

**RECEIVED**

APR 12 1991

MPCA, HAZARDOUS  
WASTE DIVISION

**REMEDIAL INVESTIGATION REPORT  
SINCLAIR STATION  
7733 PORTLAND AVE. SOUTH  
RICHFIELD, MINNESOTA**

**Prepared For:**

**SINCLAIR MARKETING, INC.  
3401 Fairbanks Av  
P O Box 6247  
Kansas City, Kansas 66106**

**Prepared By:**

**ENECOTECH MIDWEST, INC.  
3050 Metro Drive, Suite 115  
Bloomington, Minnesota 55425**

**April 5, 1991**

**PROJECT NO 711-017**

## TABLE OF CONTENTS

	<u>Page</u>
<b>1.0 Introduction</b>	<b>1</b>
1 1 Purpose	1
1 2 Scope-of-Work	1
1 3 Previous Reports	1
<b>2.0 Background Information</b>	<b>4</b>
2 1 Site Setting	4
2 2 Site History	4
2 3 Regional Geology	4
2 4 Regional Hydrogeology	4
<b>3.0 Site Investigation Procedures</b>	<b>8</b>
3 1 Soil Boring and Monitoring Well Placement	8
3 2 Soil Boring Procedures	8
3 3 Soil Sampling Procedures	8
3 4 Monitoring Well Installation	8
3 5 Monitoring Well Sampling	10
3 6 Water/Product Level Measurements	10
<b>4.0 Results and Discussion</b>	<b>11</b>
4 1 Site Geology	11
4 2 Site Hydrogeology	11
4 3 Soil Quality	11
4 3 1 Soil Organic Vapor Data	11
4 3 2 Soil Laboratory Analytical Data	11
4 4 Groundwater Quality	11
4 5 Hydrocarbon Distribution	17
4 5 1 Horizontal Distribution	17
4 5 2 Vertical Distribution	17
4 5 3 Site Groundwater	20
<b>5.0 Summary</b>	<b>23</b>
<b>6.0 Conclusions</b>	<b>24</b>
<b>7.0 Recommendations</b>	<b>25</b>
<b>8.0 References</b>	<b>26</b>

## LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Site Location	2
2	Site Map	5
3	Land Use and Utility Corridor Map	6
4	Buried Glacial Aquifer Water Table	7
5	Soil Boring and Monitoring Well Location Map	9
6	Groundwater Elevation Map	12
7	Soil Quality Map	18
8	Soil Analytical Data	19
9	Geologic Cross Section A-A'	21
10	Groundwater Analytical Data	22

## LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Groundwater Elevation Data	13
2	Soil Sample Vapor Organic Data	14
3	Soil Analytical Data	15
4	Groundwater Analytical Data	16

## APPENDICES

### Appendix

A	Excavation Report for Petroleum Release Sites
B	Soil Boring Logs and Water Level Data
C	Chain of Custody
D	Well Construction
E	Laboratory Data Sheets
F	Soil Incineration Records

## 1.0 INTRODUCTION

### 1.1 Purpose

EnecoTech Midwest, Inc (EnecoTech) was retained by Sinclair Marketing, Inc (Sinclair) on November 2, 1990 to perform a site investigation at the Sinclair Station at 7733 Portland Ave S, Richfield, Minnesota (Figure 1). The investigation was in response to data collected during underground storage tank (UST) removal activities conducted on May 15, 16, and 17, 1990 by EnecoTech. The data indicated that site soils had been impacted by a petroleum hydrocarbon release. The purpose of the investigation was to

- o Determine the nature, extent and magnitude of hydrocarbon release(s) to site soils, and
- o Provide options and recommendations for remediation of hydrocarbon impacts, if necessary

### 1.2 Scope-of-Work

An investigation scope-of-work for the site was developed and implemented by EnecoTech with the approval of Sinclair. The scope-of-work involved the characterization of site geology, hydrogeology, soil quality, groundwater quality, and potential hydrocarbon sources. Characterization of these items was accomplished by

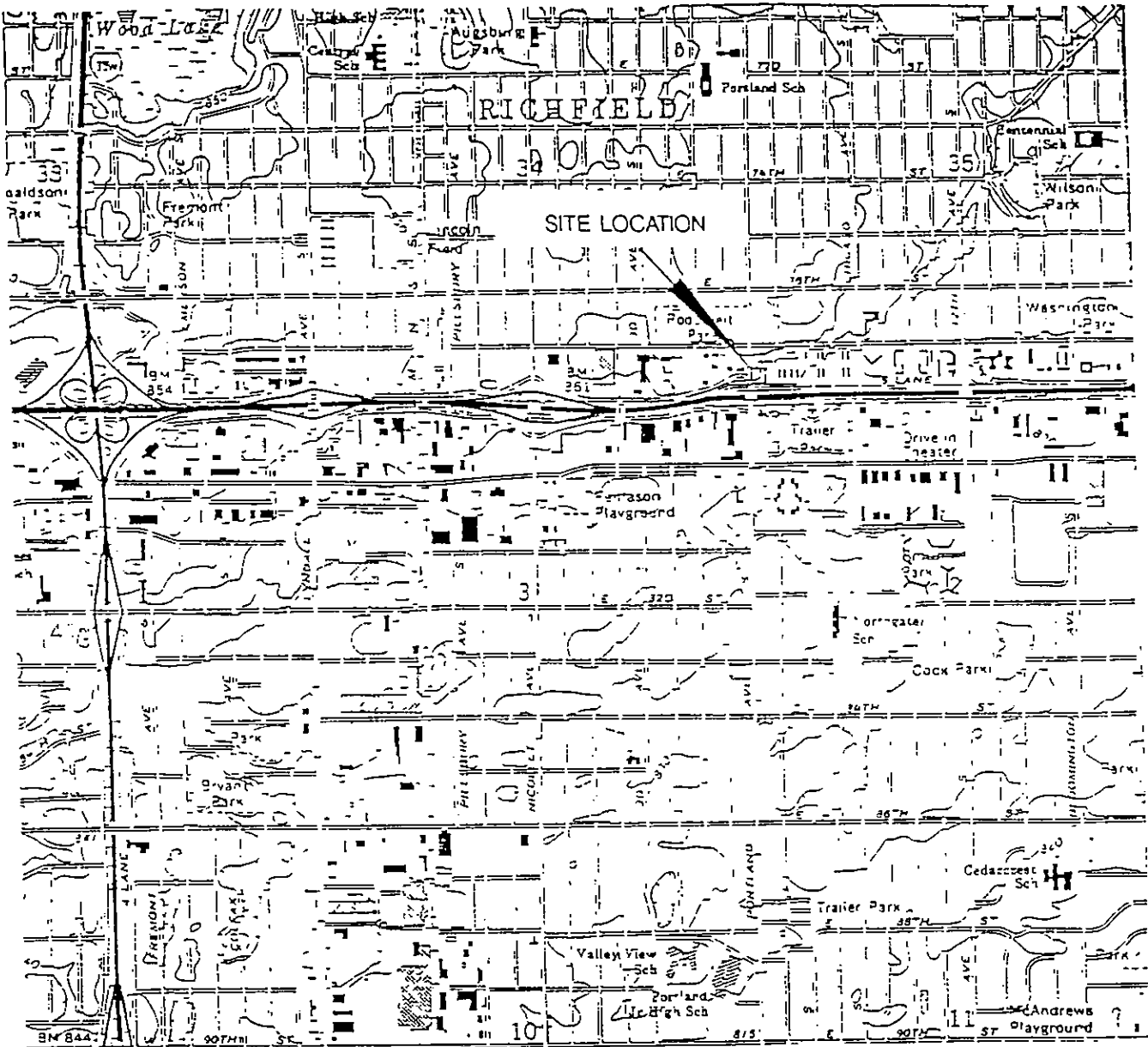
- o Drilling five (5) soil borings,
- o Logging geologic materials encountered in the borings,
- o Installing four (4) groundwater monitoring wells,
- o Monitoring soil gas vapors with an OVM Systems photo-ionizer (OVM),
- o Collecting soil and groundwater samples for laboratory analyses,
- o Performing groundwater level measurements

Field activities were initiated on November 2, 1990 and completed on March 8, 1991.

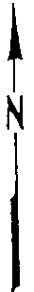
### 1.3 Previous Reports

A Minnesota Pollution Control Agency (MPCA) "Excavation Report for Petroleum Release Sites" for the subject location (Appendix A) summarized tank excavation activities performed at the site on May 15, 16, and 17, 1990. A summary of this report is provided below.

- o Two (2) 4,000 gallon regular gasoline USTs, two (2) 4,000 gallon unleaded gasoline USTs, one (1) 6,000 gallon premium unleaded gasoline UST, one (1) 1,000 gallon consumptive use fuel oil UST and one (1) 560 gallon waste oil UST were excavated at the subject location.
- o Some corrosion was noted but no holes in the tanks were visible.
- o Soils in the tank pit consisted of brownish fine to coarse grained sand.



TAKEN FROM BLOOMINGTON USGS 7.5' TOPOGRAPHICAL MAP



SCALE 124000

**EnecoTech**

Minneapolis, Minnesota

Project

SINCLAIR STATION - RICHFIELD, MINNESOTA

SITE LOCATION MAP

SINCLAIR STATION

7733 PORTLAND AVENUE SOUTH

RICHFIELD, MINNESOTA

- o Elevated OVM readings were measured in soils from beneath and adjacent to the USTs in tank pit #1 (Figure 2) OVM readings ranged from 2.2 to 357 parts per million (ppm) at depths of 2 to 16 feet bgs
- o Seven soil samples were collected from beneath the former locations of each UST Total hydrocarbons (THC) as fuel oil and gasoline were detected in five of the seven samples at concentration levels ranging from 190 ppm to 1,900 ppm THC fuel oil and 11 ppm to 1,100 ppm THC gasoline Benzene concentration levels ranged from 0.10 to 0.83 ppm
- o A complete excavation of the petroleum impacted soil was not considered feasible due to the geotechnical instability of the unconsolidated sand and the potential for structural damage to existing above ground structures Approximately, 300 cubic yards of gasoline impacted soil was removed and sent to a local soil incinerator with MPCA approval

## 2.0 BACKGROUND INFORMATION

### 2.1 Site Setting

The site is located at 7733 Portland Ave S, Richfield, Minnesota (Figure 1). At the time of the investigation, above ground structures included the station building and two pump islands located in the west central portion of the site (Figure 2). The below ground structures included two 10,000 unleaded gasoline fiberglass USTs and one 10,000 regular gasoline fiberglass UST. These three USTs were located in the south central portion of the property. The area surrounding the site is occupied by the Richfield Health Center to the north, Enterprise Car Rental to the east, of the Sinclair Station, East 78th Street and 494 are located south of the station, an auto repair/service shop is located west of the station (Figure 3).

### 2.2 Site History

No information was available regarding the site history at the time of report preparation.

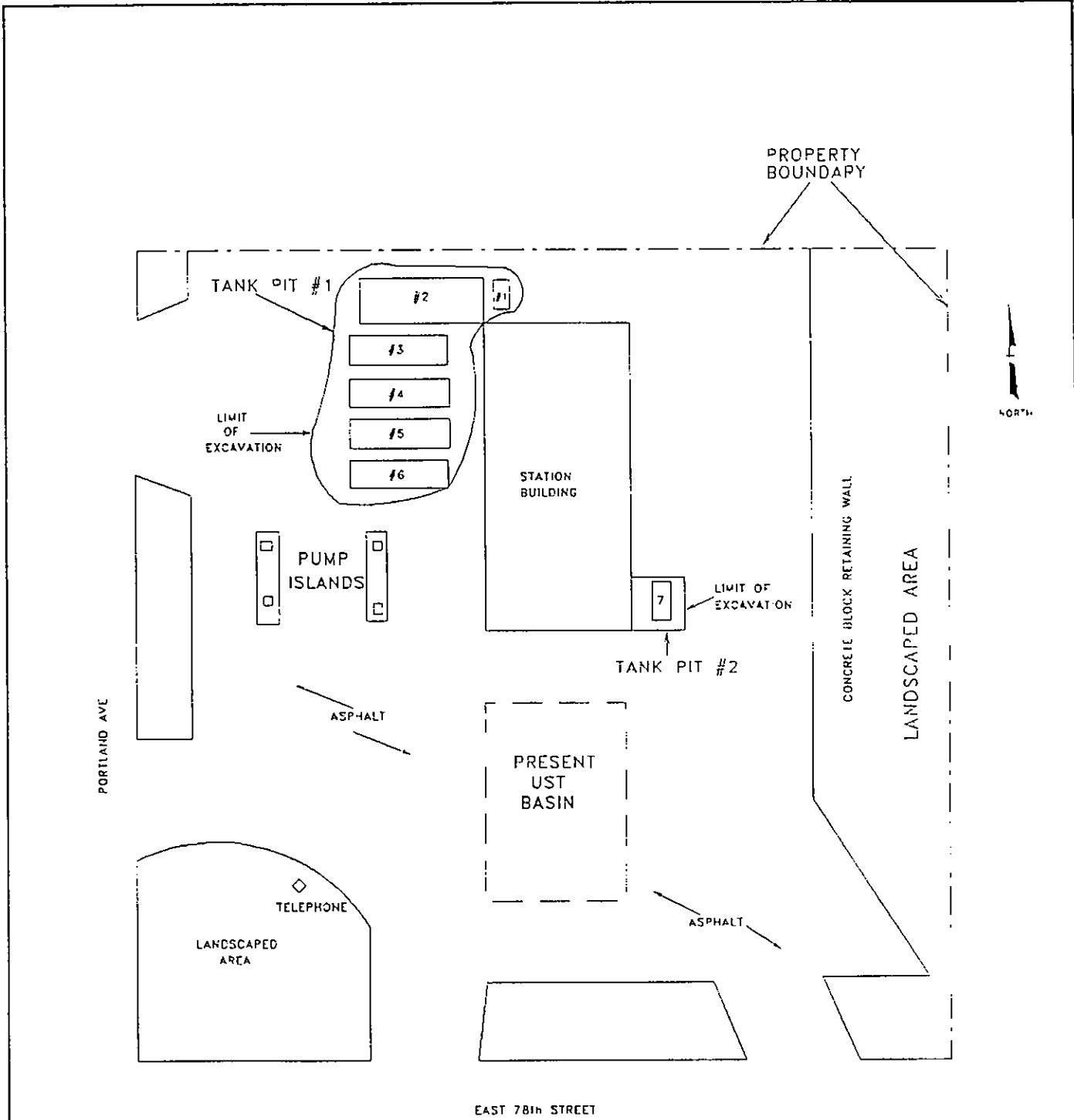
### 2.3 Regional Geology

The geology of the region has been characterized from published Minnesota Geological Survey (MGS) information. Available information indicates that the region is underlain by Pleistocene age fluvial terrace deposits consisting of sand, loamy sand and gravel. The glacial deposits in this area range in thickness from approximately 100 to 200 feet (Bloomgren, 1979).

### 2.4 Regional Hydrogeology

The regional groundwater flow direction for the unconfined buried glacial aquifer is southeast (Figure 4). Glacial deposits that underlie this portion of Richfield yield moderate amounts of water to wells. The major bedrock aquifers in the region are the St. Peter, Prairie du Chien – Jordan and Mt. Simon–Hinkley. These aquifers are approximately 100 to 800 feet below ground surface.

The St. Peter sandstone yields 9 to 100 gallons per minute (gpm) and is primarily used for private domestic wells. The Prairie du Chien–Jordan and Mt. Simon–Hinkley aquifer supply the majority of groundwater to the region. Yields range from 85 to 2,765 gpm (Norvitch, et al., 1973).



- TANK #1 = 560 GALLON WASTE OIL TANK
- TANK #2 = 6000 GALLON PREM NO LEAD
- TANK #3 = 4000 GALLON REGULAR
- TANK #4 = 4000 GALLON REGULAR
- TANK #5 = 4000 GALLON UNLEADED
- TANK #6 = 4000 GALLON UNLEADED
- TANK #7 = 1000 GALLON #1 FUEL OIL

SCALE 1" = 30'

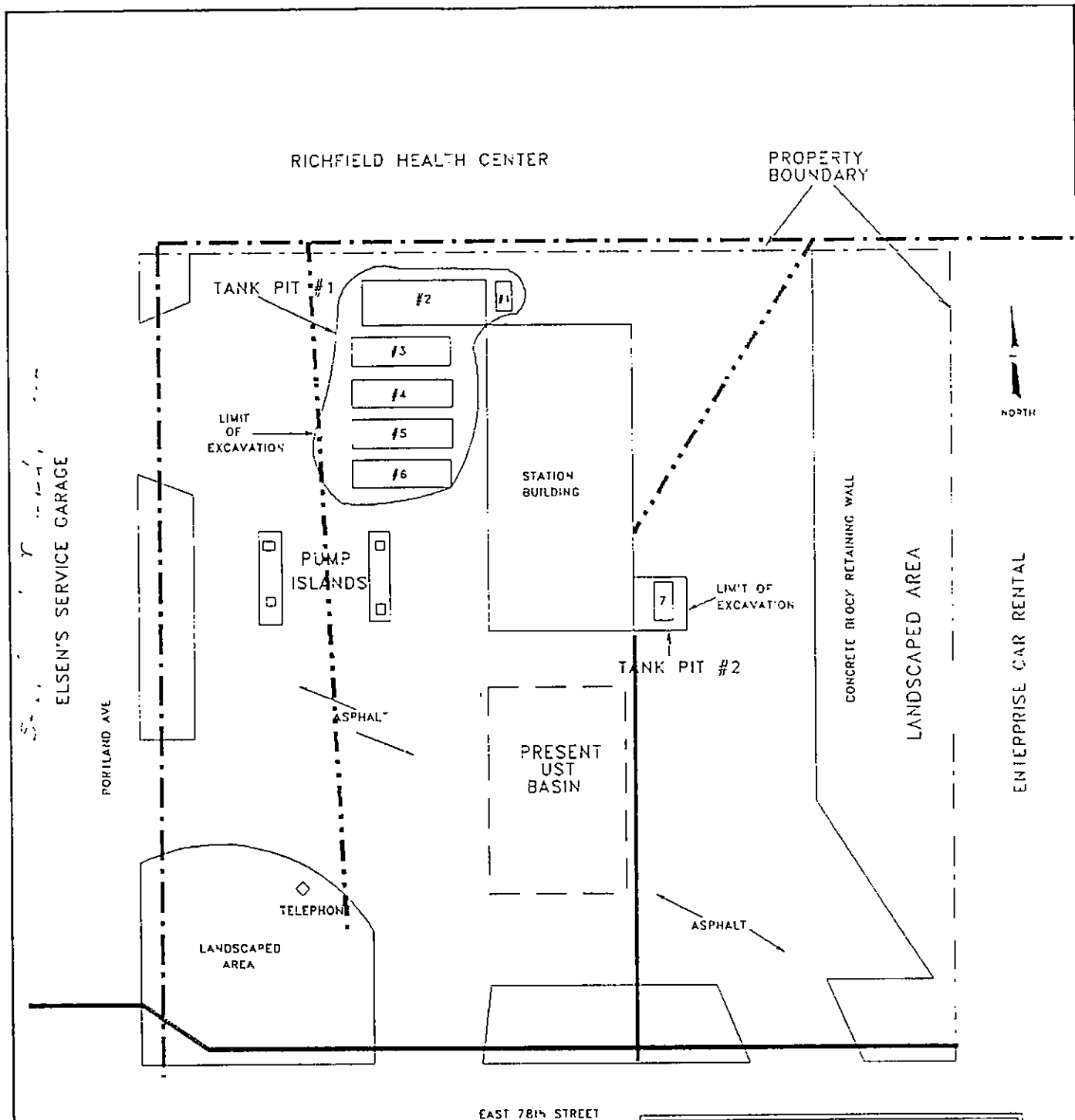
ENECOTECH

BLOOMINGTON, MINNESOTA

PROJECT SINCLAIR-PORTLAND AVE

SITE MAP  
 SINCLAIR SERVICE STATION  
 7753 PORTLAND AVE SOUTH  
 RICHFIELD, MINNESOTA





- TANK #1 = 560 GALLON WASTE OIL TANK
- TANK #2 = 6000 GALLON PREM NO LEAD
- TANK #3 = 4000 GALLON REGULAR
- TANK #4 = 4000 GALLON REGULAR
- TANK #5 = 4000 GALLON UNLEADED
- TANK #6 = 4000 GALLON UNLEADED
- TANK #7 = 1000 GALLON #1 FUEL OIL

**LEGEND**

- WATER
- ELECTRIC (OVERHEAD)
- NATURAL GAS

SCALE 1" = 30'

<p><b>ENECOTECH</b></p> <p>BLOOMINGTON MINNESOTA</p> <p>PROJECT SINCLAIR-PORTLAND AVE</p>	<p>LAND USE AND UTILITY CORRIDOR MAP</p> <p>SINCLAIR SERVICE STATION</p> <p>7753 PORTLAND AVE SOUTH</p> <p>RICHFIELD, MINNESOTA</p>
---	---



SCALE: 1 INCH = 2 MILES

AFTER BALABON, 1989

ENECOTECH

BLOOMINGTON, MINNESOTA	SG
PROJECT SINCLAIR SERVICE STATION 7733 PORTLAND AVE. SO., RICHFIELD, MN	

WATER TABLE MAP  
BURIED GLACIAL AQUIFER

FILE NO.: 711-017

DATE: DECEMBER, 1990

FIGURE NO.: 4

## 3.0 SITE INVESTIGATION PROCEDURES

### 3.1 Soil Boring and Monitoring Well Placement

The locations of soil borings and monitoring wells were based on data from the original tank pit excavation in an attempt to delineate the stratigraphic and areal extent of soil and groundwater impacts. The soil boring locations were chosen to investigate the soil quality beneath the base of the two tank basins. The monitoring wells were placed in a manner that would allow for determination of groundwater flow direction (Figure 5).

