PEER, Inc. Consultants in Hazardous Waste & Environmentally Distressed Property

February 20, 1992

Ms. Jean Hanson
Minnesota Pollution Control Agency
Hazardous Waste Division
Tanks and Spills Section
520 Lafayette Road
St. Paul, MN 55155

RE: Cleanup Strategy
Former Mobil Service Station
4201 Hiawatha Avenue
Minneapolis, Minnesota
MPCA Leak #1485

Dear Ms. Hanson:

On behalf of our client, Agate Properties, Inc., Peer Environmental & Engineering Resources, Inc. is requesting a cleanup strategy discussion for the above referenced site. In accordance with the MPCA "Leaking Underground Storage Tank Program Cleanup Strategy" document (May 1991), we are providing this letter and the enclosed materials for your review prior to scheduling the discussion.

Enclosed are the following draft documents:

- Hydrogeologic Setting and Ground Water Contamination Characterization Worksheet.
- Site location and layout figures, including all sampling points.
- Preliminary tables of soil and ground water contaminant concentrations, water level elevations, and receptor survey (water well records) information.
- Soil boring logs.
- Excavation Report.

Note that the entire Pace soil boring report is included as an attachment to the Excavation Report, since we understand you have not seen a copy of the Pace report yet.

A summary of the results of investigation and cleanup activities completed to-date is as follows:

1) The on-site geology consists of about 9 feet of alluvial clay over sand alluvium, which was encountered to the termination depths (maximum 40 feet) of all the borings. Ground water occurs at about 30 feet. Ground water flows to the west-southwest (almost opposite of the direction estimated from available hydrogeologic maps).

2) A fuel oil UST release occurred near the northeast corner of the former service station building, which contaminated the clay and underlying sand to the depth of ground water.

3) Most of the highly contaminated soil from the fuel oil UST release was removed, but some contaminated soil (above MPCA action levels) remains in place at-depth (17-30 feet) and beneath the building.

4) A gasoline tank line leak occurred in the dispenser pump area west of the building, and contaminated the clay but not the underlying sand. Essentially all of the contaminated soil from this release has been excavated.

5) The contaminated soil was thermally treated off-site.

6) Ground water investigation indicates impacts from gasoline in the northwest quadrant of the site. Fuel oil impacts do not appear to be significant.

7) The source of gasoline ground water contamination is estimated (through the process of elimination) to be from former gasoline UST(s) which were located on the north side of the site.

8) The "point of release" from the gasoline UST(s) was not encountered in borings or test pits. It is assumed the release was from the bottom of the gasoline UST(s) in the sand beneath the clay; hence is localized.

9) Ground water contamination appears to extend to the west, off-site, beneath Hiawatha Avenue.

10) There are no remaining USTs on-site.

11) The site geology and results of the receptor survey indicates no significant risk of impacts to drinking water aquifers, water wells, or surface water bodies.

12) The vapor risk assessment indicates no nearby basements are present, and no utilities in contact with contaminated soil or close to ground water.

The primary purpose of the cleanup strategy discussion will be to determine if further investigation and cleanup actions are warranted. The entire surface of the site will be "capped" with bituminous and/or concrete pavement, and the building. Based on the results of the investigation, similar project experience and in consideration of Petrofund, PEER recommends the MPCA consider this site for no further action except for a year of ground water monitoring.

We will give you a call in about a week to confirm your receipt of the materials and tentatively schedule a time when the cleanup strategy discussion can be held. If you have any questions, or would like addition information before then, please do not hesitate to contact us at 448-6775.

Sincerely,

Peer Environmental & Engineering Resources, Inc.

Stephen T. Jansen, M.S.
Senior Project Manager

David D. Vieau
President

STJ/DDV:ab
Enclosure

p.c. Mr. R.J. Voith
Ms. Karen Nordby

Hydrogeologic Setting and Ground Water Contamination Characterization
Petroleum Release Sites
Former Mobil Service Station
4201 Hiawatha Avenue
Minneapolis, Minnesota
MPCA Leak No. 1485

Minnesota Pollution Control Agency
Tanks and Spills Section
May 1991
(Form re-typed by Peer Environmental & Engineering Resources, Inc.)

This worksheet should be completed for all sites which have ground water contamination. It has several purposes. It summarizes remedial investigation (RI) results and conclusions for use by Minnesota Pollution Control Agency (MPCA) staff when reviewing the site to determine whether corrective action will be required to remediate ground water contamination. It also provides supplementary information on investigation, design and reporting requirements for sites which have ground water contamination. This worksheet and all other relevant MPCA documents should be reviewed when developing RI work plans to ensure that all RI requirements and objectives will be met during the investigation.

Answers to the following questions should be based on the results of the ground water receptor survey, RI activities, and published geologic literature. The questions should be answered in the space provided. Attach additional sheets if necessary.

1. *Identify and describe the geologic units in which ground water has been impacted by the petroleum release. What is the thickness (or estimated thickness) and estimated lateral extent of the impacted unit?*

   Middle terrace sand deposits. Saturated thickness estimated to be 20-30 feet. Lateral extent defined on the northwest quadrant of the site, undefined to the west beneath Hiawatha Avenue. (see Figures 2 and 3)

At all sites with ground water monitoring wells, the RI must include an estimated of hydraulic conductivity, and provide estimates of the ground water velocity in the impacted unit. Documentation of how you arrived at these estimates must be provided.

2. *What is the hydraulic conductivity (K), effective porosity (n), hydraulic gradient (i), estimated ground water velocity (v) and flow direction in the impacted unit?*

   Hydraulic Conductivity calculated from slug tests in 3 monitoring wells. Range in $K = 1.04 \times 10^{-2}$ cm/sec to 2.60×10^{-2} cm/sec; Average $K = 1.93 \times 10^{-2}$ cm/sec = 55 feet/day. Estimated n = 0.2 - 0.3. Measured i = 0.0013. Calculate $v = K\,i\,(n^{-1})$ = 0.24 - 0.36 feet/day. Flow direction is to the west-southwest.

3. *What is the maximum concentration of benzene and total hydrocarbons detected on the site? (parts per billion [ppb] units)*

   Benzene **N.D. (MDL = 50 ug/L)** *Total Hydrocarbons* **42,00 ug/L**
   (Well No. **1**, *Date* **12/26/91**) *(Well No.* **1**, *Date* **12/26/91**)

   Benzene was N.D. (MDL = 1 ug/L) for MW-2 and MW-3

4. *What is the maximum concentration of benzene and total hydrocarbons detected at or beyond the property boundary? (ppb units)* **MW-1 is near the northwest property corner. No wells installed beyond the property boundary.**

   Benzene _____ *Total Hydrocarbons* _____
   (Well No. ___, *Date* _____) *(Well No.* ___, *Date* _____)

5. *Do contaminant concentrations for any compound exceed the Recommended Allowable Limits (RALs), at, or beyond the site boundaries?* **Yes**

   Compound **Ethyl Benzene, Methylene Chloride, Toluene**
   (Well No. **1**, *Date* **12/26/91**)

6. *Do sources of contamination (including contaminated soil) remain at the site? (Yes/No) If Yes, briefly describe.* **Yes. A limited amount of contaminated soil was left in place. (see Excavation Report).**

7. *Is municipal water supply available at the site and within one mile downgradient of the site?* **No**

8. *Are there presently any water wells which use the impacted aquifer located within one half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured?* **No**

9. *Are there any plans for ground water development in the impacted aquifer within one half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured?* **No**

If you answered No to questions 8 and 9, please skip to question 10 and continue.

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

Cleanup Goal: The RALs for VOCs and one part per million total hydrocarbons.

Compliance Point: At and beyond the site boundaries.

At some LUST sites corrective actions may not be technically capable of achieving remediation to RALs. For a discussion of the options which should be considered when designing corrective actions for sites of this type please see the attached MPCA "Corrective Action Design for Ground Water Remediation to RALs" (May 1991) document.

Stop here if you answered Yes to question 8 or 9.

10. *Are there nonpotable water supply wells which use the impacted unit downgradient of the site?* **No**

11. *Does the plume currently discharge to surface water? If yes, what is the estimated width of the plume at the shore of the surface water body, and what are the estimated concentrations of the following contaminants at the shore of the surface water body: (the estimation method should be described in the text of the RI report.)* **No**

    Benzene _____, Ethyl Benzene _____, Toluene _____, Xylenes _____, Total Hydrocarbons _____

If the answer to question number 11 is Yes, the use category of the surface water body should also be determined, in accordance with Minnesota Rules Chapter 7050, and reported.

12. *Does the plume have a projected point of entry to surface water? (Yes/No) If Yes, what is the distance from the downgradient edge of the plume to the surface water body?* **No**

If you answered Yes to question 12, the RI report should characterize the hydrogeologic conditions and land use between the site and the surface water body, and should assess the potential for the plume to discharge to surface water and the likelihood of future ground water use in the vicinity of the plume.

13. *Is the impacted unit a bedrock aquifer?* **No**

14. *Has contamination from the site impacted a quaternary surficial or buried aquifer that is presently used as a drinking water aquifer anywhere within a two mile radius of the site?* **No**

Stop here if you answered Yes to question 13 or 14. If you answered No to both questions 13 and 14, please continue.

15. *Identify and describe the uppermost drinking water aquifer in the site vicinity. What is the depth to the top of the uppermost drinking water aquifer? What is the water level in the uppermost drinking aquifer?* **St. Peter Sandstone. Depth to top of the St. Peter Sandstone estimated to be 78-90 feet. An unconfined water table is estimated to occur in the St. Peter Sandstone at a depth of 94 feet (elevation 744).**

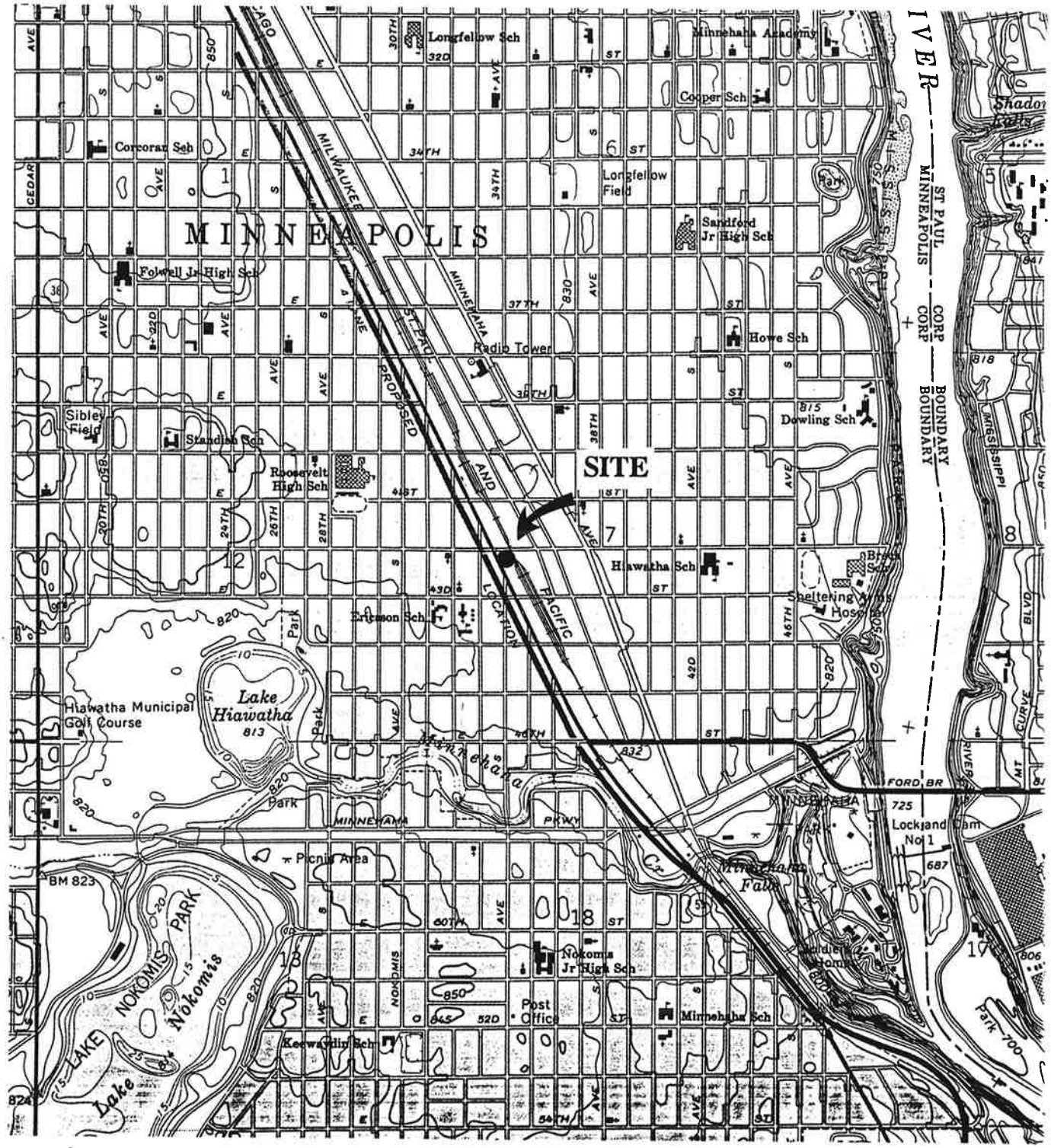
16. *Is there a confining unit between the impacted unit and the uppermost drinking water aquifer? What is its thickness and extent?* **Yes, the Platteville Limestone bedrock formation and possibly a till layer over bedrock. The till if present is probably no greater than 10 feet thick. The Platteville limestone is estimated to range from 18-44 feet thick.**

17. *Is the uppermost drinking water aquifer a karst unit or a sole source aquifer?* **No**

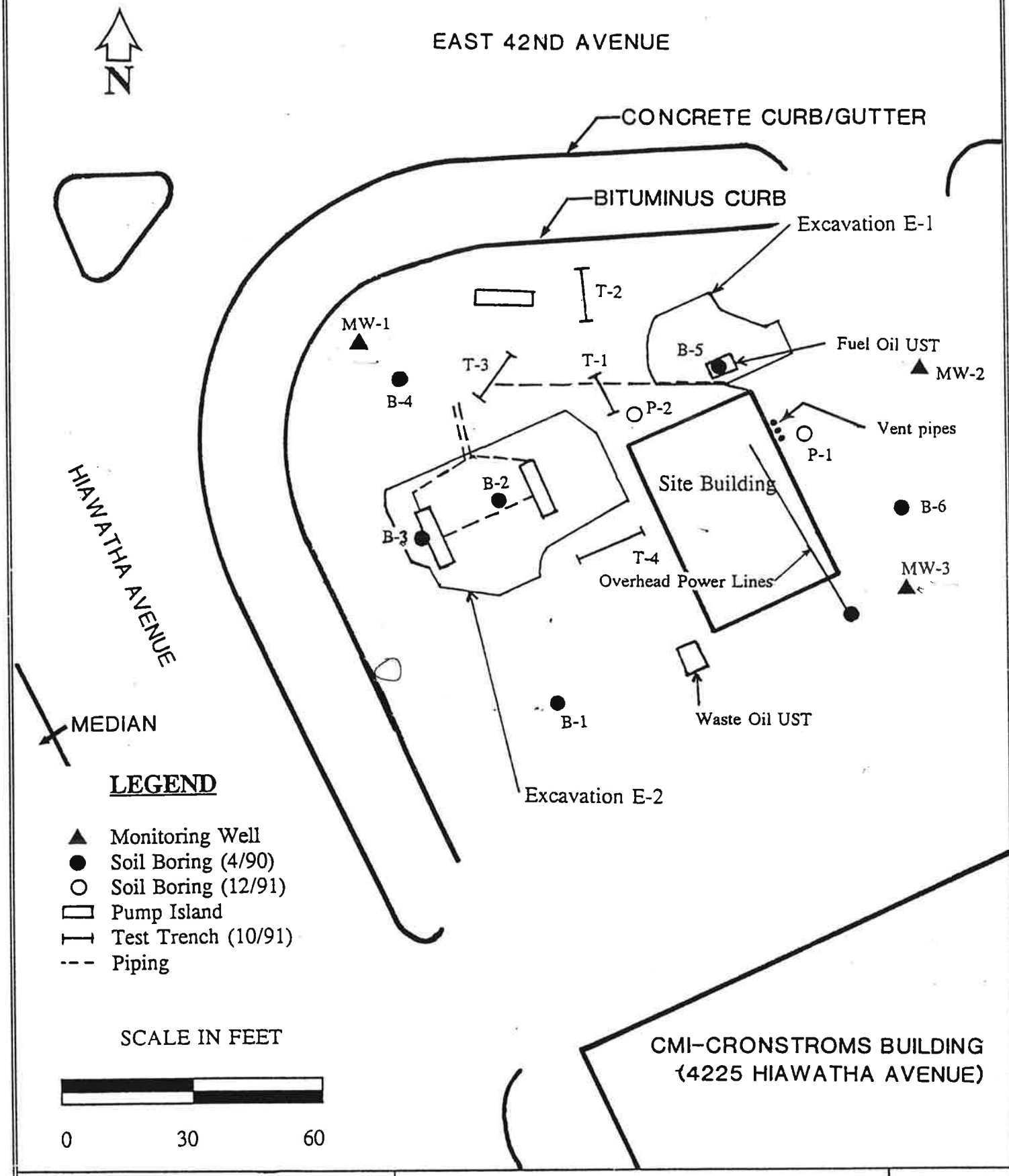
18. *Are there any existing or abandoned wells within approximately 1,000 feet downgradient of the site?* **No**

