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REVISED REPORT ON UNDERGROUND STORAGE TANK REMOVAL JORDAN TRUCK STATION JORDAN, MINNESOTA

LEAK #: 00001338

January 12, 1990

Prepared for:
Minnesota Department of Transportation
Golden Valley Office
2055 Lilac Drive
Golden Valley, MN 55422

Prepared by:
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Hydrogeologist
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1.0 INTRODUCTION

In accordance with Mr. Ron Erickson's authorization, Nova Environmental Services, Inc. (Nova), has completed services associated with the removal documentation of two underground storage tanks at the Minnesota Department of Transportation's Jordan Truck Station in Jordan, Minnesota. The site is located in Scott County in the southwest 1/4 of the northwest 1/4 of the northeast 1/4 of section 19, Township 114 North, Range 23 W.(see Figure 1-1, Site Location Map). The tanks were used for storing diesel fuel and unleaded gasoline and were removed on Friday, October 20, 1989. The purpose of Nova's involvement during tank removal activities is as follows:

- Document and monitor soil removal activities;
- Determine the extent of possible soil contamination;
- Obtain required soil samples for laboratory analysis, and;
- Prepare a written report.

2.0 BACKGROUND

The Minnesota Department of Transportation's Jordan Truck Station facility is located within a residential area in the City of Jordan, Minnesota. The site is bordered to the north by residential homes, to the east by a mobile home residential area, to the south by U.S. Highway 169 and to the west by Frontage Road and open fields. The facility presently consists of an office building, maintenance garage, several storage buildings and open areas used for storage of vehicles, sand and other construction materials. Two underground storage tanks were located at the facility. The tanks were used for storing diesel fuel and gasoline which was utilized in fueling vehicles.

2.1 TANK SUMMARY

Two underground storage tanks were removed from the Jordan Truck Station facility. The following is a summary of the tanks:

Tank I.D. No.	Tank Capacity	Substance Stored
331	1,200 gallons	Unleaded Gasoline
332	3,000 gallons	Diesel Fuel

Figure 2-1, Site Map illustrates the previous locations of the tanks.

All tanks were overlain at grade by asphalt and situated approximately four feet below grade. The tanks were located in a coarse sand fill and surrounded by native materials (coarse sand and gravel). Ground water was encountered in the excavation at a depth of approximately ten feet. The base of tank 331 was situated approximately two feet above ground water and the base of tank 332 was situated approximately one foot above ground water. The depth to ground water was determined by removing several buckets of sand and gravel, to expose the water table, and then measuring the distance from ground surface to ground water with a steel measuring tape.

2.2 TANK DESCRIPTION

The following is a description of the removed underground storage tanks.

Tank #1

Tank Identification Number: 331

Size of Tank:
- Capacity - 1,200 gallons (based on tank dimensions)
- Length - 12.0 feet
- Width - 4.0 feet
- Shape - Cylindrical

Material of Tank: Bare steel, single wall

Material of Piping: Steel

Corrosion Protection: Tank - None
Piping - None

Secondary Containment: None

Substance Stored: Unleaded gasoline

Tank Installation Date: Not available

Condition of Tank: Good, slight oxidation

Condition of Lines: Good, minor oxidation

Tank #2

Tank Identification Number: 332

Size of Tank: Capacity - 3,000 gallons (based on tank dimensions)
Length - 18.0 feet
Width - 5.3 feet
Shape - Cylindrical

Material of Tank: Bare steel, single wall

Material of Piping: Steel

Corrosion Protection: Tank - None
Piping - None

Secondary Containment: None

Substance Stored: Diesel fuel

Tank Installation Date: Not available

Condition of Tank: Good, slight oxidation and pitting

Condition of Piping: Good, minor oxidation

3.0 METHODS AND PROCEDURES

The following section describes methods and procedures used by Nova personnel to determine the impact and extent of hydrocarbon contamination in the subsurface.

3.1 PHYSICAL OBSERVATIONS

Excavated, stockpiled soil and soil remaining in the excavation was physically observed by a Nova environmental hydrogeologist to determine the presence of hydrocarbon contamination. Observation criteria used during tank removal operations included, but were not limited to, the following:

- Petroleum related odors;
- Soil discoloration or staining;
- Texture changes in soils, and;
- Amount of moisture or liquid in soils.

3.2 H-NU PHOTOIONIZATION DETECTOR

An H-NU photoionization detector was used to determine the presence of volatile organic hydrocarbon vapors emitted from soil in the excavation and soil stockpile. The H-NU detector has a range of 0 - 2,000 parts per million (ppm) and is calibrated to a benzene standard. The instrument readings were separated into two categories; detectable and non-detectable. In-field determination of impacted soil was based on H-NU readings which were above background levels (detectable).

3.3 SOIL MONITORING

Field soil vapor analysis was performed on stockpiled soil and soil in the excavation by first removing a small area of soil to expose a fresh soil surface. The instruments probe was then placed approximately 1/4 inch from the exposed surface, and remained there for approximately ten seconds until a reading was obtained.

Jar headspace analysis was also conducted on soil samples collected from the excavation and stockpiled soil. Jar headspace analysis consisted of placing select soil samples in eight ounce clean high-density polyethylene jars, applying the screw on cap and tightly sealing each jar. The headspace was allowed to develop for at least ten minutes, with each jar vigorously shaken at the beginning and end of the development period. The H-NU probe was then placed in each jar to measure the concentration of volatile organic compounds in the headspace above the soil.

3.4 SAMPLE COLLECTION

As recommended by Minnesota Pollution Control Agency (MPCA) guidelines, soil samples were collected from the excavation base at areas of most probable release. Samples were collected from soil below each tank and from the stockpile of impacted soil. The method used for sampling consisted of obtaining three duplicate soil samples in sterile 40 ml, glass VOA vials. The samples were collected by inserting the vials directly into the soil. The vials were immediately capped and placed on ice. A sample of phase separated hydrocarbon product from the water table interface in the excavation base was also collected for laboratory product identification. Samples were taken to SERCO Laboratories, Inc. of St. Paul, Minnesota for analysis.