### 3.2 Soil Boring Procedures

Soil boring activities were initiated on November 2, 1990. Then Well Company of Shakopee, Minnesota performed drilling activities under EnecoTech supervision using a Mobile drill rig and hollow stem augers. Drilling equipment was cleaned by field personnel prior to the drilling of the first soil boring and after each soil boring completion. Cleaning was performed with a high pressure washer and potable water. An EnecoTech geologist monitored cleaning activities and inspected the augers to ensure decontamination had been achieved.

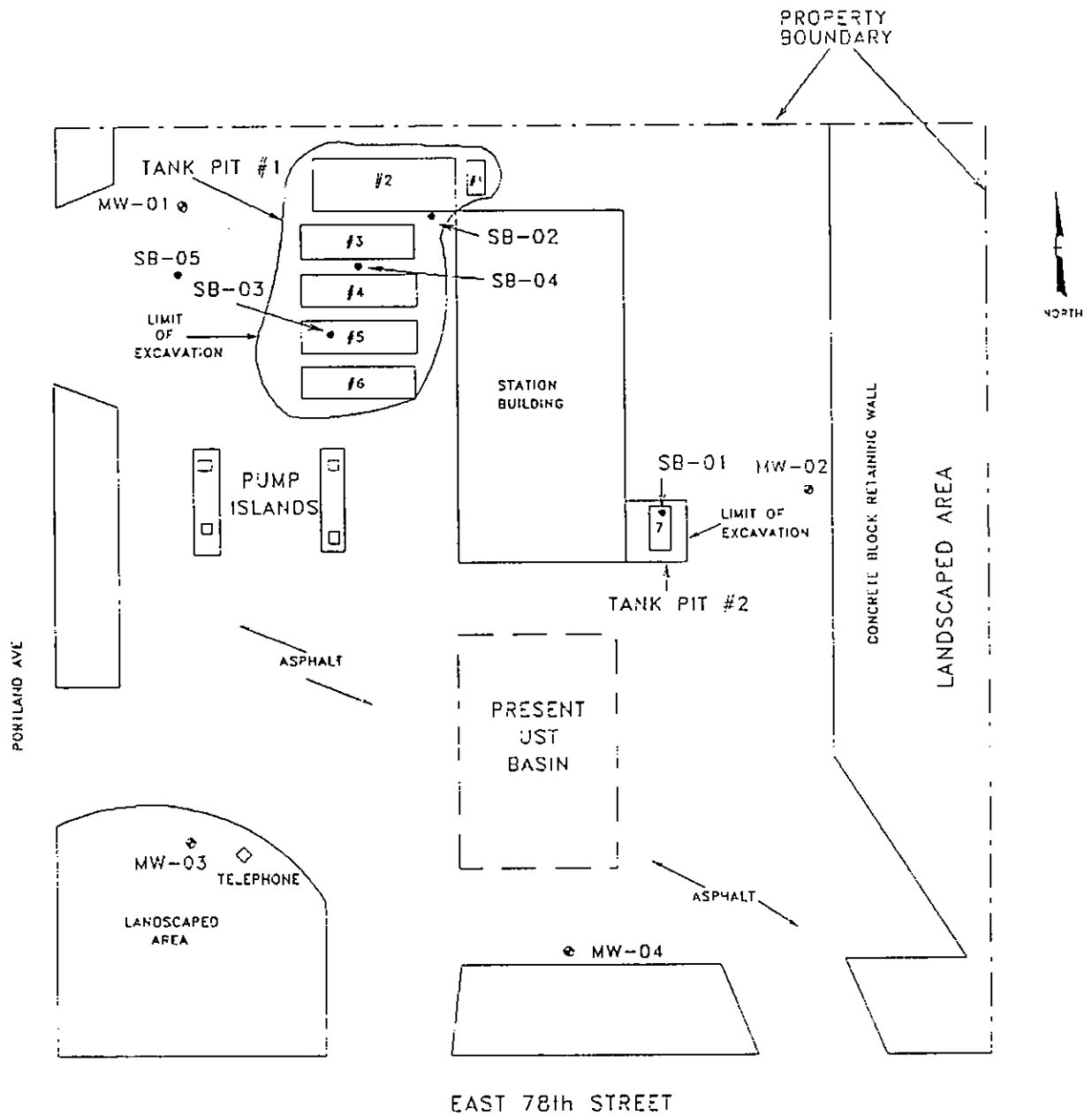
A total of 9 boreholes (5 soil borings, 4 monitoring wells) were completed to depths of 31 to 60 feet bgs. The soil borings and 2 inch diameter monitoring wells were drilled using a 6 3/4 inch O D hollow stem auger. The EnecoTech geologist logged each borehole by describing the geologic materials encountered in the subsurface (Appendix B).

### 3.3 Soil Sampling Procedures

Soil samples were collected with a split spoon sampler. Split spoons were decontaminated prior to sampling, using a detergent-distilled water-methanol-distilled water rinse cycle. Samples were collected at 5 foot intervals to the final bottom hole depths. Soil samples were screened with an OVM using the MPCA jar headspace analysis technique. The soil sample that contained the highest concentration levels of organic vapors was placed in laboratory prepared containers. All samples were labeled, stored on ice, and shipped with a chain of custody form to the analytical laboratory (Appendix C). The soil samples were analyzed for benzene, toluene, ethyl benzene and xylene (BTEX) and total hydrocarbons (THC) as fuel oil and THC as gasoline. Analyses were completed using Environmental Protection Agency (EPA) Method 8020 for BTEX, EPA Method 8015 for THC-gasoline, and Method 3820 for THC-fuel oil. In addition soil samples SB-2-9 and SB-2-29 were analyzed for lead with EPA Method SW-846, 6010.

### 3.4 Monitoring Well Installation

Four (4) monitoring wells, MW-01, MW-02, MW-03, and MW-04, were installed after the completion of the soil borings (Figure 5). The four monitoring wells were installed and completed in the same manner. A ten (10) foot section of 2 inch stainless steel #10 slot screen was installed with black iron riser pipe extending up to approximately 2.5 feet above ground surface. Number 30 flint sand was added to approximately 2 feet above the top of the well screen.



- TANK #1 = 560 GALLON WASTE OIL TANK
- TANK #2 = 6000 GALLON PREM NO LEAD
- TANK #3 = 4000 GALLON REGULAR
- TANK #4 = 4000 GALLON REGULAR
- TANK #5 = 4000 GALLON UNLEADED
- TANK #6 = 4000 GALLON UNLEADED
- TANK #7 = 1000 GALLON #1 FUEL OIL

SCALE 1" = 30'

- = SOIL BORING LOCATION
- ⊙ = MONITORING WELL LOCATION

ENECOTECH

BLOOMINGTON, MINNESOTA

PROJECT

SINCLAIR-PORTLAND AVE

SOIL BORING LOCATION MAP  
 SINCLAIR SERVICE STATION  
 7753 PORTLAND AVE SOUTH  
 RICHFIELD, MINNESOTA

A 2 to 3 foot interval of granular bentonite was used to seal the top of the sand pack. A bentonite–cement slurry was placed from the bentonite seal to within 1 foot bgs. Cement mortar was used as the top seal to ground level elevation. Protective steel casings with locking caps were installed and bumper posts were placed as needed. Well construction diagrams for each monitoring well are provided in Appendix D.

Monitoring wells were developed using the bailing method. A disposable plastic bailer attached to a new nylon rope was used to evacuate at least 3 well volumes of water from each well.

EnecoTech surveyed the monitoring well locations and elevations on February 1, 1991 using the top nut on fire hydrant located on the east side of Portland Avenue as a benchmark with the assumed elevation of 100 ft. Top of casing elevation, surface elevation, and well location measurements were completed to facilitate hydrogeologic interpretations.

### 3.5 Monitoring Well Sampling

Groundwater samples were collected from the newly installed wells on February 1, 1991. The procedure used to collect water samples from the wells consisted of the following elements:

- o Three well volumes were evacuated from each well using disposable plastic bailers,
- o After removal of three well volumes, a groundwater sample was transferred directly from the bailer into a laboratory prepared 40 ml VOC septum top vial or a 250 ml Amber bottle,
- o Samples were immediately placed on ice and stored thereafter at 4°C,
- o Sample numbers and bottle numbers were entered directly into a field log book, and
- o A chain of custody form was completed and submitted with the samples.

Groundwater samples for analysis of BTEX, THX as gasoline and THX as fuel oil were collected from all the monitoring wells. Interpoll utilized EPA Methods SW–846–8020, SW–846–8015, SW–846–3510/8015 and MDH 465 C.

### 3.6 Water/Product Level Measurements

Water level measurements were performed by EnecoTech on March 8, 1991. Measurements were taken utilizing an ORS oil/water interface probe. The use of this instrument allows for the detection of free product floating on top of the water table as well as depth to groundwater measurements. Measurements were taken to within one–one hundredth of a foot from a specific datum point on the top of the casing. The ORS probe was decontaminated between measurements to preclude cross contamination of monitoring wells.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Site Geology

The soil underlying the site has been characterized to a depth of 36 feet bgs by logging soil samples obtained from soil borings (Appendix B). The site is underlain by a brown silty fine to medium grained sand to a depth of approximately 9 feet bgs. The silty sand is underlain by fine to coarse grained sand with a trace of gravel to a depth of at least 36 feet bgs.

### 4.2 Site Hydrogeology

The unconsolidated sediments form an unconfined surficial aquifer beneath the site. Water saturated sand was encountered at a depth of approximately 35 feet bgs in soil borings SB-1 and SB-2, and the water table was measured at approximately 35 feet bgs in all MW's (Table 1, Figure 6). No confining layers were encountered in any of the soil borings.

### 4.3 Soil Quality

#### 4.3.1 Soil Sample Organic Vapor Data

No organic vapors were detected in soil boring samples from SB-1 and SB-2 (Table 2). Elevated organic vapors, however, were detected in samples that were collected from all the other soil borings. The highest value (1250 ppm) was recorded from the 9 to 11 feet sample in soil boring SB-04. The other values from samples near the surface to a depth of 36 feet bgs ranged from 3.0 to 150 ppm.

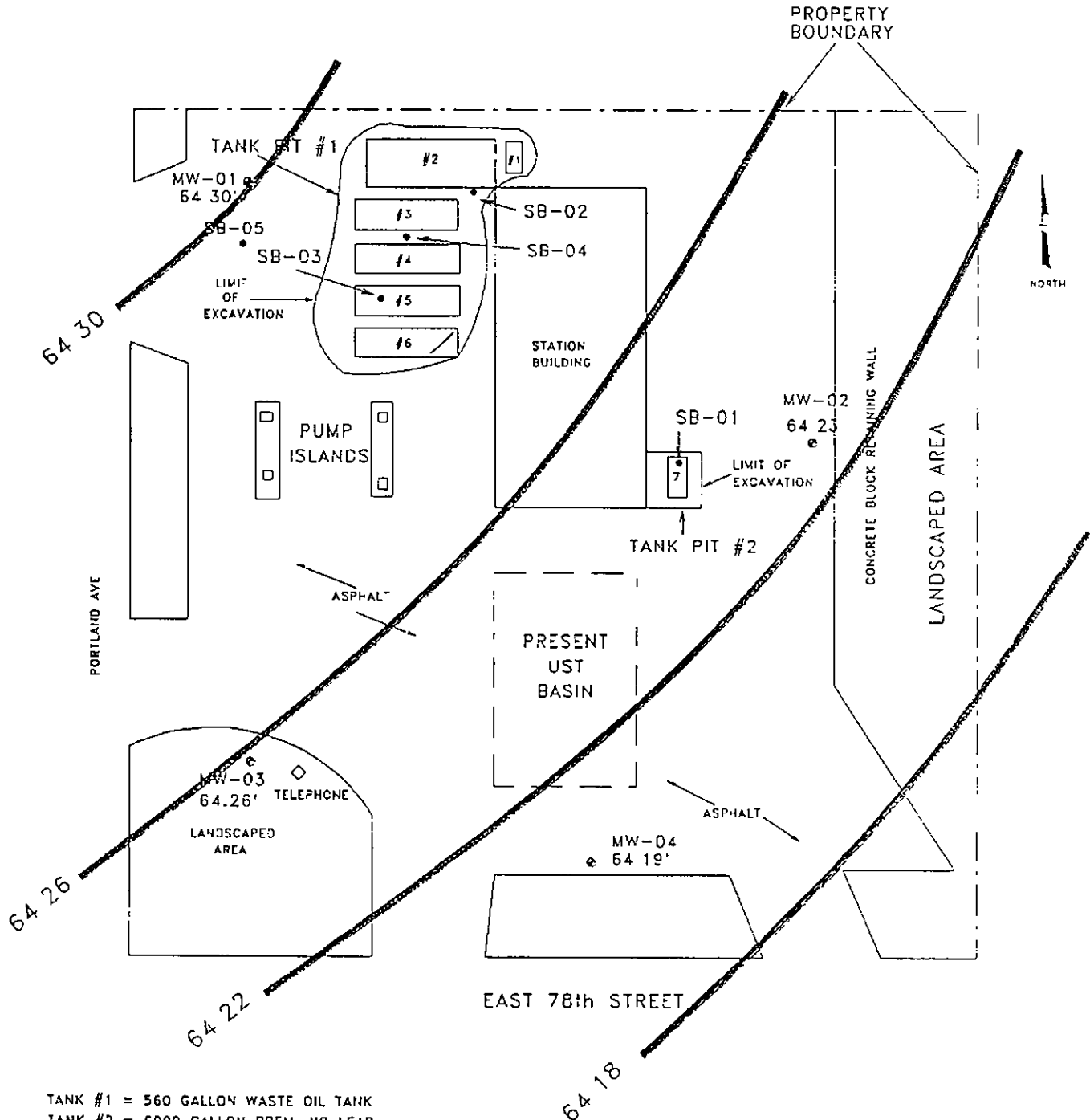
#### 4.3.2 Soil Sample Laboratory Analytical Data

Soil samples were collected from depths of 9 to 29 feet bgs for laboratory analysis (Table 3). BTEX constituents (benzene - 0.44 ppm) and THC-gasoline (920 ppm) were detected in sample SB-3-9. BTEX constituents (xylene - 13 ppm), THC-gasoline (97 ppm), and THC-fuel oil (480 ppm) were detected in sample SB-4-10. These constituents were not detected in any of the other soil boring samples. In addition, samples SB-2-9 and SB-2-29 contained non-detectable or normal concentration levels (3 ppm - SB-2-9) of lead.

### 4.4 Groundwater Quality

Groundwater samples collected from MW-01, MW-02, MW-03, and MW-04 contained no detectable levels of BTEX, MTBE, THC-gasoline, THC-fuel oil, or MDH 465C parameters with one exception, sample MW-03 contained 1,2 dichloroethane at a concentration level of 0.0032 ppm.

*Sampling lines*



- TANK #1 = 560 GALLON WASTE OIL TANK
- TANK #2 = 6000 GALLON PREM NO LEAD
- TANK #3 = 4000 GALLON REGULAR
- TANK #4 = 4000 GALLON REGULAR
- TANK #5 = 4000 GALLON UNLEADED
- TANK #6 = 4000 GALLON UNLEADED
- TANK #7 = 1000 GALLON #1 FUEL OIL

SCALE 1" = 30'

- = SOIL BORING LOCATION
- ⊙ = MONITORING WELL LOCATION

ENECOTECH

BLOOMINGTON, MINNESOTA

PROJECT SINCLAIR-PORTLAND AVE.

GROUNDWATER ELEVATION CONTOUR MAP (3/08/91)  
 SINCLAIR SERVICE STATION  
 7753 PORTLAND AVE SOUTH  
 RICHFIELD, MINNESOTA

TABLE 1  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVENUE SO , RICHFIELD, MN  
 GROUND WATER ELEVATION DATA

WELL #	LEVEL DATE	T.O C ELEVAT	WATER LEVEL	PRODUCT THICKNESS	GROUNDWATER ELEVATION
MW-01	3/08/91	103 48	39 1836	64 0 00	64 30
MW-02	3/08/91	100 86	36 6334	13 0 00	64 23
MW-03	3/08/91	99 88	35 6233	12 0 00	64 26
MW-04	3/08/91	98 47	34 2831	74 0 00	64 19
BENCHMARK	3/08/91	100 00			

T O C. - TOP OF RISER PIPE CASING

0 00 - PRODUCT LAYER NOT DETECTABLE

NOTE ALL MEASUREMENTS ARE IN FEET  
 MADE FROM THE TOP OF THE WELL CASING  
 TO AN ARBITRARY 100 FEET DATUM

WATER LEVEL MEASUREMENTS WERE  
 WATER ELEVATIONS ARE RELATIVE



TABLE 2  
SOIL SAMPLE VAPOR ORGANIC DATA  
SINCLAIR SERVICE STATION  
7733 PORTLAND AVENUE S , RICHFIELD, MN

HOLE #	DEPTH (FEET)							
	0-4	4-6	9-11	14-16	19-21	24-26	29-31	34-36
MW-01	---	2 1	2 6	3 7	3 1	7 0	11 8	11 7
MW-02	---	1 0	2 6	3 1	3 1	14 2	9 0	11 7
MW-03	---	0 0	0 0	---	0 1	0 1	0 9	0 1
MW-04	---	1 0	9 9	14 3	5 3	8 2	5 9	---
SB-01	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
SB-02	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
SB-03	4 1	49 0	993 0	3 0	0 0	0 0	0 0	0 0
SB-04	---	----	1250 0	125	7 5	2 1	2 1	150
SB-05	4.0	----	4 8	4 2	3 1	3 7	3 7	4 8

ALL CONCENTRATION LEVELS IN PARTS PER MILLION (PPM)

TABLE 3  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVE S , RICHFIELD, MN  
 SOIL ANALYTICAL DATA

HOLE SAMPLE #	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENE	THC AS GASOLINE	THC AS FUEL OIL	LEAD
01-C1-07	*	<0 06	<0 11	<0.05	<0 28	*	1900	40
01-02-14	<0 06	<0 06	<0 11	<0 05	<0.28	<1 2	*	*
01-03-15	*	0 12	0 44	0 08	91	640	*	4
01-04-15	*	0 10	0 48	0 16	150	1100	*	4
01-05-15	<0 06	0 83	1 2	0 09	0 78	11	*	*
01-06-16	<0 06	0 09	0 19	0 08	0 28	<1 2	*	*
01-07-08	*	0 09	0 15	0 08	0 28	*	190	*
01-SP-C	*	0 13	0 37	<0 05	15	120	*	9
SB-01-09	*	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	*
SB-01-29	*	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	*
SB-02-09	*	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	3
SB-02-29	*	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	ND
SB-03-09	*	44	1 7	1 4	92	920	*	*
SB-03-29	*	<0 06	<0 11	<0 05	<0.28	<1 2	*	*
SB-04-10	<0 06	<0 06	<0 11	<0 05	13	97	480	*
SB-04-34	<0.06	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	*
SB-05-35	<0.06	<0 06	<0 11	<0 05	<0 28	1 3	<1 4	*
MW-01-35	<0 06	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	*
MW-02-34	<0.06	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	*
MW-03-34	<0 06	<0 06	<0 11	<0 05	<0 28	<1 2	2 6	*
MW-04-31	<0 06	<0 06	<0 11	<0 05	<0 28	<1 2	<1 4	*

LABORATORY REPORT SHOWS SPECIFIC DETECTION LIMITS USED IN EACH ANALYSIS  
 ALL VALUES ARE IN PARTS PER MILLION (PPM.)  
 SAMPLE DEPTHS ARE IN FEET BELOW GROUND SURFACE (BGS )  
 THC - TOTAL HYDROCARBONS \* - NOT REQUESTED ND - NON DETECTED.

TABLE 4  
GROUNDWATER ANALYTICAL DATA  
SINCLAIR SERVICE STATION  
7733 PORTLAND AVENUE SO , RICHFIELD, MINNESOTA

WELL SAMPLE #	SAMPLE DATE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENE	THC AS GASOLINE	THC AS FUEL OIL	MTBE
MW-01	2/01/91	< 00047	< 00092	< 00042	< 0022	< 010	< 066	< 00052
MW-02	2/01/91	< 00047	< 00092	< 00042	< 0022	< 010	< 066	< 00052
MW-03	2/01/91	< 00047	< 00092	< 00042	< 0022	< 010	< 066	< 00052
MW-04	2/01/91	< 00047	< 00092	< 00042	< 0022	< 010	< 066	< 00052

LABORATORY REPORT SHOWS SPECIFIC DETECTION LIMITS USED IN EACH ANALYSIS  
ALL VALUES ARE IN PARTS PER MILLION (PPM)  
ND = NON DETECTABLE BY TEST METHOD USED

## 4 5 Hydrocarbon Distribution

The following discussion of the soil petroleum hydrocarbon distribution incorporates the data that was collected during the UST excavations as well as data collected during the soil boring investigation. Figures 7 & 8 represent the distribution of petroleum hydrocarbons in the soil.