19. *Are there any other site specific conditions which increase the risk of cross contamination from the impacted unit to a drinking water aquifer?* **No**

20. *Based on the answers to questions 14 through 18 and any other site specific information available, summarize and assess the risk of cross contamination from the impacted unit to the uppermost drinking water aquifer.* **Based on the presence of a confining layer, and that removal of the primary source (tanks) and substantial removal of the secondary source (contaminated soil) of contamination has been performed, the risk of cross contamination appears low.**

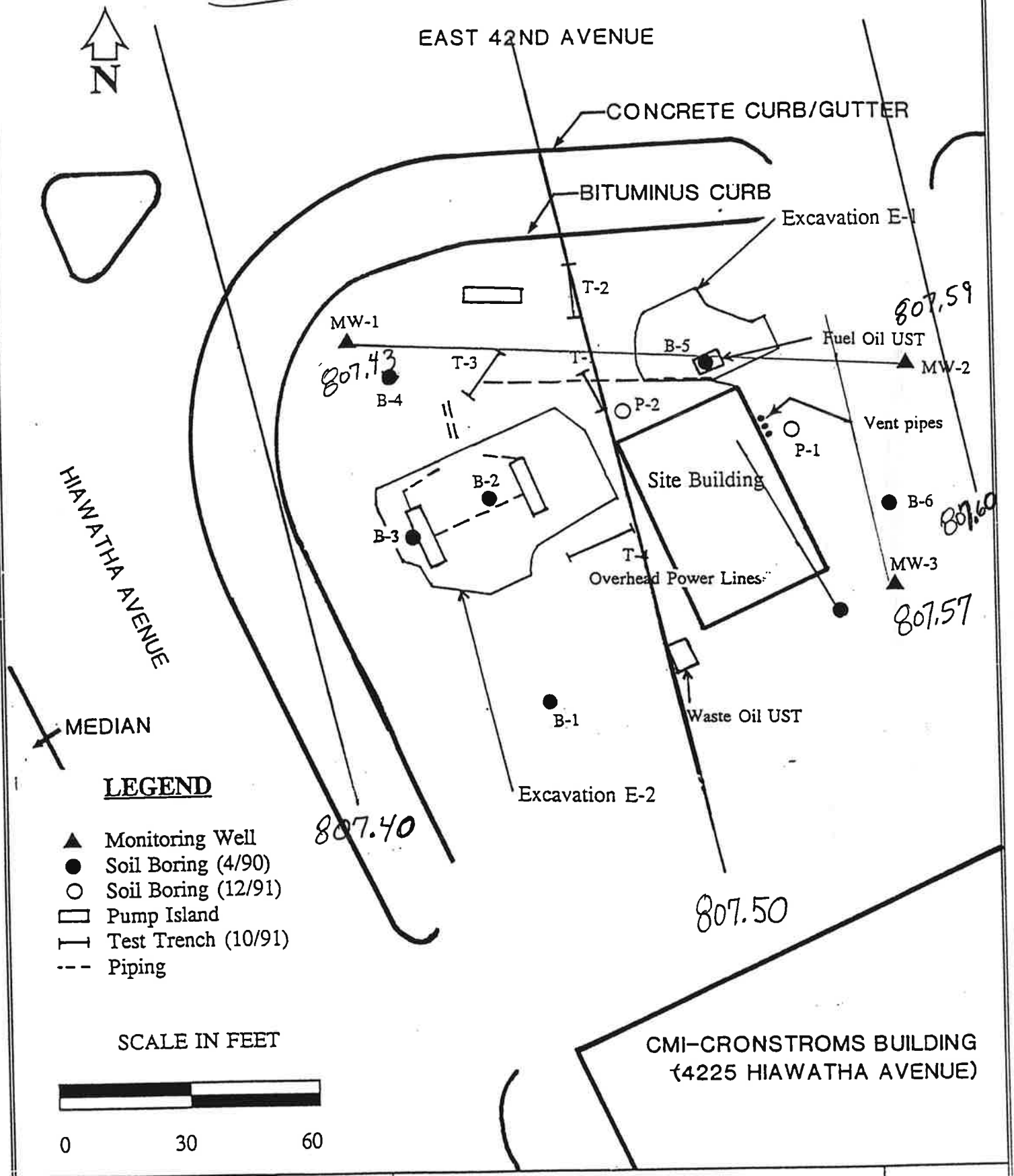


Peer Environmental & Engineering Resources, Inc. Chaska, Minnesota	Site Location Map Former Mobil Service Station 4201 Hiawatha Avenue Minneapolis, Minnesota	1



Peer Environmental & Engineering Resources, Inc. Chaska, Minnesota	Site Map Former Mobil Service Station 4201 Hiawatha Avenue Minneapolis, Minnesota	Jan. 92

GRD WTR FLOW FOR 1/27/92



Peer Environmental & Engineering Resources, Inc. Chaska, Minnesota	Site Map Former Mobil Service Station 4201 Hiawatha Avenue Minneapolis, Minnesota	Jan. 92 3

TABLE
SUMMARY OF H-NU HEADSPACE ANALYSIS
SOIL BORINGS COMPLETED BY PEER

	SOIL BORING NUMBER				
Depth Interval (feet)	P-1	P-2	MW-1	MW-2	MW-3
3 - 5	0	0	0.2	10	0
8 - 10	0.8	0	0.4	0	0
13 - 15	0	0.2	0.2	0	0
18 - 20	2	0.4	0	0	0
23 - 25	0	2.6	.2	0.8	0
28 - 30	2.2	3.2	.2	NS	NS
29 - 31	NS	NS	NS	11.2	NS
33 - 35	7.2**	NS**	220	0	0
38 -40	14**	0.2	180	---	0

NOTES:

All headspace results in parts per million (ppm).
Soil samples were collected from split spoon sampler unless otherwise indicated.
* = Denotes sample collected from auger cuttings.
** = Denotes sample submitted for analytical testing.
NS = No sample collected for headspace analysis.
--- = Indicates interval is below depth of soil boring.

TABLE
SUMMARY OF SAMPLES SUBMITTED FOR ANALYTICAL TESTING

GENERAL INFORMATION				PARAMETER			
Sample Number	Location	Matrix	Date Collected - Received*	BETX	THC as Gasoline	THC as Fuel Oil #2	VOCs
P-1/S-7	Boring P-1, 33-35'	Soil	12/17/91 - 12/18/91	X	X	X	
P-1/S-8	Boring P-1, 38-40'	Soil	12/17/91 - 12/18/91	X	X	X	
P-2/S-9	Boring P-2, 33-35'	Soil	12/17/91 - 12/18/91	X	X	X	
MW-1	Monitoring Well MW-1	Water	12/26/91 - 12/26/91		X	X	X
MW-2	Monitoring Well MW-2	Water	12/26/91 - 12/26/91		X	X	X
MW-3	Monitoring Well MW-3	Water	12/26/91 - 12/26/91		X	X	X
Trip Blank	Laboratory Trip Blank	Water	12/26/91 - 12/26/91				X

NOTES:

*Date sample was collected-date sample was received by laboratory.
All samples were analyzed by Twin City Testing, St. Paul, Minnesota.

TABLE
SUMMARY OF ANALYTICAL RESULTS FOR
SOIL SAMPLES FROM SOIL BORINGS COMPLETED BY PEER

Compound/Parameter	P-1/S-7 33-35'	P-1/S-8 38-40'	P-2/S-9 33-35'	Method Blank	PQL	MDL
Benzene	ND[1]	ND[4]	ND	ND	5	---
Ethyl benzene	ND[1]	ND[4]	ND	ND	5	---
Toluene	ND[1]	ND[4]	ND	ND	5	---
Total xylenes	ND[1]	ND[4]	ND	ND	5	---
Total Hydrocarbons as Gasoline	450,000[2][3]	31,000[3][5]	70[6]	ND	30	---
Total Hydrocarbons as Fuel Oil #2 (in mg/kg)	100	2.5	ND	ND	---	2.0

NOTES:

All units in ug/kg, unless otherwise noted.
ND = Compound or parameter not detected above Practical Quantitation Limit (PQL), or Method Detection Limit (MDL).
[1] = PQL was 1,300 ug/kg.
[2] = PQL was 8,100 ug/kg.
[3] = Chromatographic profile is not typical of gasoline. Higher boiling hydrocarbons are detected.
[4] = PQL was 40 ug/kg.
[5] = PQL was 250 ug/kg.
[6] = Chromatographic profile is not typical of gasoline.

TABLE
SUMMARY OF H-NU ANALYSIS
SOIL BORINGS COMPLETED BY PACE

	SOIL BORING NUMBER					
Depth Interval (feet)	B-1	B-2	B-3	B-4	B-5	B-6
1 - 3	NS	NS	600*	NS	NS	NS
5 - 7	2	610	22	0*	0	0
7 - 9	75	650*	3	0	15	0
9 - 11	30	340	1	0	38	2
11 - 13	800*	310	1	0	100	15
13 - 15	10*	13	0*	1	300*	18*
15 - 17	---	9	---	1*	350	2
17 - 19	---	10*	---	---	220	12
19 - 21	---	---	---	---	270	12*
21 - 23	---	---	---	---	280	---
23 - 25	---	---	---	---	250	---
25 - 27	---	---	---	---	38	---
27 - 29	---	---	---	---	28	---
29 - 31	---	---	---	---	25	---
31 - 33	---	---	---	---	24	---
33 - 35	---	---	---	---	21*	---

NOTES:

All headspace results in parts per million (ppm).
Soil samples were collected from split spoon sampler.
* = Denotes sample submitted for analytical testing.
NS = No sample collected for headspace analysis.
--- = Indicates interval is below depth of soil boring.

TABLE
SUMMARY OF ANALYTICAL RESULTS FOR
SOIL SAMPLES FROM SOIL BORINGS COMPLETED BY PACE

Compound/Parameter	B-1 11-13'	B-1 13-15'	B-2 7-9'	B-2 17-19'	B-3 1-3'	B-3 13-15'	B-4 5-7'	B-4 13-15'	B-5 13-15'	B-5 33-35'	B-6 13-15'	B-6 19-21'	MDL
METALS													
Lead (in mg/kg)	NA	7.5	17	7.2	80	6.5	16	7.3	9.6	3.0	8.5	9.7	2.5
ORGANICS													
Benzene	ND	ND	3,300	ND	2,700	ND	ND	ND	ND	ND	ND	ND	120
Ethyl benzene	ND	ND	7,500	ND	4,100	ND	ND	ND	220	ND	ND	ND	120
Toluene	ND	ND	14,000	ND	7,200	ND	ND	ND	500	ND	ND	ND	120
Xylene	ND	ND	30,000	ND	22,000	ND	ND	ND	1,600	ND	ND	ND	120
Total Hydrocarbons as Gasoline	NA	ND	340,000	ND	24,000	ND	ND	ND	63,000	2,700	ND	ND	1,000
Gasoline (Hexane Extract in mg/kg)	NA	ND	180	ND	1,700	ND	ND	ND	ND	ND	ND	ND	3.3
Fuel Oil #1 (Hexane Extract in mg/kg)	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.3
Fuel Oil #2 (Hexane Extract in mg/kg)	NA	ND	ND	ND	ND	ND	ND	ND	2,500	260	ND	ND	3.3

NOTES:

All units in ug/kg, unless otherwise noted.
ND = Compound or parameter not detected above Method Detection Limit (MDL).
NA = Sample not analyzed for this compound or parameter.

TABLE
WATER LEVEL MEASUREMENT DATA

Well	Date	Elevation of TOR	Water Level Below TOR	Water Level Elevation
MW-1	12/26/91	839.79	32.19	807.60 L
	1/27/92		32.36	807.43 L
MW-2	12/26/91	837.21	29.50	807.71 H
	1/27/92		29.62	807.59 H
MW-3	12/26/91	840.29	32.58	807.71 H
	1/27/92		32.72	807.57 H

NOTES:

TOR = Top of Riser
Elevations referenced to NGVD.

TABLE
SUMMARY OF ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Compound/Parameter	MW-1	MW-2	MW-3	Trip Blank	Method Blank	PQL	MDL	MDH RAL
Chloroform	ND[1]	2	ND	ND	ND	---	1	60
Cumene	97[1]	ND	ND	ND	ND	---	1	N/A
Ethyl benzene	2,400[1]	ND	ND	ND	ND	---	1	700
Methylene Chloride	300[1]	6	4	3	5	---	1	50
Toluene	7,000[1]	ND	ND	ND	ND	---	1	1,000
Total xylenes	7,800[1]	ND	ND	ND	ND	---	1	10,000
Total Hydrocarbons as Gasoline	42,000[2]	ND	ND	NA	ND	30	---	N/A
Total Hydrocarbons as Fuel Oil #2 (in mg/L)	ND[3]	ND	ND	NA	ND	---	0.2	N/A

NOTES:

All units in ug/L, unless otherwise noted.
ND = Compound or parameter not detected above Practical Quantitation Limit (PQL) or Method Detection Limit (MDL).
NA = Sample not analyzed for this compound or parameter.
MDL RAL = Minnesota Department of Health Recommended Allowable Limit for Drinking Water Contaminants.
N/A = Not available.
[1] = MDL was 50 ug/L.
[2] = PQL was 750 ug/L.
[3] = Chromatographic profile is not typical of #2 fuel oil. Lower boiling hydrocarbons are present.

BORING LOG

PROJECT: CMI 4201 Hiawatha Avenue Minneapolis, Minnesota	DATE: 12/17/91	BORING: P-1
	SURFACE ELEVATION: NA	SCALE: 1" = 6'

SAMPLE NO.	DEPTH FEET	ASTM D2487	DESCRIPTION - ASTM D2488 (See Report & Descr. Terminology)	"N"	HNU ppm	NOTES
		CL	Sandy clay with trace gravel. Brown to dark brown, moist, rather stiff. (fill)			H-NU PID readings taken in accordance with MPCA "headspace" method.
1	5			12	0	
		CL	Clay. Green to tan, moist, stiff. (lacustrine)			
2	10			15	0.8	
		SP	Sand fine to coarse grained with trace gravel. Light brown to brown, moist to waterbearing at 33 feet, medium dense. Faint to moderate petroleum odors detected below 28 feet. (alluvium)			
3	15			17	0	
4	20			14	2	
5	25			16	0	
6	30			19	2.2	
7*	35			8	7.2	Gray staining evident in sample from 33 to 35 feet
8*	40			15	14	
			END OF BORING Boring backfilled with mixture of auger cuttings and bentonite.			