3.5 LABORATORY ANALYTICAL METHODS

The type of analysis was based on the type of substance reportedly stored in the tanks (diesel fuel, unleaded gasoline) and MPCA guidelines. Soil samples collected from the excavation base (under each tank) and the segregated soil pile were analyzed for Benzene, Toluene, Ethyl Benzene, Xylenes, Total Hydrocarbons as Fuel Oil, Total Hydrocarbons as Gasoline and Methyl Tertiary Butyl Ether. The phase separated hydrocarbon sample was compared to several product standards for identification. See laboratory analysis, Appendix A, for complete list of compound analyses.

4.0 SUMMARY OF REMOVAL ACTIVITIES

Tank removal activities were performed Friday, October 20, 1989. Soil excavation and tank removal was performed by Minnesota Department of Transportation personnel and began at approximately 7:30 am. A Nova environmental hydrogeologist arrived on-site at 8:30 am. Prior to Nova's arrival, the 3,000 gallon tank had been removed from the excavation, the top of the 1,200 gallon was exposed, all lines were disconnected and approximately 130 yards of soil was stockpiled. Nova proceeded to physically inspect and analyze the soil stockpile with the H-NU detector (both field scan and headspace on four samples). All observations and PID analysis indicated extensive petroleum hydrocarbon contamination (field scan with H-NU> 20 ppm, H-NU headspace >40 ppm).

Following the inspection of the stockpiled soil the Nova hydrogeologist entered the excavation and inspected the base and walls surrounding the former 3,000 gallon tank and the soils surrounding the 1,200 gallon tank, which was still in place. All observations and PID analysis indicated extensive soil contamination in both areas.

Determan Welding and Tank Services of Maple Plain Minnesota arrived on site at approximately 10:30 am to purge volatile hydrocarbon vapors from the 1,200 gallon gasoline storage tank. Vapor purging consisted of inserting dry ice inside the tank.

Following vapor purging, the 1,200 gallon tank was removed from the excavation. Approximately thirty yards of soil was excavated during the tank removal. Based on the previous inspection of soils surrounding the 1,200 gallon tank (positive identification by physical observations and PID analysis), the soil was stockpiled.

Following removal of the 1,200-gallon tank, the Nova hydrogeologist entered the excavation to inspect soil quality at the base of the former tank and to investigate soils below the excavation base. Several buckets of soil were removed to expose the soils located several feet below the tanks. During this vertical excavation ground water and phase separate hydrocarbons (PSH) were discovered. Based on that discovery, the apparent high permeability of the water/PSH bearing coarse sand and gravel,and the subsequent low feasibility of complete contamination removal through excavation, Nova recommended that no further soil removal occur. Soil samples for laboratory analysis were then collected in the excavation base below each former tank (above ground water) as required by the MPCA. A PSH sample was collected for laboratory analysis.

Approximately 160 yards of contaminated soil was removed from the excavation and stockpiled in plastic on-site. If requested Nova will work to secure approval for disposal of the soil in spring. The excavation was backfilled with clean sand brought in by the Minnesota Department of Transportation.

Each tank was physically inspected and photographed following its removal from the excavation and placement on the surface. The tanks were transported and disposed of by Determan Welding and Tank Services.

Photographs were taken of the tank removal and are contained in Appendix B. A complete list of contractors is contained in Appendix C. The list includes contact personnel, telephone numbers and addresses.

5.0 RESULTS

The following are summaries of the analytical data acquired during tank removal activities.

5.1 SOIL VAPOR MONITORING

The following is a summary of the H-NU detector field soil analysis. The complete analytical report is included in Appendix D.

TABLE 5-1
H-NU DETECTOR ANALYSIS

Location	Depth	H-NU Headspace Analysis
Excavation base diesel tank*	9.5 feet	70
East wall by diesel tank	5 feet	1.0
Excavation base unleaded gasoline tank*	9.5 feet	50
East wall unleaded gasoline tank	5 feet	15
East wall center excavation base	3 feet	4
Between tanks	10 feet	150
Ground water/PSH*	10 feet	150
Stockpiled soil:		
- North*		60
- South		50
- East		60
- West		40

All results in ppm (parts per million)

*Laboratory sample locations

5.2. LABORATORY ANALYTICAL RESULTS

The following is a summary of the laboratory soil analysis and phase separated hydrocarbon (PSH) identification. The complete laboratory report is included in Appendix A.

TABLE 5-2
LABORATORY SOIL ANALYSIS

Type Analysis	Excavation Base Diesel Tank 332	Excavation Base Unleaded Tank 331	Stockpiled Soil	PSH Identification
Benzene	<.005	<0.020**	0.028	<250**
Toluene	<.005	<0.020**	0.23	<250**
Ethyl benzene	0.022	2.3	0.072	1500
Xylenes	0.055	2.0	0.82	1300
Total Hydrocarbons as #2 fuel oil	21	1600	130	***
Total Hydrocarbons as gasoline	*	*	*	*
MTBE	<0.010	<0.040**	<0.020**	<500**

All results listed in ppm (parts per million)

*Unable to quantify due to high fuel concentration.

**Increased detection limits due to increased contamination

***Sample appears to be 9.9% fuel oil (40 ml sample vial contained a mixture of ground water and PSH. Laboratory analysis was performed on composite sample from vial. Percentage (9.9% fuel oil) is based on total fluid contained in sample vial and suggests remaining 90.1% of fluid is comprised of water).

6.0 REGIONAL GEOLOGY

The unconsolidated sediment underlying the Sand Creek area, including the Jordan Truck Station facility, are comprised of flood plain alluvium deposits consisting of clay and silt interbedded with sand and gravel. The alluvium deposits are commonly encountered at surface and may range in thickness from three to ten feet. The alluvium sediments are underlain by several deposits (laterally non-homogeneous, vertically homogeneous) ranging in compositions from peat, till and sand and gravel outwash. The unconsolidated sediment in this area is approximately 50 feet thick and is underlain by bedrock.