### 4 5 1 Horizontal Distribution

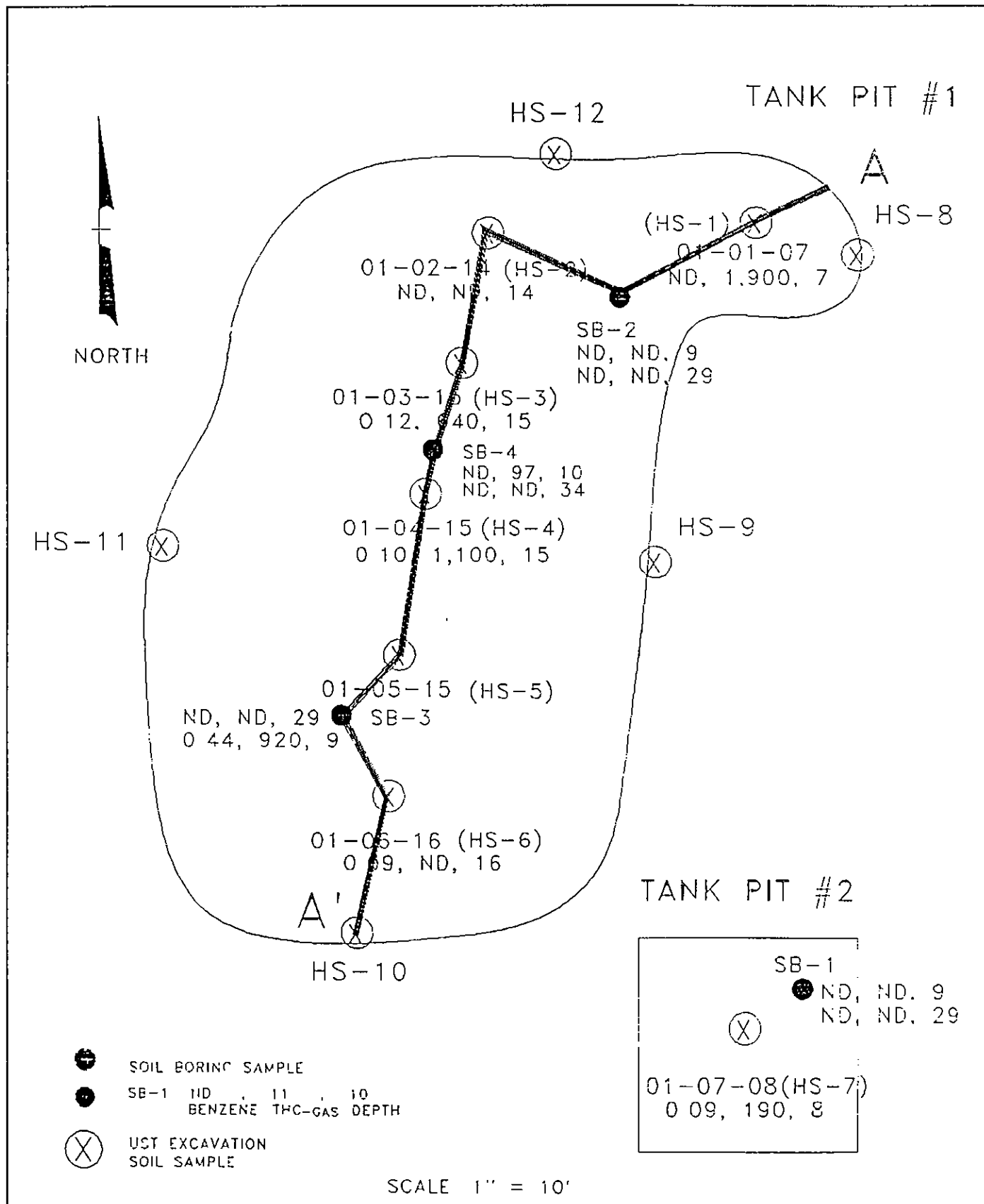
Limited soil impacts were encountered in the area of Tank pits #1 and #2. The soil impacts associated with Tank #1 are limited to the soil directly beneath the former location of that UST. Soil boring SB-2 was completed approximately five feet from the western edge of the former UST location (Figure 8). No detectable soil vapor, BTEX, THC-gasoline, or THC fuel oil concentration levels were encountered to the bottom hole depth of 36 feet bgs.

The other soil impacts associated with Tank Pit #1 are limited to the soil directly beneath Tanks #3, #4, and #5 in the central portion of the former UST pit (Figure 7). The northern boundary of this impacted area is defined by soil vapor samples HS-2 ppm, and laboratory analytical sample 01-02-14 (BTEX – nondetectable, THC-gasoline – nondetectable). The southern boundary of this impacted area is defined by soil vapor sample HS-6 (2.4 ppm) and laboratory analytical sample 01-06-16 (benzene – 0.09 ppm, THC gasoline – nondetectable). The western boundary of impacted soil in Tank Pit #1 is defined by samples collected from soil boring SB-04 and monitoring well MW-01. No significant impacts were detected at these locations (Tables 2, 3 and Figure 8).

The soil impacts associated with Tank Pit #2 (Figure 8) are limited to the soil directly beneath the former location of the consumptive use fuel oil UST. Soil sample 01-07-08 contained THC-fuel oil at a concentration level of 190 ppm. However, soil boring SB-1 soil samples collected 4 feet east of the 01-07-08 soil sample did not contain detectable concentration levels of BTEX or THC-fuel oil.

### 4 5 2 Vertical Distribution

Soil boring SB-3 and SB-4 contained the only detectable petroleum hydrocarbons encountered at and beneath the base of the former UST basins. Sample SB-3-9 contained benzene at a concentration level of 0.44 ppm and THC-gasoline at a concentration level of 920 ppm. However, the organic vapor reading from the 14 to 16 feet sample (Table 1) was only 3 ppm. None of the subsequent readings to the bottom hole depth of 36 feet contained detectable organic vapor readings. Furthermore, sample SB-3-29 did not contain detectable concentration levels of BTEX or THC-gasoline. Sample SB-04-10 contained xylene at a concentration level of 13 ppm, THC-gasoline at a concentration level of 97 ppm, and THC-fuel oil at concentration of 480 ppm. Organic vapor readings measured 125 ppm at a depth of 14-16 feet bgs and 150 ppm at the bottom of the hole (34-36 feet bgs). However, sample SB-04-34 contained no detectable concentration levels of BTEX, THC-gasoline or THC-fuel oil (Figure 7 & 8).



NORTH

HS-12

TANK PIT #1

A

HS-8

(HS-1)

01-02-14 (HS-2)  
ND, ND, 14

01-01-07  
ND, 1,900, 7

SB-2  
ND, ND, 9  
ND, ND, 29

01-03-15 (HS-3)  
0 12, 940, 15

SB-4  
ND, 97, 10  
ND, ND, 34

01-04-15 (HS-4)  
0 10, 1,100, 15

HS-9

HS-11

01-05-15 (HS-5)  
ND, ND, 29  
0 44, 920, 9

SB-3

01-06-16 (HS-6)  
0 99, ND, 16




A'

HS-10

TANK PIT #2

SB-1  
ND, ND, 9  
ND, ND, 29

01-07-08 (HS-7)  
0 09, 190, 8

-  SOIL BORING SAMPLE
-  SB-1 11D 11 10  
BENZENE THC-GAS DEPTH
-  UST EXCAVATION  
SOIL SAMPLE

SCALE 1" = 10'

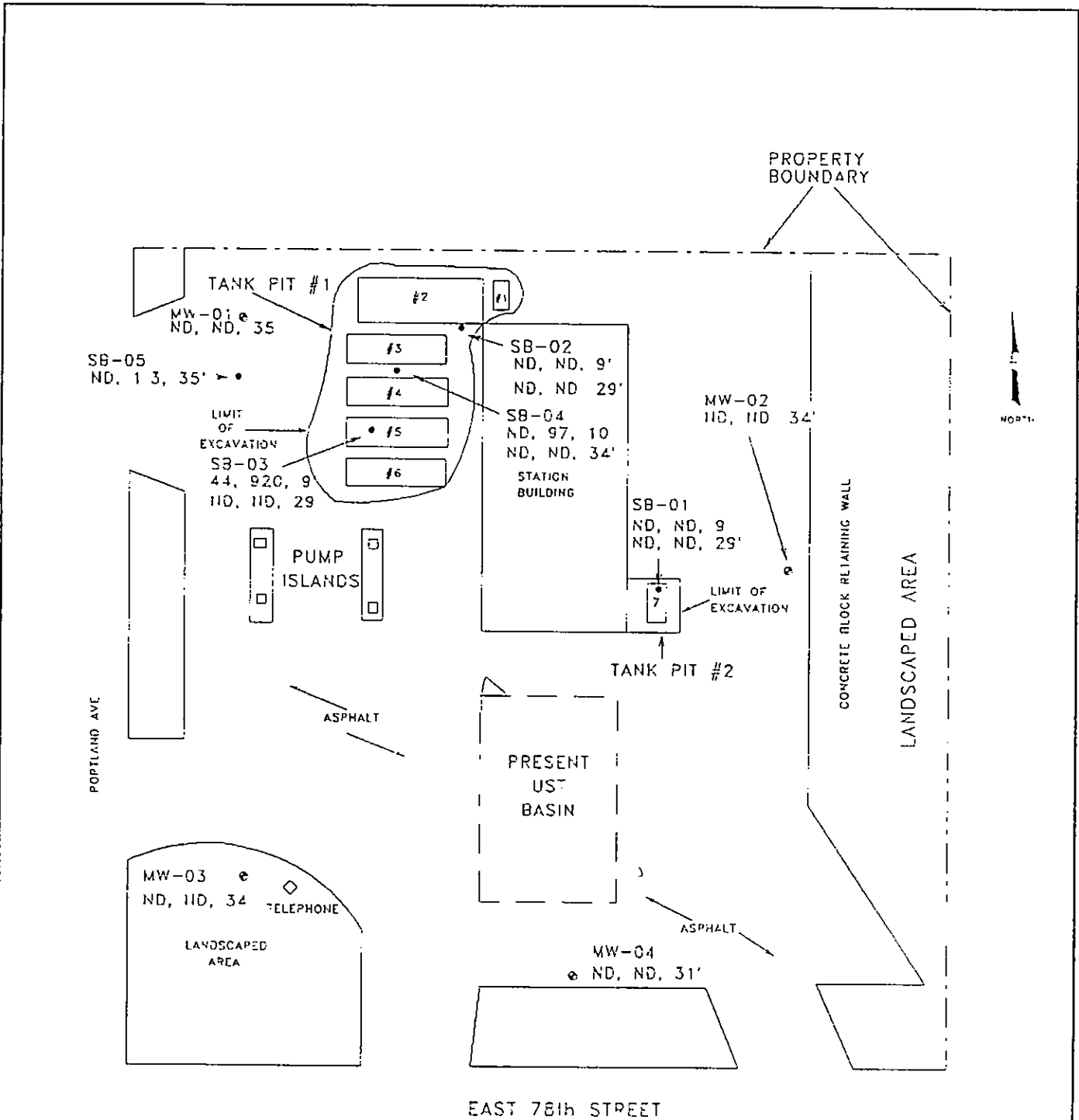
ENECOTECH

BLOOMINGTON, MINNESOTA

PROJECT

SINCLAIR - PORTLAND AVE SO

SOIL QUALITY MAP  
SINCLAIR SERVICE STATION  
7733 PORTLAND AVE S, RICHFIELD, MN



- TANK #1 = 560 GALLON WASTE OIL TANK
- TANK #2 = 6000 GALLON PREM NO LEAD
- TANK #3 = 4000 GALLON REGULAR
- TANK #4 = 4000 GALLON REGULAR
- TANK #5 = 4000 GALLON UNLEADED
- TANK #6 = 4000 GALLON UNLEADED
- TANK #7 = 1000 GALLON #1 FUEL OIL

LEGEND	
•	= SOIL BORING LOCATION
⊙	= MONITORING WELL LOCATION
	110, ND, 34'
	BENZENE, THC-CAS, DEPTH
	SCALE 1" = 30'

**ENECOTECH**  
 BLOOMINGTON, MINNESOTA  
 PROJECT SINCLAIR-PORTLAND AVE

SOIL ANALYTICAL DATA  
 SINCLAIR SERVICE STATION  
 7753 PORTLAND AVE SOUTH  
 RICHFIELD, MINNESOTA

All the available UST excavation and soil boring data indicates that the petroleum impacted soil is limited to a relatively thin layer of sand at the base of the UST excavations (Figure 9)

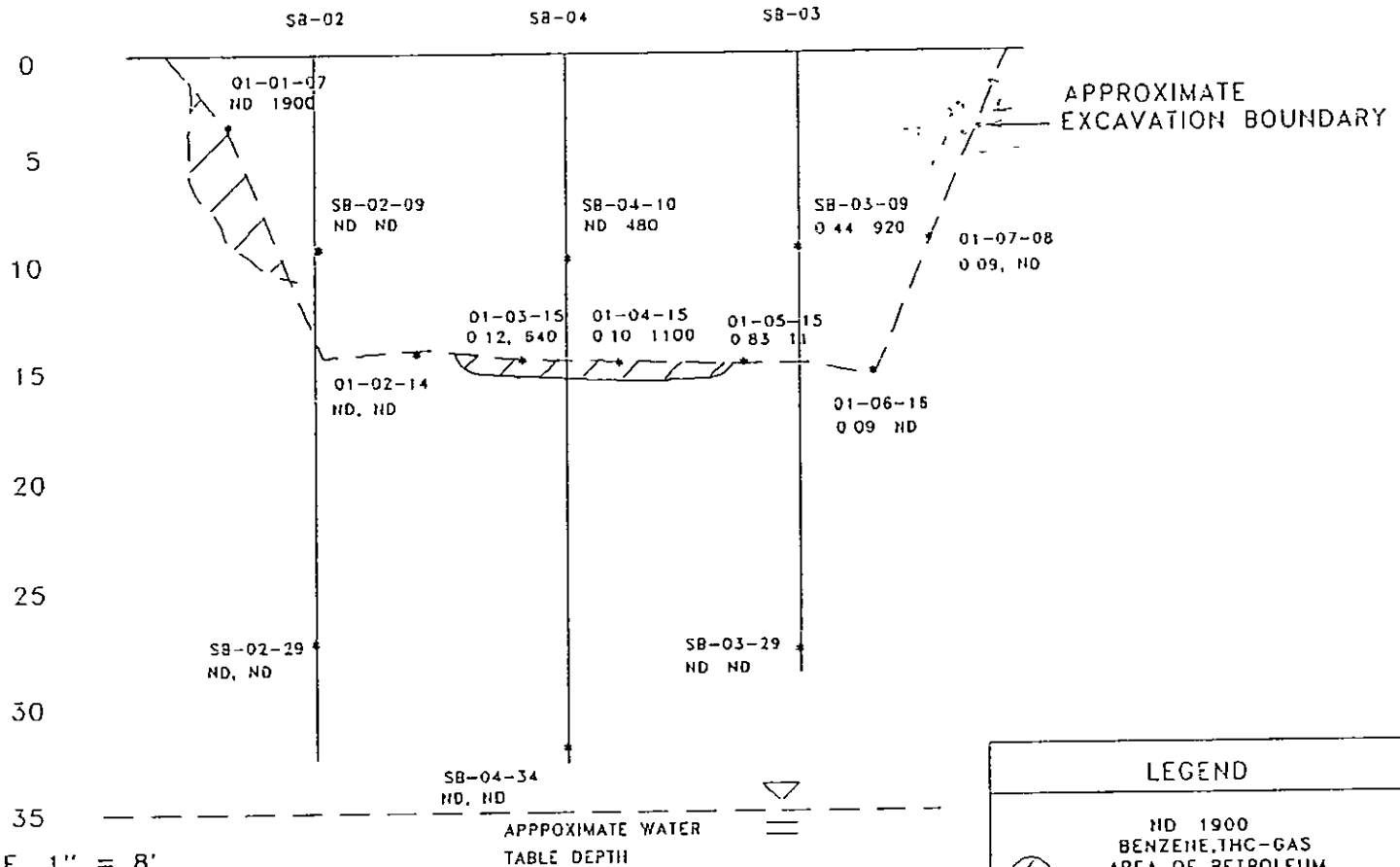
Petroleum constituents detected in soil samples SB-03-09 and SB-04-10, located above the base of the tank basin, are probably due to partial caving of the tank pit during the excavation of the UST

#### 4.5.3 Site Groundwater


Groundwater samples collected from monitoring wells MW-01, MW-02, and MW-04 did not contain petroleum hydrocarbons (Figure 10). However, the MW-03 water samples contained 0.0032 ppm of 1,2-dichloroethane. This substance is found as a trace constituent in gasoline. This concentration level is below the MDH recommended allowable limit (RAL) standard of 0.005 ppm. Therefore, this occurrence is not considered significant.

A N

S A'



VERTICAL SCALE 1" = 8'  
 HORIZONTAL SCALE 1" = 17'  
 VERTICAL EXAGGERATION = 1.2

LEGEND	
ND 1900	
	BENZENE, THC-GAS AREA OF PETROLEUM HYDROCARBON IMPACTED SOIL

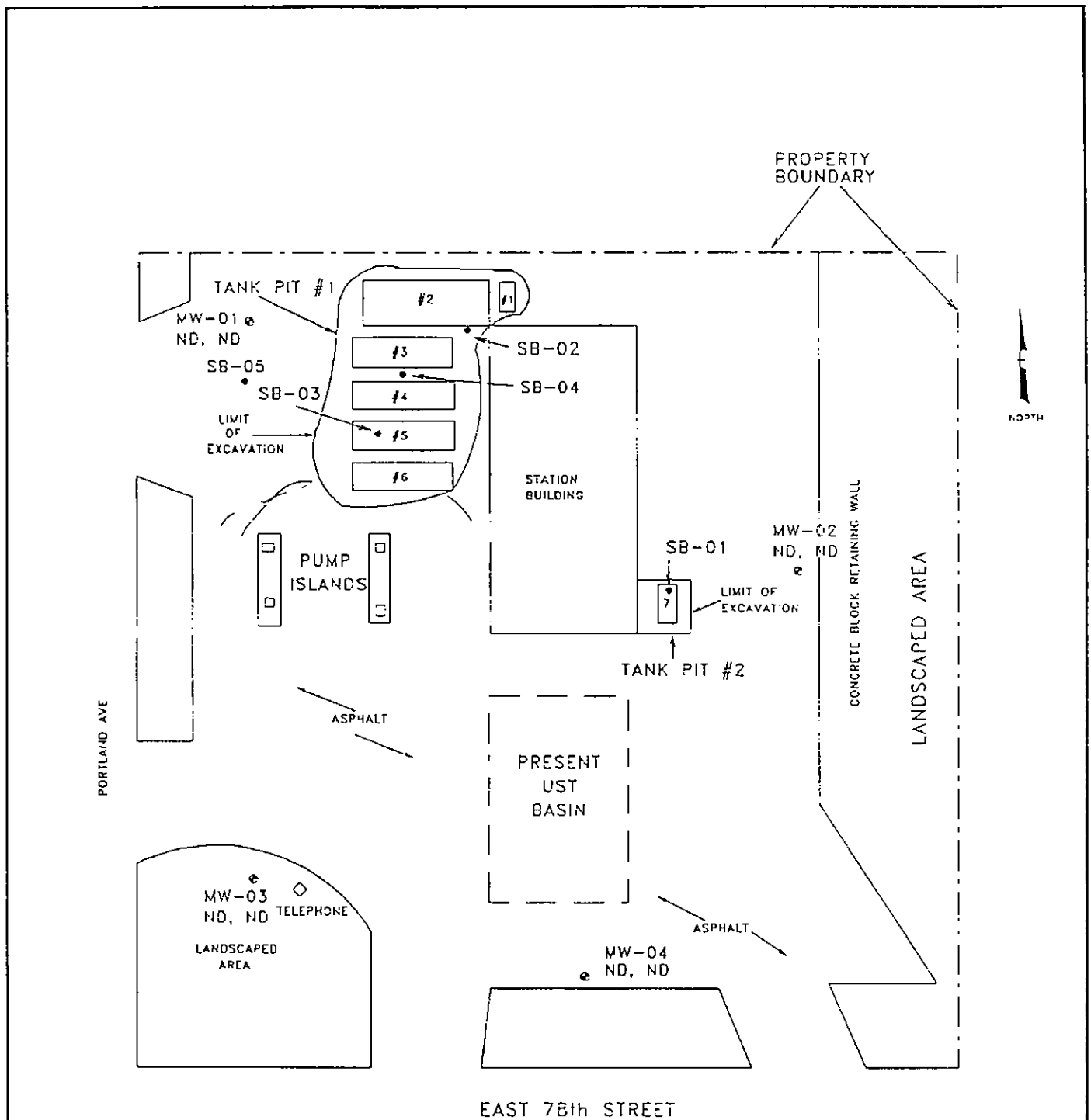


**EnecoTech®**  
 ENVIRONMENTAL CONSULTANTS  
 BLOOMINGTON, MINNESOTA

FIGURE 9  
 GEOLOGIC CROSS SECTION A-A'  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVE S, RICHFIELD, MN

PROJECT NO	DATE	SCALE	PREPARED BY	REVIEWED BY	DATE	REVISION	C1
				711-017	3/91		





- TANK #1 = 560 GALLON WASTE OIL TANK
- TANK #2 = 6000 GALLON PREM NO LEAD
- TANK #3 = 4000 GALLON REGULAR
- TANK #4 = 4000 GALLON REGULAR
- TANK #5 = 4000 GALLON UNLEADED
- TANK #6 = 4000 GALLON UNLEADED
- TANK #7 = 1000 GALLON #1 FUEL OIL

LEGEND	
•	= 50'L BORING LOCATION
⊙	= MONITORING WELL LOCATION ND, ND BENZENE, THC- GAS
SCALE 1" = 30'	

ENECOTECH

BLOOMINGTON, MINNESOTA

PROJECT

SINCLAIR-PORTLAND AVE

GROUNDWATER ANALYTICAL DATA  
SINCLAIR SERVICE STATION  
7753 PORTLAND AVE SOUTH  
RICHFIELD, MINNESOTA

## 5.0 SUMMARY

- o On May 15, 16, and 17, 1990 two (2) 4,000 gallon regular gasoline USTs, two (2) 4,000 gallon unleaded gasoline USTs, one (1) 6,000 gallon premium unleaded gasoline UST, one (1) 1,000 gallon consumptive use fuel oil UST and one (1) 560 gallon waste oil UST were excavated at the subject location. Some corrosion was noted but no holes in the tanks were visible. Soils in the tank pit consisted of brownish fine to coarse grained sand.
- o Elevated OVM readings were measured in soils from beneath and adjacent to both USTs. OVM readings ranged from 2.2 to 357 parts per million (ppm) at depths of 2 to 16 feet bgs. Total hydrocarbons (THC) as fuel oil and gasoline were detected in five of the seven soil samples at concentration levels ranging from 190 ppm to 1900 ppm. THC fuel oil and 11 ppm to 1,100 ppm THC gasoline. Benzene concentration levels ranged from 0.10 to 0.83 ppm.
- o A complete excavation of the petroleum impacted soil was not considered feasible due to the geotechnical instability of the unconsolidated sand and the potential for structural damage to existing above ground structures. Approximately, 300 cubic yards of gasoline impacted soil was removed and sent to a local soil incinerator with MPCA approval (Appendix F).
- o Soil boring activities were initiated on November 2, 1990. A total of 9 boreholes (5 soil borings, 4 monitoring wells) were completed to depths of 31 to 60 feet bgs. The soil borings and 2 inch diameter monitoring wells were drilled using a 6 3/4 inch O.D. hollow stem auger.
- o Groundwater was encountered at a depth of approximately 35 feet bgs.
- o No organic vapors were detected in soil boring samples collected from SB-1 and SB-2. Elevated organic vapors were detected in soil boring samples that were collected from SB-3 and SB-4. The highest value (1250 ppm) was recorded from soil boring SB-4 at a depth of 9 to 11 feet bgs.
- o BTEX constituents (benzene - 0.44 ppm) and THC-gasoline (920 ppm) were detected in sample SB-3-9. Sample SB-04-10 contained 97 ppm of the THC-gasoline and 480 ppm of the THC-fuel oil. THC-gasoline (1.3 ppm) was detected in sample SB-05-35 and 2.6 ppm of the THC-fuel oil was detected in sample MW-03-34. However, all other samples contained non-detectable or normal concentration levels of BTEX constituents, THC-gasoline, and THC-fuel oil.
- o All the available UST excavation and soil boring data indicates that the petroleum impacted soil is limited to a relatively thin layer of sand at the base of the UST excavations.
- o No significant petroleum hydrocarbon impacts were detected in the groundwater at the site.