PEER ENVIRONMENTAL & ENGINEERING RESOURCES, INC.
11 Peavey Road, Chaska, MN 55318 (612) 448-6775

BORING LOG

PROJECT: CMI 4201 Hiawatha Avenue Minneapolis, Minnesota	DATE: 12/18/91	BORING: P-2
	SURFACE ELEVATION: NA	SCALE: 1" = 6'

SAMPLE NO.	DEPTH FEET	ASTM D2487	DESCRIPTION - ASTM D2488 (See Report & Descr. Terminology)	"N"	HNU ppm	NOTES
		CL	Sandy clay with trace gravel. Dark brown, moist, rather stiff. (fill)			H-NU PID readings taken in accordance with MPCA "headspace" method. *Duplicate sample submitted for laboratory analysis. **Auger cutting sample. NS = no sample.
1	5			11	0	
				**	2.4	
2	10	CL	Silty clay. Green to tan, moist, stiff. (lacustrine)	13	0	
3	15	SP	Sand fine to coarse grained with trace gravel. Light brown to gray, moist to waterbearing at 33 feet, medium dense to dense. Faint petroleum odors detected below 23 feet. (alluvium)	27	0.2	
4	20			16	0.4	
5	25			19	26	
6	30			21	3.2	
7*	35			28	NS	
8	40			14	0.2	
			END OF BORING Boring backfilled with mixture of auger cuttings and bentonite.			

PEER ENVIRONMENTAL & ENGINEERING RESOURCES, INC.
11 Peavey Road, Chaska, MN 55318 (612) 448-6775

1/27/92 WL @ ~30'

BORING LOG

PROJECT: CMI 4201 Hiawatha Avenue Minneapolis, Minnesota	DATE: 12/20/91	BORING: MW-1
	SURFACE ELEVATION: NA	SCALE: 1" = 6'

SAMPLE NO.	DEPTH FEET	ASTM D2487	DESCRIPTION - ASTM D2488 (See Report & Descr. Terminology)	"N"	HNU ppm	NOTES
		CL	Silty clay. Gray to brown, moist, stiff. (fill)			H-NU PID readings taken in accordance with MPCA "headspace" method.
1	5			16	0.2	
		CL	Clay. Green to tan, moist, stiff. (lacustrine)			
2	10			16	0.4	*Duplicate sample submitted for laboratory analysis.
3	15			20	0.2	
4	20			85	0	Layer of gravel noted at 18.5 to 19.5 feet.
5	25	SP	Sand, fine to coarse grained, with trace gravel. Light brown to brown, moist to waterbearing at 30 feet, medium dense to dense. Strong petroleum odors detected below 33 feet. (alluvium)	31	0.2	
6	30			35	0.2	
7	35			24	220	
8	40			18	180	
			END OF BORING Monitoring well MW-1 installed upon boring completion.			

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11 Peavey Road, Chaska, MN 55318 (612) 448-6775

1/27/92 WL, @ 29.6'

BORING LOG

PROJECT: CMI 4201 Hiawatha Avenue Minneapolis, Minnesota	DATE: 12/18/91	BORING: MW-2
	SURFACE ELEVATION: NA	SCALE: 1" = 6'

SAMPLE NO.	DEPTH FEET	ASTM D2487	DESCRIPTION - ASTM D2488 (See Report & Descr. Terminology)	"N"	HNU ppm	NOTES
		CL	Sandy clay. Dark gray to black, moist, very stiff. (fill)			H-NU PID readings taken in accordance with MPCA "headspace" method. *Duplicate sample submitted for laboratory analysis.
1	5			20	10	
		CL	Clay. Green to tan, moist, stiff. (lacustrine)			
2	10			14	0	
		SP	Sand, fine to medium grained, with trace coarse sand and gravel. Light brown to brown, moist, medium dense to dense. (alluvium)			
3	15			12	0	
4	20			28	0	
		SC	Clayey sand with trace gravel. Dark gray to black, moist.			
5	25	SP	Sand, fine to coarse grained. Light brown to brown, moist to waterbearing at 30 feet. Faint petroleum odor detected in sample from 29 to 31 feet. (alluvium)	55	0.8	Black sandy clay to clayey sand from 29 to 29.5 feet.
6	31			25	11.2	
7	35			22	0	
			END OF BORING Monitoring well MW-2 installed upon boring completion.			No petroleum odors detected in boring.

PEER ENVIRONMENTAL & ENGINEERING RESOURCES, INC.
11 Peavey Road, Chaska, MN 55318 (612) 448-6775

1/27/92 WL @ 30.3'

BORING LOG

PROJECT: CMI 4201 Hiawatha Avenue Minneapolis, Minnesota	DATE: 12/17/91	BORING: MW-3
	SURFACE ELEVATION: NA	SCALE: 1" = 6'

SAMPLE NO.	DEPTH FEET	ASTM D2487	DESCRIPTION - ASTM D2488 (See Report & Descr. Terminology)	"N"	HNU ppm	NOTES
		CL	Silty clay with some sand. Gray to brown, moist, rather stiff. (fill)			H-NU PID readings taken in accordance with MPCA "headspace" method. *Duplicate sample submitted for laboratory analysis. NS = no sample. Trace gravel noted in samples from 18 to 35 feet
1	5			11	0	
		CL	Clay. Green to tan, moist, stiff. (lacustrine)			
2	10			13	0	
		SP	Sand, fine to medium grained, with trace gravel. Light brown to brown, moist to waterbearing at 31 feet, medium dense to dense. (alluvium)			
3	15			15	0	
4	20			20	0	
5	25			21	0	
6	30			48	NS	
7	35			20	0	
8	40			14	0	
			END OF BORING Monitoring well MW-3 installed upon boring completion.			

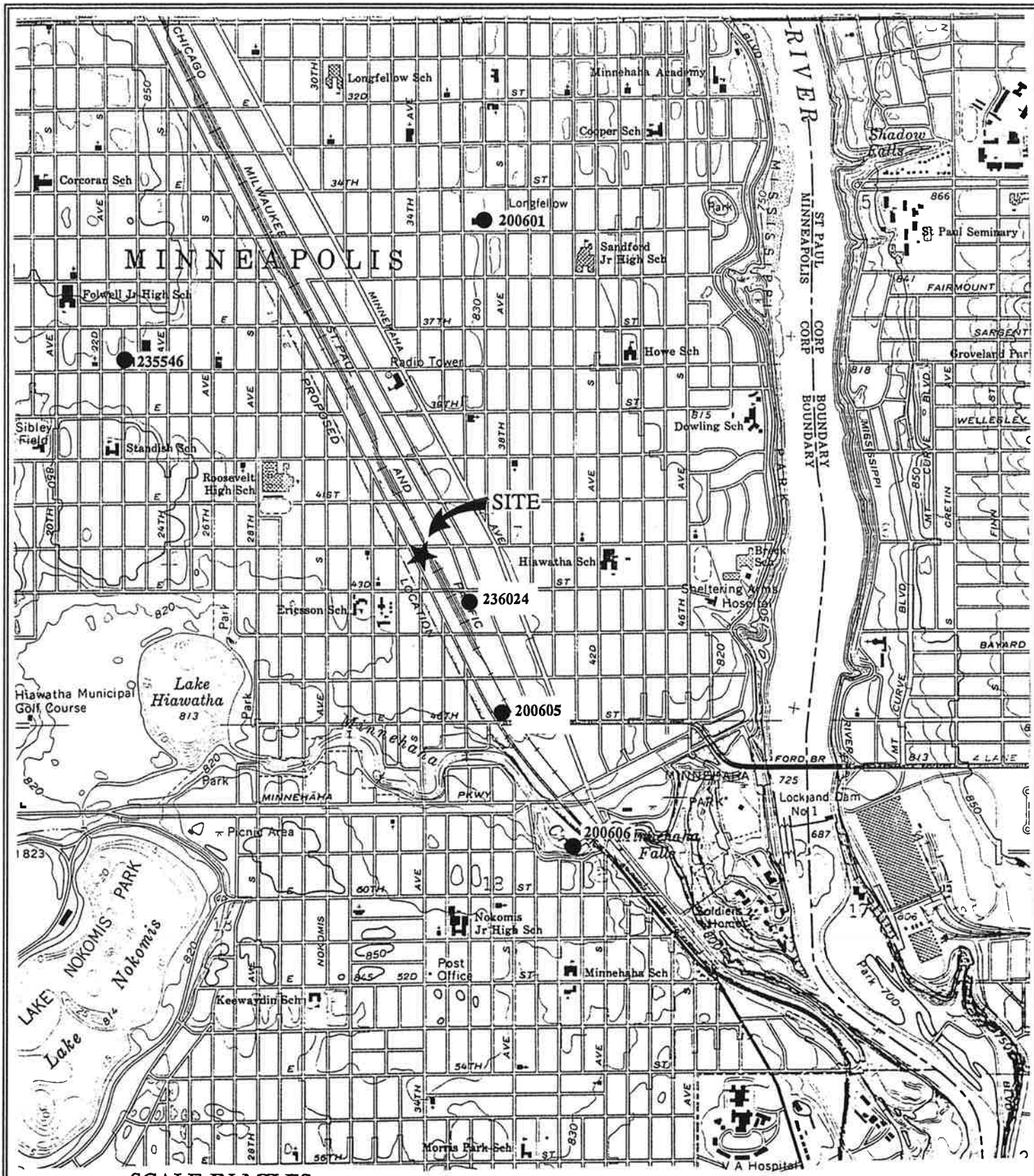
PEER ENVIRONMENTAL & ENGINEERING RESOURCES, INC.
11 Peavey Road, Chaska, MN 55318 (612) 448-6775

WATER WELL DATA

MN Well Number	Ground Surface Elevation (ft)	Well Base Elevation (ft)	Casing Base Elevation (ft)	Water Level Elevation	Aquifer	Use and/or Diameter (inches)
236024	832	468	579	740	OPDC	12
200605	832	760	760	801	OPVL	5
200601	831	ND	ND	ND	OPVL	ND
235546	835	456	692	ND	CJDN	10
200606	811	80	ND	ND	ND	ND

NOTES:

Listed elevations are relative to NGVD (National Geodetic Vertical Datum).
OPVL = Ordovician Platteville Limestone
OPDC = Ordovician Prairie du Chien
CJDN = Cambrian Jordan
ND = No Data



Peer Environmental & Engineering Resources, Inc. Chaska, Minnesota	Location of Water Wells One Mile Radius of 4201 Hiawatha Avenue Minneapolis, Minnesota	Feb. 92

EXCAVATION REPORT FOR PETROLEUM RELEASE SITES

Minnesota Pollution Control Agency
Tanks and Spills Section
May, 1991
(Form re-typed by Peer Environmental & Engineering Resources, Inc.)

The information below should be completed and submitted to the Minnesota Pollution Control Agency (MPCA) Tanks and Spills Section to document excavation and treatment of petroleum contaminated soil. Excavations must be done in accordance with the MPCA document "Excavation of Petroleum Contamination Soil" (May, 1991). Preliminary site investigation reports (if conducted) should be included with this report.

Additional pages may be attached. Please type or print clearly.

I. BACKGROUND

Site: **Former Mobil Service Station**	Tank Owner/Operator: **Agate Properties**
Street: **4201 Hiawatha Avenue**	Mailing Address: **c/o CMI-Cronstroms**
City, Zip: **Minneapolis, 55406-3394**	Street/Box: **4225 Hiawatha Avenue**
County: **Hennepin**	City, Zip: **Minneapolis, 55406-3394**
MPCA Site ID# **LEAK00001485**	Telephone: **722-6671**
Excavating Contractor: **Germundsen Companies, Inc.**	Consultant: **Peer Environmental & Engineering Resources, Inc.**
Contact: **Mr. Brian Germundsen**	Contact: **Mr. Stephen T. Jansen**
Telephone: **422-1696**	Mailing Address: **11 Peavey Road**
Tank Contractor Certification Number: **0021**	City, Zip: **Chaska, 55318**
	Telephone: **448-6775**

Others on-site during site work (e.g., fire marshal, local officials, MPCA staff, etc.):

No regulatory officials were present on-site during work.

Note: If person other than tank owner and/or operator is conducting the cleanup, provide name, address and relationship to site on a separate attached sheet.

II. DATES

A. Date release reported to MPCA: **August 17, 1989**

B. Dates site work performed:

Work Performed	Date
Removal of fuel oil UST	**August 17, 1989**
Soil investigation by Pace	**April 9-12, 1990**
Excavation of impacted soil	**October 1-3, 1991**

III. RELEASE INFORMATION

A. Provide the following information for all tanks which have been removed.

Tank 1: Capacity: **560** Type: **Uncoated Steel** Age: **Unknown**

Condition: **Corroded with small holes**

Product History: **#2 fuel oil**

Approximate quantity of petroleum released, if known: **Unknown**

Cause of release: **Presumed leak from tank**

Tank 2: Capacity: **1,000** Type: **Uncoated Steel** Age: **29**

Condition: **Moderately corroded**

Product History: **Waste oil**

Approximate quantity of petroleum released, if known: **None**

Cause of release: **N/A***

N/A* = not applicable

Tank 3: Capacity: **8,000** Type: **Uncoated Steel** Age: **17**

Condition: **No information available**

Product History: **Reported to be gasoline**

Approximate quantity of petroleum released, if known: **N/A**

Cause of release: **N/A**

Tank 4: Capacity: **4,000** Type: **Uncoated Steel** Age: **17**

Condition: **No information available**

Product History: **Reported to be gasoline**

Approximate quantity of petroleum released, if known: **N/A**

Cause of release: **N/A**

Tank 5: Capacity: **5,000** Type: **Uncoated Steel** Age: **17**

Condition: **No information available**

Product History: **Reported to be gasoline**

Approximate quantity of petroleum released, if known: **N/A**

Cause of release: **N/A**

B. Provide the following information for all existing tanks.

Tank No.	Capacity	Contents	Type	Age

No known USTs remain on-site.

C. If the release was associated with the lines or dispensers, briefly describe the problem:

A fuel oil release was associated with a leak from the fuel oil UST. A gasoline release was associated with former dispenser lines.

D. If the release was a surface spill, briefly describe the problem: **N/A**

IV. EXCAVATION

A. Dimensions of excavation: **See Figure 2. Two excavations (E-1, E-2); E-1: 25x20' x 17' deep, E-2: 50x24' x 10' deep.**

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

C. Native soil type (clay, sand, etc.): **Clay to 9 feet, sand below**

D. Quantity of contaminated soil removed (cubic yards): **Approximately 80 cubic yards from excavation E-1, 320 cubic yards from E-2**

E. Was ground water encountered or was there evidence of a seasonally high ground water table? At what depth? **No**

F. If a soil boring was necessary (as indicated in part VI of "Excavation of Petroleum Contaminated Soil" for sand and silty sand native soils) describe the soil analytical and soil vapor headspace results. Attach the boring logs and laboratory results to this report.

Pace Incorporated (Pace) completed a soil boring investigation in response to the reported release. A copy of the July 27, 1990 Pace report is attached. Boring locations are shown on Figure 2. Several test trenches were completed during excavation activities to assist in delineating areas of contaminated soil. Logs for the test trenches are also attached.

G. If ground water was encountered or if a soil boring was conducted, was there evidence of ground water contamination? Specify, e.g., free product (specify thickness), product sheen, ground water in contact with petroleum contaminated soil, water analytical results, etc.

Ground water was encountered in boring B-5 completed in the former fuel oil tank basin at a depth of 35 feet. No free product was detected, however, analytical data indicated petroleum impacted soil was in contact with ground water.

H. Was bedrock encountered in the excavation? At what depth? **No**

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

The fuel oil UST was located 8 feet from the former service station building (Figure 2). The proximity of the building made total excavation not feasible.

V. SAMPLING

A. Briefly describe the field methods (including use of a photoionization detector) used to distinguish contaminated from uncontaminated soil:

Samples were collected from the sidewalls and bases of the excavations and screened with a PID using jar headspace analysis as specified by MPCA excavation guidelines. Soil with PID readings above the MPCA action levels was considered contaminated.

B. List soil vapor headspace analysis results. Indicate sampling locations using sample codes (with sampling depths in parenthesis), e.g. SV-1 (2 feet), SV-2 (10 feet), etc. Samples that were taken at different depths at the same location should be labeled SV-1A (2 feet), SV-1B (4 feet), SV-1C, (6 feet), etc. These should correspond with the codes on the site map in part VI. If sample represents soil from final extent of the excavation indicate "bottom" or "sidewall" in the bottom/sidewall column.

Sample Code	Soil Type	Reading ppm	Sample Code	Soil Type	Reading ppm

Soil vapor headspace analysis results for excavation E-1 are summarized in attached Table 1. Results for excavation E-2 are summarized in Table 2. Sample locations are shown on Figure 3.

