

August 4, 1987

P & F, Inc.  
Attn: Mr. Peter Flink  
3425 Washington Drive  
Eagan, MN 55121

C.G. Kruse P.E., President  
J.S. Braun P.E., Vice President  
R.V. Blomquist, Ph.D., Vice President/  
Manager

RE: E87-190 UNDERGROUND STORAGE  
TANK INVESTIGATION  
Union 76 Gasoline  
Station  
Prior Lake, MN

Mr. Flink:

In accordance with your authorization of July 16, 1987, we have completed the investigation at the above referenced site. The investigation consisted of four soil borings around several underground storage tanks located at the site. The purpose of the investigation was to determine if leaking had occurred next to the underground storage tanks.

In summary, an elevated level of soil contamination was detected in boring ST-3. No free product was observed in the soils at this location. No soil contamination was noted in boring locations ST-1, ST-2, or ST-4.

State law requires that the Minnesota Pollution Control Agency (MPCA) be notified concerning the soil contamination discovered on the study site.

Please refer to the attached report for details and results of this investigation.

August 4, 1987

We appreciate the opportunity to provide our professional services on this project. Should you have any questions regarding the contents of this report, please do not hesitate to contact us at your convenience.

Very truly yours,

BRAUN ENVIRONMENTAL LABORATORIES, INC.

*Charles R. Geisler*

Charles R. Geisler  
Environmental Geologist

*Paul R. Book*

Paul R. Book, CPGS  
Environmental Geology Manager

CRG/PRB:jmd



August 4, 1987

RE: E87-190 UNDERGROUND STORAGE  
TANK INVESTIGATION  
Union 76 Gasoline  
Station  
Prior Lake, MN

A. INTRODUCTION

A.1. Scope: This investigation included the conduct of four soil borings and chemical analysis of soil samples.

A total of four standard penetration test borings were conducted between July 16, and July 20, 1987. Boring depths ranged from 21-50 feet. Soils were checked on-site using odor and visual criteria for petroleum contamination. One soil sample was collected for a petroleum scan.

A.2. Background: It is our understanding that the current Union 76 gasoline station in Prior Lake will be renovated into another gasoline station. It is anticipated that all existing underground storage tanks will be removed and replaced with new tanks.

B. METHODS AND PROCEDURES

B.1. Field Testing and Sampling: The penetration test borings were performed between July 16, and July 20, 1987, with a core and auger drill unit mounted on a flotation-tired carrier. Sampling for the borings was conducted in accordance with ASTM D 1586 "Penetration Test and Split-Barrel Sampling of Soils." Using this method, we advanced the bore hole with hollow-stem auger to the desired test depth. Then a 140-pound hammer falling 30 inches drove a standard, 2-inch OD, split-barrel sampler a total penetration of 1 1/2 feet below the tip of the hollow-stem auger.



The blows for the last foot of penetration were recorded and are an index of soil strength characteristics. Samples were taken at 5-foot intervals to the termination depth of the borings. Immediately after taking the final sample at the bottom of the boring, the bore hole was probed through the hollow-stem auger to check for the presence of ground water.

B.2. Soil Classification: Soils encountered in the borings were visually and manually classified in the field by the crew chief in accordance with ASTM D 2487 "Unified Soils Classification System" and ASTM D 2488 "Recommended Practice for Visual and Manual Description of Soils." A copy of ASTM D 2487 is attached. All samples were then returned to the laboratory for review of the field classifications by a geologist. Representative samples will remain in our Minneapolis office for a period of 60 days to be available for your examination.

B.3. Field Contamination Detection Procedures: During the field sampling, all soil samples and auger cuttings were analyzed with an H-Nu photoionization detector to detect for the presence of petroleum contamination. In addition, all soils were given a visual examination which involved looking for a "sheen" typically seen in petroleum contaminated soils.

B.4. Chemical Analysis: One soil sample was collected from boring ST-3 and was analyzed for benzene, toluene, xylenes, and total hydrocarbons expressed as fuel oil #1. All analysis were performed by EPA or other recognized standard procedures.

### C. RESULTS

C.1. Logs: Log of Boring sheets indicating the depths and descriptions of the various soil strata, the penetration

resistances, and water level information are attached. The depths shown as changes between the strata are only approximate. The actual changes are likely transitions, and the depths of the transitions likely vary horizontally.

C.2. Soils Encountered: In general, the borings encountered 2 inches of bituminous pavement overlying 6 to 7 feet of possible fill (silty sand and silty clayey sand). Beneath the fill, glacial outwash (poorly graded sand) overlying glacial till (sandy lean clay) in turn overlying glacial outwash (poorly graded sand) was encountered to the termination depth of the borings. Slight petroleum odors were detected at the 15 and 20 foot depths in boring ST-3. No visual signs of free product were noted in the soils at this location. No soil contamination was detected in borings ST-1, ST-2, or ST-4.

