

QC Batch ID: 20866
Analysis Method: TPH GRO/PVOC WI
Associated Pace Samples: 101049815 101049823 101049831 101049849 101049864
QC Batch Method: TPH GRO/BTEX
Analysis Description: WI GRO and PVOC

METHOD BLANK: 101060549
Associated Pace Samples:

101049815 101049823 101049831 101049849 101049864

Parameter	Units	Method		PRL	Footnotes
		Blank Result	Result		
benzene	ug/L	ND	1		
Ethylbenzene	ug/L	ND	1		
Toluene	ug/L	ND	1		
Xylene (Total)	ug/L	ND	2		
Methyl-tert-butyl Ether	ug/L	ND	4		
Gasoline Range Organics	ug/L	ND	100		
Monobenzene (S)	%	103			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 101060572 101060580

Parameter	Units	Spike Conc.	Matrix		Matrix		Spike		Footnotes
			Result	Spike %	Sp. Dup. Result	Spike %	Dup. Rec	RPD	
benzene	ug/L	100	108.0	102	104.0	97.9	4		
Ethylbenzene	ug/L	100	301.0	93.0	291.0	83.0	11		
Toluene	ug/L	100	127.0	93.6	122.0	88.6	5		
Xylene (Total)	ug/L	300	982.0	87.7	947.0	76.0	14		
Methyl-tert-butyl Ether	ug/L	100	115.0	94.5	110.0	89.5	5		
Gasoline Range Organics	ug/L	1000	3277	97.5	3079	77.7	23		
Monobenzene (S)				163		158	1.1		

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QUALITY CONTROL DATA

DATE: 01/20/99
PAGE: 15

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

LABORATORY CONTROL SAMPLE & LCSD: 101060556 101060564

Parameter	Units	Spike Conc.	LCS Result	Spike		LCSD		Spike		Footnotes
				% Rec	Result	% Rec	Result	% Rec	RPD	
Benzene	ug/L	100	95.50	95.5	96.40	96.4	1			
Toluene	ug/L	100	99.10	99.1	99.70	99.7	1			
Xylene (Total)	ug/L	100	92.60	92.6	94.30	94.3	2			
Methyl-tert-butyl Ether	ug/L	300	295.0	98.3	298.0	99.3	1			
Isoline Range Organics	ug/L	100	89.70	89.7	92.60	92.6	3			
Fluorobenzene (S)	ug/L	1000	1048	105	992.0	99.2	6			
				108		106				

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QUALITY CONTROL DATA

DATE: 01/20/99
PAGE: 16

Pracon Environmental, Inc.
35 Hoffman Road East
White Bear Lake, MN 55110

Pace Project Number: 1011916
Client Project ID: AVANTI-05 41987087

Attn: Mr. Davison Nagle
Phone: 612-770-1500

QC Batch ID: 20926
Analysis Method: TPH GRO/PVOC WI
Associated Pace Samples: 101049872 101049880 101049898 101049906 101053940
QC Batch Method: TPH GRO/PVOC WI ext
Analysis Description: WI GRO and PVOC, soil

PHOD BLANK: 101063063
Associated Pace Samples:

101049872 101049880 101049898 101049906 101053940

Method

Blank

Parameter	Units	Result	PRL	Footnotes
Benzene	mg/kg	ND	0.025	
Ethylbenzene	mg/kg	ND	0.025	
Toluene	mg/kg	ND	0.025	
Xylene (Total)	mg/kg	ND	0.075	
Methyl-tert-butyl Ether	mg/kg	ND	0.025	
Gasoline Range Organics	mg/kg	ND	5	
Monobenzene (S)	%	95		

LABORATORY CONTROL SAMPLE & LCSID: 101063071 101063089

Parameter	Units	Spike Conc.		LCS Result		Spike % Rec		LCSD Result		Spike Dup % Rec		Footnotes
		Conc.	Result	Result	Result	% Rec	RPD	% Rec	RPD			
Benzene	mg/kg	5.000	4.860	97.2	4.995	99.9	3					
Ethylbenzene	mg/kg	5.000	4.865	97.3	4.930	98.6	1					
Toluene	mg/kg	5.000	4.465	89.3	4.560	91.2	2					
Xylene (Total)	mg/kg	15	14.65	97.7	14.85	99.0	1					
Methyl-tert-butyl Ether	mg/kg	5.000	5.250	105	5.600	112	6					
Gasoline Range Organics	mg/kg	50	49.10	98.2	46.74	93.5	5					
Monobenzene (S)				104		106						

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Tel: 612-607-1700
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DATE: 01/20/99
PAGE: 17

Pace Project Number: 1011916
Client Project ID: AVANTI-Q5 41987087

QUALITY CONTROL DATA PARAMETER FOOTNOTES

Consistent with EPA guidelines unrounded concentrations are displayed and have been used to calculate % Rec and RPD values.