C. Briefly describe the soil sampling and handling procedures used:

Soil vapor headspace analysis samples were obtained from the excavated soil (approximately one per every 10 cubic yards) and from the base and sidewalls of the excavations. Soil samples (grab samples) were also obtained from the base and sidewalls of the excavations for analytical testing to document the cleanup levels achieved. Soil sample locations are shown on Figure 3. All samples were collected using a stainless steel trowel which was decontaminated between sample locations using an Alconox detergent wash and deionized water rinse. The samples from the base of the excavations were obtained from the backhoe bucket. The soil samples were placed in clean glass containers provided by the contract laboratory. The sample containers were labeled and immediately placed in a field cooler, then transported to the laboratory with completed chain-of-custody forms.

D. List the appropriate soil sample analytical results from the bottom and sidewalls of the excavation below (refer to the MPCA document "Soil and Ground Water Analysis at Petroleum Release Sites"). If the petroleum was not gasoline or fuel oil attach a separate table. Code the samples (with sampling depths in parenthesis) SS-1 (8 feet), SS-2 (4 feet), etc. These should correspond with the codes on the site map in part VI. Do not include analyses from the stockpiled soil.

Sample Code	THC as gas or FO (circle one)	Benzene (ppm)	Ethyl benzene (ppm)	Toluene (ppm)	Xylene (ppm)	MTBE (ppm)	Lead (ppm)
Analytical testing results of soil samples from excavations E-1 and E-2 are summarized in attached Tables 3 and 4. Laboratory reports are also attached.							

NOTE: COPIES OF LABORATORY REPORTS AND CHAIN OF CUSTODY FORMS MUST BE INCLUDED

VI. FIGURES

Attach the following figures to this report:

1. Site location map.
2. Site map(s) drawn to scale illustrating the following:
   a. location (or former location) of all present and former tanks, lines, and dispensers.
   b. location of other structures (buildings, canopies, etc.).
   c. adjacent city, township, or county roadways.
   d. final extent of excavation.
   e. location of soil vapor analyses (e.g., SV-1), soil samples (e.g., SS-1), and soil borings (e.g. SB-1). Also, attach all boring logs.
   f. north arrow and map legend.

VII. SUMMARY

Briefly summarize evidence indicating whether or not additional investigation is necessary at the site, as discussed in part VI of the MPCA document "Excavation of Petroleum Contaminated Soil".

Based on the results of analytical testing of soil samples collected during excavation activities, it does not appear additional corrective actions or investigation are warranted in the vicinity of the former product lines for the gasoline USTs (Excavation E-2). The analytical results from the fuel oil tank excavation (Excavation E-1) indicate soil with petroleum hydrocarbon concentrations above the MPCA action level still remains in place. In addition, previous soil boring data suggests that the fuel oil release may be in contact with ground water. Since the MPCA action level is exceeded and there is a potential for ground water impacts, MPCA guidelines indicate a remedial investigation (RI) is necessary.

VIII. SOIL TREATMENT INFORMATION

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

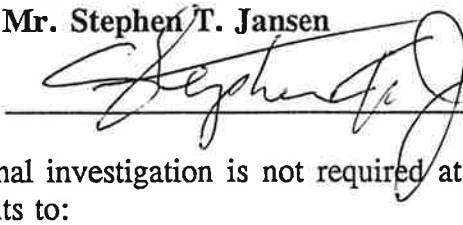
B. Location of treatment site/facility: **C.S. McCrossan, Maple Grove, Minnesota**

C. Date MPCA approved soil treatment (if thermal treatment was used after May 1, 1991, indicate date that the MPCA permitted thermal treatment facility agreed to accept soil):

November 6, 1991

IX. CONSULTANT (OR OTHER) PREPARING THIS REPORT

Company Name: **Peer Environmental & Engineering Resources, Inc.**
Street/Box: **11 Peavey Road**
City, Zip: **Chaska, 55318**
Telephone: **(612) 448-6775**
Contact: **Mr. Stephen T. Jansen**

Signature  Date: **11/15/91**

If additional investigation is not required at the site, please mail this form and all necessary attachments to:

(Project Manager)
Minnesota Pollution Control Agency
Hazardous Waste Division
Tanks and Spills Section
520 Lafayette Road
St. Paul, MN 55155

If additional investigation is required at the site, this form should be included as a section in the Remedial Investigation/Corrective Action Design report. Excavation reports which indicate that a remedial investigation (RI) is necessary will not be reviewed by MPCA staff until the RI has been completed (if required).

TABLE 1
SOIL VAPOR HEADSPACE ANALYSIS RESULTS FOR EXCAVATION E-1

Sample No.	Depth (feet)	Excavated volume (yds^3) and/or sample location	Headspace (ppm)	Soil description
S-1	7-9	3	20	Tan-light gray clay, fuel oil odor
S-2	6-7	10	70	Black-brown sandy clay
S-3	5-8	20	80	Tan-light gray clay
S-4	10-11	30	110	Tan-light gray clay, fractured, strong fuel oil odor
S-5	7-9	35, West sidewall	0	Tan clay, no odor
S-6	9-11	40	154	Gray sand
S-7	9-11	50	7	Gray sand
S-8	12-14	60	8	Tan fine-medium sand, faint odor
S-9	13-15	80, Northwest corner	34	Light gray sand
S-10*	15-17	100, Northwest corner	2.5	Light gray sand
S-11	15-17	110, Southeast sidewall	150	Light gray sand
S-12	13-15	120, Northeast sidewall	2	Light gray sand, no odor
S-13*	16-17	110, Base of excavation, north side	2.5	Tan fine-medium sand, no odor
S-14*	15-17	111, Southwest sidewall	5	Tan fine-medium sand, no odor
S-15*	7-9	111, South sidewall	128	Gray clay
S-16*	15-17	115, Base of excavation, south side	180	Gray sand
S-17	7-9	125, East sidewall	80	Gray clay, visual sheen in fractures
S-18	7-9	130, East sidewall	0.2	Light gray-tan clay, no odor
S-19	15-17	140, Southeast sidewall	8	Light gray sand, no odor
S-20	7-9	150, Southeast sidewall	0.8	Light gray clay, no odor
S-21	15-17	160, Southeast sidewall	60	Tan medium sand
S-22*	15-17	180, Southeast sidewall	2.8	Light gray fine-medium sand, no odor

NOTES:

*Denotes sample submitted for analytical testing
yds^3 = cubic yards
ppm = parts per million

TABLE 2
SOIL VAPOR HEADSPACE ANALYSIS RESULTS FOR EXCAVATION E-2

Sample No.	Depth (feet)	Excavated volume (yds^3) and/or sample location	Headspace (ppm)	Soil description
S-1	0.5	10' West of northwest building corner	0	Black sandy clay with brick (fill), no odor
S-2	2	10, West of northwest building corner	190	Black sandy clay, gas odor
S-3	3	20, West of northwest building corner	180	Black sandy clay, gas odor
S-4	4	30, West of northwest building corner	17	Tan clay, faint gas odor
S-5A	2-3	40	300	Black sandy clay, strong gas odor
S-5B	3-5	50	90	Black sandy clay, gas odor
S-5C	7	60	0.4	Tan clay, no odor
S-6A	2-3	70	350	Black sandy clay, strong gas odor
S-6B	3-5	80	300	Black sandy clay, strong gas odor
S-6C	6-7	90	5	Tan clay
S-7A	5-7	100, East of boring B-2	40	Tan clay, gas odor
S-7B	8-10	110, East of boring B-2	30	Tan clay, gas odor
S-7C	10-12	120, East of boring B-2	2	Tan clay/brown sand, no odor
S-8A	4-6	130, West of boring B-2	300	Gray-green clay, strong gas odor
S-8B	8-10	140, West of boring B-2	280	Gray-green clay, strong gas odor
S-8C	10-12	150, West of boring B-2	10	Tan clay/brown sand, no odor
S-9	3-5	160, West of boring B-2	200	Black sandy silt
S-10	5-7	170, East of boring B-2	300	Green-tan clay
S-11A	5-7	180	280	Green-tan clay

NOTES:

*Denotes sample submitted for analytical testing
yds^3 = cubic yards
ppm = parts per million

TABLE 2 (CONTINUED)
SOIL VAPOR HEADSPACE ANALYSIS RESULTS FOR EXCAVATION E-2

Sample No.	Depth (feet)	Excavated volume (yds^3) and/or sample location	Headspace (ppm)	Soil description
S-11B	11-12	190	5	Brown sand, no odor
S-12	5-7	200, West of boring B-2	150	Green-tan clay
S-13A	3-5	210	190	Black clayey silt
S-13B	6-7	220	50	Tan-brown clay
S-13C	7-9	230	10	Tan-brown clay
S-14A	3-6	240	180	Green-tan clay
S-14B	6-8	250	60	Tan-brown clay
S-14C	8-10	260	6	Tan-brown clay
S-15	3-5	270, at boring B-3	50	Black silty clay, gas odor
S-16*	7	280, East side of excavation, base	0	Tan clay
S-17	9-10	290, West half of excavation	88	Green-tan clay/tan sand
S-18	12	300, at boring B-2	5	Light brown sand
S-19	9-10	310, West half of excavation	260	Green-tan clay/tan sand
S-20	3	320, East sidewall of excavation	8	Black sandy clay, no odor
S-21	7-9	330, Southwest sidewall of excavation	52	Green-tan clay
S-22*	5-6	340, South sidewall of excavation	10	Green-tan clay
S-23*	12-13	350, West half of excavation, base	0	Tan sand
S-24	7-8	360, South sidewall of excavation	4	Green-tan clay, no odor
S-25	3-4	370, Southwest corner of excavation	21	Black clayey silt, faint odor

NOTES:

*Denotes sample submitted for analytical testing
yds^3 = cubic yards
ppm = parts per million

TABLE 2 (CONTINUED)
SOIL VAPOR HEADSPACE ANALYSIS RESULTS FOR EXCAVATION E-2

Sample No.	Depth (feet)	Excavated volume (yds^3) and/or sample location	Headspace (ppm)	Soil description
S-26	4-5	380, Southwest sidewall	10	Green clay, faint odor
S-27A	2-4	390	34	Black-brown clayey silt, gas odor
S-27B	4-6	400	24	Green clay, gas odor
S-28A	2-4	410	20	Black clayey silt, gas odor
S-28B	4-6	420	8	Green clay, no odor
S-29	3-4	430	10	Black clayey silt, no odor
S-30	5-7	440, By boring B-3	10	Green clay, no odor
S-31*	7-8	450, West sidewall	4	Green-tan clay, no odor
S-32*	7	450	22	Green-tan clay, gas odor
S-33*	3.5	450	8	Black-green clayey silt, no odor

NOTES:

*Denotes sample submitted for analytical testing
yds^3 = cubic yards
ppm = parts per million

TABLE 3
ANALYTICAL RESULTS FOR EXCAVATION E-1

Sample Code	TH as Gasoline	TH as #2 Fuel Oil	Benzene	Ethyl Benzene	Toluene	Total Xylenes	MTBE	Lead
E-1/S-10	ND	ND	ND	ND	ND	ND	ND	NA
E-1/S-13	ND	ND	ND	ND	ND	ND	ND	NA
E-1/S-14	ND	ND	ND	ND	ND	ND	ND	NA
E-1/S-15	74*	130	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	NA
E-1/S-16	1,300*	1,700	ND[2]	2.4	2.7	2.6	ND[2]	NA
E-1/S-22	ND	ND	ND	ND	ND	ND	ND	NA
Method Detection Limit	0.007	2.0	0.001	0.001	0.001	0.001	0.001	—

NOTES:

All units in mg/kg or parts per million (ppm)
TH = Total Hydrocarbons
ND = compound not detected at or above the method detection limit
NA = Not analyzed for this parameter
MTBE = Methyl tertiary butyl ether
* Higher boiling hydrocarbons present, non-typical of gasoline
[1] Method detection limit was 150 ug/kg
[2] Method detection limit was 1,300 ug/kg

TABLE 4
ANALYTICAL RESULTS FOR EXCAVATION E-2

Sample Code	TH as Gasoline	TH as #2 Fuel Oil	Benzene	Ethyl Benzene	Toluene	Total Xylenes	MTBE	Lead
E-2/S-16	ND	NA	ND	ND	ND	ND	ND	6.0
E-2/S-22	ND	NA	ND	ND	ND	ND	ND	7.7
E-2/S-23	ND	ND	ND	ND	ND	ND	ND	4.2
E-2/S-31	0.016	NA	ND	0.002	0.002	0.004	ND	7.3
E-2/S-32	ND	NA	ND	ND	ND	ND	ND	5.3
E-2/S-33	ND	ND	ND	ND	ND	ND	ND	8.7
Method Detection Limit	0.007	2.0	0.001	0.001	0.001	0.001	0.001	---

NOTES:

All units in mg/kg or parts per million (ppm)
TH = Total Hydrocarbons
ND = compound not detected at or above the method detection limit
NA = Not analyzed for this parameter
MTBE = Methyl tertiary butyl ether

TEST TRENCH LOGS
FORMER MOBIL SERVICE STATION
4201 HIAWATHA AVENUE
MINNEAPOLIS, MINNESOTA

Project No.: 1041

Test Trench No. T-1
Date: 10/1/91

Depth (feet)	Material Description	Notes
0-.5	Brown silty gravel (Class V)	H-NU headspace readings were 0 ppm at 8 feet and 10-11 feet. North end of T-1 encountered bundle of electrical conduits and 3-2" vent pipe lines.
.5-5.5	Green clay with topsoil lumps, metal, brick, bottles (fill)	
5.5-9	Tan-gray clay	
9-11	Tan sand	
END OF TEST TRENCH AT 11 FEET Test trench backfilled with native material.		

Test Trench No. T-2
Date: 10/1/91

Depth (feet)	Material Description	Notes
0-.5	Brown silty gravel (Class V)	H-NU headspace readings were 0 ppm at 5-6 feet and 9-10 feet.
.5-1	Black clayey silt with brick (fill)	
1-5.5	Gray-black sand	
5.5-9	Brown clay	
9-10	Brown-tan sand	
END OF TEST TRENCH AT 10 FEET Test trench backfilled with native material.		

Test Trench No. T-3
Date: 10/1/91

Depth (feet)	Material Description	Notes
0-1	Brown silty gravel (Class V)	H-NU headspace reading was 0 ppm at 9-11 feet. Trench apparently completed in former basin of gasoline USTs.
1-9	Brown medium sand with blocks of concrete (fill)	
9-11	Brown fine-medium sand	
END OF TEST TRENCH AT 11 FEET Test trench backfilled with native material.		

Test Trench No. T-4
Date: 10/2/91

Depth (feet)	Material Description	Notes
0-.7	Brown silty gravel (Class V)	H-NU headspace readings were 1 ppm at 5-6 feet, 0 ppm at 7-8 feet, 1.2 ppm at 9-10 feet, and 0 ppm at 12-13 feet.
.7-3.5	Black clayey silt with brick	
3.5-5	Black-brown sand	
5-9	Tan clay, fractured	
9-13	Tan-brown fine-coarse sand	
END OF TEST TRENCH AT 13 FEET Test trench backfilled with native material.		