Bedrock is estimated at a depth of approximately 50 feet below surface and is classified as the St. Lawrence Formation. This formation may range in thickness from approximately 45 to 60 feet and is chiefly comprised of a silty dolomite interbedded with siltstone, soft shale and very fine grained quartzose sandstone. The St. Lawrence Formation is underlain by the Franconia Formation. This formation ranges in thickness from 130 - 150 feet and is comprised of a very fine grained glaconite quartzose sandstone and shale.

References/Geology:

1) Arnow, Saul and Hobbs, Howard C.; "Surficial Geological Map"; Minnesota Geological Survey County Atlas Series, Map C-1, Plate 2; 1982.

2) Meyer, Gary N.; "Surficial Geologic Cross Sections"; Minnesota Geologic Survey County Atlas Series, Map C-1, Plate 3; 1982.

3) Hobbs, Howard C. and Goeble, Joseph E.; "Geologic Map of Minnesota - Quaternary Geology"; Minnesota Geologic Survey; 1982.

4) Kanivetsky, Roman; "Hydrogeologic Map of Minnesota - Quaternary Geology"; Minnesota Geologic Survey; 1979.

5) Ojakangas, Richard W. and Matsch, Charles L.; "Minnesota's Geology"; University of Minnesota Press; 1982.

6) Olson, Bruce M.; "Bedrock Geology Map"; Minnesota Geological Survey County Atlas Series, Map C-1, Plate 5; 1982.

6.1 SEDIMENT OBSERVATION

The material encountered in the tank excavation consisted of approximately seven feet of a silty clay with sand. This material was underlain by a very coarse sand and gravel. This coarse sediment was encountered at a depth of approximately seven feet. The vertical extent of the excavation did not penetrate the entire vertical extent of the coarse sand and gravel material. Ground water was encountered in the coarse sand and gravel at a depth of approximately 10 to 11 feet.

7.0 HYDROGEOLOGY

Ground water was encountered in the open excavation under unconfined conditions at a depth of approximately ten feet below grade. Based on Minnesota Geologic Survey Map information, surficial ground water movement in this area appears to be in a northwest direction toward the Minnesota River.

References/Hydrogeology:

Kantivesky, Roman and Palen, Barbara; "Hydrogeology of Scott County"; Minnesota Geologic Survey County Atlas Series, Map C-1, Pate 6; 1982.

8.0 DISCUSSION

The information and data collected during tank removal activities at the Minnesota Department of Transportation's Jordan Truck Station indicates a release of petroleum hydrocarbons to the subsurface has occurred. This conclusion is based on the discovery of petroleum hydrocarbons in the soil surrounding (above ground water) the two former underground storage tanks and the identification of phase separated hydrocarbons floating on the water table interface. Laboratory analysis of the phase separated hydrocarbons identified the composition as #2 fuel oil.

Several possibilities exist for the source of the petroleum hydrocarbon contaminated soils and phase separated hydrocarbons. Several potential sources are as follows:

- Tank failure;
- Tank/piping connection failure;
- Line failure;
- Tank overfill, and;
- Surface spills in vicinity of tanks.

Visual observations indicate both tanks were in fairly good condition with only slight oxidation and pitting. Although conditions appeared good, the possibility still remains that a hole which was not visible (i.e. overlooked, covered by dirt, covered by oxidation) may have existed in either tank. Since a majority of tank removal activities (i.e. disconnection and removal of piping, removal and stockpiling of soils above and surrounding the tanks and the removal of the diesel fuel tank) were completed prior to Nova's arrival on site, the exact nature and source of the release (other than verifying the tank system as a whole failed) could not be determined by Nova's field personnel.

The base of both tanks were situated above the water table in a very coarse sand and gravel. Ground water/phase separated hydrocarbons were discovered below the tanks (approximately 2 feet below tank #331 and 1 foot below tank #332) in the excavation base at a depth of approximately ten feet. Due to the coarseness (*estimated hydraulic conductivity of 10^{-1} to 1.0 cm/sec.) of the sand and gravel and the small distance between the tanks and ground water it is feasible to expect that a majority of lost hydrocarbons would enter the shallow unconfined aquifer system. Therefore, the potential for extensive hydrocarbon migration along with ground water and the subsequent development of significant phase separated and dissolved phase contaminant plumes exists. At present time, there is not enough data (i.e. ground water flow direction, ground water velocity, site soil conditions outside the tank area) to estimate the extent of hydrocarbon migration.

*Reference: Freeze, R. Allan, Cherry, John A.; "Groundwater"; Prentice-Hall, Inc.; 1979; pg. 29.

The vertical distance between the surficial water table and bedrock is approximately 40 feet. Since petroleum type hydrocarbons (i.e. fuel oil and gasoline) have lower specific gravities than water (compounds float on water), the surficial ground water will act as a barrier, restricting vertical (downward) migration of the petroleum contamination to the bedrock environment. The majority of the release will remain at or near the surficial water table with horizontal migration in the direction of ground water flow.

Due to the geological (coarse sand and gravel) and hydrogeological (shallow water table) site conditions and location of phase separated hydrocarbons on the water table it was determined that soil excavation of the entire vertical and horizontal extent of contamination was not a feasible remedial action. Based on that conclusion soil excavation was limited to the amount necessary for removal of the tanks.

9.0 RECOMMENDATIONS

Based on physical observation of geological and hydrogeological subsurface conditions and field and analytical data Nova recommends that Phase II Remedial Investigation work be performed at the Minnesota Department of Transportation Jordan Truck Facility. The objective of the Remedial Investigation should be to identify the vertical and horizontal extent of petroleum impact to the soil and ground water and examine the potential liabilities associated with off property migration into the residential areas.

Approximately 160 yards of contaminated soil remain stockpiled on site. Due to the approach of winter, soil disposal is not feasible at this time. Nova recommends that the soil remain in place until spring. At that time the following disposal methods may be examined:

- o Incorporating contaminated soils in the road base;
- o Asphalt plant incineration, or;
- o Thin spreading.

If requested, Nova will help to secure the disposal approval of the soil at the appropriate time.