Borings ST-3 and ST-4 were drilled to depths of 50 feet. No water table was encountered to these depths. Based on our in-field observations, a water table likely exists on this site at depths greater than 55 feet.

C.3. Chemical Analysis: The results of our chemical analysis for the soil sample taken at 20 feet from boring ST-3 are shown in the table below.

TABLE I

<u>Parameters</u>	<u>Results</u>
Benzene, mg/kg	<1.0
Toluene, mg/kg	<1.0
Xylenes, mg/kg	<1.0
Total Hydrocarbons as Fuel Oil #1, mg/kg	1000





As shown in the table above, a high level of total hydrocarbons expressed as fuel oil #1 is present in soil boring ST-3. In addition, benzene, toluene and xylenes are quite low in concentration because fuel oil #1 typically does not contain significant quantities of these aromatic compounds. No soil contamination was detected in borings ST-1, ST-2 or ST-4.

Based on the results of the chemical analysis and our field observations, the area exhibiting the highest level of soil contamination appears to be limited around the diesel tank in the northern portion of the site. Additional soil borings would be required to determine the horizontal limits of the contamination.

#### D. ANALYSIS AND RECOMMENDATIONS

It is the responsibility of the current owner to notify the MPCA concerning the soil contamination found on the study site.

After the MPCA evaluates the chemical data and site conditions, remedial alternatives can be addressed.

It is our opinion that the contamination found at the study site poses a low risk of contaminating the underlying aquifer. A 2-4-foot thick low permeability layer of sandy lean clay underlies the contamination zone found at 15-20 feet in the sandy soils. A water table was not encountered to a depth of 50 feet in the borings on this site.

Based on this data, the MPCA may not require that any remedial action be taken.

We would be pleased to meet with you and representatives of the MPCA to discuss these or other remedial alternatives.



GENERAL REMARKS

Services performed by the geotechnical and environmental scientists for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

# LOG OF BORING



PROJECT: E87-190		UNDERGROUND STORAGE TANK INVESTIGATION		BORING: ST-1	
		Union 76 Station 4th St. & Dakota St. Prior Lake, MN		LOCATION: See Attached Sketch.	
		DATE: 7/16/87		SCALE: 1" = 4'	
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPFWL	Tests or Notes
94.6	0	SM	ILLINOIS PAVEMENT POSSIBLE FILL: SILTY SAND, fine to medium-grained, a trace of Gravel, brown, moist.		
87.6	7	SP	POORLY GRADED SAND, fine to medium-grained, with Gravel and large Cobbles at 20', brown, moist, medium dense to dense. (Glacial Outwash)	4 16 15/18 34	BENCH MARK: Top of nut on hydrant located at SE corner of Dakota Street and Main street. Assumed elevation = 100.0'.
71.1	23.5		END OF BORING. Refusal on Cobbles at 23.5'. Water level not encountered with 23' of hollow-stem auger in the ground. Water level not encountered to cave-in depth of 18' immediately after withdrawal of auger.		

(See Report and Standard Plates for evaluation and descriptive terminology.)



# LOG OF BORING



PROJECT: E87-190 UNDERGROUND STORAGE TANK INVESTIGATION Union 76 Station 4th St. & Dakota St. Prior Lake, MN		BORING: ST-2 LOCATION: See Attached Sketch.		DATE: 7/20/87 SCALE: 1" = 4'		
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
94.4	0	SM	BILUMINOUS PAVEMENT POSSIBLE FILL: SILTY SAND, fine to medium-grained, a trace of Gravel, brown, moist.			
88.4	6	SP-SM	POORLY GRADED SAND with SILT, fine to medium-grained, a trace of Gravel, brown, moist. (Glacial Outwash)			
72.9	21.5		END OF BORING. Refusal on Cobbles at 21.5'. Water level not encountered with 21' of hollow-stem auger in the ground. Water level not encountered to cave-in depth of 14' immediately after withdrawal of auger.			

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING



PROJECT: E87-190 UNDERGROUND STORAGE TANK INVESTIGATION Union 76 Station 4th St. & Dakota St. Prior Lake, MN		BORING: ST-3				
		LOCATION: See Attached Sketch.				
		DATE: 7/20/87	SCALE: 1" = 4'			
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
95.6	0	SC-SM	POSSIBLE FILL: SILTY CLAYEY SAND, fine to medium-grained, a trace of Gravel, dark brown, moist.			Sheet 1 of 2
89.6	6	SP-SM	POORLY GRADED SAND with SILT, fine to medium-grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash)	10		
81.6	14	SP	POORLY GRADED SAND, fine to medium-grained, with Gravel, brown, moist, medium dense to dense. (Glacial Outwash)	13		Slight petroleum odor noted at 15' and 20'.
69.6	26	CL	SANDY LEAN CLAY, a trace of Gravel, grayish-brown, wet, rather soft. (Glacial Till)	21		
65.6	30		(Continued on Sheet 2)	22		
				40/52		
				9		