Test Trench No. T-5
Date: 10/3/91

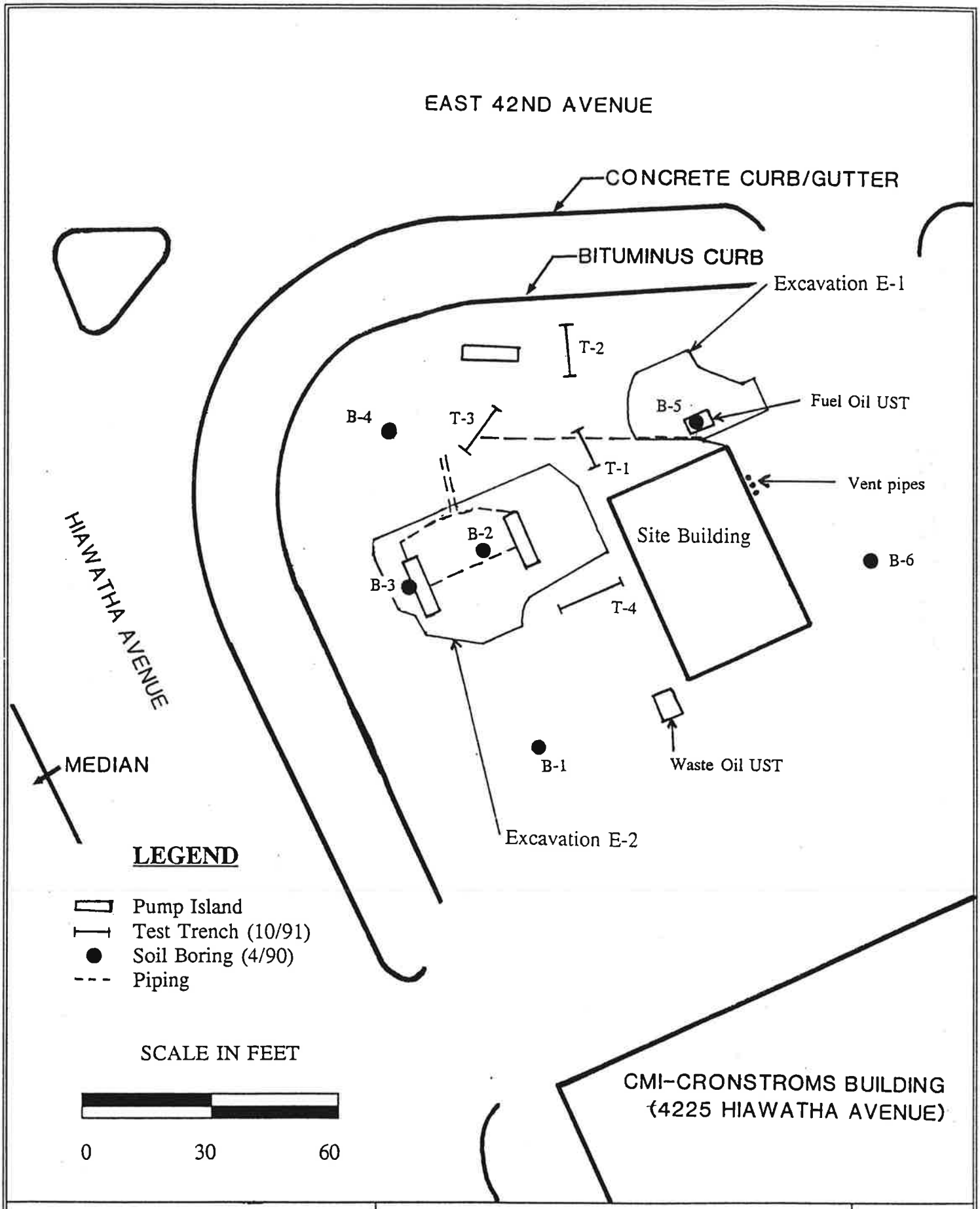
Depth (feet)	Material Description	Notes
0-.5	Brown silty gravel (Class V)	H-NU headspace readings were 1 ppm at 3.5 feet, 10 ppm at 5 feet, and 0 ppm at 5-6 feet.
.5-3.5	Brown-black silty sand	
3.5-5	Black silty clay with brick	
5-6	Green clay	
END OF TEST TRENCH AT 6 FEET Test trench backfilled with native material.		

SCALE IN MILES

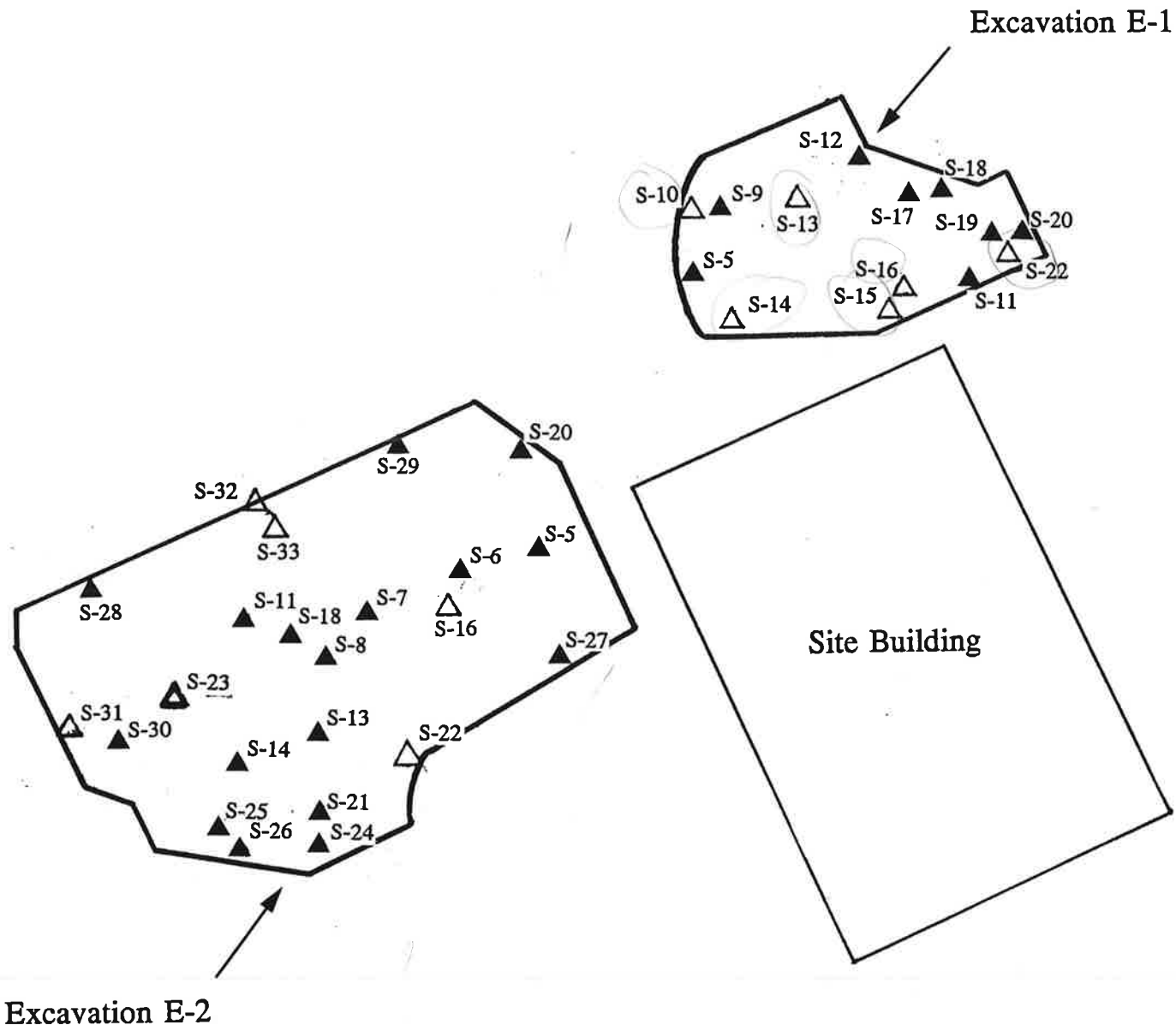
0 .5 1

N

Peer Environmental & Engineering Resources, Inc. Chaska, Minnesota	Site Location Map Former Mobil Service Station 4201 Hiawatha Avenue Minneapolis, Minnesota	Oct. 91 1



Peer Environmental & Engineering Resources, Inc. Chaska, Minnesota	Site Map Former Mobil Service Station 4201 Hiawatha Avenue Minneapolis, Minnesota	Oct. 91 2



N

SCALE

0 15 feet

LEGEND

▲ Soil vapor headspace analysis sample

△ Soil sample submitted for analytical testing

Peer Environmental & Engineering Resources, Inc. Chaska, Minnesota	Areas of Excavation Former Mobil Service Station 4201 Hiawatha Avenue Minneapolis, Minnesota	Oct. 91 3

twin city testing corporation
662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-3601

REPORT OF: CHEMICAL ANALYSES

PROJECT: AGATE PROPERTIES/CMI #1041 **DATE:** October 28, 1991

REPORTED TO: Peer Environmental
Attn: Steve Jansen
11 Peavey Road
Chaska, MN 55318

LABORATORY NO: 4410 92-0071

INTRODUCTION

This report presents the results of the analyses of seven samples received on October 3, 1991, from a representative of Peer Environmental. The scope of our services was limited to the parameters listed in the attached tables.

SAMPLE IDENTIFICATION

E-1/S-10 - TCT #264175
E-1/S-13 - TCT #264176
E-1/S-14 - TCT #264177
E-1/S-15 - TCT #264178
E-1/S-16 - TCT #264179
E-1/S-22 - TCT #264180
SP-1 - TCT #264181

METHODOLOGY

Fuel Oil (#2)

The samples were extracted with methylene chloride. The extracts were dehydrated with anhydrous sodium sulfate and concentrated to less than five milliliters in Kuderna-Danish concentrators on a steam bath. The extracts were then analyzed using an HP 5890A gas chromatograph equipped with a flame ionization detector. Fuel oil (#2) was identified by column retention time and quantified by peak area comparisons to those of known standards using a VG Laboratory data system.

Volatiles

Gasoline concentrations were determined using methods similar to EPA Method 8020 with a Tekmar Liquid Sample Concentrator on a Perkin Elmer Sigma 3B gas chromatograph equipped with a flame ionization detector. Compounds were identified by column retention time and quantified by peak area comparisons to those of known standards using a HP3396A integrator.

Lead

Lead content was determined based on EPA Test Methods for Evaluating Solid Wastes, SW-846, Method #6010.

REPORT OF: CHEMICAL ANALYSES

PROJECT: AGATE PROPERTIES/CMI #1041

DATE: October 28, 1991

LABORATORY NO: 4410 92-0071

PAGE: 2

RESULTS

The results are listed in the attached tables.

REMARKS

The samples were collected on October 1, 1991 and October 2, 1991, and were consumed in the analyses.

TWIN CITY TESTING CORPORATION

Stephanie A. Kidder
Project Manager

Catherine A. Laudenbach
Project Manager

SAK/CAL/lml

TABLE 1

ANALYTICAL RESULTS

Parameter	E-1/S-10	E-1/S-13	E-1/S-14	MDL (µg/kg)
Total hydrocarbons as gasoline	ND	ND	ND	7
Benzene	ND	ND	ND	1
Toluene	ND	ND	ND	1
Total xylenes	ND	ND	ND	1
Ethyl benzene	ND	ND	ND	1
Methyl-tert-butyl ether	ND	ND	ND	1
Surrogate Recovery:				
α,α,α-Trifluorotoluene	76%	74%	77%	

All values are in µg/kg which is equal to parts-per-billion (ppb).

ND = Not Detected

MDL = Method Detection Limit

Date Analyzed: October 10, 1991 through October 14, 1991

Laboratory No: 4410 92-0071

TABLE 1 (Cont.)

ANALYTICAL RESULTS

Parameter	E-1/S-22	Method Blank	MDL (µg/kg)
Total hydrocarbons as gasoline	ND	ND	7
Benzene	ND	ND	1
Toluene	ND	ND	1
Total xylenes	ND	ND	1
Ethyl benzene	ND	ND	1
Methyl-tert-butyl ether	ND	ND	1
Surrogate Recovery:			
α,α,α-Trifluorotoluene	72%		

All values are in µg/kg which is equal to parts-per-billion (ppb).

ND = Not Detected

MDL = Method Detection Limit

Date Analyzed: October 10, 1991 through October 14, 1991

Laboratory No: 4410 92-0071

TABLE 2

ANALYTICAL RESULTS

Parameter	E-1/S-16	MDL (µg/kg)
Total hydrocarbons as gasoline	1,300,000*	9,100
Benzene	ND	1,300
Toluene	2,400	1,300
Total xylenes	2,700	1,300
Ethyl benzene	2,600	1,300
Methyl-tert-butyl ether	ND	1,300
Surrogate Recovery:		
α,α,α-Trifluorotoluene	80%	

---

* Higher boiling hydrocarbons present, non-typical of gasoline.

All values are in µg/kg which is equal to parts-per-billion (ppb).

ND = Not Detected

MDL = Method Detection Limit

Date Analyzed: October 10, 1991 through October 14, 1991

Laboratory No: 4410 92-0071

TABLE 3

ANALYTICAL RESULTS

Parameter	E-1/S-15	SP-1	MDL (µg/kg)
Total hydrocarbons as gasoline	74,000*	49,000*	1,000
Benzene	ND	ND	150
Toluene	ND	ND	150
Total xylenes	ND	ND	150
Ethyl benzene	ND	ND	150
Methyl-tert-butyl ether	ND	ND	150
Surrogate Recovery:			
α,α,α-Trifluorotoluene	80%	102%	

* Higher boiling hydrocarbons detected; non-typical of gasoline.

All values are in µg/kg which is equal to parts-per-billion (ppb).

ND = Not Detected

MDL = Method Detection Limit

Date Analyzed: October 10, 1991 through October 14, 1991

Laboratory No: 4410 92-0071

TABLE 4

ANALYTICAL RESULTS

Sample Identification	Total Hydrocarbons as #2 Fuel Oil (mg/kg)	Pentacosane Recovery (%)
E-1/S-10	ND	56
E-1/S-13	ND	57
E-1/S-14	ND	57
E-1/S-15	130	55
E-1/S-16	1,700	61
E-1/S-22	ND	106
SP-1	140	61
Method Detection Limit	2.0	

All values are in mg/kg which is equal to parts-per-million (ppm).

ND = Not Detected

Date Extracted: October 8, 1991

Date Analyzed: October 16, 1991

Laboratory No: 4410 92-0071

TABLE 5

ANALYTICAL RESULTS

Parameter	SP-1	LDL (mg/kg)
Lead	8.0	2.5

All values are in mg/kg which is equal to parts-per-million (ppm).

LDL = Lower Detectable Limit

Date Analyzed: October 11, 1991

Laboratory No: 4410 92-0071

twin city testing corporation
737 PELHAM AVENUE
DOCK 4
ST. PAUL, MN 55114
PHONE 612/649-5555

CHAIN-OF-CUSTODY RECORD

TCT NO. 32027

CLIENT NAME: PEER ENVIRONMENTAL
CLIENT ADDRESS: 11 PEAVEY ROAD, CHASKA 55318
CLIENT CONTACT/ADDRESS IF DIFFERENT FROM ABOVE: STEVE JANSEN — PHONE: 448-6775
SAMPLED BY PRINT NAME/SIGNATURE: STEVE JANSEN / Steve Jansen
DATE/TIME SAMPLED: 10/1/91-10/2/91

POSSIBLE HAZARD: YES X UNKNOWN ____ (COMMENT BELOW)
SAMPLE DISPOSAL: RETURN TO CLIENT ____ DISPOSAL BY LAB X
(ADDITIONAL CHARGES MAY BE ASSESSED)

STEPHANIE KIBBER
TCT CONTACT: ~~CMI~~ ALLATE PROPERTIES / CMI
PROJECT NAME: — / #1041
CLIENT P.O. # / PROJECT NO.: PEER ENVIRONMENTAL
BILL TO (CO. NAME, ADDRESS): STEVE JANSEN
REPORT TO

TCT USE ONLY	
PROJ. MGR.	Steph
PRIORITY	Normal
INVOICE #	441092-0071
JOB NAME	Peer.19
CUSTODY SEAL INTACT/NUMBER Y/N	NO
TEMPERATURE OF CONTAINER	Dropoff
SAMPLE CONDITION	OK

PREPAY Y/N	NO
CHECK NO.	↓
CHECK AMOUNT	↓

ANALYSES REQUEST
FILTERED (YES/NO)
PRESERVED (CODE)
REFRIGERATED (Y/N)
CODE A - NONE, B - HNO3, C - H_2SO_4, D - NaOH, E - HCl, F - ____

ITEM NO.	CLIENT SAMPLE ID.	MATRIX	NO. OF CONTAINERS	CONTAINER TYPE	THC as #2 Fuel Oil (A, Y)	~~THC as Gas, MTBE~~ (~~A~~, Y)	TH as Gas, BETX (A, Y)	MTBE (A, Y)	TOTAL LEAD (A, Y)	REMARKS	TCT NO.
1	E-1/S-10 / 10/1/91 (TCT 10/3)	Soil	3	Glass	✓		✓	✓		~~[illegible]~~ NW Wall (15-17')	264175
~~2~~	~~E-1/S-12~~	~~"~~	~~"~~	~~"~~	✓		✓			~~NE Wall (13-15')~~	not submitted SJ
3	E-1/S-13 / 10/2/91 (TCT 10/3)	"	"	"	✓		✓	✓		Bottom N. side excav. (16-17')	264176
4	E-1/S-14 10/2/91	"	"	"	✓		✓	✓		SW Wall (15-17')	264177
5	E-1/S-15, 10/2/91	"	"	"	✓		✓	✓		South wall (7-9')	264178
6	E-1/S-16, 10/2/91.	"	"	"	✓		✓	✓		Bottom S. side excav. (15-17')	264179
7	E-1/S-22, 10/2/91	"	"	"	✓		✓	✓		SE Wall (15-17')	264180
8	SP-1 10/2/91. (10/3/91)	"	4	GLASS	✓		✓	[scribbled]	✓	Stockpile #1	264181
9											
10											

Additional Comments
NOTE: SAMPLES CONTAIN LOW TO MOD. CONCENTRATIONS OF PETROLEUM CONSTITUENTS,
* STANDARD TURN-AROUND FOR ANALYSES

ITEM NO.	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
1/3-8	Steve Jansen / PEER	Ann Morin Jansen / PEER	10/3/91	7:30
1/3-8	Ann Morin Jansen / PEER	Chee Yang TCT	10/3/91	11:32 Am

CA13 Rev. 6/91

* SEE REVERSE SIDE FOR INSTRUCTIONS

twin city testing corporation
662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-3601

REPORT OF: CHEMICAL ANALYSES

PROJECT: AGATE PROPERTIES/CMI PROJECT #1041 **DATE:** October 25, 1991

REPORTED TO: Peer Environmental
Attn: Steve Jansen
11 Peavey Road
Chaska, MN 55318

LABORATORY NO: 4410 92-0083

INTRODUCTION

This report presents the results of the analyses of eight samples received on October 4, 1991, from a representative of Peer Environmental. The scope of our services was limited to the parameters listed in the attached tables.