10.0 GENERAL REMARKS

The services performed by the geotechnical and environmental scientists on this project have been conducted with that level of care and skill ordinarily exercised by reputable members of the profession, practicing in the same locality, under similar budget and time constraints. No warranty is made or intended.

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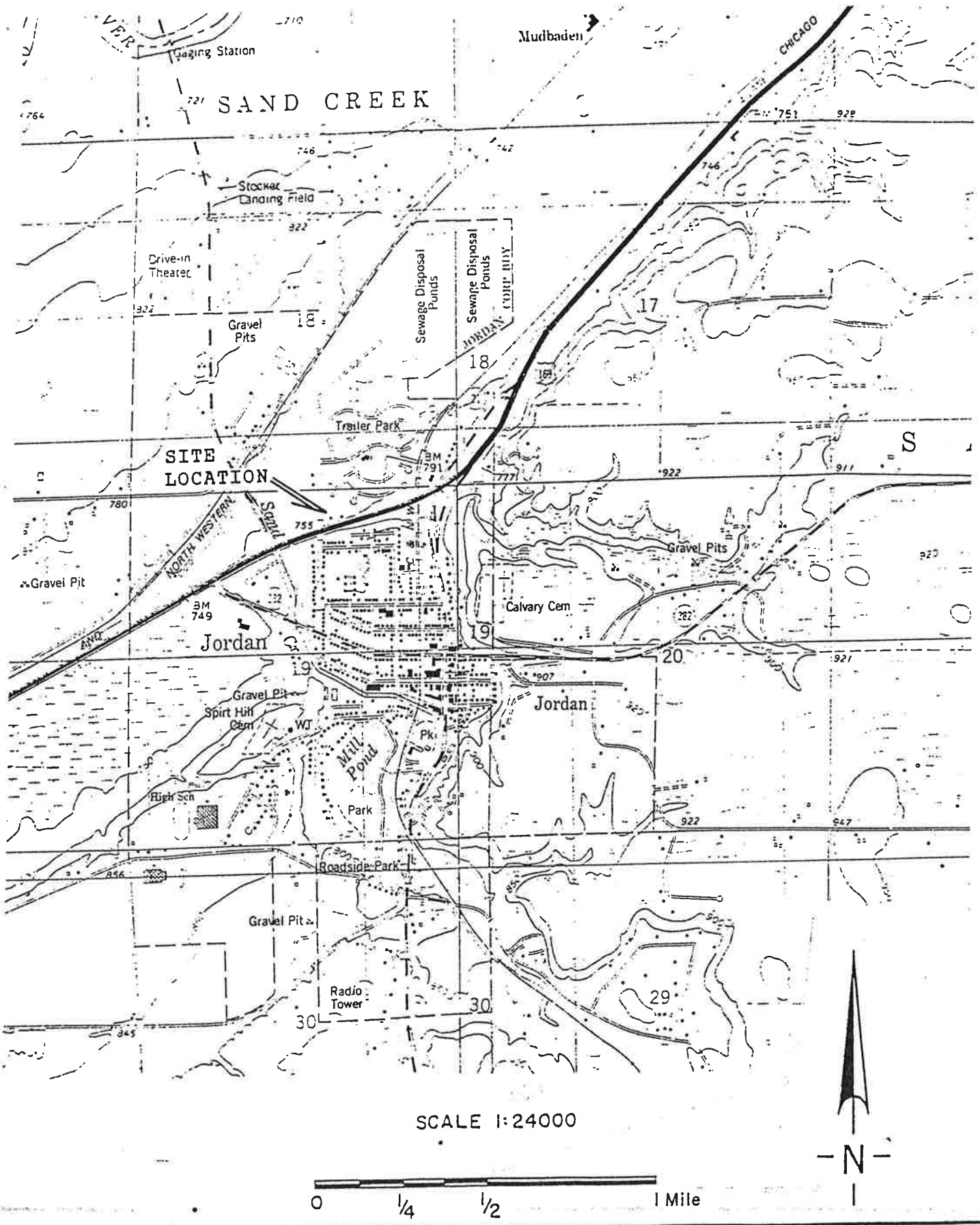
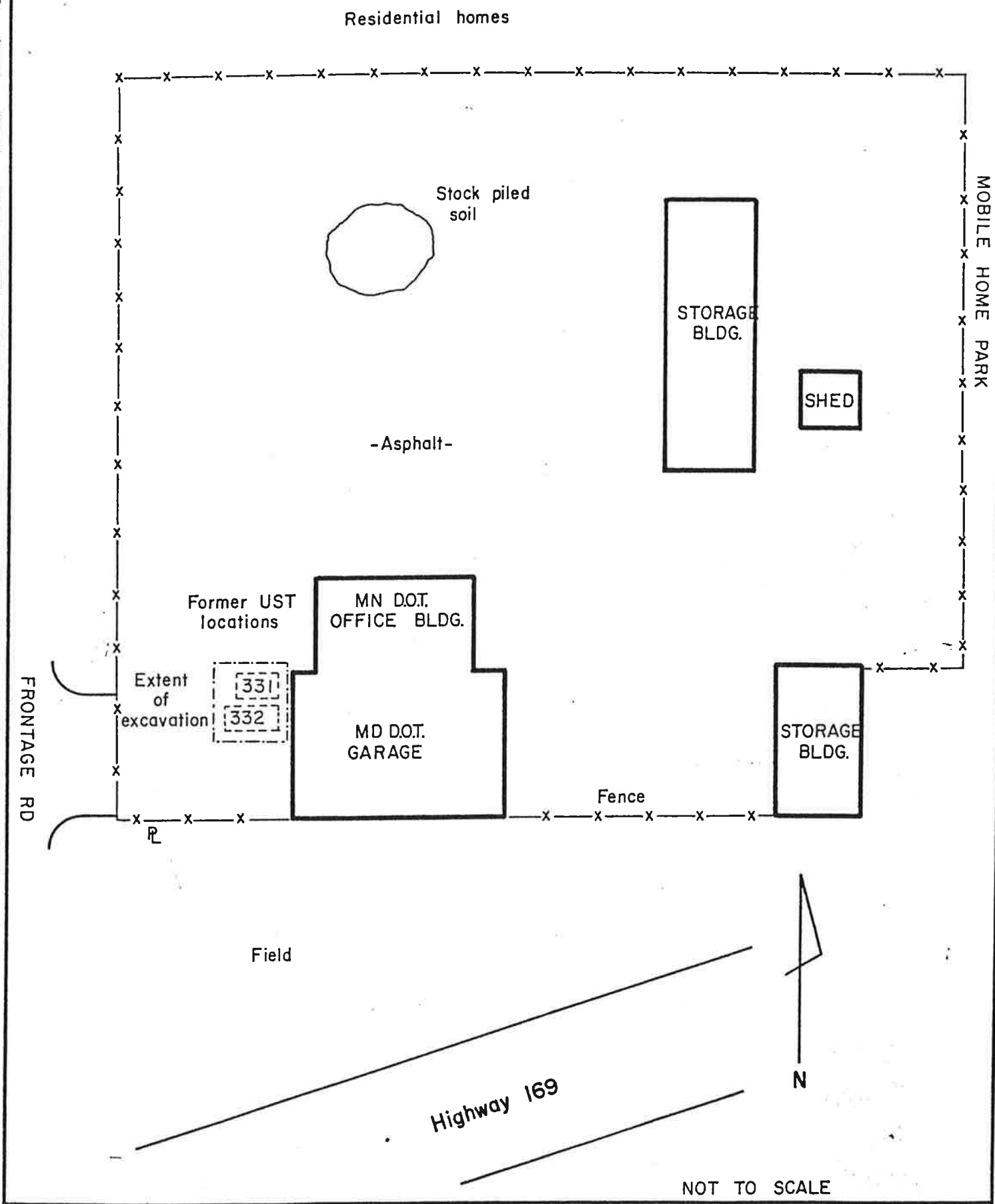