## 6.0 CONCLUSIONS

Three distinct areas of petroleum impacted soil were identified during the UST excavations of May 1990. These areas include the Tank #1 area in the northeast corner of Tank Pit #1, the area around Tanks #3, #4, and #5 in the central portion of Tank Pit #1, and the Tank Pit #2 area.

Fuel oil impacts (THC–fuel oil 1,900 ppm) were detected in the Tank #1 area from a sample collected during the UST excavation. Soil boring SB–2 was subsequently completed approximately 10 feet from the UST excavation sample location to determine the dimensions and severity of this impact. Neither field or laboratory soil analytical techniques detected any soil impacts in samples from this soil boring. Therefore we conclude that a very limited fuel oil release occurred in this area.

Fuel oil impacts (190 ppm THC–fuel oil) were detected in the Tank Pit #2 area from samples collected during the excavation of Tank #7. Soil boring SB–1 was completed in this area 4 feet east of the UST excavation sample location (01–07–08). Neither field or laboratory soil analytical techniques detected any soil impacts in samples from this soil boring. Therefore we conclude that a very limited fuel oil release occurred in this area.

Gasoline impacts were detected in tank #3 and #4, and #5 area (11 ppm and 4100 ppm THC–gasoline) from samples collected during the UST excavation. Soil boring SB–3, SB–4 and SB–5 were subsequently drilled in this area. Soil samples from SB–3 and SB–4 contained significant gasoline impacted soil near the former base of the UST excavation (SB–3–9, 980 ppm THC–gasoline, and SB–4–10 97 ppm THC–gasoline, 480 ppm THC–fuel oil). However, no gasoline impacted soil was detected below a depth of 16 feet (Figure 10). Monitoring wells were also installed around the two (2) tank pits to determine if the groundwater had been affected. No significant water impacts were detected in any of the water samples collected from these wells.

The soil and water quality data indicate limited petroleum hydrocarbon impacts adjacent to the former tank basins, the site groundwater has not been significantly affected.

## 7.0 RECOMMENDATIONS

EnecoTech's recommendations are based on conditions at the site at the time of field investigations. These recommendations have been determined from the data that has been generated by tasks outlined in the scope-of-work.

Due to the limited extent of petroleum hydrocarbon soil impacts and non-impacted status of the surficial aquifer, we recommend no additional investigation or remediation of this site.

## 8.0 REFERENCES

Balabon, N H , 1989, Geologic Atlas, Hennepin County, Minnesota, County Atlas Series, Atlas C-4, Minnesota Geological Survey

Bloomgren, B A , Poppe, J R , 1979 Geologic and Hydrologic Aspects of Tunneling in the Twin Cities Area, Minnesota Minnesota Geological Survey

Norvitch, R F , Ross, T G , and Brietkrietz, Alex, 1973 Water Resources Outlook for the Minneapolis-St Paul Metropolitan Area, Minnesota USGS

Minnesota Pollution Control Agency Guidelines, 1986 "Procedures for Groundwater Monitoring" MPCA Solid and Hazardous Waste Division Program Development Section

APPENDIX A  
EXCAVATION REPORT FOR  
PETROLEUM RELEASE SITES

# EXCAVATION REPORT FOR PETROLEUM RELEASE SITES

Minnesota Pollution Control Agency  
Tanks and Spills Section  
April 15, 1990

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

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

## I BACKGROUND

A Site Sinclair Station

B Tank Owner/Operator Sinclair Marketing

Street. 7733 Portland Ave So  
City, Zip Richfield, MN  
County Hennepin

Mailing Address 3401 Fairbanks Ave, Box 6247  
City, Zip Kansas City, Kansas 66106  
Telephone (913) 321-3700

MPCA Site ID# LEAK00002572

C Excavating Contractor  
Hale Company

D Consultant  
EnecoTech Midwest, Inc

Contact Guy Assmussen  
Telephone (612) 635-0825  
Tank Contractor Certification  
Number. Pending

Contact Jim Berg  
Street/Box 3050 Metro Drive, Suite 115  
City, Zip Bloomington, MN 55425  
Telephone (612) 854-5513

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

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 May 22, 1990

B Dates site work performed

Work Performed

Date

Excavated one (1) 560 gallon waste oil tank, two (2) 4,000 gallon regular gasoline tanks, two (2) 4,000 gallon unleaded gasoline tanks, one (1) 6,000 gallon premium unleaded gasoline, and one (1) 1,000 gallon #1 fuel oil tank.

May 15, 16 and 17, 1990

III RELEASE INFORMATION

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

Tank 1    Capacity: 560 gallon                      Type Steel                      Age 28 years

Condition: Slightly corroded, no visible holes

Product History Waste oil

Approximate quantity of petroleum released, if known

Cause of release: Faulty drain lines suspected

Tank 2.    Capacity: 6,000 gallon                      Type Steel                      Age 17 years

Condition: Slightly corroded, no visible holes

Product History. Premium unleaded

Approximate quantity of petroleum released, if known

Cause of release None suspected

Tank 3    Capacity 4,000 gallon                      Type Steel                      Age 28 years

Condition Slightly corroded, no visible holes

Product History Regular gasoline

Approximate quantity of petroleum released, if known

Cause of release Faulty dispenser lines suspected

Tank 4    Capacity 4,000 gallon                      Type Steel                      Age 28 years

Condition Slightly corroded, no visible holes

Product History Regular gasoline

Approximate quantity of petroleum released, if known

Cause of release Faulty dispenser lines suspected



Excavation Report for Petroleum Release Sites

Page 3

April 25, 1990

Tank 5   Capacity   4,000 gallon   Type   Steel   Age   28 years

*Condition:*   Slightly corroded, no visible holes

*Product History:*   Unleaded gasoline

*Approximate quantity of petroleum released, if known*   Unknown

*Cause of release:*   Unknown

Tank 6   Capacity   4,000 gallon   Type   Steel   Age   28 years

*Condition:*   Slightly corroded, no visible holes

*Product History*   Unleaded gasoline

*Approximate quantity of petroleum released, if known*   Unknown

*Cause of release*   Unknown

Tank 7   Capacity   1,000 gallon   Type   Steel   Age   28 years

*Condition*   No corroded or visible holes

*Product History*   #1 Fuel Oil

*Approximate quantity of petroleum released, if known*   Unknown

*Cause of release*   Unknown

B. Provide the following information for all existing tanks

<u>Tank No.</u>	<u>Capacity</u>	<u>Contents</u>	<u>Type</u>	<u>Age</u>
1	10,000 gallons	Unleaded	Fiberglass	<1 year
2	10,000 gallons	Unleaded	Fiberglass	<1 year
3	10,000 gallons	Regular	Fiberglass	<1 year

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

The release is suspected to be the result of leaking lines running from tanks #3 and #4 to the dispensers. The lines appeared to be corroded and soil on top of the tanks showed evidence of petroleum hydrocarbon impacts.

D If the release was a surface spill, briefly describe the problem. Not applicable

IV EXCAVATION

A. Dimension of excavation: Tank Pit #1 30' x 50' x 10-15' deep  
Tank Pit #2 (Fuel Oil Tank Pit) 12' x 12' x 8' deep

B Original tank backfill material (sand, gravel, etc ) Fine to coarse brown sand

C Native soil type (clay, sand, etc ) Fine to coarse brown sand

D Quantity of contaminated soil removed (cubic yards) 300 yds<sup>3</sup>

E. Was ground water encountered or was there evidence of a seasonally high ground water table? At what depth? Ground water was not encountered during excavation activities

No evidence of seasonally high water table

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

Soil borings were not drilled during the UST excavation activities

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

Ground water was not encountered

H. Was bedrock encountered in the excavation? At what depth?

Bedrock was not encountered in the excavation

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

There were no unique conditions

V. SAMPLING

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

Soil was screened with an Organic Vapor Meter (OVM) to determine if it had been impacted by hydrocarbons. The screening was completed in accordance with MPCA document "Jar Headspace Analytical Screening Procedure". Two sixteen ounce mason type jars were half-filled with the soil to be analyzed. The top of each jar was quickly covered with clean aluminum foil. Screw caps were applied to seal the jars. Headspace development was allowed for at least 10 minutes. The jars were shaken vigorously for 15 seconds both at the beginning and at the end of the headspace development period. The screw lid was then removed, exposing the foil seal. The foil seal was punctured by the OVM sampling probe, and submerged to a point approximately one-half of the headspace depth. The highest OVM reading was recorded as the jar headspace concentrations. At least one headspace reading was made per 10 cubic yards of excavated soil.

B. *List soil vapor headspace analysis results. Indicate sampling locations using sample codes (with sampling depths in parentheses), e.g., SV-1 (2'), location should be labeled SV-1A (2'), SV-1B (4'), SV-1C (6'), etc. These should correspond with the codes on the site map in part VI.*

Sample Code	Soil Type	Reading, ppm	Sample Code	Soil Type	Reading, ppm
HS-1(2')	Fine to Coarse Sand	2.2	HS-5(15')	Fine to Coarse Sand	357
HS-1(4')	Fine to Coarse Sand	4.1	HS-6(16')	Fine to Coarse Sand	2.4
HS-1(5')	Fine to Coarse Sand	88	HS-7(3')	Fine to Coarse Sand	0.0
HS-1(7')	Fine to Coarse Sand	22.4	HS-7(5')	Fine to Coarse Sand	0.0
HS-2(11')	Fine to Coarse Sand	30.8	HS-7(6')	Fine to Coarse Sand	0.0
HS-2(14')	Fine to Coarse Sand	3.9	HS-7(8')	Fine to Coarse Sand	0.0
HS-3(15')	Fine to Coarse Sand	38.6	HS-8(4')	Fine to Coarse Sand	4.1
HS-4(15')	Fine to Coarse Sand	345	HS-9(6')	Fine to Coarse Sand	10.4
			HS-10(4')	Fine to Coarse Sand	54.5
			HS-11(4')	Fine to Coarse Sand	10.7
			HS-12(5')	Fine to Coarse Sand	2.0

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

Soil grab samples were collected from freshly exposed soil and placed in laboratory prepared sample containers, sealed, stored on ice, and submitted to Interpoll Laboratories in Circle Pines, Minnesota. Soil samples were collected from the bottom of the tank pit beneath the former locations of the UST's after the completion of all excavation, and from the stockpile of excavated soils.

- D. List the appropriate soil sample analytical results 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 parentheses) SS-1 (8'), SS-2 (4'), etc. These should correspond with the codes on the site map in part VI

Sample Code	THC as gas or FO ppm	Benzene ppm	Ethyl-benzene ppm	Toluene ppm	Xylene ppm	MTBE ppm	Lead ppm
01-01-7	1900(fuel oil)	<0 06	<0 05	<0 11	<0 28	na	40
01-02-14	<1 2(gas)	<0 06	<0 05	<0 11	<0 28	<0 06	na
01-03-15	640(gas)	0 12	0 08	0 44	91	na	4
01-04-15	1100(gas)	0 10	0 16	0 48	150	na	4
01-05-15	11(gas)	0 83	0 09	1 2	0 78	<0 06	na
01-06-16	<1 2(gas)	0 09	0 08	0 19	0 28	<0 06	na
01-07-08	190(fuel oil)	0 09	0 08	0 15	0 28	na	na

NOTE. Attach copies of laboratory reports and chain of custody forms.

## 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 (building, canopies, etc )
  - c. Adjacent city, township, or county roadways
  - d. Final extent of excavation.
  - e. Location of soil vapor analyses (eg SV-1), soil samples (eg SS-1), and soil borings (eg, SB-1) Also, attach all boring logs
  - f. North arrow and map legend.

April 25, 1990

VII. SUMMARY

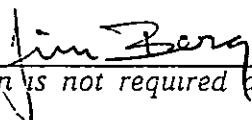
Briefly summarize evidence indicating whether or not additional investigation is necessary at the site, as discussed in part VI of the MPCA document "Excavation of Petroleum Contaminated Soil"

Laboratory results and headspace analysis indicate that petroleum hydrocarbon impacts to the soils within the tank pit have occurred. Laboratory results indicate that soil samples 01-01-07, 01-03-15, 01-04-15, and 01-07-08 contain total hydrocarbon levels above the Minnesota Pollution Control Agency (MPCA) action level of 50 parts per million (ppm) total hydrocarbons as fuel oil or gas. A remedial investigation will be necessary to delineate the vertical and horizontal extent of petroleum hydrocarbon impacts to site soils and/or ground water.

VIII CONSULTANT (OR OTHER) PREPARING THIS REPORT

Company Name: EnecoTech Midwest, Inc  
Street/Box: 3050 Metro Drive, Suite 115  
City, Zip: Bloomington, Minnesota 55425  
Telephone: (612) 854-5513  
Contact: Jim Berg

Signature



Date

4/11/91

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

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

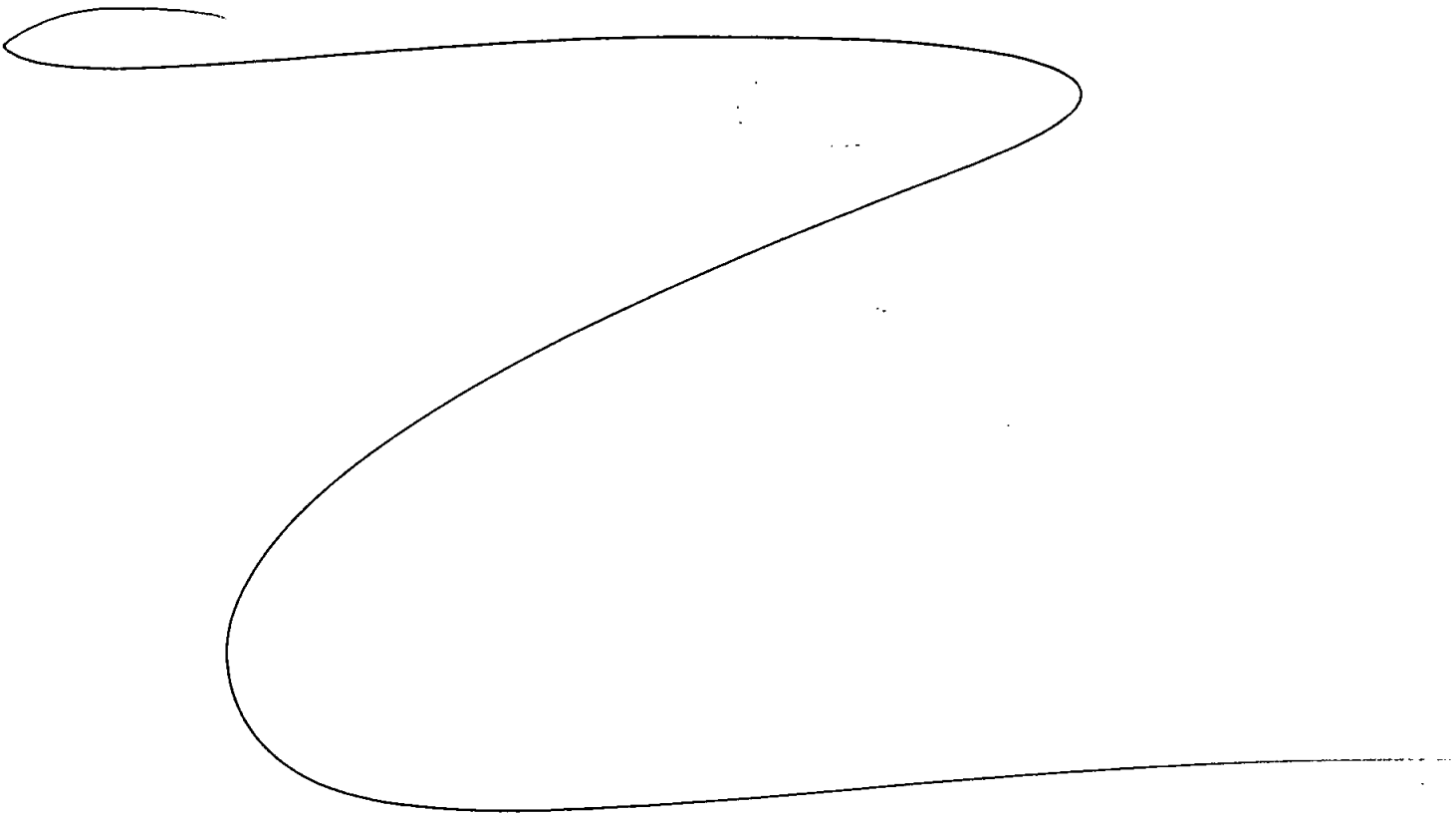
If additional investigation is required at the site, this form should be included as a section in the Remedial Investigation/Corrective Action Design report. Excavation reports which indicate that a remedial investigation (RI) is necessary will not be reviewed by MPCA staff until the RI has been completed.

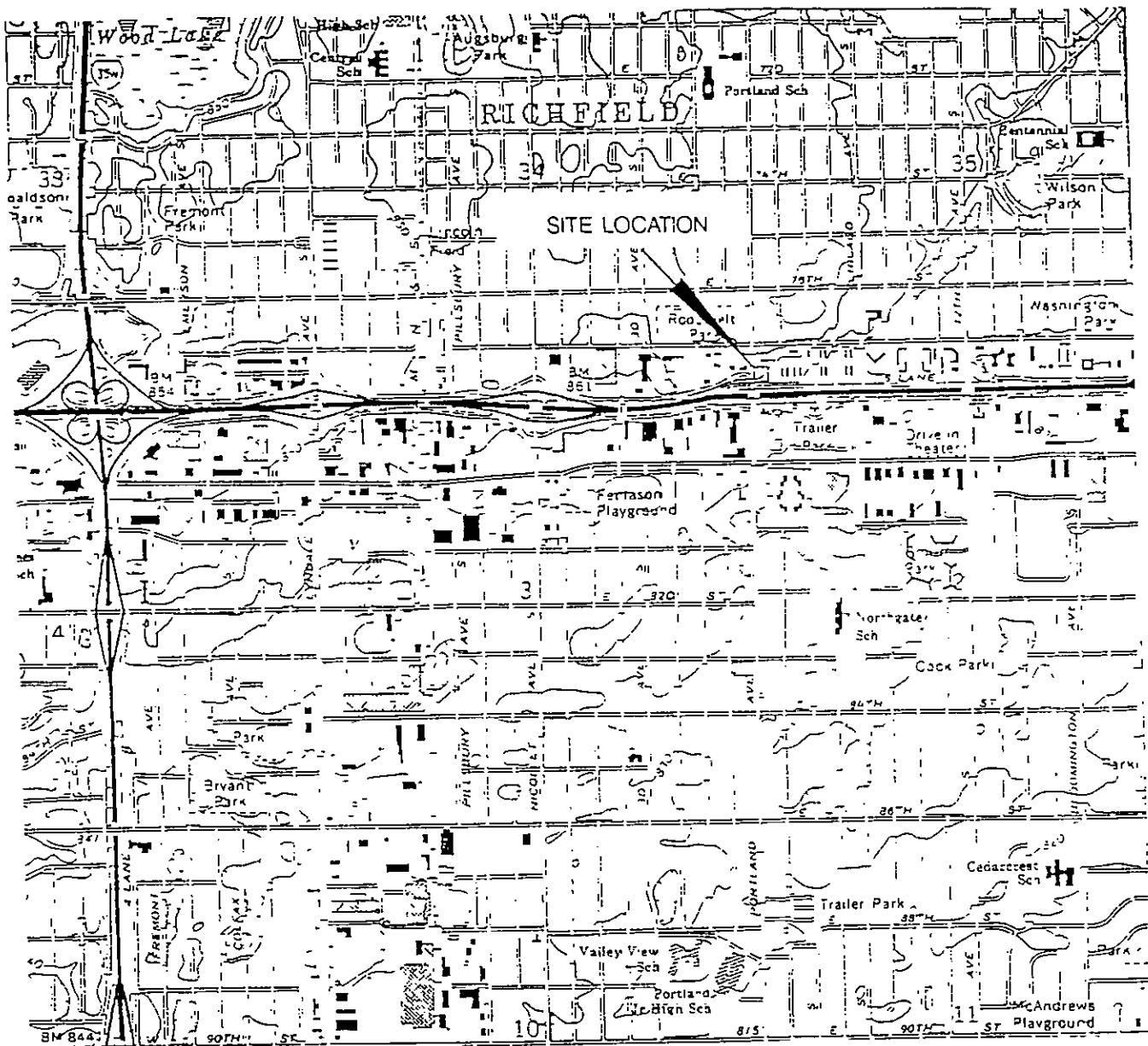
## EXCAVATION REPORT FOR PETROLEUM RELEASE SITES – ATTACHMENT

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

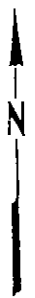
EnecoTech Midwest, Inc , (EnecoTech) Environmental Consultants, 3050 Metro Drive, Suite 115, Bloomington, Minnesota 55425, is conducting or has conducted the cleanup for Sinclair Marketing EnecoTech is acting as the environmental consultant for this project