NC Not Calculable
Pace Reporting Limit
(S) Relative Percent Difference
Surrogate

The surrogate recovery was outside QC acceptance limits due to matrix interference.

REPORT OF LABORATORY ANALYSIS

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433640

To Be Completed by Pace Analytical and Client

Section A Required Client Information:
 Company: Terracon
 Address: 3535 Hoffman Rd E
 White Bear Lake, MN
 P.O.:
 Report To: Davison Abgie
 Invoice To: TERRACON

Section B Required Client Information:
 Project Name: Avanti - 05
 Project Number: 41987087
 Phone: 651-770-1500
 Fax: 651-770-1657

Section D Required Client Information:
 Valid Matrix Codes →
 MATRIX CODE
 WATER
 WT
 SOIL
 SL
 OIL
 W/P
 AIR
 TISSUE
 OTHER
 MATRIX CODE
 SAMPLE ID
 One character per box.
 (A-Z, 0-9 / -)
 Sample IDs MUST BE UNIQUE

ITEM #

ITEM #	SAMPLE ID	DATE COLLECTED	TIME COLLECTED	# Containers	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	HOAc/Meth	Na ₂ S ₂ O ₃	Matrix Code	REMARKS / Lab ID
1	P8-10	1-4-99	1100	3				X			MT	1049815
2	P8-8		1105	2				X			SL	1049872
3	P9-8		1140	3				X			MT	1049823
4	P9-8		1150	2				X			SL	1049880
5	P10-11		1130	3				X			MT	1049831
6	P10-7.5		1135	2				X			SL	1049898
7	P11-8		1140	3				X			MT	1049849
8	P11-7.5		1300	2				X			SL	1049906
9	MEOH BLANK			2				X				1053940 1049858
10	TRIP BLANK			2				X			MT	1049864
11												
12												

Sample Condition	Temp in °C	Received on ICE	Sealed Cooler	Samples Intact
	1.0	Y / N	Y / N	Y / N

Additional Comments:

Sample Notes	Item No.	Relinquished By / Company	Date	Time	Accepted By / Company	Date	Time

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: USA & MOULDER
 SIGNATURE of SAMPLER: *USA & MOULDER*
 DATE Signed: (MM/DD/YY) 1-7-99

SEE REVERSE SIDE FOR INSTRUCTIONS

METHODS

GEOPROBE METHODS

Ground Water Sampling Procedures

Ground water samples were collected using a 1-inch diameter, 4-foot stainless steel screen. The screen sampler was encased in steel and driven to the desired depth. The casing was then pulled up a distance of four feet to allow ground water to pass through the screen. A vacuum was applied to the tubing and the water was collected in a one-liter glass jar. If enough water was available the first liter collected was purged. The ground water was transferred directly from the jar to the appropriate laboratory containers.

Soil Sampling Procedures-macro core sampler

Soil samples were collected with a 2-inch diameter 4-foot sampler that attaches to the leading end of the probe rod. The sampler is comprised of a hollow steel cylinder with an acetate liner. Samples are collected in the liner continuously in four foot lengths. The samples are extruded and placed into laboratory prepared sample jars or other appropriate containers.

Soil Sampling Procedures-discrete sampler

At depths greater than 12 to 16 feet discrete soil samples were collected using a 1.25-inch diameter 2-foot sampler that attaches to the leading end of the probe rod. The sampler is comprised of a hollow steel cylinder, a center piston, and an acetate liner. The sampler remains sealed until it is advanced to the desired sampling depth. The piston is retracted and the probe is advanced approximately two feet to recover a sample. The sample is extruded and placed into laboratory prepared sample jars or other appropriate containers.

Cleaning Procedures

The downhole tools were cleaned using high pressure hot water wash prior to mobilization to the site and between borings. The split barrel sampler was washed with atri-sodium phosphate solution and rinsed with potable water prior to collecting soil samples. The water level indicator was cleaned between wells using a potable water wash, a methanol wash, and a potable water rinse.

Boring Abandonment

The probe holes were abandoned using a bentonite grout mixture upon completion of sample collection.