SITE LOCATION MAP MN DOT JORDAN TRUCK STATION	NOVA Environmental Services, Inc.	M89604 1-1



SITE MAP MN DOT JORDAN TRUCK STATION	NOVA Environmental Services, Inc.	M89604 2-1

APPENDIX A

LABORATORY ANALYSIS REPORT

SERCO Laboratories

1931 West County Road C2 St Paul, Minnesota 55113 (612) 636-7173

REVISED

LABORATORY ANALYSIS REPORT NO: 2541 PAGE 1
11/15/89

Nova
1107 Hazeltine Blvd
Suite 420
Chaska, Mn 55318

DATE RECEIVED: 10/20/89
COLLECTED BY : CLIENT
DELIVERED BY : CLIENT
SAMPLE TYPE : SOIL
LIQUID

Attn: Ed Radecki

SERCO SAMPLE NO:	72319	72329	72339	72349
SAMPLE DESCRIPTION:	M89-604 Base Under No Lead	M89-604 Base Under Diesel	M89-604 Stock pile	M89-604 Product ID
ANALYSIS:				
Benzene, mg/kg	<0.005	<0.020**	0.028	<250**
Toluene, mg/kg	<0.005	<0.020**	0.23	<250**
Ethylbenzene, mg/kg	0.022	2.3	0.072	1500
Xylene, mg/kg	0.055	2.0	0.82	1300
Methyl Tertiary Butyl Ether, mg/kg	<0.010	<0.040**	<0.020**	<500**
FID Scan, mg/kg, as #2 fuel oil	21	1600	130	***
FID Scan, mg/kg, as gasoline	*	*	*	*

* Unable to quantify due to high fuel concentration.
** Increased detection limits due to high levels of contamination.
*** Sample appears to be 9.9% fuel oil.

< means "not detected at this level". 1 mg = 1000 ug.

Member

SERCO Laboratories

1931 West County Road C2. St Paul. Minnesota 55113 (612) 636-7173

All analyses were performed using EPA or other accepted methodologies. Samples that may be of an environmentally hazardous nature will be returned to you. Other samples will be stored for 30 days from the date of this report. then disposed of by SERCO LABORATORIES. Please contact me if other arrangements are needed.

Report submitted by,

Diane J. Anderson

Diane J. Anderson
Project Manager

< means "not detected at this level". 1 mg = 1000 ug.

Member

NOVA Environmental Services, Inc.

Minneapolis Office ☒
1107 Hazeltine Blvd. Ste. 420
Chaska, MN 55318
(612) 448-9393
Fax # 612-448-9572

Chain of Custody Record

Chicago Office ☐
O'Hare Atrium Office Plaza, Ste 170
2860 River Road
Des Plaines, Il 60018
(312) 803-4510
Fax # 312-803-0780

Name of Project	Project Number	Project Manager
MNDOT / JORDAN	M89-604	ED RADECKI

Project Location: JORDAN, MN

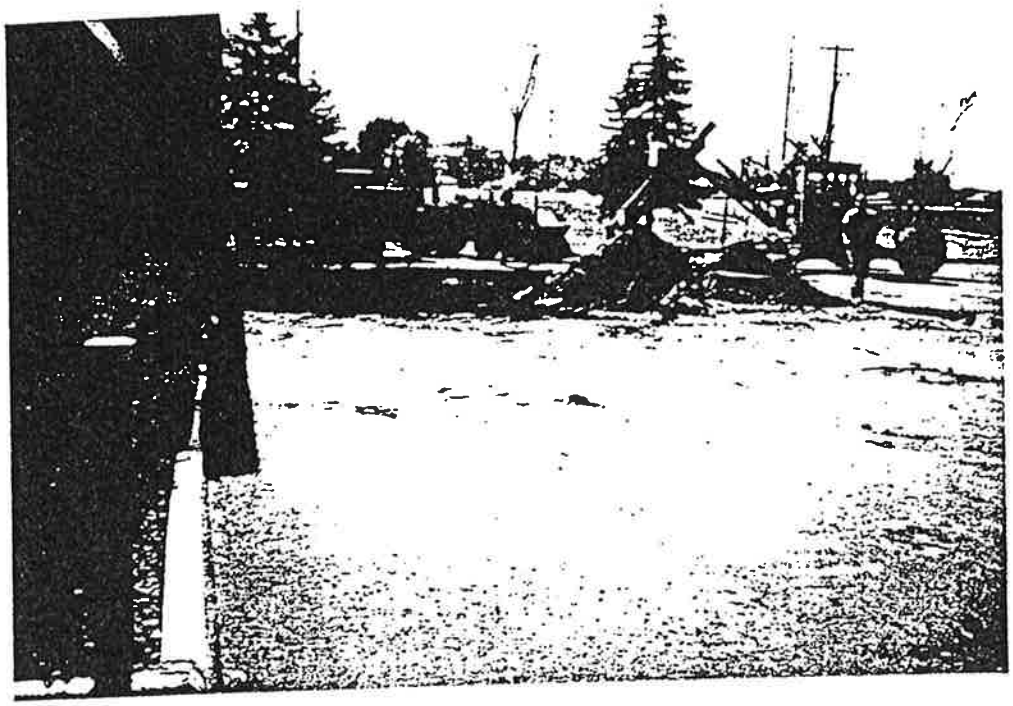
Specials Instructions: CALL ED RADECKI IF you have any questions regarding product I.D.