SAMPLE IDENTIFICATION

E-2/ S-16 Excavation #2	- TCT #264318
E-2/ S-22 Excavation #2	- TCT #264319
E-2/ S-23 Excavation #2	- TCT #264320
E-2/ S-31 Excavation #2	- TCT #264321
E-2/ S-32 Excavation #2	- TCT #264322
E-2/ S-33 Excavation #2	- TCT #264323
SP-2 Stockpile #2	- TCT #264324
SP-2A Stockpile #2	- TCT #264325

METHODOLOGY

Volatiles
Gasoline concentrations were determined using methods similar to EPA Method 8020 with a Tekmar Liquid Sample Concentrator on a Perkin Elmer Sigma 3B gas chromatograph equipped with a flame ionization detector. Compounds were identified by column retention time and quantified by peak area comparisons to those of known standards using a HP3396A integrator.

Fuel Oil (#2)
The samples were extracted with methylene chloride. The extracts were dehydrated with anhydrous sodium sulfate and concentrated to less than five milliliters in Kuderna-Danish concentrators on a steam bath. The extracts were then analyzed using an HP 5890A gas chromatograph equipped with a flame ionization detector. Fuel oil (#2) was identified by column retention time and quantified by peak area comparisons to those of known standards using a VG Laboratory data system.

Metals
Lead content was determined based on EPA Test Methods for Evaluating Solid Wastes, SW-846, Method #6010.

REPORT OF: CHEMICAL ANALYSES

PROJECT: AGATE PROPERTIES/CMI PROJECT #1041 **DATE:** October 25, 1991

LABORATORY NO: 4410 92-0083 **PAGE:** 2

RESULTS

The results are listed in the attached tables.

REMARKS

The samples were collected on October 3 and October 4, 1991, and were consumed in the analyses.

TWIN CITY TESTING CORPORATION

Stephanie A. Kidder
Project Manager

Catherine A. Laudenbach
Project Manager

SAK\CAL\pph

TABLE 1

ANALYTICAL RESULTS

Sample Identification	Total Hydrocarbons as #2 Fuel Oil (mg/kg)	Pentacosane Recovery (%)
E-2/ S-23 Excavation #2	ND	94
E-2/ S-33 Excavation #2	ND	98
SP-2 Stockpile #2	110*	120
SP-2A Stockpile #2	160**	110
Method Detection Limit	2.0	

* Chomatographic profile contains lower boiling hydrocarbons and is non-typical of #2 fuel oil.

** Chomatographic profile contains lower boiling hydrocarbons and is non-typical of #2 fuel oil, higher boiling hydrocarbons are also detected.

All values are in mg/kg which is equal to parts-per-million (ppm).

ND = Not Detected

Date Extracted: October 10, 1991

Date Analyzed: October 15, 1991

Laboratory No: 4410 92-0083

TABLE 2

ANALYTICAL RESULTS

Parameter	E-2/ S-16 Excavation #2	E-2/ S-22 Excavation #2	LDL
Lead	6.0	7.7	2.5

All values are in mg/kg which is equal to parts-per-million (ppm).

LDL = Lower Detectable Limit

Date Analyzed: October 11, 1991

Laboratory No: 4410 92-0083

TABLE 3

ANALYTICAL RESULTS

Parameter	E-2/ S-23 Excavation #2	E-2/ S-31 Excavation #2	E-2/ S-32 Excavation #2	LDL
Lead	4.2	7.3	5.3	2.5

All values are in mg/kg which is equal to parts-per-million (ppm).

LDL = Lower Detectable Limit

Date Analyzed: October 11, 1991

Laboratory No: 4410 92-0083

TABLE 4

ANALYTICAL RESULTS

Parameter	E-2/ S-33 Excavation #2	SP-2 Stockpile #2	SP-2A Stockpile #2	LDL
Lead	8.7	10	89	2.5

All values are in mg/kg which is equal to parts-per-million (ppm).

ND = Not Detected

LDL = Lower Detectable Limit

Date Analyzed: October 11, 1991

Laboratory No: 4410 92-0083

TABLE 5

ANALYTICAL RESULTS

Parameter	E-2/S-16 Excavation #2	E-2/S-22 Excavation #2	E-2/S-23 Excavation #2	E-2/S-31 Excavation #2	MDL (µg/kg)
Total hydrocarbons as gasoline	ND	ND	ND	16	7
Benzene	ND	ND	ND	ND	1
Toluene	ND	ND	ND	2	1
Total xylenes	ND	ND	ND	4	1
Ethyl benzene	ND	ND	ND	2	1
Methyl-tert-butyl ether	ND	ND	ND	ND	1
Surrogate Recovery:					
α,α,α-Trifluorotoluene	80%	82%	80%	84%	

All values are in µg/kg which is equal to parts-per-billion (ppb).

ND = Not Detected

MDL = Method Detection Limit

Date Analyzed: October 15 and October 16, 1991

Laboratory No: 4410 92-0083

TABLE 6

ANALYTICAL RESULTS

Parameter	E-2/S-32 Excavation #2	E-2/S-33 Excavation #2	SP-2 Stockpile #2	SP-2A Stockpile #2	MDL (µg/kg)
Total hydrocarbons as gasoline	ND	ND	360,000*	280,000*	7
Benzene	ND	ND	2,400	760	1
Toluene	ND	ND	2,000	1,100	1
Total xylenes	ND	ND	8,000	27,000	1
Ethyl benzene	ND	ND	1,400	1,900	1
Methyl-tert-butyl ether	ND	ND	---	---	1
Surrogate Recovery:					
α,α,α-Trifluorotoluene		84%	81%	86%	95%

All values are in µg/kg which is equal to parts-per-billion (ppb).

ND = Not Detected

MDL = Method Detection Limit

* Nontypical of fresh gasoline.

Date Analyzed: October 15 and October 16, 1991

Laboratory No: 4410 92-0083

pace
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Received initial payment w/ Client

SOIL INVESTIGATION
Former Mobil Gas Station
4201 Hiawatha Avenue
Minneapolis, Minnesota

Prepared For: Mr. R.J. Voith
CMI-Constroms
4225 Hiawatha Avenue
Minneapolis, Minnesota

Prepared By: PACE, Incorporated
Golden Valley, Minnesota

Date: July 27, 1990

MTW283

1710 Douglas Drive North
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3377

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July 27, 1990

Mr. R.J. Voith
CMI-Constroms
4225 Hiawatha Avenue
Minneapolis, MN 55406

RE: Former Mobil Gas Station Soil Investigation
PACE Project No. 900406.200

Dear Mr. Voith:

This report provides a summary of the soil investigation conducted at a former Mobil Gas Station located at 4201 Hiawatha Avenue in Minneapolis, Minnesota. This investigation was conducted to further define the extent of soil contamination discovered during the removal of a fuel oil tank on August 17, 1989. The scope of this project is outlined in our proposal dated March 15, 1990.

PURPOSE

The purpose of this investigation was to collect soil samples near the former fuel oil tank to attempt to determine the extent of contamination. In addition, soil samples from various locations on the property were collected to determine if there was any evidence of contamination from previously removed gasoline tanks.

CITY OF MINNEAPOLIS

The City of Minneapolis was contacted for any information they may have on the site. This information is included as Attachment A. The Fire Prevention Bureau Records showed (1) 8,000 gallon gasoline, (1) 4,000 gallon gasoline, (1) 5,000 gallon gasoline and (1) 550 gallon drain oil tank installed on June 20, 1962. These tanks were removed in September 1979. In addition a fuel oil tank was removed and found to be leaking on August 17, 1989.

SOIL INVESTIGATION

On April 9-12, 1990 Mr. John A. Plaschko of PACE, Incorporated was on-site to provide consulting and analytical services during the advancing of six test borings. Tellus Consultants was subcontracted to conduct the soil borings. A copy of their soil boring logs is included as Attachment B.

1710 Douglas Drive North
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3377

Mr. Plaschko was on-site to direct the boring operation as well as collect and prescreen soil sample for analyses. The soil boring locations are shown on Figure 1 and denoted as B-1, B-2, B-3, B-4, B-5 and B-6.

SOIL SAMPLING AND ANALYSIS

A hollow stem, split spoon auger was utilized to collect soil samples at two foot intervals at each location. Each sample was screened in the field using a portable HNu Photoionization Detector (PID). The PID was calibrated and operated to yield "total organic vapors" in parts per million (ppm) as benzene. The field screening reading are recorded in Table 1. The samples chosen for testing were analyzed for lead, BTEX (benzene, toluene, ethyl benzene and xylene), total hydrocarbons as gasoline and a hexane extraction for petroleum products. One sample was analyzed for volatile compounds using Method 465C. This was done because of a high HNu reading, although no petroleum odor was detected. The laboratory analytical results are found in Attachment C.

DISCUSSION

Boring B-1 was taken 39 feet west of the southwest corner of the building. Soil samples were collected every two feet from a depth of 5 feet to a depth, of 15 feet. The HNu reading was the highest (800 ppm) at the 11-13 foot depth however, no petroleum odor was detected in this sample. Therefore this sample was chosen for analysis for volatile organics - 465C instead of BTEX, hexane extraction and lead. Volatile organics - 465C detects many other compounds as well as BTEX (benzene, toluene, ethyl benzene and xylene). Results of the laboratory analyses can be found in Attachment C. These results indicate that no volatile compounds were detected in this sample. In addition, a sample was collected at the 13-15 foot depth and analyzed for petroleum compounds via BTEX, hexane extraction and lead. None of the compounds analyzed for were detected.

Boring B-2 was conducted 32 feet west and 1 foot north of the northwest corner of the building. Soil samples were collected every two feet from a depth of 5 feet to a depth of 19 feet. The HNu reading was highest (650 ppm) at the 7-9 foot depth and a strong petroleum odor was detected at this location. Results of this analysis can be found in Attachment C. Gasoline was detected in this sample. Based on the headspace screening results the gasoline appears to extend to approximately 13 feet. A sample was collected at the 17-19 foot depth and analyzed for petroleum compounds. No petroleum compounds were detected in this sample.

Boring B-3 was performed 50 feet west and two feet south of the northwest corner of the building. Samples were collected every two feet from a depth of 1 foot to a depth of 15 feet. A sample could not be obtained from 3-5 feet. The HNu reading was the highest at the 1-3 foot depth and significantly declines after 7 feet. The sample at 1-3 feet was analyzed for petroleum compounds. Results of this analysis can be found in Attachment C. Gasoline was detected in this sample. A sample was collected at the 13-15 foot depth and analyzed for petroleum compounds. No petroleum compounds were detected in this sample.

Boring B-4 was conducted 33 feet north and 39 feet west of the northwest corner of the building. Soil samples were collected every two feet from a depth of 5 feet to a depth of 15 feet. No significant HNu readings were detected in any of the samples. Two samples (5-7 feet and 13-15 feet) were chosen for analysis. Results of these analyses can be found in Attachment C. No petroleum compounds were detected in either of the samples.

Boring B-5 was conducted 4 feet west and 8 feet north of the northeast corner of the building. This is near the location of a former fuel oil tank which was removed on August 17, 1989. Soil samples were collected every two feet from a depth of 5 feet to a depth of 35 feet. At 35 feet the soil was very moist indicating that ground water would probably be encountered within 5 feet. A fuel oil smell was detected in all the samples from nine feet to thirty five feet. Two samples (13-15 feet and 33-35 feet) were chosen for analysis. Results of these analyses can be found in Attachment C. Fuel oil and gasoline were detected in both samples.

Boring B-6 was conducted 20 feet east and 8.5 feet north of the southeast corner of the building. Samples were collected every two feet from a depth of 5 feet to a depth of 21 feet. No petroleum odor was detected in any of the soil samples. HNu screening results were relatively low. Two samples (13-15 feet and 19-21 feet) were chosen for laboratory analysis. These results can be found in Attachment C. No petroleum compounds were detected in either of the samples.

SUMMARY AND RECOMMENDATIONS

The following is a summary of our findings:

1. No petroleum contamination was detected in three of the soil borings (B-1, B-4, B-6).

2. Gasoline contamination was found in the soil from one foot to approximately thirteen feet in the area of borings B-2 and B-3.

3. Fuel oil and gasoline contamination extend to a depth of 35 feet in boring B-5.

The following is our recommendation for the property at 4201 Hiawatha Avenue in Minneapolis, Minnesota:

1. Since fuel oil and gasoline contamination extend to a depth of 35 feet in boring B-5, there is a possibility that ground water has been impacted. It is therefore recommended that a further subsurface investigation be conducted to determine if ground water has been contaminated. If requested, PACE will prepare a Remedial Investigation Proposal to outline the further investigative and corrective actions necessary to determine the extent of contamination and its cleanup.

Should you have any questions or require additional information, please feel free to call us.