FIGURES





TAKEN FROM BLOOMINGTON USGS 7.5' TOPOGRAPHICAL MAP



SCALE 1 24000

**ENECOTECH**

Minnetonka, Minnesota

Project

SINCLAIR STATION RICHFIELD, MINNESOTA

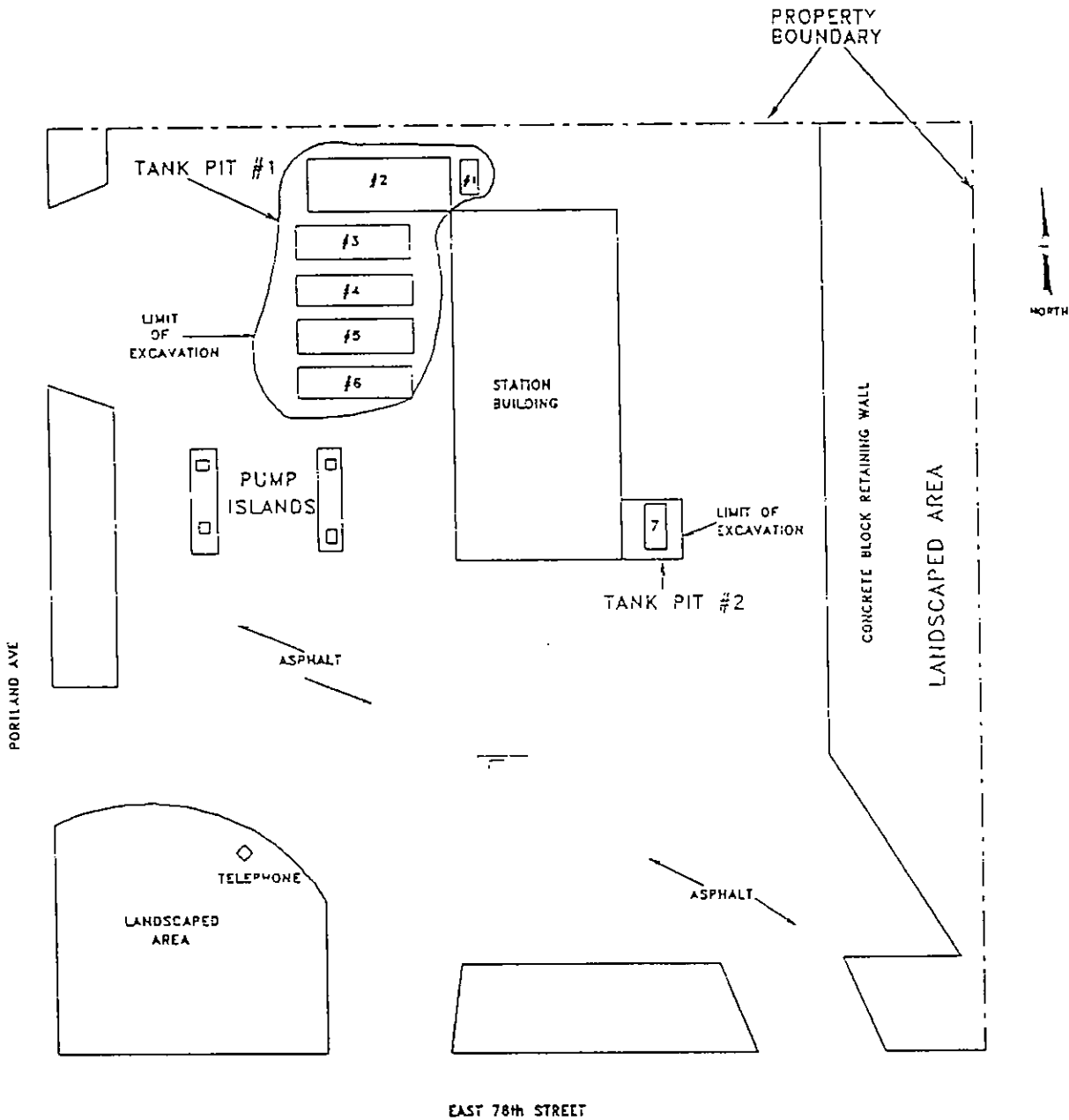
SITE LOCATION MAP

SINCLAIR STATION

7733 PORTLAND AVENUE SOUTH

RICHFIELD, MINNESOTA





- TANK #1 = 560 GALLON WASTE OIL TANK
- TANK #2 = 6000 GALLON PREM. NO LEAD
- TANK #3 = 4000 GALLON REGULAR
- TANK #4 = 4000 GALLON REGULAR
- TANK #5 = 4000 GALLON UNLEADED
- TANK #6 = 4000 GALLON UNLEADED
- TANK #7 = 1000 GALLON #1 FUEL OIL

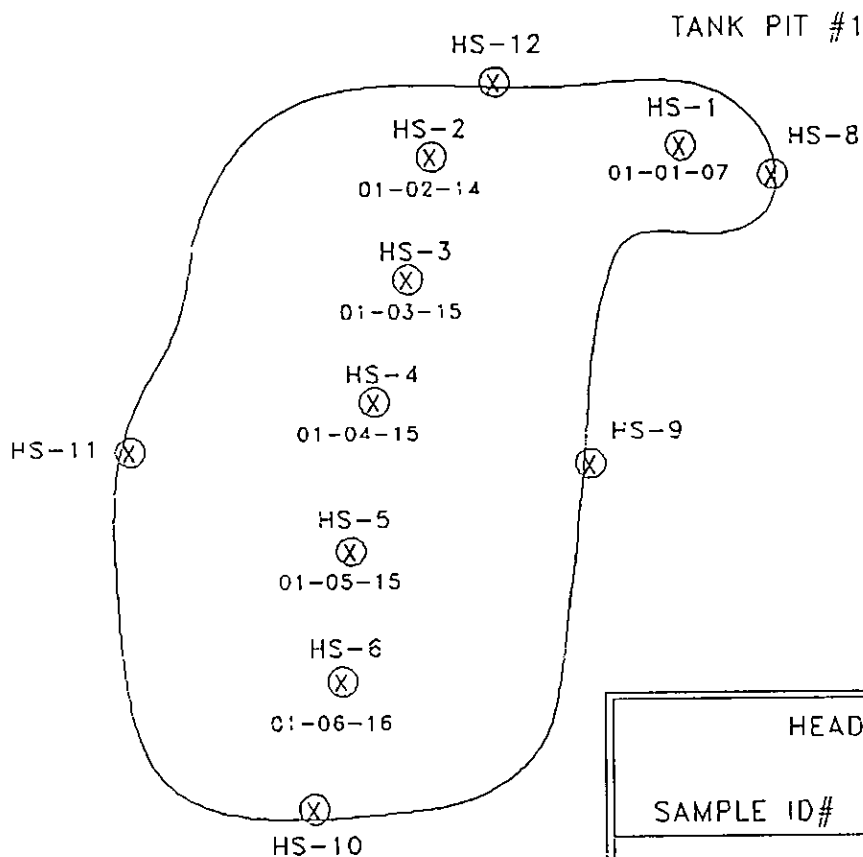
SCALE 1" = 30'

ENECOTECH

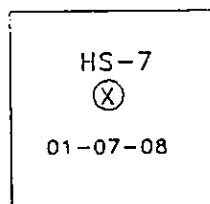
BLOOMINGTON, MINNESOTA

PROJECT SINCLAIR-PORTLAND AVE.

SITE MAP  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVE. SOUTH  
 RICHFIELD, MINNESOTA



TANK PIT #2



⊗ HEADSPACE SAMPLING LOCATIONS

\* DEPTH SHOWN IN FEET

PPM PARTS PER MILLION

HEADSPACE ANALYSIS RESULTS		
SAMPLE ID#	DEPTH*	OVM READ (PPM)
HS-1 (2')	2	2.2
HS-1 (4')	4	4.1
HS-1 (5')	5	88
HS-1 (7')	7	22.4
HS-2 (11')	11	30.8
HS-2 (14')	14	3.9
HS-3 (15')	15	38.6
HS-4 (15')	15	345
HS-5 (15')	15	357
HS-6 (16')	16	2.4
HS-7 (3')	3	0.0
HS-7 (5')	5	0.0
HS-7 (6')	6	0.0
HS-7 (8')	8	0.0
HS-8 (4')	4	4.1
HS-9 (6')	6	10.4
HS-10 (4')	4	54.5
HS-11 (4')	4	10.7
HS-12 (5')	5	2.0



**EnecoTech**<sup>®</sup>  
 ENVIRONMENTAL CONSULTANTS  
 BLOOMINGTON, MINNESOTA

FIGURE

HEADSPACE SAMPLE LOCATION MAP  
 SINCLAIR GAS STATION  
 7733 PORTLAND AVE SOUTH  
 RICHFIELD, MINNESOTA

PROJECT NO	DATE	SCALE	PREPARED BY	REVIEWED BY	DATE	REVISION	
711-017	12/90	1" = 15'	EFW				U2

**APPENDIX B  
SOIL BORING LOGS AND  
WATER LEVEL DATA**

SOIL BORING LOG

ENECOTECH, INC

SHEET NO OF 3

PROJECT NAME - SINCLAIR - RICHFIELD  
 PROJECT NUMBER - 711-017  
 CLIENT - SINCLAIR  
 LOCATION - 7753 PORTLAND AVE S

DRILLING CONTRACTOR - THEIN  
 DRILLER - MIKE THEIN  
 SURFACE ELEVATION -  
 DRILLING METHOD - HSA

HOLE DESIGNATION - SS-1  
 DATE STARTED - 11/2/90  
 DATE COMPLETED - 11/2/90  
 ENECOTECH SUPERVISOR - T P B

DEPTH	FROM	TO	SAMPLE NUMBER	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS				RECOVERED	DVM VALUE	OSDTORRENGTH	ASTSMBOL	SAMPLE DESCRIPTION (COMPONENTS, COLOR, MOISTURE, NATIVE/FILL)	NOTES (STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION)
					6"	6"	6"	6"						
0	4			AF						D 0	NONE	SM	SILTY SAND, TRACE GRAVEL, BROWN, MOIST	3" OF ASPHALT
4	6			SS	1	2	2	2	50	D 0	NONE	SP	SAND, FINE TO MEDIUM, BROWN, MOIST	
6	9			AF							NONE	SP	SAME AS ABOVE	
9	11		SB-1-9	SS	1	2	2	3	100	D 0	NONE	SP	SAND, FINE TO COARSE, LIGHT BROWN, MOIST	
11	14			AF							NONE	SP	SAME AS ABOVE	
14	16			SS	1	1	2	2	75	D 0	NONE	SP	SAND, MED TO COARSE, BROWN, MOIST	
16	19			AF							NONE	SP	SAME AS ABOVE WELL SORTED	
19	21			SS	2	3	5	7	100	D 0	NONE	SW	SAND, MEDIUM LIGHT BROWN, MOIST	
21	24			AF								SW	SAME AS ABOVE	
24	26			SS	3	6	8	10	75	D 0	NONE	SW	SAME AS ABOVE	
26	29			AF								SW	SAME AS ABOVE	
29	31		SB-1-29	SS	4	5	9	11	75	D 0	NONE	SP	SAND, MEDIUM TO COARSE BROWN, MOIST	
31	34			AF								SP	SAME AS ABOVE	



SOIL BORING LOG

ENECOTECH, INC

SHEET NO 1 OF 2

PROJECT NAME - SINCLAIR - RICHFIELD  
 PROJECT NUMBER - 711-017  
 CLIENT - SINCLAIR  
 LOCATION - 7753 PORTLAND AVE S

DRILLING CONTRACTOR - THEIN  
 DRILLER - MIKE THEIN  
 SURFACE ELEVATION -  
 DRILLING METHOD - HSA

HOLE DESIGNATION - SB-2  
 DATE STARTED - 11/2/90  
 DATE COMPLETED - 11/2/90  
 ENECOTECH SUPERVISOR - T R B

DEPTH		S A M P L E  N U M B E R	S A M P L E  M E T H O D	PENETRATION RECORD SPLIT SPOON BLOWS				P R E C O V E R Y	D V M  V A L U E	O S T O R E N G T H	A S T M B O L	SAMPLE DESCRIPTION  (COMPONENTS, COLOR, MOISTURE, NATIVE/FILL)	NOTES (STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION)
F R O M	T O			5"	6"	5"	5"						
0	4		AF						NONE	SM	3" OF ASPHALT; SILTY SAND, FINE TO MEDIUM, TRACE GRAVEL, BROWN, MOIST, FILL		
4	6		SS	2	4	3	2	25	0 0	NONE	SM	SAME AS ABOVE	
6	9		AF							NONE	SM	SAME AS ABOVE	
9	11	SB-2-9	SS	1	2	2	3	75	0 0	NONE	SP	SAND, MEDIUM TO COARSE, TRACE GRAVEL, LT BRN, MOIST	
11	14		AF							NONE	SP	SAME AS ABOVE	
14	16		SS	2	3	3	4	75	0 0	NONE	SP	SAME AS ABOVE, FINE TO MEDIUM	
16	19		AF							NONE	SP	SAME AS ABOVE	
19	21		SS	3	4	7	8	75	0 0	NONE	SW	SAME AS ABOVE, WELL SORTED	
21	24		AF								SW	SAME AS ABOVE	
24	26		SS	3	7	8	10	75	0 0	NONE	SW	SAME AS ABOVE, MEDIUM TO COARSE	
26	29		AF								SW	SAME AS ABOVE	
29	31	SB-2-29	SS	4	7	8	11	75	0 0	NONE	SP	SAME AS ABOVE, FINE TO COARSE	



SOIL BORING LOG

ENECOTECH, INC

SHEET NO 1 OF 1

PROJECT NAME - SINCLAIR - RICHFIELD  
 PROJECT NUMBER - 711-017  
 CLIENT - SINCLAIR  
 LOCATION - 7753 PORTLAND AVE S

DRILLING CONTRACTOR - THEIN  
 DRILLER - MIKE THEIN  
 SURFACE ELEVATION -  
 DRILLING METHOD - HSA

HOLE DESIGNATION - SB-3  
 DATE STARTED - 11/2/90  
 DATE COMPLETED - 11/2/90  
 ENECOTECH SUPERVISOR - T R B

DEPTH	S A M P L E	N U M B E R	S A M P L E	PENETRATION RECORD SPLIT SPOON BLOWS				P R E C O V E N E R Y	D V M	O S D T O R E N G T H	A S T S M Y B O L	SAMPLE DESCRIPTION (COMPONENTS, COLOR, MOISTURE, NATIVE/FILL)	NOTES (STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION)
				6"	6"	6"	6"						
0	4		AF					1	SLIGHT	SM	SILTY SAND, FINE TO MEDIUM, BROWN, MOIST, FILL		
4	6		SS	1	2	2	2	75	49	MOD	SM	SAME AS ABOVE	
6	9		AF							MOD	SM	SAME AS ABOVE	
9	11	SB-3-9	SS	2	2	3	3	75	993	STRONG	SP	SAND, FINE TO MEDIUM, LIGHT BROWN, MOIST	
11	14		AF								SP	SAME AS ABOVE	
14	16		SS	1	2	3	4	75	30	NONE	SP	SAND, COARSE TO MED, TRACE GRAVEL, MOIST, LT BROWN	
16	19		AF								SP	SAME AS ABOVE	
19	21		SS	5	8	10	12	75	00	NONE	SW	SAND, FINE TO MED, WELL SORTED, TRACE GRAVEL, MOIST, LIGHT BROWN	
21	24		AF								SW	SAME AS ABOVE	
24	26		SS	6	10	11	14	75	00	NONE	SW	SAME AS ABOVE	
26	29		AF								SW	SAME AS ABOVE	
29	31	SB-3-29	SS	7	12	10	12	75	00	NONE	SW	SAME AS ABOVE	







SOIL BORING LOG

ENECOTECH, INC

SHEET NO 1 OF 2

PROJECT NAME - SINCLAIR PORTLAND  
 PROJECT NUMBER - 711-017  
 CLIENT - SINCLAIR  
 LOCATION - RICHFIELD, MINNESOTA

DRILLING CONTRACTOR - THEIN WELL  
 DRILLER - MIKE/DAVE  
 SURFACE ELEVATION - TBD  
 DRILLING METHOD - HSA

HOLE DESIGNATION - MW-1  
 DATE STARTED - 1/23/91  
 DATE COMPLETED - 1/23/91  
 ENECOTECH SUPERVISOR - KWK

DEPTH		S A M P L E	N U M B E R	S A M P L E T H I N G D	PENETRATION RECORD SPLIT SPOON BLOWS				R E C O R D V A L U E	D V M	O S D T O R R E N G T H	A S T S M B O L	SAMPLE DESCRIPTION (COMPONENTS, COLOR, MOISTURE, NATIVE/FILL)	NOTES (STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION)
F R O M	T O				6"	6"	6"	6"						
0	4			AU								BUFF-LT BRN, POORLY SORTED MEDIUM SAND		
4	6	5		SS	---	8	---	90	2 1	NONE	SP	SAME AS ABOVE (S A A )		
6	9			AU								S A A		
9	11	10		SS	---	12	---	90	2 6	NONE	SP	S A A		
11	14			AU								S A A		
14	16	15		SS	---	18	---	90	3 7	NONE	SP	S A A		
16	19			AU								S A A		
19	21	20		SS	---	29	---	90	3 1	NONE	SP	BUFF COLORED, POORLY SORTED MEDIUM TO COARSE SAND		
21	24			AU								S A A		
24	26	25		SS	---	20	---	90	7 0	NONE	SP	S A A		
26	29			AU								S A A		
29	31	30		SS	---	19	---	90	11 8	NONE	SP	S A A		



SOIL BORING LOG

ENECOTECH, INC

SHEET NO 1 OF 2

PROJECT NAME - SINCLAIR PORTLAND  
 PROJECT NUMBER - 711-017  
 CLIENT - SINCLAIR  
 LOCATION - RICHFIELD, MINNESOTA

DRILLING CONTRACTOR - THEIN WELL  
 DRILLER - MIKE/DAVE  
 SURFACE ELEVATION - TBD  
 DRILLING METHOD - HSA

HOLE DESIGNATION - MW-2  
 DATE STARTED - 1/24/91  
 DATE COMPLETED - 1/24/91  
 ENECOTECH SUPERVISOR - KWK

DEPTH	S A M P L E	N U M B E R	S A M P L E T H I C K N E S S	PENETRATION RECORD SPLIT SPOON BLOWS				P R E C O U N T	D V M	O S D T O R E N G T H	S T R E S S	S A M P L E B O L	SAMPLE DESCRIPTION (COMPONENTS, COLOR, MOISTURE, NATIVE/FILL)	NOTES (STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION)
				6"	6"	6"	6"							
0	4		AU									DK BRN POORLY SORTED MEDIUM SAND		
4	6	5	SS	---	29	---		80	1 0	NONE	SP	SAME AS ABOVE (S A A )		
6	9		AU									S A A		
9	11	10	SS	---	11	---		90	2 6	NONE	SP	S A A -		
11	14		AU									S A A		
14	16	15	SS	---	18	---		90	3 1	NONE	SP	S A A		
16	19		AU									S A A		
19	21	20	SS	---	18	---		90	3 1	NONE	SP	BUFF COLORED POORLY SORTED MEDIUM TO COARSE SAND		
21	24		AU									S A A		
24	26	25	SS	---	48	---		90	14 2	NONE	SP	S A A		
26	29		AU									S A A		
29	31	30	SS	---	29	---		90	9 0	NONE	SP	S A A		



SOIL BORING LOG

ENECOTECH, INC

SHEET NO 1 OF 2

PROJECT NAME - SINCLAIR PORTLAND  
 PROJECT NUMBER - 711-017  
 CLIENT - SINCLAIR  
 LOCATION - RICHFIELD, MINNESOTA

DRILLING CONTRACTOR - THEIN WELL  
 DRILLER - MIKE/DAVE  
 SURFACE ELEVATION - TBD  
 DRILLING METHOD - HSA

HOLE DESIGNATION - MM-3  
 DATE STARTED - 1/25/91  
 DATE COMPLETED - 1/25/91  
 ENECOTECH SUPERVISOR - JFS

DEPTH	S A M P L E	N U M B E R	S A M P L E T H I N G	PENETRATION RECORD SPLIT SPOON BLOWS				P R E C O V E R Y	D V M	O S D T O R E N G T H 13KG	S P	S A M P L E D E S C R I P T I O N (COMPONENTS, COLOR, MOISTURE, NATIVE/FILL)	N O T E S (STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION)
				6"	6"	6"	6"						
0	4		AU	--	--	--	--	--	NONE	SP	AUGER SAMPLE-TOPSOIL, FINE-GRAINED SAND, TAN-DK. BRN		
4	6		SP	2	2	3	3	80	0/0	NONE	SP	SAME AS ABOVE (S A A )	
6	9		AU	--	--	--	--	--	NONE	SP			
9	11		SP		T=13			100	0/0	NONE	SP	S A A , MINOR LAMINATIONS	
11	14		AU	--	--	--	--	--	NONE	SP			
14	16		SP		T=14			100		NONE	SP	S A A , MINOR CLAYEY SAND 14 8'-16', MOIST	
16	19		AU	--	--	--	--	--	NONE	SP			
19	21		SP		T=16			100	*	NONE	SP	S A A , TAN-BUFF COLORED	* Hnu Values = 0 1/0 1
21	24		AU	--	--	--	--	--	NONE	SP			
24	26		SP		T=20			95	*	NONE	SP	S A A	* Hnu Values = 0 1/0 1
26	29		AU	--	--	--	--	--	NONE	SP			
29	31		SP		T=27			90	*	NONE	SP	S A A , MOIST ON BOTTOM	* Hnu Values = 0 9/0 9
(T = TOTAL BLOWS)													