Sample No.	Time	No. & Vol. of Containers	Station Location	Requested Analysis: MTBE	BTEX	THC as Gasoline	THC as Fuel Oil	Product I.D.	Sample Description / Remarks
1		1	EXCAVATION BASE UNDER #10 LEAD TANK : 8'	X	X	X	X		
2		1	EXCAVATION BASE UNDER DIESEL TANK : 9'	X	X	X	X		
3		1	Stockpile 1 Soil / Pile	X	X	X	X		
4		1	EXCAVATION BASE : 12'	X	X	X	X	X	Suspect Fuel was Diesel Fuel and/ or UNLEADED GASOLINE

Sampler (Signature)	Relinquished By	Affiliation	Date	Time	Received By	Affiliation	Date	Time
Ed Radecki	Ed Radecki	NOVA	10/20/89					
Affiliation: NOVA			10-20	4:30			10/20	3:40
							10/20	4:30
Date: 10/20/89	Time: 2:00 PM							

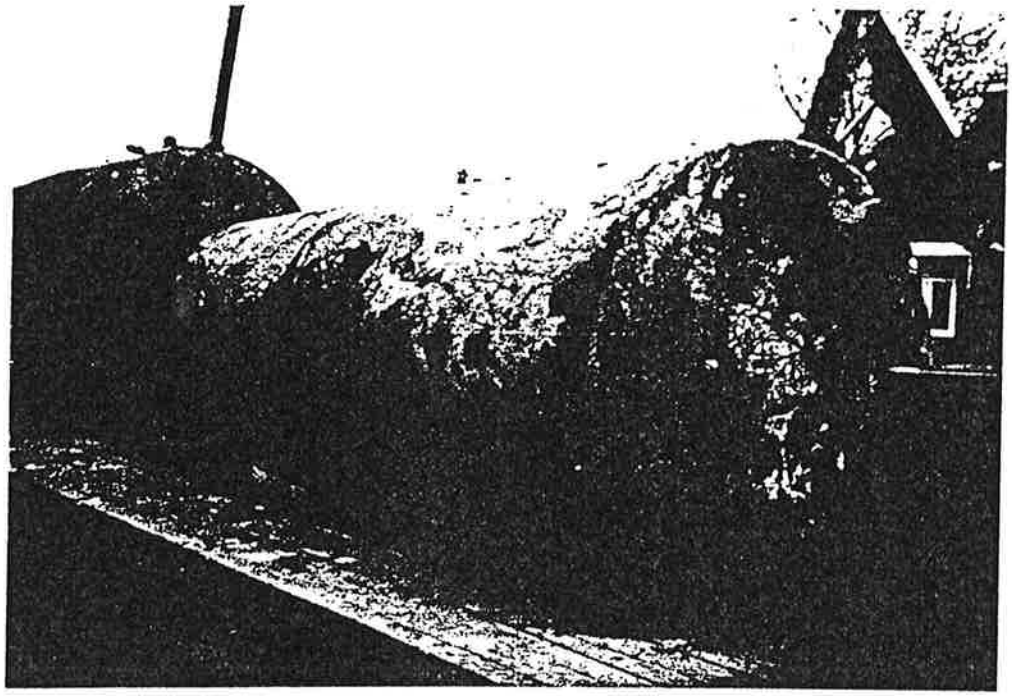
APPENDIX B

PHOTOGRAPHIC DOCUMENTATION

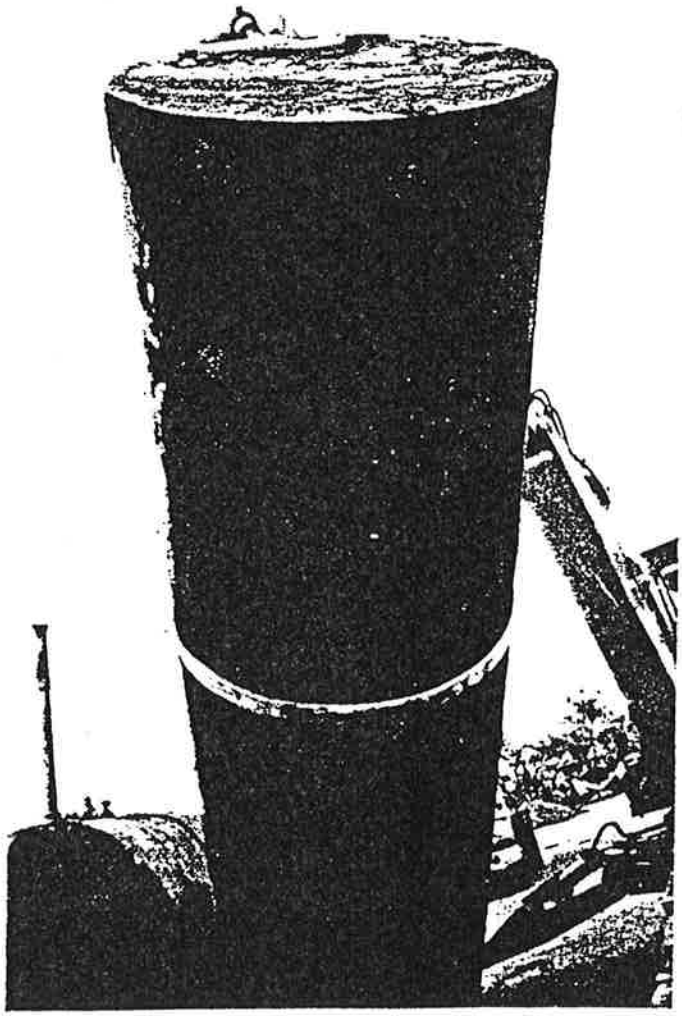


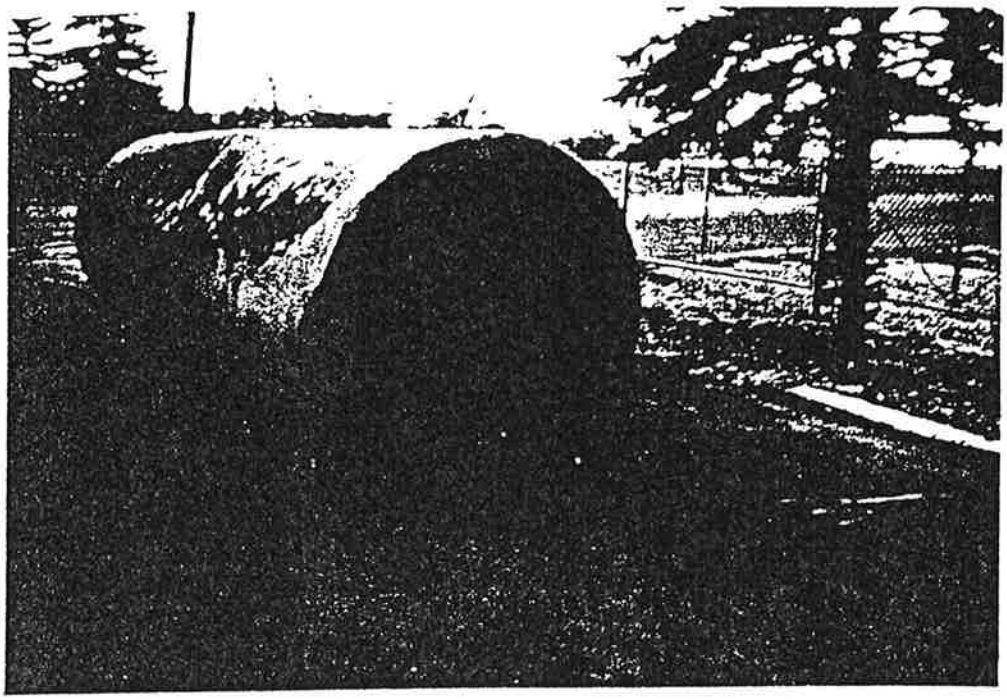
View of Excavation (Looking South)

View of Site (Looking East)