Sincerely,

Mary T. Wentworth

Mary T. Wentworth, E.I.T.
Chemical Engineer

Robert A. Kaiser
Manager, Environmental Services

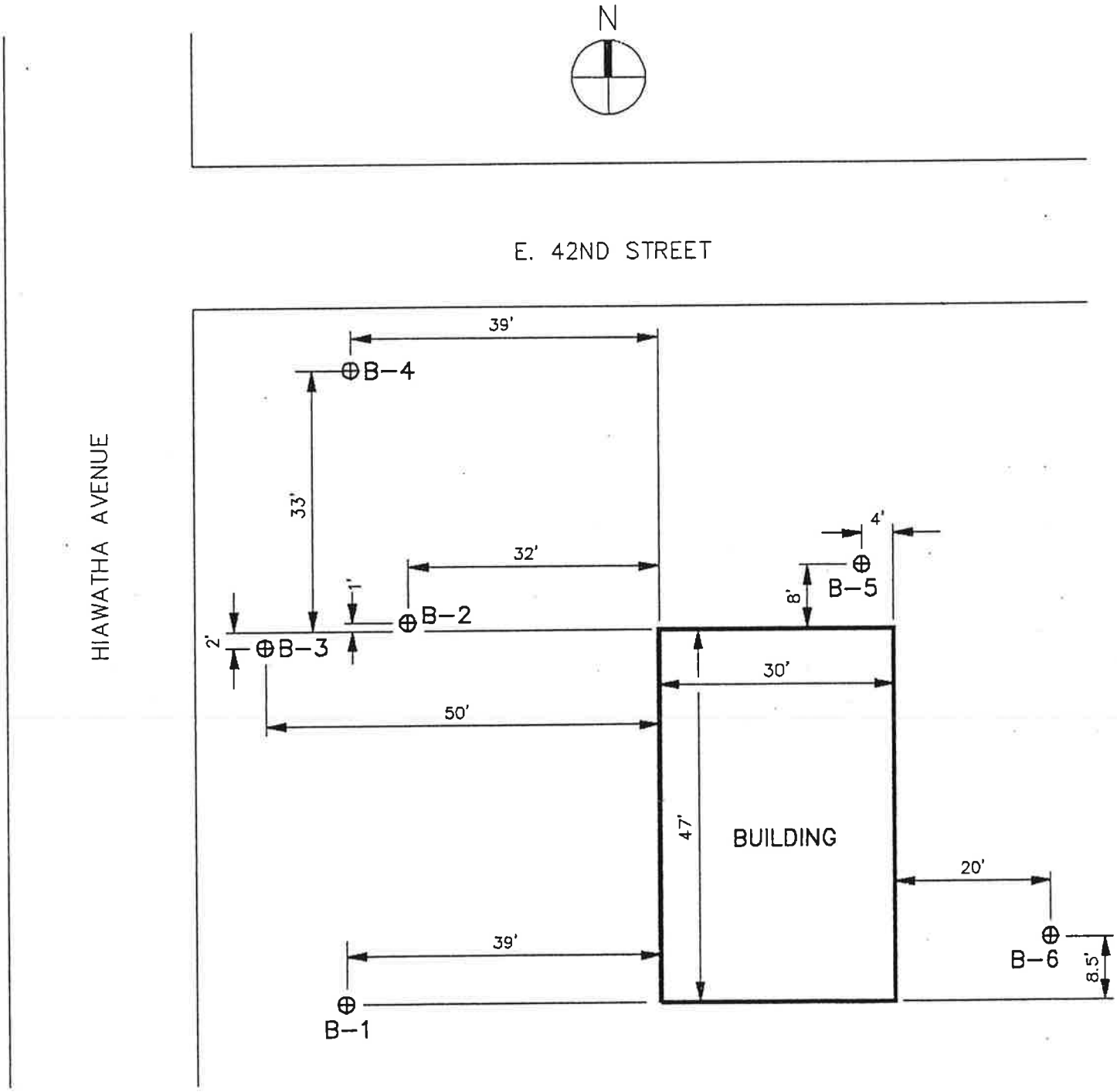
MTW283:RAK/emb

FIGURE 1
SOIL BORING LOCATIONS

FORMER MOBIL GAS STATION
4201 HIAWATHA AVE.
MINNEAPOLIS, MINNESOTA

PACE Incorporated

JULY 25, 1990



PACE Project No. 900406.200

Table 1

SOIL BORING LOG SHEET

Project: Phase I - Soil Investigation
Client: CMI-Cronstroms
Location: Former Mobil Gas Station
4201 Hiawatha Ave.
Minneapolis, Minnesota

DATE: 4/9-10/90

SAMPLING LOCATION	DEPTH (ft.)	SOIL DESCRIPTION	PETROLEUM ODOR	PID READING (ppm)
B-1	5-7	Brown sand	None	2
	7-9	Brown sand	None	75
	9-11	Fine light brown sand	None	30
*	11-13	Brown sand	None	800
*	13-15	Coarse brown sand	None	10
B-2	5-7	Green clay	Strong	610
*	7-9	Green clay	Strong	650
	9-11	Green clay/Brown sand	Strong	340
	11-13	Green/Brown sand	None	310
	13-15	Brown fine sand	None	13
	15-17	Brown fine sand	None	9
*	17-19	Brown fine sand	None	10
B-3 *	1-3	Black clay and sand	Strong	600
	5-7	Green clay	Strong	22
	7-9	Hard green clay	None	3
	9-11	Green clay and sand	None	1
	11-13	Coarse brown sand	None	1
*	13-15	Coarse brown sand	None	ND
B-4 *	5-7	Green hard clay	None	ND
	7-9	Green hard clay	None	ND
	9-11	Green clay/Brown sand	None	ND
	11-13	Brown sand	None	1
*	13-15	Coarse brown sand	None	1

* - Sample selected for laboratory analysis
ND - Not detected

Table 1 (continued)

SOIL BORING LOG SHEET

Project: Phase I - Soil Investigation
Client: CMI-Cronstroms
Location: Former Mobil Gas Station
4201 Hiawatha Ave.
Minneapolis, Minnesota

DATE: 4/9-12/90

SAMPLING LOCATION	DEPTH (ft.)	SOIL DESCRIPTION	PETROLEUM ODOR	PID READING (ppm)
B-5	5-7	Moist dark brown sand	Strong	ND
	7-9	Moist brown clay	Strong	15
	9-11	Fine gray sand	Strong	38
	11-13	Fine gray sand	Strong	100
*	13-15	Gray sand	Strong	300
	15-17	Gray sand	Strong	350
	17-19	Gray sand	Strong	220
	19-21	Gray sand	Strong	270
	21-23	Gray sand	Strong	280
	23-25	Gray/Brown sand	Strong	250
	25-27	Brown sand	Slight	38
	27-29	Brown sand	Slight	28
	29-31	Brown sand	Slight	25
	31-33	Brown sand	Slight	24
*	33-35	Moist brown/gray sand	Slight	21
B-6	5-7	Green hard clay	None	ND
	7-9	Green hard clay	None	ND
	9-11	Green clay/Brown sand	None	2
	11-13	Fine brown sand	None	15
*	13-15	Fine brown sand	None	18
	15-17	Fine brown sand	None	2
	17-19	Coarse brown sand	None	12
*	19-21	Coarse brown sand	None	12

* - Sample selected for laboratory analysis
ND - Not Detected

SR37
$50.00 PD

DEPARTMENT OF REGULATORY SERVICES
250 South Fourth Street Rm 300
Minneapolis MN 55415-1316

JOHN A. BERGQUIST, DIRECTOR
INSPECTIONS DIVISION
(612) 673-5820

T.F. THORSTENSON, P.E.
DIRECTOR

MERWYN LARSON, P.E.
DEPUTY DIRECTOR

ADMINISTRATION
HOUSING
BUILDING
ZONING
PLAN REVIEW
ENVIRONMENTAL
ELECTRICAL
PLUMBING
HEATING

minneapolis
city of lakes

May 1, 1990

Mary Wentworth
PACE LABORATORIES, INC.
1710 Douglas Drive North
Minneapolis, MN 55422

Dear Ms. Wentworth: RE: 4201 Hiawatha Avenue

After researching Pollution Control records, Building permits and Fire Prevention records, I was able to locate the following information:

1. There are Pollution Control complaints on record regarding leaking underground storage tanks. A 560 gallon underground fuel oil tank was removed on August 17, 1989 and reportedly had pinholes in it. Both PACE Laboratories and Delta Environmental were the consultants for this project.

2. A copy of the Building card is enclosed.

3. Fire Prevention Bureau records show (1) 8000 gallon gasoline, (1) 4000 gallon gasoline, (1) 5000 gallon gasoline and (1) 550 gallon drain oil tank installed on June 20, 1962. See attached Fire Prevention record. These tanks were removed in September 1979.

Since underground storage tanks may have been installed without permits and spills or leaks could have occurred without being reported, soil and/or groundwater investigation may provide further assurance that this site is pollution free. Visual inspection of the area for fill or vent pipes is also recommended.

If you have any questions, please give me a call at 673-5807.

Sincerely,

Janice L. Kline

Janice Kline
Pollution Control Inspector

JK:br

Enclosure

PAID
MAY - 2 1990
$ 50.00 BY
DEPT. OF INSPECTIONS

INSPECTOR OF BUILDINGS

LOCATION 4201 Hiawatha Ave.

LOT 17 BLOCK 4 ADD. Deans South Park Plot of the distributors of part of Estate of Annie E. Steele

PERMIT NO.	CONSTRUCTION	DATE	CONTRACTOR	COST	O. K.
F-411012	5 transfs-neon sign	7-12-48	Suburban Elec.Co.	100.	
B 377534	47.3x29.9x12-1sty.Gasoline service station	7-12-62	Socony Mobile Oil Co.	18,000.	S

SR 37

Size 5' CONSIRONS
A201 Hiawatha

Form F-P. 17

AID
OF BUILDINGS
F MINNEAPOLIS

Application for Fire Department Permit to STORE, HANDLE OR USE FLAMMABLE LIQUIDS

Permit No. 5975
Application No. G-

Receipt No. _____ Date Issued 6-20, 1967
License No. _____ Date Permit Expires ~~6-20~~, 19 ~~67~~
Fee Paid $ _____
Location 42nd & Hiawathia Ave
Licensee Mobil Oil Co. Address 606 Vandalia St Phone Mo-6-7851

Chief, Bureau of Fire Prevention
Minneapolis Fire Department

The undersigned hereby makes application for a permit to store, handle or use flammable liquids in accordance with the provisions of the Fire Prevention Code, city ordinances of Minneapolis, Minn., and agrees not to violate any of the conditions imposed by the Bureau of Fire Prevention.

Minneapolis, Minnesota _____, 19__

Owner of Building Mobil Oil Co. Address 606 Vandalia St.
Construction of Building Cement Block
Name of Original Owner of Tanks and Pumps ~~E~~ New
Name of Present Owner of Tanks and Pumps Mobil
Name of Company Installing or Removing Tanks or Pumps Pump & Meter Service Tel.No. FE-8-5831
Name of Company Purging Tanks " " " Tel.No. "
Are Tanks or Pumps Being Removed or Installed? Installed

Number of Tanks 1 Capacity of Each 8000 Contents Gas Class Liquid _____
Number of Tanks 1 Capacity of Each 4000 Contents " Class Liquid _____
Number of Tanks 1 Capacity of Each 5000 Contents " Class Liquid _____
Drain Oil Tanks 1 Capacity of Each 550
Location of Tanks See Plan on file
Location of Pumps _____ No. 6 Dispensing Nozzles _____
Size of Fill Pipe 4" Extended to Settle proof cap
Size of Fill Pipe _____ Extended to _____
Size of Vent Pipe 2" Extended to 18 inches above sidewalk
Type of Pump Submerged How Operated Electric
Are Tanks or Pumps on Private Property or City Property? Private
Kind of Heating Plant Overhead Air Does It Comply with Ordinance? Yes
Number of Fire Extinguishers one Kind 20 lb. Dry Chemical
Remarks: Tanks Removed on 9-24-79 D. Jorgenson

NOTE: The Bureau of Fire Prevention shall be notified at least 24 hours prior to the installation or removal of any gasoline or flammable liquid storage tanks and before any piping from flammable liquid storage tanks is removed or altered.

Approved Robert T. Palmer (RJ) _____
Chief, Bureau of Fire Prevention

_____
Signature of Applicant

Installation Inspected By Stanley J. Leight Date O.K. June 24 1968
Approved by Safety Committee _____ Passed by City Council _____

LOG OF B-1

Project: PACE90111

Location: 4201 Hiawatha Ave. No., Minneapolis, MN

Client: Pace Laboratories

TELLUS CONSULTANTS
1315 Glenwood Avenue North, Minneapolis, MN 55405
(612) 374-1422

Boring Co. Tellus Consultants | Date: 4/12/90 | Sheet 1 of 1

Foreman JEA | Rig: B-57 | Date started: 4/12/90

Geologist AHS | Weather: Sunny 40° F. | Date completed: 4/12/90

Depth	"N" Blows/ ft.	Sample Number	Type Sample	SAMPLE DESCRIPTION (Surface Elevation ft.)	REMARKS
				0.3 Asphalt	No Fuel Odor
				0.5 Brown, sandy GRAVEL FILL (GP)	
				Black, silty, sandy CLAY FILL (CL)	
				5.0	
5	2·2·3·3	SS-1	SS	Brown, very loose, fine-med. SAND (SP)	Rec. 1.5
	1·2·3·3	SS-2	SS		Rec. 1.5
10	2·2·5·5	SS-3	SS		Rec. 1.5
	5·6·8·9	SS-4	SS		Rec. 1.5
				13.0 Brown, very loose, moist, med.-cse. SAND (SP)	
	2·3·4·6	SS-5	SS		Rec. 1.5
15				15.0 Bottom of Hole	No Fuel Odor

Drawn: Date:

Approved: Date:

Job #

Exact location

Topsoil Thickness	Water Level
Fill Thickness	Water Loss
Cave in Level	Artesian Pressure

LOG OF B-2

Project: PACE90111

Location: 4201 Hiawatha Ave. No., Minneapolis, MN

Client: Pace Laboratories

TELLUS CONSULTANTS
1315 Glenwood Avenue North, Minneapolis, MN 55405
(612) 374-1422

Boring Co. Tellus Consultants | Date: 4/11/90 | Sheet 1 of 1

Foreman JEA | Rig: B-57 | Date started: 4/11/90

Geologist AHS | Weather: Cloudy, Flurries 25° F. | Date completed: 4/11/90

Depth	"N" Blows/ ft.	Sample Number	Type Sample	SAMPLE DESCRIPTION Surface Elevation ft.	REMARKS
				0.5 Concrete	
				1.0 Brown, sandy GRAVEL FILL (GP)	Strong Gasoline Odor Begins at One Foot.
				Black/green, sandy, silty CLAY (CL)	
5				5.0 Green/tan, soft, moist CLAY (CL)	
	2·2·4·6	SS-1	SS		Rec. 1.5
	1·2·5·6	SS-2	SS		Rec. 1.5
10	2·4·7·12	SS-3	SS	9.5 Brown, loose, med.-cse. SAND some gravel (SP)	Rec. 1.5
	6·9·11·10	SS-4	SS		Rec. 1.5
	4·4·6·7	SS-5	SS		Rec. 1.5 Diminishing Fuel Odor
15	2·2·7·7	SS-6	SS		Rec. 1.5 No Fuel Odor
	4·6·5·5	SS-7	SS		Rec. 1.6 No Fuel Odor
				19.0 Bottom of Hole	
20					

Drawn: Date:

Approved: Date:

Job #

Exact location

Topsoil Thickness	Water Level
Fill Thickness	Water Loss
Cave in Level	Artesian Pressure

LOG OF B-3

Project: PACE90111

Location: 4201 Hiawatha Ave. No., Minneapolis, MN

Client: Pace Laboratories

TELLUS CONSULTANTS
1315 Glenwood Avenue North, Minneapolis, MN 55405
(612) 374-1422

Boring Co. Tellus Consultants | Date: 4/12/90 | Sheet 1 of 1

Foreman JEA | Rig: B-57 | Date started: 4/12/90

Geologist AHS | Weather: Sunny, 40° F. | Date completed: 4/12/90

Depth	"N" Blows/ ft.	Sample Number	Type Sample	SAMPLE DESCRIPTION (Surface Elevation ft.)	REMARKS
				-0.3 Asphalt / Black, silty, sandy CLAY FILL (CL)	Strong Gasoline Odor at 0.3; No Fuel Odor Below 5-7 ft.
	3-4-3-4	SS-1	SS	-2.5	Rec. 1.8
5					
	2-3-5-4	SS-2	SS	Green, soft CLAY tr. gravel (CL)	Rec. 1.8
	2-2-4-6	SS-3	SS	Green grading to tan soft CLAY (CL)	Rec. 1.8
				-9.5	
10	2-4-4-9	SS-4	SS	Brown, loose, med. SAND tr. gravel (SP)	Rec. 1.5
	5-6-8-8	SS-5	SS		Rec. 1.5
	1-4-6-6	SS-6	SS		Rec. 1.5
15				-15.0 Bottom of Hole	

Drawn: Date:

Approved: Date:

Job #

Exact location

Topsoil Thickness

Fill Thickness

Cave in Level

Water Level

Water Loss

Artesian Pressure

LOG OF B-4

Project: PACE90111

Location: 4201 Hiawatha Ave. No., Minneapolis, MN

Client: Pace Laboratories

TELLUS CONSULTANTS
1315 Glenwood Avenue North, Minneapolis, MN 55405
(612) 374-1422

Boring Co. Tellus Consultants | Date: 4/11/90 | Sheet 1 of 1

Foreman JEA | Rig: B-57 | Date started: 4/11/90

Geologist AHS | Weather: Sunny, 40° F. | Date completed: 4-11/90

Depth	"N" Blows/ ft.	Sample Number	Type Sample	SAMPLE DESCRIPTION (Surface Elevation ft.)	REMARKS
				-0.3 Asphalt Black, moist, sandy CLAY FILL (CL)	Some Fuel Odor in Top Three Feet, Auger Cuttings
				-3.0 Grading to gray/brown, soft, moist CLAY (CL)	
5	2-3-6-7	SS-1	SS		Rec. 1.8 No Fuel Odor
	2-3-4-5	SS-2	SS		Rec. 1.8
				-9.5	
10	1-2-6-10	SS-3	SS	Brown, loose, fine-medium SAND (SP)	Rec. 1.5
	4-7-8-9	SS-4	SS		Rec. 1.5
	5-8-8-9	SS-5	SS		Rec. 1.5
15				-15.0 Bottom of Hole	