Soil Classification

As the samples were obtained in the field, they were classified by the field engineer in accordance with ASTM D-2487 based on visual observations, texture and plasticity. Boring logs indicating the depth and identification of the various strata, water level information, sample collection intervals, and field screening were completed on-site by the field engineer.

Soil Sample Organic Vapor Screening

Soil samples were screened for the presence of organic vapors using a photoionization detector. This device is calibrated to isobutylene and provides a direct reading in parts per million (ppm). Soil samples were collected upon retrieval of the sample from the borehole. The soil samples were placed in clean ziplock bags and sealed. The samples were allowed to stand for 15 minutes and warmed, if necessary, prior to inserting the probe and recording the organic vapor level.

Quality Control/Quality Assurance

A trip blank for VOCs, if analyzed, was submitted to the laboratory. Each sample container was labeled with the analysis, sample name, time and date of collection, and the preservative (if any). Proper chain-of-custody records accompanied the samples. Samples were placed in coolers with ice and were then secured with shipping seals for transport to the laboratory.

LOG OF BORING NO. P1

CLIENT: AVANTI PETROLEUM INC. PROJECT MANAGER

LOCATION: STORE Q5 HUTCHINSON, MINNESOTA PROJECT: Q MIDWEST INC.

GRAPHIC LOG	DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS
0.3	Asphalt	Fill		GP	36				
4.0	FILL, Sand W/ trace Gravel and Clay Moist Brown	CL	1	GP	36			ND	*
8.0	FILL, Lean Clay W/ Sand Wet to Waterbearing Brown-Gray	SP	2	GP	36			ND	
12.0	SAND Waterbearing Brown								
	BOTTOM OF BORING GP = GEOPROBE								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS	
WL ∇	6.00 WL ∇
WL ∇	WL ∇
WL	WL

BORING STARTED	8-10-98
BORING COMPLETED	8-10-98
RIG	THEIN FOREMAN MLN
APPROVED DJW	JOB # 41987066



LOG OF BORING NO. P2

CLIENT: AVANTI PETROLEUM INC. PROJECT MANAGER

LOCATION: STORE Q5 PROJECT: Q MIDWEST INC.

HUTCHINSON, MINNESOTA

GRAPHIC LOG	DEPTH (FT.)	USCS SYMBOL	SAMPLES				TESTS				
			NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT.**	MOISTURE (%)	FIELD VAPOR READING (PPM)*	SAMPLE SUBMITTED FOR LAB ANALYSIS		
0.3	Asphalt FILL, Clay W/ Sand and Gravel	Fill		GP							
4.5	LEAN CLAY, W/ Sand and Gravel Moist to Waterbearing Mottled Olive W/ Gray and Black	CL	1	GP			1	*			
11.0	LEAN CLAY, Sand W/ Trace Gravel(Till) Moist Olive W/ Gray Mottled	CL	2	GP				ND			
12.0	BOTTOM OF BORING GP = GEOPROBE										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS		BORING STARTED	8-10-98
WL	7.00 WL	BORING COMPLETED	8-10-98
WL	WL	RIG	THEIN FOREMAN MLN
WL	WL	APPROVED DJW	JOB # 41987066



LOG OF BORING NO. P3

CLIENT **AVANTI PETROLEUM INC.** PROJECT MANAGER

LOCATION **STORE Q5 HUTCHINSON, MINNESOTA** PROJECT **Q. MIDWEST INC.**

DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	SAMPLES			TESTS		
				RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS	
0.3	Fill		GP	48					
		1					ND		
6.0	CL		GP	48					
8.0		2					ND	*	
10.5	CL		GP	48					
12.0		3					ND		
BOTTOM OF BORING GP = GEOPROBE									

DESCRIPTION

0.3 Asphalt

FILL, Lean Clay, Trace Sand and Gravel
Damp
Dark Brown to Black

6.0 LEAN CLAY, W/ Trace Sand and Gravel
Moist

8.0 Olive Gray to Gray to Brown
SAND
Waterbearing

10.5 Brown

12.0 LEAN CLAY, W/ Trace Gravel(Till)
Damp to Dry
Olive Gray

GRAPHIC LOG

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS

WL	7.00	WL	✓
WL		WL	✓
WL			

BORING STARTED	8-10-98
BORING COMPLETED	8-10-98
RIG	THEIN FOREMAN MLN
APPROVED DJW	JOB # 41987066



LOG OF BORING NO. P4

CLIENT AVANTI PETROLEUM INC.		PROJECT MANAGER								
LOCATION STORE Q5 HUTCHINSON, MINNESOTA		PROJECT Q MIDWEST INC.								
GRAPHIC LOG	DESCRIPTION	SAMPLES			TESTS					
		DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT.**	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS
0.3	Asphalt	Fill	GP	48						
8.0	FILL, Lean Clay, Trace Sand and Gravel Dry to Damp Gray to Black	CL	GP	48	1	3				
11.5	LEAN CLAY, W/ Trace Gravel Interbedded Waterbearing Sand Lenses Moist Olive Mottled W/ Gray to Brown	CL	GP	48	2	3			*	
12.0	LEAN CLAY, W/ Trace Gravel(Till) Moist Gray BOTTOM OF BORING GP = GEOPROBE				3	ND				