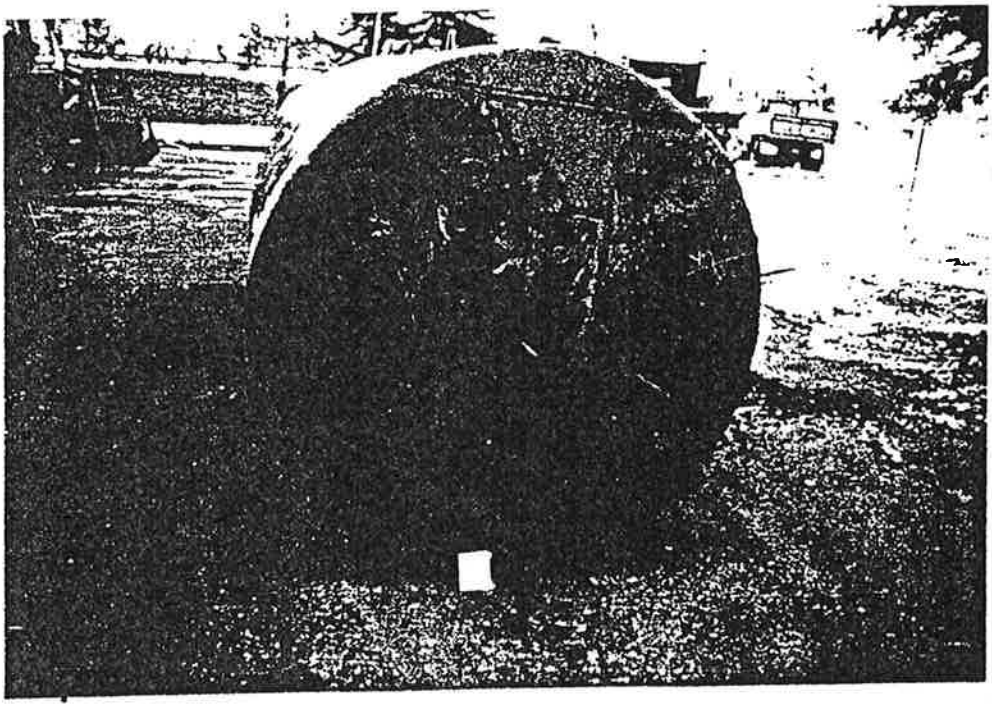


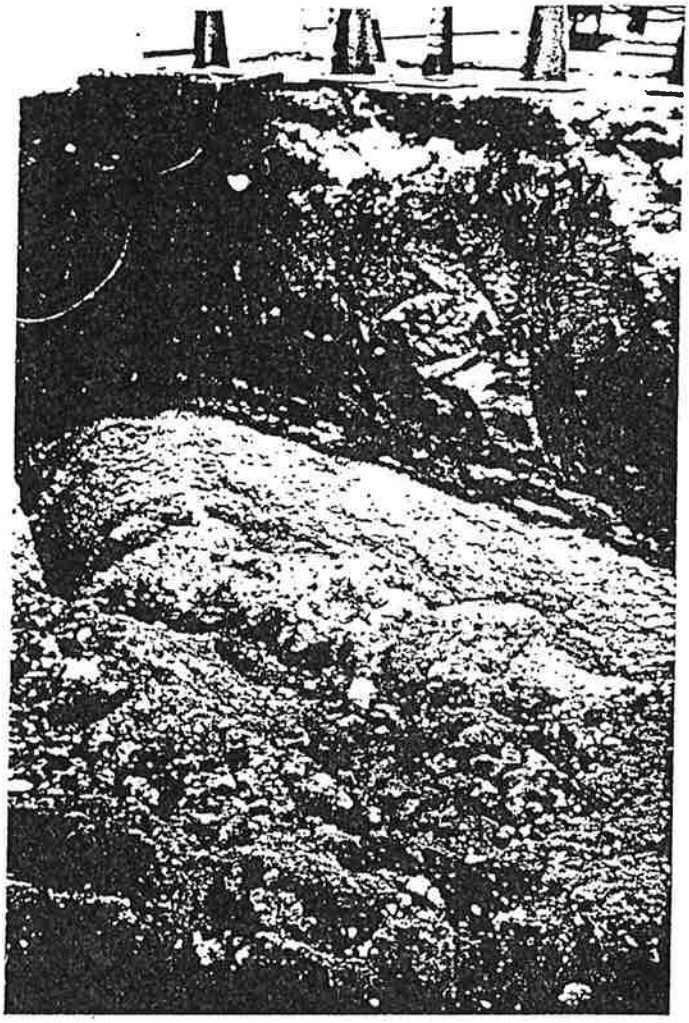
TANK 331 (UNLEADED FUEL)



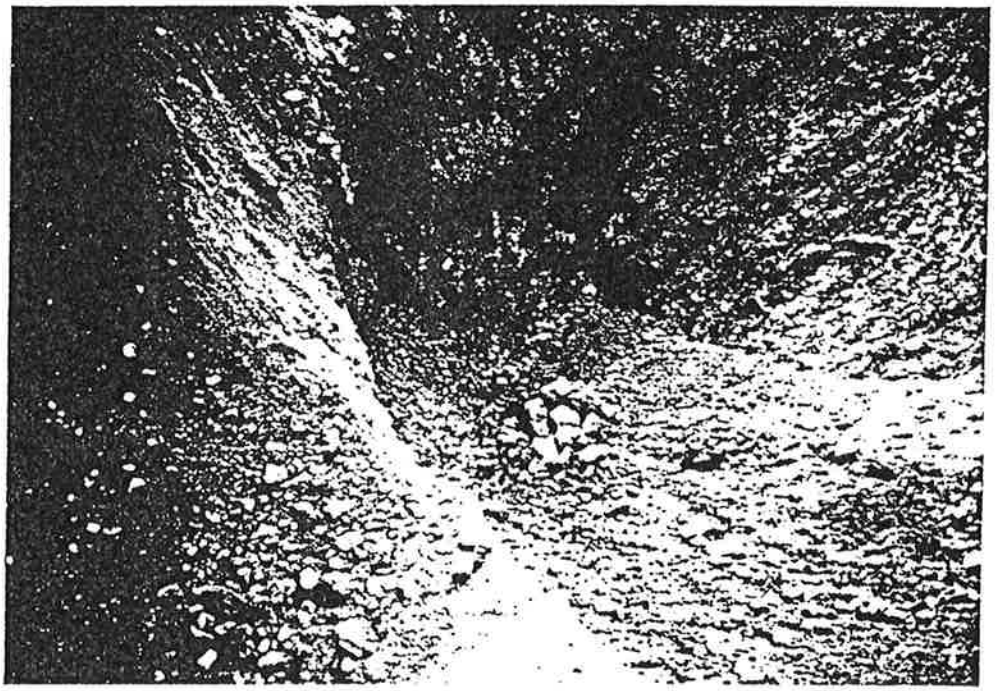


TANK 332 (DIESEL FUEL)





Excavation Base
(South East Corner)



Excavation Base (West Side Center)

APPENDIX C

LIST OF CONTRACTORS

Nova Environmental Services, Inc.
1107 Hazeltine Boulevard, Suite 420
Chaska, Minnesota 55318
(612) 448-9393
Contact Person: Edward Radecki
Service: Subcontracting, Monitoring, Sampling, Reporting

Determan Welding and Tank Service
1241 - 72nd Avenue Northeast
Fridley, Minnesota
(612) 571-8110
Contact Person: Gerald Korb
Service: Residual fuel removal and disposal, tank destruction and disposal

Serco Laboratories, Inc.
1931 West County Road C2
St. Paul, MN 55113
(612) 636-7173
Contact Person: Diane Anderson
Service: Laboratory analysis of soils

APPENDIX D

SOIL VAPOR MONITORING REPORT

PROJECT: MN DOT Jordan Truck Station
PROJECT NO.: M89-604
LOCATION: Jordan, MN

Analyst: E. Radecki
Calibration Data: 58 ppm @ 3.6 span
Background (0-20 Scale): 0.4 ppm

Date Analyzed	Location	Depth Feet	H-NU Field (ppm)	H-NU Headspace (ppm)	H-NU Corrected Headspace (ppm)	Scale (ppm)
10-20-89	Excavation Base (331)	9.5		70		0-200
	East Wall (331)	5.0		1.4*	1.0	0-20
	Excavation Base (332)	9.5		50		0-200
	East Wall (332)	5.0		15		0-20
	East Wall Center	3.0		4		0-20
	West Base Center	10.0		150		0-200
	Ground water/PSH	10.0		150		0-200
	Stockpiled Soil					
	North	NA		60		0-200
	South	NA		50		
	East	NA		60		
	West	NA		40		

COMMENTS:
NA= Not Applicable
*: Corrected heads are used for analysis less than 5 ppm

H-NU PHOTOIONIZATION DETECTOR ANALYSIS

NOVA Environmental Services, Inc.