Drawn: Date:

Approved: Date:

Job #

Exact location

Topsoil Thickness	Water Level
Fill Thickness	Water Loss
Cave in Level	Artesian Pressure

LOG OF B-5

Project: PACE90111

Location: 4201 Hiawatha Ave. No., Minneapolis, MN

Client: Pace Laboratories

TELLUS CONSULTANTS
1315 Glenwood Avenue North, Minneapolis, MN 5540:
(612) 374-1422

Boring Co. Tellus Consultants | Date: 4/9/90 | Sheet 1 of 2

Foreman JEA | Rig: B-57 | Date started: 4/9/90

Geologist AHS | Weather: Sunny, 50° F. | Date completed: 4/9/90

Depth	"N" Blows/ ft.	Sample Number	Type Sample	SAMPLE DESCRIPTION Surface Elevation ft.	REMARKS
				-1.0 Asphalt	
				Sandy PEA GRAVEL FILL (GW)	
				-5.0	
5	1·1·2·1	SS-1	SS	Brown, very loose, moist, silty, medium SAND FILL, tr. clay, gravel (SP)	Rec. 0.9
				-7.0	
	2·2·3·6	SS-2	SS	Gray, soft, moist CLAY (CL)	Rec. 1.5 Slight Fuel Odor
10	1·4·8·10	SS-3	SS	-10.0	Rec. 1.5 Increasing Fuel Odor
				Gray, loose, fine-med. SAND (SP)	
	3·7·9·14	SS-4	SS		Rec. 1.3
	5·9·9·9	SS-5	SS	Gray/brown, loose, med.-cse. SAND (SP)	Rec. 1.3
15					
	4·8·13·13	SS-6	SS		Rec. 1.5
	9·10·12·15	SS-7	SS		Rec. 1.7
				Brown, firm, fine-med. SAND tr. gravel (SP)	
20	6·29·21·15	SS-8	SS		Rec. 1.3 Gravel 1/2" to 2" Diameter
	5·9·15·20	SS-9	SS		Rec. 1.3
	6·12·15·17	SS-10	SS		Rec. 1.5
25					
	4·6·10·15	SS-11	SS		Rec. 1.2
	4·12·20·25	SS-12	SS		Rec. 1.0
	7·13·18·26	SS-13	SS		Rec. 1.2

Drawn: Date:

Approved: Date:

Job #

Exact location

Topsoil Thickness	Water Level
Fill Thickness	Water Loss
Cave in Level	Artesian Pressure

LOG OF B-5

Project: PACE90111

Location: 4201 Hiawatha Ave. No., Minneapolis, MN

Client: Pace Laboratories

TELLUS CONSULTANTS
1315 Glenwood Avenue North, Minneapolis, MN 5540
(612) 374-1422

Boring Co. Tellus Consultants | Date: 4/9/90 | Sheet 2 of 2

Foreman JEA | Rig: B-57 | Date started: 4/9/90

Geologist AHS | Weather: Sunny, 50° F. | Date completed: 4/9/90

Depth	"N" Blows/ ft.	Sample Number	Type Sample	SAMPLE DESCRIPTION Surface Elevation ft.	REMARKS
				Brown, firm, moist fine-med. SAND (SP)	
31	8.15.22.25	SS-14	SS		Rec. 1.2
	4.12.16.18	SS-15	SS		Rec. 1.2
35				35.0 Bottom of Hole	Tip of Spoon at 35 ft. Saturated Fuel Odor from 7-35 ft.

Drawn: Date:

Approved: Date:

Job #

Exact location

Topsoil Thickness	Water Level
Fill Thickness	Water Loss
Cave in Level	Artesian Pressure

LOG OF B-6

Project: PACE90111

Location: 4201 Hiawatha Ave. No., Minneapolis, MN

Client: Pace Laboratories

TELLUS CONSULTANTS
1315 Glenwood Avenue North, Minneapolis, MN 5540
(612) 374-1422

Boring Co. Tellus Consultants | Date: 4/10/90 | Sheet 1 of 1

Foreman JEA | Rig: B-57 | Date started: 4/10/90

Geologist AHS | Weather: Sunny, 45° F. | Date completed: 4/10/90

Depth	"N" Blows/ ft.	Sample Number	Type Sample	SAMPLE DESCRIPTION Surface Elevation ft.	REMARKS
				-0.5 Asphalt	Fill has Debris, i.e. Concrete, Bricks, etc.
				-1.5 Brown, gravelly SAND FILL (SP)	
				Black, silty SAND FILL (SP)	
				-5.0 Tan, soft, moist CLAY (CL)	
5	3·3·5·6	SS-1	SS		Rec. 1.8
	3·3·5·8	SS-2	SS		Rec. 2.0
				-9.5	
10	2·6·6·6	SS-3	SS		Rec. 1.5
	2·3·8·12	SS-4	SS	Brown, loose, fine-med. SAND some coarse sand, tr. gravel (SP)	Rec. 1.5
	2·5·7·11	SS-5	SS		Rec. 1.5
15	6·7·8·9	SS-6	SS		Rec. 2.0
	6·6·20·19	SS-7	SS		Rec. 1.5
				Brown, loose, med.-cse. SAND (SP)	
20	6·6·13·11	SS-8	SS		Rec. 1.0 Not Enough Sample for Pace to Split with Tellus
				-21.0 Bottom of Hole	No Fuel Odor in Boring

Drawn: Date:

Approved: Date:

Job #

Exact location

Topsoil Thickness	Water Level
Fill Thickness	Water Loss
Cave in Level	Artesian Pressure

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

CMI Constroms
4225 Hiawatha Avenue
Minneapolis, MN 55406-3394

May 03, 1990
PACE Project Number: 900406200

Attn: Mr. R Voith

Phase II Soil

PACE Sample Number:			139150	139250	139300
Date Collected:			04/09/90	04/09/90	04/10/90
Date Received:			04/13/90	04/13/90	04/13/90
Parameter	Units	MDL	B-5 13-15	B-5 33-35	B-6 13-15
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Lead	mg/kg	2.5	9.6	3.0	8.5
ORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Moisture content	%	1.0	4.0	11.5	4.4
VOLATILE PETROLEUM RELATED CMPDS IN SOIL					
Date Analyzed			04/17/90	04/17/90	04/17/90
Benzene	mg/kg	0.12	ND	ND	ND
Toluene	mg/kg	0.12	0.50	ND	ND
Ethyl benzene	mg/kg	0.12	0.22	ND	ND
Xylene	mg/kg	0.12	1.6	ND	ND
Total Hydrocarbons as gasoline	mg/kg	1.0	63	2.7	ND
HEXANE EXTRACT PETROLEUM PRODUCTS SOIL					
Date Analyzed			04/20/90	04/20/90	04/20/90
Date Extracted			04/18/90	04/18/90	04/18/90
Gasoline	mg/kg	3.3	ND	ND	ND
Fuel oil #1	mg/kg	3.3	ND	ND	ND
Fuel oil #2	mg/kg	3.3	2500	260	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

? How does this relate to TPH's

Action Level
50 ppm THCs

1710 Douglas Drive North
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3377

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REPORT OF LABORATORY ANALYSIS

Mr. R Voith
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May 03, 1990
PACE Project Number: 900406200

Phase II Soil

PACE Sample Number:			139330	139350	139400
Date Collected:			04/10/90	04/11/90	04/11/90
Date Received:			04/13/90	04/13/90	04/13/90
Parameter	Units	MDL	B-6 19-21	B-2 7-9	B-2 17-19
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Lead	mg/kg	2.5	9.7	17	7.2
ORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Moisture content	%	1.0	4.3	25.5	4.1
VOLATILE PETROLEUM RELATED CMPDS IN SOIL					
Date Analyzed			04/17/90	04/17/90	04/20/90
Benzene	mg/kg	0.12	ND	3.3	ND
Toluene	mg/kg	0.12	ND	14	ND
Ethyl benzene	mg/kg	0.12	ND	7.5	ND
Xylene	mg/kg	0.12	ND	30	ND
Total Hydrocarbons as gasoline	mg/kg	1.0	ND	340	ND
HEXANE EXTRACT PETROLEUM PRODUCTS SOIL					
Date Analyzed			04/20/90	04/20/90	04/20/90
Date Extracted			04/18/90	04/18/90	04/18/90
Gasoline	mg/kg	3.3	ND	180	ND
Fuel oil #1	mg/kg	3.3	ND	ND	ND
Fuel oil #2	mg/kg	3.3	ND	ND	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. R Voith
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May 03, 1990
PACE Project Number: 900406200

Phase II Soil

PACE Sample Number:			139410	139450	139460
Date Collected:			04/11/90	04/11/90	04/12/90
Date Received:			04/13/90	04/13/90	04/13/90
Parameter	Units	MDL	B-4 5-7	B-4 13-15	B-3 1-3
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Lead	mg/kg	2.5	16	7.3	80
ORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Moisture content	%	1.0	25.2	2.1	12.4
VOLATILE PETROLEUM RELATED CMPDS IN SOIL					
Date Analyzed			04/17/90	04/17/90	04/17/90
Benzene	mg/kg	0.12	ND	ND	2.7
Toluene	mg/kg	0.12	ND	ND	7.2
Ethyl benzene	mg/kg	0.12	ND	ND	4.1
Xylene	mg/kg	0.12	ND	ND	22
Total Hydrocarbons as gasoline	mg/kg	1.0	ND	ND	240
HEXANE EXTRACT PETROLEUM PRODUCTS SOIL					
Date Analyzed			04/20/90	04/20/90	04/20/90
Date Extracted			04/18/90	04/18/90	04/18/90
Gasoline	mg/kg	3.3	ND	ND	1700
Fuel oil #1	mg/kg	3.3	ND	ND	ND
Fuel oil #2	mg/kg	3.3	ND	ND	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. R Voith
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May 03, 1990
PACE Project Number: 900406200

Phase II Soil

PACE Sample Number:			139510	139550	139560
Date Collected:			04/12/90	04/12/90	04/12/90
Date Received:			04/13/90	04/13/90	04/13/90
Parameter	Units	MDL	B-3 13-15	B-1 11-13	B-1 13-15
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Lead	mg/kg	2.5	6.5	-	7.5
ORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Moisture content	%	1.0	2.9	2.9	6.1
VOLATILE PETROLEUM RELATED CMPDS IN SOIL					
Date Analyzed			04/17/90	-	04/17/90
Benzene	mg/kg	0.12	ND	-	ND
Toluene	mg/kg	0.12	ND	-	ND
Ethyl benzene	mg/kg	0.12	ND	-	ND
Xylene	mg/kg	0.12	ND	-	ND
Total Hydrocarbons as gasoline	mg/kg	1.0	ND	-	ND
HEXANE EXTRACT PETROLEUM PRODUCTS SOIL					
Date Analyzed			04/20/90	-	04/20/90
Date Extracted			04/18/90	-	04/18/90
Gasoline	mg/kg	3.3	ND	-	ND
Fuel oil #1	mg/kg	3.3	ND	-	ND
Fuel oil #2	mg/kg	3.3	ND	-	ND
MDH VOLATILE ORGANICS SOIL EXTRACT-465C					
Date Analyzed			-	F 04/25/90	-
Chloromethane	ug/kg	120	-	ND	-
Bromomethane	ug/kg	190	-	ND	-
Dichlorodifluoromethane	ug/kg	190	-	ND	-
Vinyl chloride	ug/kg	190	-	ND	-
Chloroethane	ug/kg	120	-	ND	-
Methylene Chloride	ug/kg	120	-	ND	-
Acetone	ug/kg	5000	-	ND	-
Trichlorofluoromethane	ug/kg	50	-	ND	-

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. R Voith
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May 03, 1990
PACE Project Number: 900406200

Phase II Soil

PACE Sample Number:			139510	139550	139560
Date Collected:			04/12/90	04/12/90	04/12/90
Date Received:			04/13/90	04/13/90	04/13/90
Parameter	Units	MDL	B-3 13-15	B-1 11-13	B-1 13-15
ORGANIC ANALYSIS					
MDH VOLATILE ORGANICS SOIL EXTRACT-465C					
Allyl chloride	ug/kg	500	-	ND	-
1,1-Dichloroethylene	ug/kg	38	-	ND	-
Tetrahydrofuran	ug/kg	1800	-	ND	-
1,1-Dichloroethane	ug/kg	25	-	ND	-
trans-1,2-Dichloroethylene	ug/kg	38	-	ND	-
cis-1,2-Dichloroethylene	ug/kg	62	-	ND	-
Ethyl ether	ug/kg	38	-	ND	-
Chloroform	ug/kg	62	-	ND	-
1,1,2-Trichlorotrifluoroethane	ug/kg	88	-	ND	-
Methyl ethyl ketone	ug/kg	2500	-	ND	-
1,2-Dichloroethane	ug/kg	25	-	ND	-
Dibromomethane	ug/kg	180	-	ND	-
1,1,1-Trichloroethane	ug/kg	62	-	ND	-
Carbon tetrachloride	ug/kg	38	-	ND	-
Bromodichloromethane	ug/kg	25	-	ND	-
Dichloroacetonitrile	ug/kg	10000	-	ND	-
q,3-Dichloro-1-propene	ug/kg	62	-	ND	-
1,2-Dichloropropane	ug/kg	25	-	ND	-
1,1-Dichloro-1-propene	ug/kg	120	-	ND	-
cis-1,3-Dichloro-1-propene	ug/kg	62	-	ND	-
1,1,2-Trichloroethylene	ug/kg	62	-	ND	-
Benzene	ug/kg	120	-	ND	-
1,3-Dichloropropane	ug/kg	75	-	ND	-
Dibromochloromethane	ug/kg	120	-	ND	-
1,1,2-Trichloroethane	ug/kg	120	-	ND	-
trans-1,3-Dichloro-1-propene	ug/kg	38	-	ND	-
1,2-Dibromoethane	ug/kg	500	-	ND	-
2-Chloroethylvinyl ether	ug/kg	620	-	ND	-
Bromoform	ug/kg	120	-	ND	-

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. R Voith
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May 03, 1990
PACE Project Number: 900406200

Phase II Soil

PACE Sample Number:			139510	139550	139560
Date Collected:			04/12/90	04/12/90	04/12/90
Date Received:			04/13/90	04/13/90	04/13/90
Parameter	Units	MDL	B-3 13-15	B-1 11-13	B-1 13-15
ORGANIC ANALYSIS					
MDH VOLATILE ORGANICS SOIL EXTRACT-465C					
1,1,1,2-Tetrachloroethane	ug/kg	38	-	ND	-
Methyl isobutyl ketone	ug/kg	120	-	ND	-
1,2,3-Trichloropropane	ug/kg	500	-	ND	-
1,1,2,2-Tetrachloroethane	ug/kg	120	-	ND	-
1,1,2,2-Tetrachloroethylene	ug/kg	120	-	ND	-
Pentachloroethane	ug/kg	250	-	ND	-
Toluene	ug/kg	120	-	ND	-
Chlorobenzene	ug/kg	120	-	ND	-
Ethylbenzene	ug/kg	120	-	ND	-
Cumene	ug/kg	120	-	ND	-
m-Xylene	ug/kg	120	-	ND	-
p-Xylene	ug/kg	120	-	ND	-
o-Xylene	ug/kg	120	-	ND	-
1,3-Dichlorobenzene	ug/kg	500	-	ND	-
1,2-Dichlorobenzene	ug/kg	500	-	ND	-
1,4-Dichlorobenzene	ug/kg	500	-	ND	-
Dichlorofluoromethane	ug/kg	120	-	ND	-

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Mr. R Voith
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May 03, 1990
PACE Project
Number: 900406200

Phase II Soil

The analyses of soil samples were performed 'as received' and do not reflect analyses on a dry weight basis unless indicated.

The data contained in this report were obtained using EPA or other approved methodologies. All analyses were performed by me or under my supervision.

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