SOIL BORING LOG

ENECOTECH, INC

SHEET NO 1 OF 2

PROJECT NAME - SINCLAIR PORTLAND  
 PROJECT NUMBER - 711-017  
 CLIENT - SINCLAIR  
 LOCATION - RICHFIELD, MINNESOTA

DRILLING CONTRACTOR - THEIN WELL  
 DRILLER - MIKE/DAVE  
 SURFACE ELEVATION - TBD  
 DRILLING METHOD - HSA

HOLE DESIGNATION - MW-4  
 DATE STARTED - 1/24/91  
 DATE COMPLETED - 1/24/91  
 ENECOTECH SUPERVISOR - KWK

DEPTH	S A M P L E	N U M B E R	S A M P L E	PENETRATION RECORD SPLIT SPOON BLOWS				P R E C O V E R T R Y	D V M	O S D T O R P E N G T H	A S T M Y B O L	SAMPLE DESCRIPTION (COMPONENTS, COLOR, MOISTURE, NATIVE/FILL)	NOTES (STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION)
				6"	6"	6"	6"						
0	4		AU								BUFF-MED BRN POORLY SORTED MEDIUM SAND		
4	6	5	SS		--29--			100	1 0	NONE	SP	S A A	
6	9		AU									S A A	
9	11	10	SS		--18--			100	9 9	NONE	SP	S A A	
11	14		AU									S A A	
14	16	15	SS		--10--			90	4 3	NONE	SP	S A A	
16	19		AU									S A A	
19	21	20	SS		--10--			90	5 3	NONE	SP	BUFF COLORED, S A A	
21	24		AU									S A A	
24	26	25	SS		--29--			90	8 2	NONE	SP	S A A	
26	29		AU									S A A	
29	31	30	SS		--21--			90	5 9	NONE	SP	S A A	



**APPENDIX C  
CHAIN OF CUSTODY**



# CHAIN OF CUSTODY RECORD

NO 00247

3050 METRO DRIVE, SUITE 115  
BLOOMINGTON, MN 55425 (612) 854-5513

LOCATION Sinclair - Portland Ave  
PROJECT NUMBER 711

PROJECT MANAGER Tom Borg  
LABORATORY EnecoTech

TURNAROUND TIME Standard

ITEM NO	SAMPLE NUMBER	NUMBER OF CONTAINERS AND TYPE	MATRIX	COLLECTION DATE	COLLECTION TIME	ANALYSIS REQUIRED
1	01-SP-C	1 - 11.11.11	1	5/13/90	1230	MTBE, THC (gasoline), Lead
2	01-01-07	3 - 11.11.11	1	5/17/90	1115	MTBE, THC (gasoline), Lead, Chlorine, Cadmium, PCBs
3	01-02-11	4 - 11.11.11		5/13/90	1000	BTX, MTBE, THC (gasoline)
4	01-03-15	3 - 11.11.11	11	5/17/90	1345	BTX, THC (gasoline), Lead
5	01-04-15	11	11	11	11	11 11 11
6	01-05-15	1 - 11.11.11	11	11	1330	BTX, MTBE, THC (gasoline)
7	01-06-16	11	11	11	1115	11 11 11
8	01-07-08	3 - 11.11.11	11	11	1100	BTX, THC (Fuel Oil)
9	01-SP-C	1 - 11.11.11	11	5/13/90	1030	Source Analysis
10						

SAMPLER'S SIGNATURE	DATE
<u>Thomas R. Borg</u>	<u>5/13/90</u>
NOTES	

TRANSFER NO	ITEM NO	RELINQUISHED BY	ACCEPTED BY	DATE SUBMITTED
1	1-1	Thomas R. Borg	11	5/13/90
2				
3				
4				



# CHAIN OF CUSTODY RECORD

NO 00359

3050 METRO DRIVE, SUITE 115  
BLOOMINGTON, MN 55425 (612) 854-5513

LOCATION Sinclair-7753 Pointwood  
PROJECT NUMBER ~~711-017~~

PROJECT MANAGER Jim Berg  
LABORATORY Interpoll

TURNAROUND TIME Normal

711-017-RB 12-11-90

ITEM NO	SAMPLE NUMBER	NUMBER OF CONTAINERS AND TYPE	MATRIX	COLLECTION DATE	COLLECTION TIME	ANALYSIS REQUIRED
1	SB-1-9	1-250 ml Jar	Soil	11/2/90	900	BTEX, THC-gas/Fuel oil
2	SB-1-29	1-250 ml Jar	Soil	11/2/90	900	BTEX, THC-gas/Fuel oil
3	SB-2-9	2-250 ml Jars	Soil	11/2/90	1030	BTEX, THC-gas/Fuel oil, Lead
4	SB-2-29	2-250 ml Jars	Soil	11/2/90	1030	BTEX, THC-gas/Fuel oil, Lead
5	SB-3-9	1-250 ml Jar	Soil	11/2/90	1200	BTEX, THC-gas
6	SB-3-29	1-250 ml Jar	Soil	11/2/90	1200	BTEX, THC-gas
7						
8						
9						
10						

SAMPLER'S SIGNATURE	DATE
<u>Thomas R. Below</u>	<u>11/2/90</u>
NOTES	

TRANSFER NO	ITEM NO	RELINQUISHED BY	ACCEPTED BY	DATE SUBMITTED
1	1-6	<u>Thomas R. Below</u>	<u>Lozier</u>	<u>11/2/90</u>
2			<u>Kimbalynne</u>	<u>11/2/90</u>
3				
4				



3050 METRO DRIVE, SUITE 115  
 BLOOMINGTON, MN 55425 (612) 854-5513

# CHAIN OF CUSTODY RECORD

FILE COPY

*Handwritten initials*

NO 00398

LOCATION S. Sinclair / Portland Ave S.  
 PROJECT NUMBER 711-017

PROJECT MANAGER Kelly Kadiny  
 LABORATORY Interpoll

TURNAROUND TIME Normal

ITEM NO	SAMPLE NUMBER	NUMBER OF CONTAINERS AND TYPE	MATRIX	COLLECTION DATE	COLLECTION TIME	ANALYSIS REQUIRED
1	SB-04-10	2-250 ml	Soil	1/23/91	1000	BETX, MTBE, THC-Gas, THC-fuel oil
2	SB-04-34	" "	" "	" "	1045	" "
3	SB-05-35	" "	" "	" "	1220	" "
4	<del>SB</del> -mw2-34	" "	" "	1/24/91	1015	" "
5	<del>SB</del> -mw4-31	" "	" "	" "	1510	" "
6	<del>SB</del> -mw1-35	" "	" "	1/23/91	1520	" "
7	<del>SB</del> -mw3-34	" "	" "	1/25/91	1035	" "
8						
9						
10						

SAMPLER'S SIGNATURE	DATE
<i>J. F. Smith</i>	1/25/91
NOTES	

TRANSFER NO	ITEM NO	RELINQUISHED BY	ACCEPTED BY	DATE SUBMITTED
1	1-7	<i>J. F. Smith</i>	<i>Bob Berg</i>	1500 1/25/91
2				
3				
4				



# CHAIN OF CUSTODY RECORD

NO 00402

3050 METRO DRIVE, SUITE 115  
BLOOMINGTON, MN 55425 (612) 854-5513

LOCATION RICHFIELD MN <sup>SINGULAR</sup> PORTLAND  
PROJECT NUMBER 711-017

PROJECT MANAGER JIM BERG  
LABORATORY INTERPOL

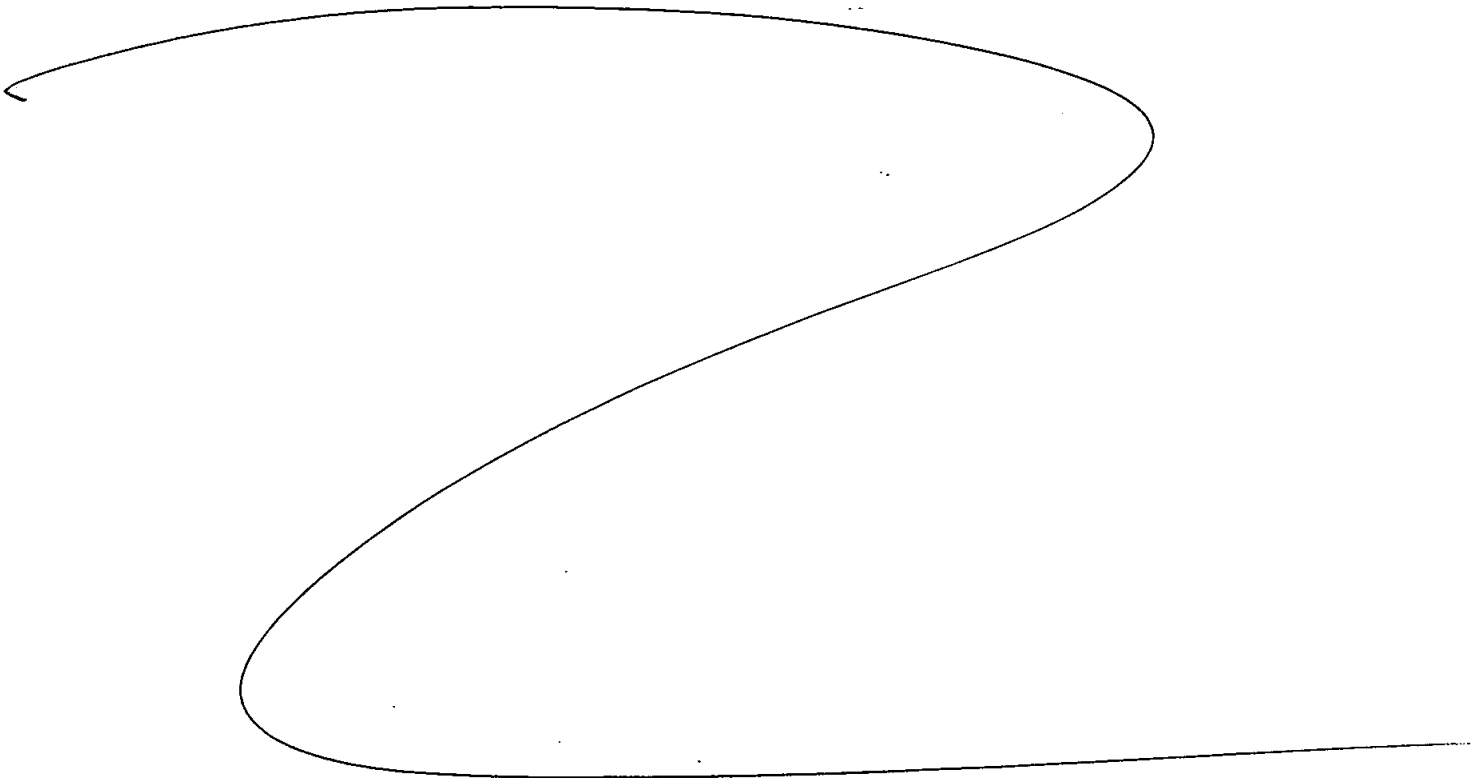
TURNAROUND TIME STANDARD

ITEM NO	SAMPLE NUMBER	NUMBER OF CONTAINERS AND TYPE	MATRIX	COLLECTION DATE	COLLECTION TIME	ANALYSIS REQUIRED
1	MW-1	③ VOA	WATER	2/1/91	1500	MDH 465 + MTBE + <sup>THK</sup> <del>PAH</del>
2	MW-2	③ VOA	"	"	1530	" "
3	MW-3	③ VOA	"	"	1530	" "
4	MW-4	③ VOA	"	"	1445	" "
5	MW-1	① LITER	"	"	1500	THC FUEL OIL
6	MW-2	① LITER	"	"	1530	" "
7	MW-3	① LITER	"	"	1530	" "
8	MW-4	① LITER	"	"	1445	" "
9						
10						

SAMPLER'S SIGNATURE	DATE
<i>Kelly M. Kelly</i>	1 FEB 91
NOTES	

TRANSFER NO	ITEM NO	RELINQUISHED BY	ACCEPTED BY	DATE SUBMITTED
1	1-	<i>Kelly M. Kelly</i>	<i>Linda Lynne</i>	2/4/91 1630
2				
3				
4				

**APPENDIX D  
WELL CONSTRUCTION**

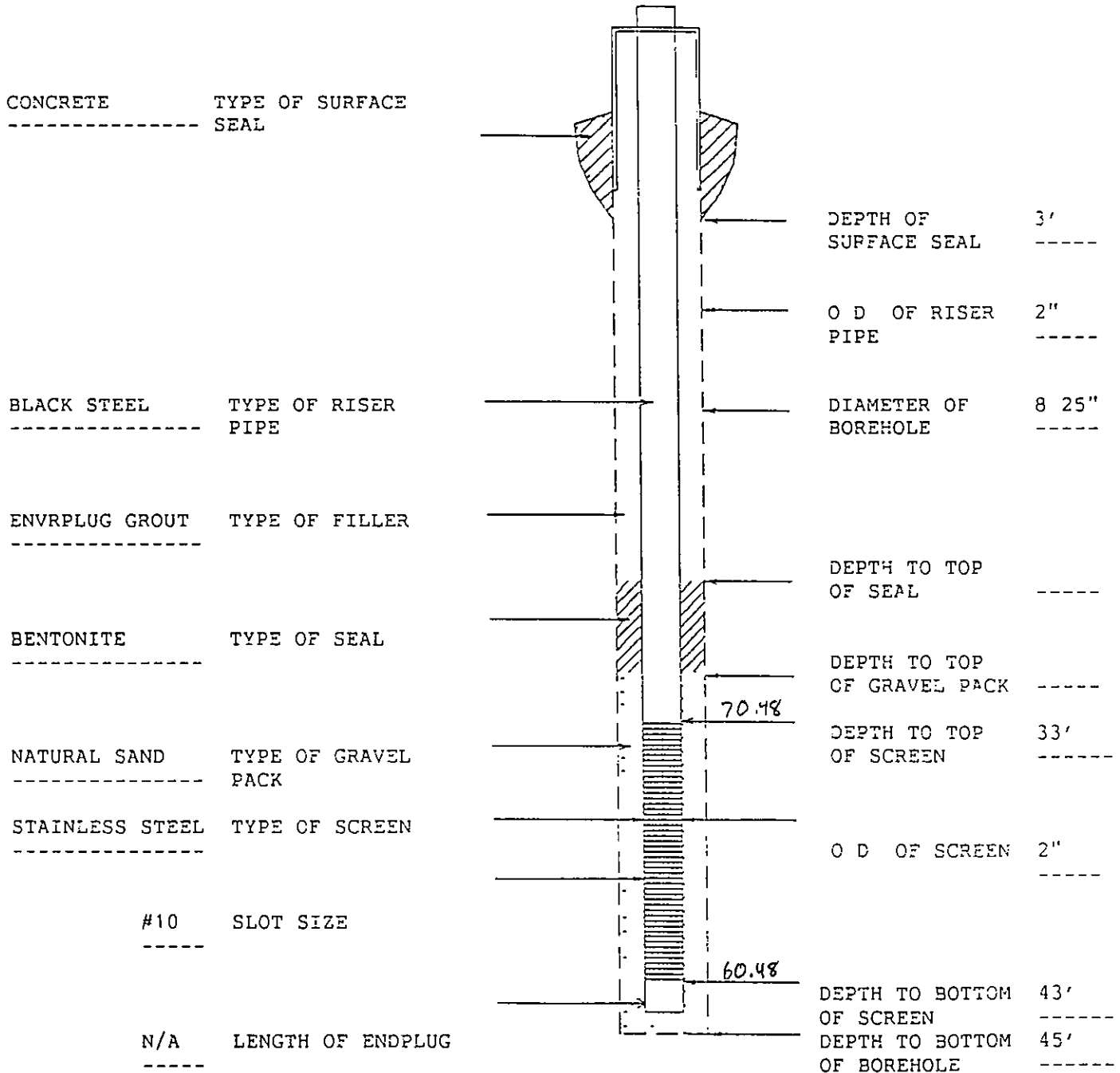




MONITORING WELL CONSTRUCTION DIAGRAM  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVENUE SOUTH  
 RICHFIELD, MINNESOTA

REGION MN  
 PROJECT NUMBER 711-017  
 SITE NUMBER 01  
 WELL NUMBER MW-01  
 OWNER SINCLAIR  
 DRILLER THEIN  
 DONE BY KWK

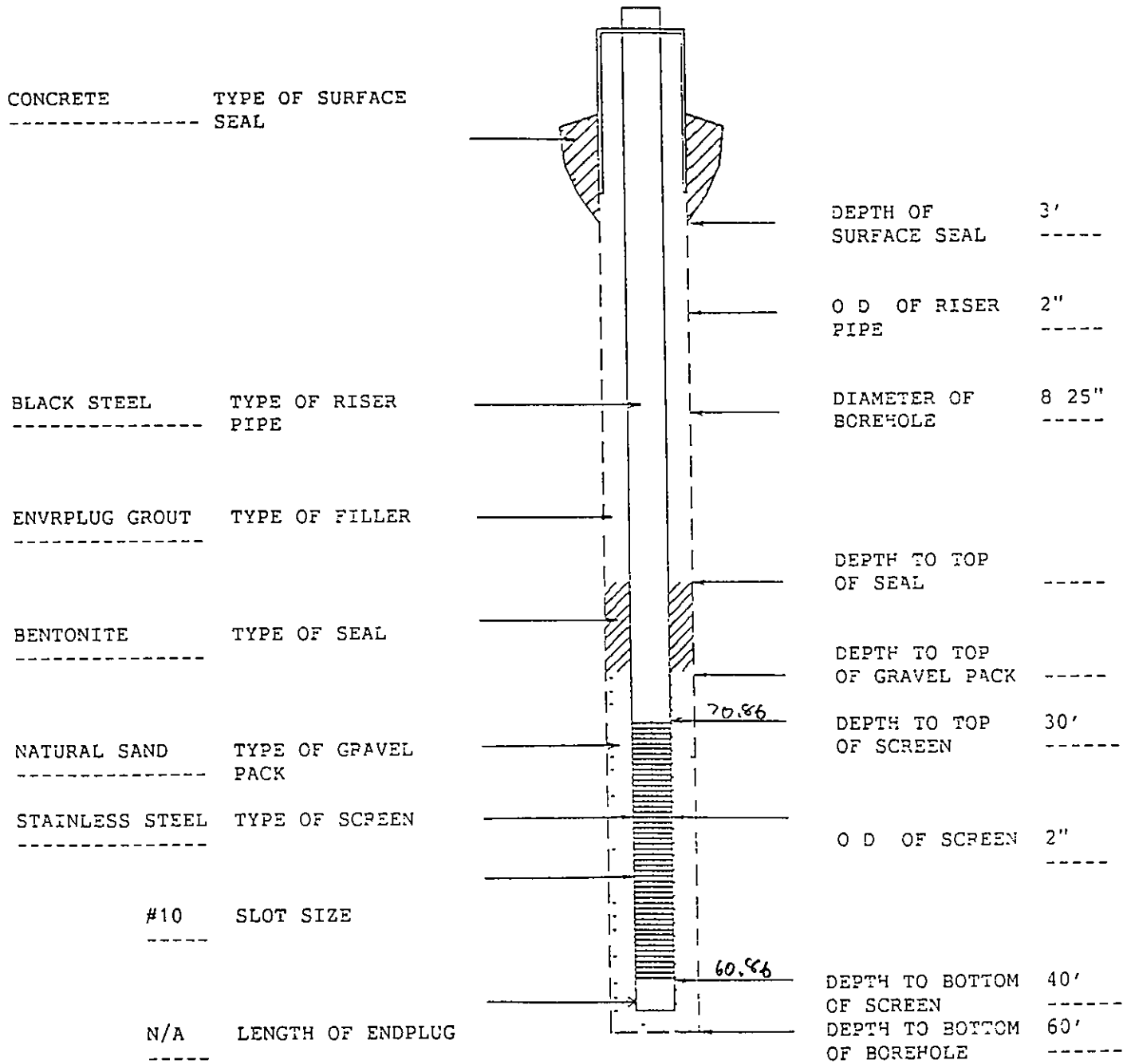
COMPLETION DATE 1/23/91  
 GRADE ELEVATION  
 T O C ELEVATION 103.48  
 STATIC WATER LEVEL 35.5'  
 U S G S QUADRANGLE  
 TOWNSHIP, RANGE, SECTION



MONITORING WELL CONSTRUCTION DIAGRAM  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVENUE SOUTH  
 RICHFIELD, MINNESOTA

REGION MN  
 PROJECT NUMBER 711-017  
 SITE NUMBER 01  
 WELL NUMBER MW-02  
 OWNER SINCLAIR  
 DRILLER THEIN  
 DONE BY KWK