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS		BORING STARTED	8-10-98
WL	8.00 WL	BORING COMPLETED	8-10-98
WL	WL	RIG	THEIN FOREMAN MLN
WL	WL	APPROVED DJW	JOB # 41987066



LOG OF BORING NO. P5

CLIENT AVANTI PETROLEUM INC.	PROJECT MANAGER								
LOCATION STORE Q5 HUTCHINSON, MINNESOTA	PROJECT Q. MIDWEST INC.								
GRAPHIC LOG	DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS
	5	Fill	1	GP	48			16	
0.3	Asphalt								
7.0	FILL, Lean Clay, W/ Sand and Gravel Moist Gray Mixed W/ Black		2					98	*
9.0	CLAYEY SAND, W/ Trace Gravel Moist to Wet	SM		GP	48				
10.0	Olive Mottled W/ Gray to Brown SILTY SAND Waterbearing Gray								
12.0	LEAN CLAY, W/ Gravel (Till) Brown		3					1	
	BOTTOM OF BORING GP = GEOPROBE								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS

WL	▽	8.00	WL	▽
WL	▽		WL	▽
WL			WL	



BORING STARTED	8-10-98	BORING COMPLETED	8-10-98
RIG	THEIN	FOREMAN	MLN
APPROVED DJW	JOB #	41987066	

LOG OF BORING NO. P6

CLIENT	PROJECT MANAGER	
LOCATION	PROJECT	
AVANTI PETROLEUM INC.	Q. MIDWEST INC.	
STORE Q5		
HUTCHINSON, MINNESOTA		

GRAPHIC LOG	DEPTH (FT.)	USCS SYMBOL	SAMPLES				TESTS			
			NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS	
0.3	Asphalt	Fill		GP	48					
6.0	FILL, Lean Clay, W/ Sand and Gravel Moist Brown W/ Gray Mottled to Brown	Fill	1	GP	48		98			
9.0	SILTY LEAN CLAY, W/ Trace Sand Moist to Saturated Olive Gray	SM	2	GP	48		221		*	
11.0	LEAN CLAY Moist Olive Gray			GP	48					
12.0	LEAN CLAY Moist Olive W/ Gray Mottled		3				31			
	BOTTOM OF BORING GP = GEOPROBE									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS	
WL ∇	8.00 WL ∇
WL ∇	∇
WL	∇
BORING STARTED 8-10-98	
BORING COMPLETED 8-10-98	
RIG	THEIN FOREMAN MLN
APPROVED DJW JOB # 41987066	



LOG OF BORING NO. P7

CLIENT: AVANTI PETROLEUM INC.
 LOCATION: STORE Q5
 HUTCHINSON, MINNESOTA

PROJECT MANAGER

PROJECT: Q MIDWEST INC.

GRAPHIC LOG	DEPTH (FT.)	USCS SYMBOL	SAMPLES				TESTS			
			NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT.**	MOISTURE (%)	FIELD VAPOR READING (PPM)*	SAMPLE SUBMITTED FOR LAB ANALYSIS	
0.3 Asphalt		Fill		GP	48					
FILL, Lean Clay, W/ Gravel Damp										
3.5 FILL, Sand Dry		Fill	1	GP	48			1		
5.0 Black										
6.0 Fill, Old Topsoil Moist			2					1		*
8.0 Black										
10.0 LEAN CLAY, W/ Trace Gravel Moist		SM		GP	48					
Gray										
12.0 LEAN CLAY Dark Brown										
SILT, W/ Clay Wet to Waterbearing Olive Gray										
BOTTOM OF BORING GP = GEOPROBE										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS		BORING STARTED	8-10-98
WL	10.00 WL	BORING COMPLETED	8-10-98
WL		RIG	THEIN FOREMAN MLN
WL		APPROVED DJW	JOB # 41987066