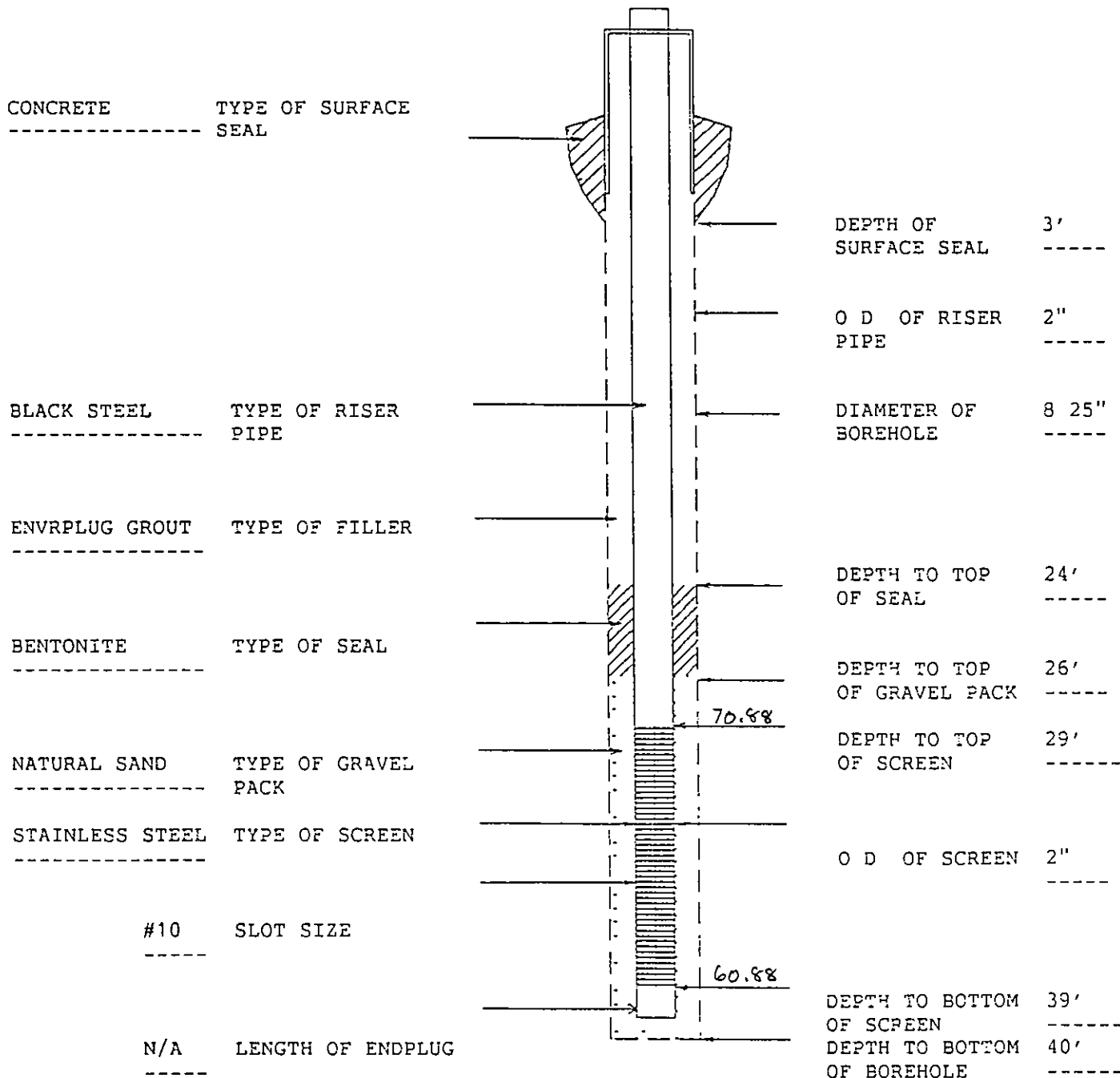
COMPLETION DATE 1/24/91  
 GRADE ELEVATION  
 T O C ELEVATION 100.86  
 STATIC WATER LEVEL 34.0'  
 U S G S QUADRANGLE  
 TOWNSHIP, RANGE, SECTION



MONITORING WELL CONSTRUCTION DIAGRAM  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVENUE SOUTH  
 RICHFIELD, MINNESOTA

REGION MN  
 PROJECT NUMBER 711-017  
 SITE NUMBER 01  
 WELL NUMBER MW-03  
 OWNER SINCLAIR  
 DRILLER THEIN  
 DONE BY JFS

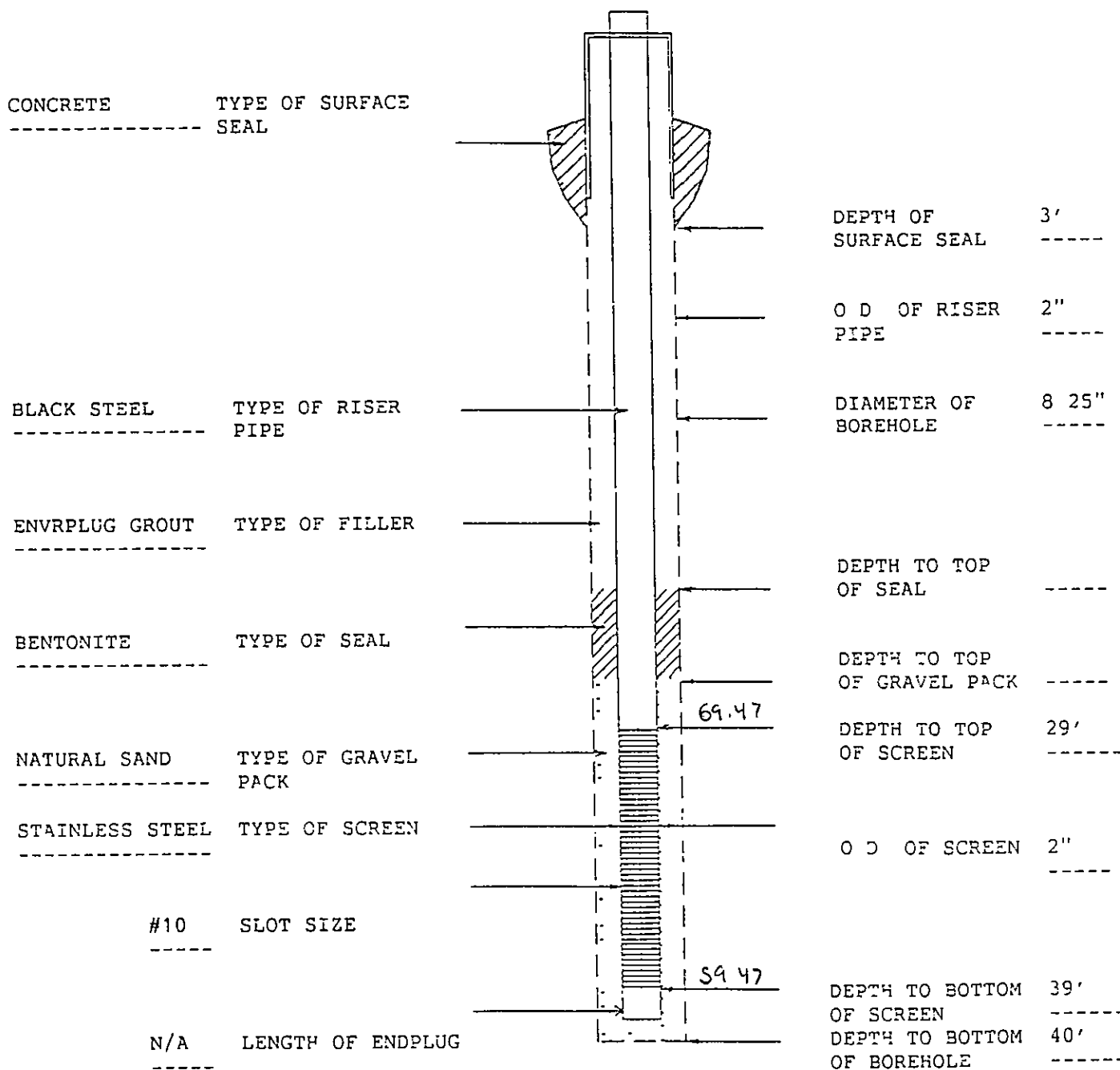
COMPLETION DATE 1/25/91  
 GRADE ELEVATION  
 T O C ELEVATION 99.88  
 STATIC WATER LEVEL 34 0'  
 U S G S QUADRANGLE  
 TOWNSHIP, RANGE, SECTION



MONITORING WELL CONSTRUCTION DIAGRAM  
 SINCLAIR SERVICE STATION  
 7733 PORTLAND AVENUE SOUTH  
 RICHFIELD, MINNESOTA

REGION MN  
 PROJECT NUMBER 711-017  
 SITE NUMBER 01  
 WELL NUMBER MW-04  
 OWNER SINCLAIR  
 DRILLER THEIN  
 DONE BY KWK

COMPLETION DATE 1/24/91  
 GRADE ELEVATION  
 T O C ELEVATION 48.47  
 STATIC WATER LEVEL 33 0'  
 U S G S QUADRANGLE  
 TOWNSHIP, RANGE, SECTION



APPENDIX E  
LABORATORY DATA SHEETS



INTERPOLL LABORATORIES INC  
4500 BALL ROAD NE  
CIRCLE PINES MINNESOTA 55014-1819  
TEL 512/786-6020  
FAX 512/786-7854

June 7, 1990

EnecoTech  
3050 Metro Drive, Suite 115  
Bloomington, MN 55425

Attention: Jim Berg

LABORATORY REPORT: #9563  
ENECOTECH PROJECT: #711-017

SAMPLES COLLECTED: May 17 & 18, 1990  
SAMPLES RECEIVED: May 18, 1990

Sample Identification:  
Sample Type:  
Laboratory Log Number:

01-SP-C  
Soil  
9563-01

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>	
EPA Method SW-846, 6010: Lead	mg/Kg	1.3	9
EPA Method SW-846, 8020: Benzene	mg/Kg	0.06	0.13
Toluene	mg/Kg	0.11	0.37
Ethylbenzene	mg/Kg	0.05	< 0.05
Xylenes	mg/Kg	0.28	15
EPA Method SW-846, 8015: Total hydrocarbons, as gasoline	mg/Kg	1.2	120

Interpoll Laboratories, Inc.  
 Laboratory Report #9563  
 EnecoTech  
 Page Two

Sample Identification:  
 Sample Type:  
 Laboratory Log Number:

01-01-07  
 Soil  
9563-02

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>	
EPA Method SW-846, 6010:			
Cadmium	mg/Kg	0.3	< 0.3
Chromium	mg/Kg	0.3	3
Lead	mg/Kg	1.3	40
Method MDH 465-C:			
Chloromethane	mg/Kg	0.17	< 0.17
Bromomethane	mg/Kg	0.03	< 0.03
Vinyl chloride	mg/Kg	0.04	< 0.04
Dichlorodifluoromethane	mg/Kg	0.11	< 0.11
Chloroethane	mg/Kg	0.03	< 0.03
Methylene chloride	mg/Kg	0.38	< 0.38
Trichlorofluoromethane	mg/Kg	0.11	< 0.11
1,1-Dichloroethene	mg/Kg	0.08	< 0.08
Allyl chloride	mg/Kg	0.04	< 0.04
1,1-Dichloroethane	mg/Kg	0.02	< 0.02
cis-1,2-Dichloroethene	mg/Kg	0.03	< 0.03
trans-1,2-Dichloroethene	mg/Kg	0.04	< 0.04
Chloroform	mg/Kg	0.04	< 0.04
1,1,2-Trichlorotrifluoroethane	mg/Kg	0.11	< 0.11
Dibromomethane	mg/Kg	0.06	< 0.06
1,2-Dichloroethane	mg/Kg	0.06	< 0.06
1,1,1-Trichloroethane	mg/Kg	0.18	< 0.18
Carbon tetrachloride	mg/Kg	0.05	< 0.05
Bromodichloromethane	mg/Kg	0.07	< 0.07
2,3-Dichloro-1-propene	mg/Kg	0.04	< 0.04
1,2-Dichloropropane	mg/Kg	0.04	< 0.04
1,1-Dichloro-1-propene	mg/Kg	0.02	< 0.02
trans-1,3-Dichloropropane	mg/Kg	0.01	< 0.01
Trichloroethene	mg/Kg	0.07	< 0.07
1,3-Dichloropropane	mg/Kg	0.05	< 0.05
1,1,2-Trichloroethane	mg/Kg	0.13	< 0.13
Dibromochloromethane	mg/Kg	0.14	< 0.14
cis-1,3-Dichloropropane	mg/Kg	0.03	< 0.03
1,2-Dibromoethane	mg/Kg	0.03	< 0.03
2-Chloroethylvinyl ether	mg/Kg	0.09	< 0.09
Bromoform	mg/Kg	0.05	< 0.05
1,1,1,2-Tetrachloroethane	mg/Kg	0.04	< 0.04
1,2,3-Trichloropropane	mg/Kg	0.07	< 0.07
1,1,2,2-Tetrachloroethane	mg/Kg	0.27	< 0.27

Interpoll Laboratories, Inc.  
 Laboratory Report #9563  
 EnecoTech  
 Page Three

Sample Identification:  
 Sample Type:  
 Laboratory Log Number:

01-01-07  
 Soil  
9563-02

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>	
Method MDH 465-C (continued):			
Tetrachloroethene	mg/Kg	0.06	< 0.06
Pentachloroethane	mg/Kg	0.21	< 0.21
Chlorobenzene	mg/Kg	0.03	< 0.03
1,3-Dichlorobenzene	mg/Kg	0.06	< 0.06
1,2-Dichlorobenzene	mg/Kg	0.06	< 0.06
1,4-Dichlorobenzene	mg/Kg	0.09	< 0.09
Acetone	mg/Kg	2.8	< 2.8
Tetrahydrofuran	mg/Kg	1.1	< 1.1
Ethyl ether	mg/Kg	0.14	< 0.14
Methyl ethyl ketone	mg/Kg	0.49	< 0.49
Benzene	mg/Kg	0.06	< 0.06
Methyl isobutyl ketone	mg/Kg	0.20	< 0.20
Toluene	mg/Kg	0.11	< 0.11
Ethylbenzene	mg/Kg	0.05	< 0.05
Cumene	mg/Kg	0.22	< 0.22
Total xylenes	mg/Kg	0.28	< 0.28
Modified SW-846 Method 3820:			
Total hydrocarbons, as fuel oil	mg/Kg	1.6	1900 <sup>a</sup>
Dilution factor			75 <sup>b</sup>
EPA Method SW-846, 3550/8080:			
Total PCB	mg/Kg	0.0033	< 0.033
Dilution factor			10 <sup>c</sup>



Interpoll Laboratories, Inc.  
 Laboratory Report #9563  
 EnecoTech  
 Page Four

Sample Identification:	01-02-14	01-03-15
Sample Type:	Soil	Soil
Laboratory Log Number:	<u>9563-03</u>	<u>9563-04</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 6010: Lead	mg/Kg	1.3	NR	4
EPA Method SW-846, 8020: MTBE	mg/Kg	0.06	< 0.06	NR
Benzene	mg/Kg	0.06	< 0.06	0.12
Toluene	mg/Kg	0.11	< 0.11	0.44
Ethylbenzene	mg/Kg	0.05	< 0.05	0.08
Xylenes	mg/Kg	0.28	< 0.28	91 <sup>d</sup>
EPA Method SW-846, 8015: Total hydrocarbons, as gasoline	mg/Kg	1.2	< 1.2	640 <sup>d</sup>

Sample Identification:	01-04-15	01-05-15
Sample Type:	Soil	Soil
Laboratory Log Number:	<u>9563-05</u>	<u>9563-06</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 6010: Lead	mg/Kg	1.3	4	NR
EPA Method SW-846, 8020: MTBE	mg/Kg	0.06	NR	< 0.06
Benzene	mg/Kg	0.06	0.10	0.83
Toluene	mg/Kg	0.11	0.48	1.2
Ethylbenzene	mg/Kg	0.05	0.16	0.09
Xylenes	mg/Kg	0.28	150 <sup>d</sup>	0.78
EPA Method SW-846, 8015: Total hydrocarbons, as gasoline	mg/Kg	1.2	1100 <sup>d</sup>	11

Interpoll Laboratories, Inc.  
 Laboratory Report #9563  
 EnecoTech  
 Page Five

Sample Identification:	01-06-16	01-07-08
Sample Type:	Soil	Soil
Laboratory Log Number:	<u>9563-07</u>	<u>9563-08</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020:				
MTBE	mg/Kg	0.06	< 0.06	NR
Benzene	mg/Kg	0.06	0.09	0.09
Toluene	mg/Kg	0.11	0.19	0.15
Ethylbenzene	mg/Kg	0.05	0.08	0.08
Xylenes	mg/Kg	0.28	0.28	0.28
EPA Method SW-846, 8015:				
Total hydrocarbons, as gasoline	mg/Kg	1.2	< 1.2	NR
Modified SW-846 Method 3820:				
Total hydrocarbons, as fuel oil	mg/Kg	1.5	NR	190 <sup>d</sup>
Dilution factor				10 <sup>d</sup>

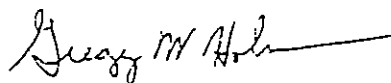
<sup>a</sup>Although quantified as fuel oil #2, the chromatographic pattern did not match that of fuel oil #2, but a heavier grade.

<sup>b</sup>Sample extract was diluted as indicated to accommodate the analyte concentration. Reported values represent the concentration in the original undiluted sample, i.e., instrumental results were multiplied by the dilution factor prior to reporting. Target detection limits are given. The detection limit applicable to the sample may be obtained by multiplying the detection limit by the dilution factor

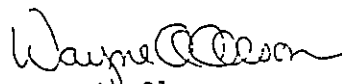
<sup>c</sup>Sample extract was diluted as indicated due to matrix interferences. Reported value represents the concentration in the original undiluted sample, i.e., instrumental results were multiplied by the dilution factor prior to reporting. Target detection limit is given. The detection limit applicable to the sample may be obtained by multiplying the detection limit by the dilution factor.

<sup>d</sup>Sample was diluted by a factor of 4. Reported values represent the concentration in the original undiluted sample, i.e., instrumental results were multiplied by the dilution factor prior to reporting. Target detection limit are given. The detection limit applicable to the sample may be obtained by multiplying the detection limit by the dilution factor.

Respectfully submitted,



Gregg W. Holman,  
Senior Scientist  
Inorganic Chemistry Department



Wayne A. Olson,  
Senior Scientist  
Organic Chemistry Department

GWH/WAO/cg  
Invoice Enclosed  
< = less than  
NR = analysis not requested

All analyses were performed using EPA or other recognized methodologies.  
All units are on an "as received" basis unless otherwise indicated.



RECEIVED

NOV 30 1990

INTERPOLL LABORATORIES INC  
4500 BALL ROAD N E  
CIRCLE PINES MINNESOTA 55014-1819  
TEL 612/786 6020  
FAX 612/786-7854

November 26, 1990

*Entered  
12/31/90  
efw*

EnecoTech  
3050 Metro Drive, Suite 115  
Bloomington, MN 55425

Attention: Jim Berg

LABORATORY REPORT: #1700  
ENECOTECH PROJECT: ~~#711-022~~ 711-017 TRB 12-11-90

SAMPLES COLLECTED: November 2, 1990  
SAMPLES RECEIVED: November 2, 1990

Sample Identification:	SB-1-9	SB-1-29
Sample Type:	Soil	Soil
Laboratory Log Number:	<u>1700-01</u>	<u>1700-02</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020:				
Benzene	mg/Kg	0.06	< 0.06	< 0.06
Toluene	mg/Kg	0.11	< 0.11	< 0.11
Ethylbenzene	mg/Kg	0.05	< 0.05	< 0.05
Xylenes	mg/Kg	0.28	< 0.28	< 0.28
EPA Method SW-846, 8015:				
Total hydrocarbons, as gasoline	mg/Kg	1.2	< 1.2	< 1.2
Modified SW-846 Method 3820:				
Total hydrocarbons, as fuel oil	mg/Kg	1.9	< 1.9	< 1.9

Sample Identification:	SB-2-9	SB-2-29
Sample Type:	Soil	Soil
Laboratory Log Number:	<u>1700-03</u>	<u>1700-04</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 6010: Lead	mg/Kg	1.3	3	< 1.3
EPA Method SW-846, 8020: Benzene	mg/Kg	0.06	< 0.06	< 0.06
Toluene	mg/Kg	0.11	< 0.11	< 0.11
Ethylbenzene	mg/Kg	0.05	< 0.05	< 0.05
Xylenes	mg/Kg	0.28	< 0.28	< 0.28
EPA Method SW-846, 8015: Total hydrocarbons, as gasoline	mg/Kg	1.2	< 1.2	< 1.2
Modified SW-846 Method 3820: Total hydrocarbons, as fuel oil	mg/Kg	1.9	< 1.9	< 1.9

Sample Identification:	SB-3-9	SB-3-29
Sample Type:	Soil	Soil
Laboratory Log Number:	<u>1700-05</u>	<u>1700-06</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020: Benzene	mg/Kg	0.06	0.44	< 0.06
Toluene	mg/Kg	0.11	1.7	< 0.11
Ethylbenzene	mg/Kg	0.05	1.4	< 0.05
Xylenes	mg/Kg	0.28	92	< 0.28
Dilution factor			5 <sup>a</sup>	1
EPA Method SW-846, 8015: Total hydrocarbons, as gasoline	mg/Kg	1.2	920 <sup>b</sup>	< 1.2
Dilution factor			5 <sup>c</sup>	1

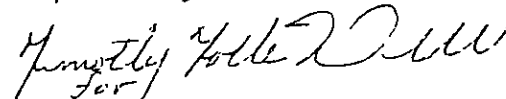
Footnotes:

<sup>a</sup>Sample was diluted as indicated to accommodate the analyte with the highest concentration. Reported values represent the concentration in the original undiluted sample, i.e., instrumental results were multiplied by the dilution factor prior to reporting. Target detection limits are given. The detection limit applicable to the sample may be obtained by multiplying the detection limit by the dilution factor.

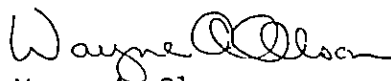
<sup>b</sup>The absence of the early eluting peaks from the chromatogram suggests that the sample contains weathered gasoline from which the more volatile components have been lost.

<sup>c</sup>Sample was diluted as indicated to accommodate the analyte concentration. Reported value represents the concentration in the original undiluted sample, i.e., instrumental result was multiplied by the dilution factor prior to reporting. Target detection limit is given. The detection limit applicable to the sample may be obtained by multiplying the detection limit by the dilution factor.

Respectfully submitted,



Gregg W. Holman,  
Senior Scientist  
Inorganic Chemistry Department



Wayne A. Olson,  
Senior Scientist  
Organic Chemistry Department

GWH/WAO/cg  
Invoice Enclosed  
< = less than

# interpoll

INTERPOLL LABORATORIES INC  
 4500 BALL ROAD N E  
 CIRCLE PINES MINNESOTA 55014 1819  
 TEL 612/786 6020  
 FAX 612/786 7854

February 12, 1991

EnecoTech  
 3050 Metro Drive, Suite 115  
 Bloomington, MN 55425

Attention: Kelly Kading

LABORATORY REPORT #2226  
 ENECOTECH PROJECT #711-017

SAMPLES COLLECTED January 23 - 26, 1991  
 SAMPLES RECEIVED January 28, 1991

Sample Identification:	SB-04-10	SB-04-34
Sample Type	Soil	Soil
Laboratory Log Number	<u>2226-01</u>	<u>2226-02</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020				
MTBE	mg/Kg	0.06	< 0.06	< 0.06
Benzene	mg/Kg	0.06	< 0.06	< 0.06
Toluene	mg/Kg	0.11	< 0.11	< 0.11
Ethylbenzene	mg/Kg	0.05	< 0.05	< 0.05
Xylenes	mg/Kg	0.28	13	< 0.28
EPA Method SW-846, 8015				
Total hydrocarbons, as gasoline	mg/Kg	1.2	97 <sup>b</sup>	< 1.2
EPA Method SW-846, 3550/8015				
Total hydrocarbons, as fuel oil	mg/Kg	2.2	480	< 2.2
Dilution factor			10 <sup>b</sup>	1

Sample Identification  
 Sample Type  
 Laboratory Log Number

SB-05-35      MW2-34  
 Soil            Soil  
2226-03      2226-04

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020				
MTBE	mg/Kg	0.06	< 0.06	< 0.06
Benzene	mg/Kg	0.06	< 0.06	< 0.06
Toluene	mg/Kg	0.11	< 0.11	< 0.11
Ethylbenzene	mg/Kg	0.05	< 0.05	< 0.05
Xylenes	mg/Kg	0.28	< 0.28	< 0.28
EPA Method SW-846, 8015				
Total hydrocarbons, as gasoline	mg/Kg	1.2	1.3	< 1.2
EPA Method SW-846, 3550/8015				
Total hydrocarbons, as fuel oil	mg/Kg	2.2	< 2.2	< 2.2

Sample Identification  
 Sample Type  
 Laboratory Log Number

MW4-31      MW1-35  
 Soil            Soil  
2226-05      2226-06

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020				
MTBE	mg/Kg	0.06	< 0.06	< 0.06
Benzene	mg/Kg	0.06	< 0.06	< 0.06
Toluene	mg/Kg	0.11	< 0.11	< 0.11
Ethylbenzene	mg/Kg	0.05	< 0.05	< 0.05
Xylenes	mg/Kg	0.28	< 0.28	< 0.28
EPA Method SW-846, 8015				
Total hydrocarbons, as gasoline	mg/Kg	1.2	< 1.2	< 1.2
EPA Method SW-846, 3550/8015				
Total hydrocarbons, as fuel oil	mg/Kg	2.2	< 2.2	< 2.2

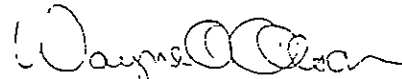


Sample Identification  
Sample Type  
Laboratory Log Number

HW3-34  
Soil  
2226-07

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>	
EPA Method SW-846, 8020			
MTBE	mg/Kg	0.05	< 0.05
Benzene	mg/Kg	0.06	< 0.06
Toluene	mg/Kg	0.11	< 0.11
Ethylbenzene	mg/Kg	0.05	< 0.05
Xylenes	mg/Kg	0.28	< 0.28
EPA Method SW-846, 8015 <sup>a</sup>			
Total hydrocarbons, as gasoline	mg/Kg	1.2	< 1.2
EPA Method SW-846, 3550/8015 <sup>b</sup>			
Total hydrocarbons, as fuel oil	mg/Kg	2.2	2.6

Respectfully submitted,



Wayne A. Olson,  
Senior Scientist  
Organic Chemistry Department

WAO/cg  
Invoice Enclosed  
< = less than

<sup>a</sup>The absence of the early eluting peaks from the chromatogram suggests that the sample contains weathered gasoline from which the more volatile components have been lost.

<sup>b</sup>Sample extract was diluted as indicated to accommodate the analyte concentration. Reported value represents the concentration in the original undiluted sample, i.e., instrumental result was multiplied by the dilution factor prior to reporting. Target detection limit is given. The detection limit applicable to the sample may be obtained by multiplying the detection limit by the dilution factor.

All analyses were performed using EPA or other recognized methodologies. All units are on an "as received" basis unless otherwise indicated.



INTERPOLL LABORATORIES INC  
4500 BALL ROAD N E  
CIRCLE PINES MINNESOTA 55014-1819  
TEL 612/786-6020  
FAX 612/786-7854

June 7, 1990

EnecoTech  
3050 Metro Drive, Suite 115  
Bloomington, MN 55425

Attention: Jim Berg

LABORATORY REPORT: #9563-09  
ENECOTECH PROJECT: #711-017

SAMPLES COLLECTED: May 17 & 18, 1990  
SAMPLES RECEIVED: May 18, 1990

Results of Sieve Analysis on Soil<sup>1</sup> Sample #01-SP-C

<u>Mesh</u>	<u>Diameter</u>	<u>Relative Cumulative Frequency</u>
<u>Size</u>		<u>Percent by Mass Greater Than</u>
18	1000 um	1.7
40	425 um	13.7
200	75 um	95.2

Sieve determination using sieves meeting ASTM E-11 specifications.

Respectfully submitted,

Gregg W. Holman,  
Senior Scientist  
Inorganic Chemistry Department

GWH/cg

<sup>1</sup>Soil sample was oven dried at 105°C.

# interpoll

INTERPOLL LABORATORIES INC  
 4560 BALL ROAD NE  
 CIRCLE PINES MINNESOTA 55014 1819  
 TEL 612 786 6020  
 FAX 612 786 7854

February 20, 1991

EnecoTech  
 3050 Metro Drive, Suite 115  
 Bloomington, MN 55425

Attention: Jim Berg

LABORATORY REPORT #2274  
 ENECOTECH PROJECT: #711-017

SAMPLES COLLECTED: February 1, 1991  
 SAMPLES RECEIVED: February 4, 1991

Sample Identification.  
 Sample Type:  
 Laboratory Log Number:

MW-1	MW-2
Water	Water
<u>2274-01</u>	<u>2274-02</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020 MTBE	ug/L	0.52	< 0.52	< 0.52
EPA Method SW-846, 8015 Total hydrocarbons, as gasoline	ug/L	10	< 10	< 10
EPA Method SW-846, 3510/8015 Total hydrocarbons, as fuel oil	ug/L	66	< 66	< 66

Sample Identification  
 Sample Type  
 Laboratory Log Number

MW-1                      MW-2  
 Water                      Water  
2274-01                      2274-02

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
Method MDH 465-C:				
Chloromethane	ug/L	1.4	< 1.4	< 1.4
Bromomethane	ug/L	0.23	< 0.23	< 0.23
Vinyl chloride	ug/L	0.30	< 0.30	< 0.30
Dichlorodifluoromethane	ug/L	0.91	< 0.91	< 0.91
Chloroethane	ug/L	0.26	< 0.26	< 0.26
Methylene chloride	ug/L	3.0	< 3.0	< 3.0
Trichlorofluoromethane	ug/L	0.87	< 0.87	< 0.87
1,1-Dichloroethene	ug/L	0.66	< 0.66	< 0.66
Allyl chloride	ug/L	0.35	< 0.35	< 0.35
1,1-Dichloroethane	ug/L	0.16	< 0.16	< 0.16
cis-1,2-Dichloroethene	ug/L	0.28	< 0.28	< 0.28
trans-1,2-Dichloroethene	ug/L	0.28	< 0.28	< 0.28
Chloroform	ug/L	0.33	< 0.33	< 0.33
1,1,2-Trichlorotrifluoroethane	ug/L	0.90	< 0.90	< 0.90
Dibromomethane	ug/L	0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	0.47	< 0.47	< 0.47
1,1,1-Trichloroethane	ug/L	1.4	< 1.4	< 1.4
Carbon tetrachloride	ug/L	0.44	< 0.44	< 0.44
Bromodichloromethane	ug/L	0.56	< 0.56	< 0.56
2,3-Dichloro-1-propene	ug/L	0.35	< 0.35	< 0.35
1,2-Dichloropropane	ug/L	0.35	< 0.35	< 0.35
1,1-Dichloro-1-propene	ug/L	0.18	< 0.18	< 0.18
trans-1,3-Dichloropropene	ug/L	0.09	< 0.09	< 0.09
Trichloroethene	ug/L	0.58	< 0.58	< 0.58
1,3-Dichloropropane	ug/L	0.38	< 0.38	< 0.38
1,1,2-Trichloroethane	ug/L	1.0	< 1.0	< 1.0
Dibromochloromethane	ug/L	1.1	< 1.1	< 1.1
cis-1,3-Dichloropropene	ug/L	0.27	< 0.27	< 0.27
1,2-Dibromoethane	ug/L	0.26	< 0.26	< 0.26
2-Chloroethylvinyl ether	ug/L	0.70	< 0.70	< 0.70
Bromoform	ug/L	0.39	< 0.39	< 0.39
1,1,1,2-Tetrachloroethane	ug/L	0.30	< 0.30	< 0.30
1,2,3-Trichloropropane	ug/L	0.58	< 0.58	< 0.58
1,1,2,2-Tetrachloroethane	ug/L	2.1	< 2.1	< 2.1
Tetrachloroethene	ug/L	0.45	< 0.45	< 0.45
Pentachloroethane	ug/L	1.7	< 1.7	< 1.7

Sample Identification	MW-1	MW-2
Sample Type	Water	Water
Laboratory Log Number	<u>2274-01</u>	<u>2274-02</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
Method MDH 465-C (continued)				
Chlorobenzene	ug/L	0.23	< 0.23	< 0.23
1,3-Dichlorobenzene	ug/L	0.46	< 0.46	< 0.46
1,2-Dichlorobenzene	ug/L	0.49	< 0.49	< 0.49
1,4-Dichlorobenzene	ug/L	0.69	< 0.69	< 0.69
Acetone	ug/L	22	< 22	< 22
Tetrahydrofuran	ug/L	8.7	< 8.7	< 8.7
Ethyl ether	ug/L	1.1	< 1.1	< 1.1
Methyl ethyl ketone	ug/L	3.9	< 3.9	< 3.9
Benzene	ug/L	0.47	< 0.47	< 0.47
Methyl isobutyl ketone	ug/L	1.6	< 1.6	< 1.6
Toluene	ug/L	0.92	< 0.92	< 0.92
Ethylbenzene	ug/L	0.42	< 0.42	< 0.42
Cumene	ug/L	1.8	< 1.8	< 1.8
Total xylenes	ug/L	2.2	< 2.2	< 2.2

Sample Identification	MW-3	MW-4
Sample Type	Water	Water
Laboratory Log Number	<u>2274-03</u>	<u>2274-04</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
EPA Method SW-846, 8020				
MTBE	ug/L	0.52	< 0.52	< 0.52
EPA Method SW-846, 8015				
Total hydrocarbons, as gasoline	ug/L	10	< 10	< 10
EPA Method SW-846, 3510/8015				
Total hydrocarbons, as fuel oil	ug/L	66	< 66	< 66

Sample Identification:	MW-3	MW-4
Sample Type:	Water	Water
Laboratory Log Number:	<u>2274-03</u>	<u>2274-04</u>

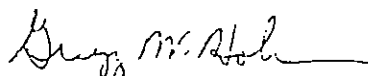
<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
Method MDH 465-C:				
Chloromethane	ug/L	1.4	< 1.4	< 1.4
Bromomethane	ug/L	0.23	< 0.23	< 0.23
Vinyl chloride	ug/L	0.30	< 0.30	< 0.30
Dichlorodifluoromethane	ug/L	0.91	< 0.91	< 0.91
Chloroethane	ug/L	0.26	< 0.26	< 0.26
Methylene chloride	ug/L	3.0	< 3.0	< 3.0
Trichlorofluoromethane	ug/L	0.87	< 0.87	< 0.87
1,1-Dichloroethene	ug/L	0.66	< 0.66	< 0.66
Allyl chloride	ug/L	0.35	< 0.35	< 0.35
1,1-Dichloroethane	ug/L	0.16	< 0.16	< 0.16
cis-1,2-Dichloroethene	ug/L	0.28	< 0.28	< 0.28
trans-1,2-Dichloroethene	ug/L	0.28	< 0.28	< 0.28
Chloroform	ug/L	0.33	< 0.33	< 0.33
1,1,2-Trichlorotrifluoroethane	ug/L	0.90	< 0.90	< 0.90
Dibromomethane	ug/L	0.50	< 0.50	< 0.50
1,2-Dichloroethane	ug/L	0.47	3.2	< 0.47
1,1,1-Trichloroethane	ug/L	1.4	< 1.4	< 1.4
Carbon tetrachloride	ug/L	0.44	< 0.44	< 0.44
Bromodichloromethane	ug/L	0.56	< 0.56	< 0.56
2,3-Dichloro-1-propene	ug/L	0.35	< 0.35	< 0.35
1,2-Dichloropropane	ug/L	0.35	< 0.35	< 0.35
1,1-Dichloro-1-propene	ug/L	0.18	< 0.18	< 0.18
trans-1,3-Dichloropropene	ug/L	0.09	< 0.09	< 0.09
Trichloroethene	ug/L	0.58	< 0.58	< 0.58
1,3-Dichloropropane	ug/L	0.38	< 0.38	< 0.38
1,1,2-Trichloroethane	ug/L	1.0	< 1.0	< 1.0
Dibromochloromethane	ug/L	1.1	< 1.1	< 1.1
cis-1,3-Dichloropropene	ug/L	0.27	< 0.27	< 0.27
1,2-Dibromoethane	ug/L	0.26	< 0.26	< 0.26
2-Chloroethylvinyl ether	ug/L	0.70	< 0.70	< 0.70
Bromoform	ug/L	0.39	< 0.39	< 0.39
1,1,1,2-Tetrachloroethane	ug/L	0.30	< 0.30	< 0.30
1,2,3-Trichloropropane	ug/L	0.58	< 0.58	< 0.58
1,1,2,2-Tetrachloroethane	ug/L	2.1	< 2.1	< 2.1
Tetrachloroethene	ug/L	0.45	< 0.45	< 0.45
Pentachloroethane	ug/L	1.7	< 1.7	< 1.7

RAL  
40

Sample Identification	MW-3	MW-4
Sample Type	Water	Water
Laboratory Log Number	<u>2274-03</u>	<u>2274-04</u>

<u>Parameter</u>	<u>Units</u>	<u>Target Detection Limit</u>		
Method MDH 465-C (continued)				
Chlorobenzene	ug/L	0.23	< 0.23	< 0.23
1,3-Dichlorobenzene	ug/L	0.46	< 0.46	< 0.46
1,2-Dichlorobenzene	ug/L	0.49	< 0.49	< 0.49
1,4-Dichlorobenzene	ug/L	0.69	< 0.69	< 0.69
Acetone	ug/L	22	< 22	< 22
Tetrahydrofuran	ug/L	8.7	< 8.7	< 8.7
Ethyl ether	ug/L	1.1	< 1.1	< 1.1
Methyl ethyl ketone	ug/L	3.9	< 3.9	< 3.9
Benzene	ug/L	0.47	< 0.47	< 0.47
Methyl isobutyl ketone	ug/L	1.6	< 1.6	< 1.6
Toluene	ug/L	0.92	< 0.92	< 0.92
Ethylbenzene	ug/L	0.42	< 0.42	< 0.42
Cumene	ug/L	1.8	< 1.8	< 1.8
Total xylenes	ug/L	2.2	< 2.2	< 2.2

Respectfully submitted,

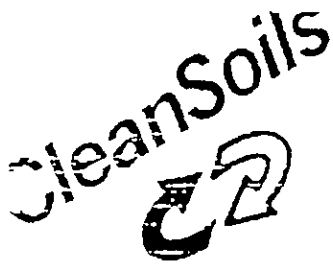


Gregg W. Holman,  
Senior Scientist  
Chemistry Department

GWH/cg  
Invoice Enclosed  
< = less than

APPENDIX F  
SOIL INCINERATION RECORDS





CleanSoils Inc.  
 14120 23rd Avenue North  
 Minneapolis, MN 55447  
 (612) 557 7106

SOIL PROFILE SHEET

CleanSoils Reference No.: \_\_\_\_\_ Date: \_\_\_\_\_

INSTRUCTIONS: Complete each section of the soil profile sheet and submit with a one gallon sample (1 foot into pile) in a sealed plastic pail and analytical reports. Mark sample pail with customer, generator and application date. If no analytical testing has been performed, an additional \$200 may be charged depending on soil characteristics and other data submitted. CleanSoils will evaluate each application and may perform benchscale tests to determine processing parameters and costs. Samples may be returned to the applicant at Cleansoils' option.

1 CUSTOMER Name: Smclair Marketing  
 Address: 3401 Fairbanks Avenue, P.O. Box 6247, Kansas City, Kansas 66106  
 Contact: Denny Lorenz Telephone: (913) 321-3700

2. GENERATOR Name: Smclair Marketing  
 Address: 3401 Fairbanks Avenue, P.O. Box 6247, Kansas City, Kansas 66106

3 SOIL LOCATION Facility: Smclair Station  
 Address: 7753 Portland Avenue South  
Richfield, MN 55423

Source:  Tanks,  Pipeline,  Spill,  Other

Date Excavated: 5/16/90 - 5/15/90

4. ESTIMATED QUANTITY \_\_\_\_\_ Tons OR 300 Cubic Yards

5 CONTAMINATION  Gasoline,  No.  Fuel Oil,  Other

Field PID Reading: Instrument used Organic Vapor Meter

Date tested 5/15/90

Range (min-max) 0 - 357 ppm Average 50

6. ANALYTICAL DATA (attach reports if available):

Total Petroleum Hydrocarbons as Gasoline	<u>120</u> ppm	Benzene	<u>0.13</u> ppm
Total Petroleum Hydrocarbons as Fuel Oil	<u>—</u> ppm	Toluene	<u>0.37</u> ppm
Total Lead	<u>9</u> ppm	Xylenes	<u>15</u> ppm

(Continued on Reverse Side)

CleanSoils

SOIL PROFILE SHEET  
(CONTINUED)

7. SOIL CHARACTER

Type:  Sand,  Silty Sand,  Clay,  Sandy Clay,  Topsoil,

Color:  Dark Brown  Tan  Black

Fines Content:  % Estimated Silts or Clays (finer than #200) by Wt  
OR  
4.8 % Actual Fines Passing #200

Moisture:  Appears Dry,  Moist,  Wet,  Saturated  
OR  
 % Actual Moisture Content

Pocks:  None,  % Below 2",  % Above 2",  Boulders

Debris:  None,  Some (describe) \_\_\_\_\_

8. ADDITIONAL INFORMATION \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. TERMS I understand that this application and soil sample is submitted for evaluation by CleanSoils Inc and all test samples may be returned to the applicant. No soils will be received or processed unless a CleanSoils acceptance notification is issued and an agreement properly executed.

Signed. Jim Berg 6/3/90

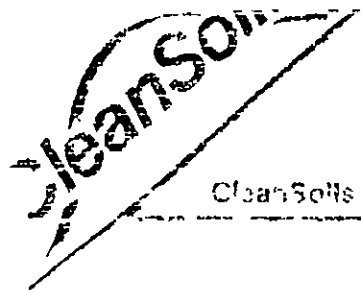
\*\*\*\*\*  
CLEANSOILS INC. ONLY:

_____ % MC	_____ ppm	PID	_____ ppm	Xylenes
_____ % >3/4"	_____ ppm	TPHC-G	_____ ppm	Lead
_____ % P #40	_____ ppm	TPHC-F		
_____ % P #100	_____ ppm	Benzene	Date: _____	
_____ % P #200	_____ ppm	Toluene	Tech: _____	

_____ Gal/Ton	_____ °F	PTU	Screening Required? _____
_____ AB	_____ TPH		Lump Breaker Required? _____

Quoted:  
Processing \$ \_\_\_\_\_ per ton, Trucking \$ \_\_\_\_\_ per ton, Setup \$ \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



CleanSoils Inc 812nd Avenue S E

Post-IT brand fax/transmittal memo 76.		page # 2
To	Cooley, G	From
Co	Envirotech - Michigan	Co
Dept		Phone #
Fax #	854-5745	Fax #

'9-8313

August 9, 1990

Mr. Denny Lorenz  
 Sinclair Marketing  
 3401 Fairbanks Avenue  
 P O Box 6247  
 Kansas City, KS 66105

Dear Mr. Lorenz:

RE: Final Report on Soil Treatment and Notification of Post-Burn Sampling Results

Site: Portland Avenue S.E., Richfield, MN  
 MPCA Leak ID#: LEAK00002572  
 CleanSoils Project #: 90.043

CleanSoils has completed the thermal treatment of petroleum contaminated soil from the above referenced site. The treated soil meets all MPCA requirements. Attached please find a copy of independent post-burn soil analyses for BTEX and TPH. Below is other information regarding the soil treated

Quantity of Soil: 269.14 tons  
 Completion Date: July 30, 1990  
 Post-Burn Samples: 90.043-01  
 Final Disposition of Soil: Road Base

If you should have any questions regarding this project, please contact me at (612) 639-8811.

Sincerely,

David H. Kress  
 Project Manager

attachments

pc: File  
 Bob Dullinger, MPCA



# SERCO Laboratories

LABORATORY ANALYSIS REPORT NO. 2104  
08/07/90

PAGE 1

CleanSoils, Inc  
34 2nd Ave SE  
New Brighton, MN 55112

DATE RECEIVED 07/31/90  
COLLECTED BY CLIENT  
DELIVERED BY CLIENT  
SAMPLE TYPE SOIL

Attn: Dr. Robert Willis

SERCO SAMPLE NO 61970  
SAMPLE DESCRIPTION 90 043-1

## ANALYSIS.

benzene, mg/kg	0.020
toluene, mg/kg	<0.005
ethylbenzene, mg/kg	0.014
xylene, mg/kg	0.038
GC Scan, mg/kg, as #2 fuel oil	<2.0
GC Scan, mg/kg, as gasoline	<0.50

SERCO SAMPLE NO  
SAMPLE DESCRIPTION

## ANALYSIS

benzene, mg/kg	
toluene, mg/kg	
ethylbenzene, mg/kg	
xylene, mg/kg	
GC Scan, mg/kg, as #2 fuel oil	
GC Scan, mg/kg, as gasoline	