LOG OF BORING NO. P8

CLIENT AVANTI PETROLEUM		PROJECT MANAGER								
LOCATION 640 HIGHWAY 7 EAST HUTCHINSON, MINNESOTA		PROJECT AVANTI Q5								
GRAPHIC LOG	DESCRIPTION	SAMPLES			TESTS					
		DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS
0.3	ASPHALT									
2.5	FILL: SAND AND GRAVEL, Brown									
4.0	CLAY, Dark Brown									
8.0	CLAY TRACE GRAVEL, Brown to Gray	SW/ CL	1	GP	48			ND		
12.0	CLAY TRACE GRAVEL, Brown to Gray, intermittent sand lenses around 10' ∇	CL	2	GP	48			ND		
	BOTTOM OF BORING	CL	3	GP	48			ND		

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS	
WL ∇ 10.00	WD ∇
WL ∇	WL ∇
WL	WL
Terracon	
BORING STARTED	1-6-99
BORING COMPLETED	1-6-99
RIG	GEOPROBE FOREMAN LRM
DCN	JOB # 41987087

LOG OF BORING NO. P9

CLIENT AVANTI PETROLEUM		PROJECT MANAGER							
LOCATION 640 HIGHWAY 7 EAST HUTCHINSON, MINNESOTA		PROJECT AVANTI Q5							
GRAPHIC LOG	DESCRIPTION	SAMPLES			TESTS				
		USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS
0.3	ASPHALT								
4.0	SAND AND GRAVEL, Light Brown, Fine to Medium Grain	SW	1	GP	48			1	
8.0	SAND AND GRAVEL, Light Brown, Fine to Medium Grain, Wet at 8'								
8.0	CLAY	SW	2	GP	48			2	
10.0	BOTTOM OF BORING	CL	3	GP	24			ND	

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS		BORING STARTED	1-6-99
WL	▽ 8.00	BORING COMPLETED	1-6-99
WL	▽	RIG	GEOPROBE FOREMAN LRM
WL		DCN	JOB # 41987087



LOG OF BORING NO. P10

CLIENT AVANTI PETROLEUM		PROJECT MANAGER								
LOCATION 640 HIGHWAY 7 EAST HUTCHINSON, MINNESOTA		PROJECT AVANTI Q5								
GRAPHIC LOG	DESCRIPTION	SAMPLES			TESTS					
		DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS
0.3	ASPHALT	5								
2.5	FILL: SAND AND GRAVEL, Brown, Medium Grain									
4.0	SILTY, SANDY CLAY		SW/1 SC	1	GP	48		ND		
7.5	CLAY, Dark Brown			2	GP	42		ND		
11.7	CLAY, Dark Brown			3	GP	30		ND		
12.0	SAND WITH GRAVEL, Moist			4	GP	24		ND		
14.0	SAND WITH GRAVEL, Brown, Wet			5	GP	36		ND		
15.0	CLAY, Gray, Moist									
	BOTTOM OF BORING									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS	
WL	11.00 WD ▽
WL	▽
WL	▽
Terracon	
BORING STARTED	1-6-99
BORING COMPLETED	1-6-99
RIG	GEOPROBE FOREMAN LRM
DCN	JOB # 41987087

LOG OF BORING NO. P11

CLIENT AVANTI PETROLEUM		PROJECT MANAGER								
LOCATION 640 HIGHWAY 7 EAST HUTCHINSON, MINNESOTA		PROJECT AVANTI Q5								
GRAPHIC LOG	DESCRIPTION	SAMPLES				TESTS				
		DEPTH (FT.)	USCS SYMBOL	NUMBER	TYPE	RECOVERY, IN.	SPT - N BLOWS / FT. **	MOISTURE (%)	FIELD VAPOR READING (PPM) *	SAMPLE SUBMITTED FOR LAB ANALYSIS
0.3	ASPHALT	5	SW	1	GP	48		ND		
4.0	SAND AND GRAVEL, Brown, Fine to Medium Grain									
6.5	SILTY, SANDY CLAY									
	CLAY, Dark Gray, Moist		CL	2	GP	36		ND		
10.7	SAND, Brown, Fine to Coarse, Wet	10	CL/SP	3	GP	42		ND		
	BOTTOM OF BORING									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual. * ND indicates a reading of less than the field detection limit (FDL) of one (1) part per million isobutylene equivalents (ppmi)

WATER LEVEL OBSERVATIONS	
WL	8.00 WD
WL	WL
WL	WL
Terracon	
BORING STARTED	1-6-99
BORING COMPLETED	1-6-99
RIG	GEOPROBE FOREMAN LRM
DCN	JOB # 41987087