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING



PROJECT: E87-190		UNDERGROUND STORAGE TANK INVESTIGATION Union 76 Station 4th St. & Dakota St. Prior Lake, MN		BORING: ST-3 (Continued)		DATE: 7/20/87		SCALE: 1" = 4'	
LOCATION:									
Elev. 65.6	Depth 30	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests	Notes		
62.6	33	CL	SANDY LEAN CLAY, a trace of Gravel, grayish-brown, wet, rather soft. (Glacial Till)				Sheet 2 of 2		
		SP	POORLY GRADED SAND, fine to medium-grained, brown, moist, medium dense. (Glacial Outwash)	19					
				25					
				26					
45.1	50.5			17	31				
END OF BORING.									
Water level not encountered with 50' of hollow-stem auger in the ground.									
Water level not encountered to cave-in depth of 39' immediately after withdrawal of auger.									

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING



PROJECT: E87-190		UNDERGROUND STORAGE TANK INVESTIGATION		BORING: ST-4	
		Union 76 Station 4th St. & Dakota St. Prior Lake, MN		LOCATION:	
		See Attached Sketch.		DATE: 7/20/87	
		SCALE: 1" = 4'		Tests or Notes	
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF WL	Sheet 1 of 2
94.9 94.7	0	SM	<del>ILLUMINOUS PAVEMENT</del> POSSIBLE FILL: SILTY SAND, fine to medium-grained, a trace of Gravel, dark brown, moist.	11	
88.9	6	SP-SM	POORLY GRADED SAND with SILT, fine to medium-grained, with Gravel, brown, moist, medium dense. (Glacial Outwash)	16	
				18	
				26	
66.9	28	CL	SANDY LEAN CLAY, a trace of Gravel, brown, wet, rather soft. (Glacial Till)	26	
64.9	30			12	
			(Continued on Sheet 2)		

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING



PROJECT: E87-190		UNDERGROUND STORAGE TANK INVESTIGATION		BORING: ST-4 (Continued)	
		Union 76 Station 4th St. & Dakota St. Prior Lake, MN		LOCATION:	
				DATE: 7/20/87	SCALE: 1" = 4'
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF WL	Tests or Notes
64.9	30	CL	SANDY LEAN CLAY, a trace of Gravel, brown, wet, rather soft. (Glacial Till)		
61.9	33	SP	POORLY GRADED SAND, fine-grained, brown, moist, medium dense to dense. (Glacial Outwash)	33	
				24	
				31	
44.4	50.5			21	
			END OF BORING.		
			Water level not encountered with 40' of hollow-stem auger in the ground.		
			Water level not encountered to cave-in depth of 20' immediately after withdrawal of auger.		

(See Report and Standard Plates for evaluation and descriptive terminology.)

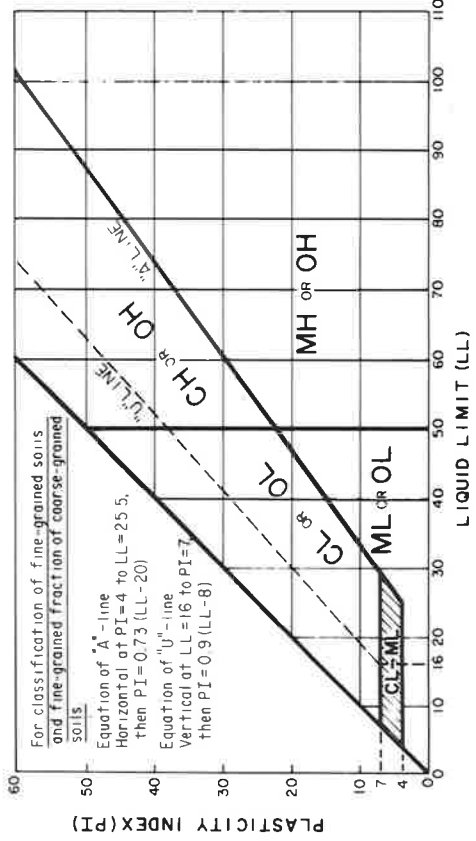


Designation D 2487 — 83

## Standard Test Method for CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS <sup>a</sup>	SOIL CLASSIFICATION	
	GROUP SYMBOL	GROUP NAME <sup>b</sup>
GRAVELS More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels $C_u > 4$ and $1 \leq C_c \leq 3$ e	Well-graded gravel G
	Gravels with fines More than 12% fines c Fines classify as ML or MH	Poorly graded gravel GP
SANDS 50% or more of coarse fraction passes No. 4 sieve	Clean Sands $C_u > 6$ and $1 \leq C_c \leq 3$ e	Silty gravel f, g, h Clayey gravel f, g, h
	Sands with fines More than 12% fines d Fines classify as CL or CH	Well-graded sand SW Poorly graded sand SP
SILTS AND CLAYS Liquid limit less than 50%	Inorganic PI > 7 and plots on or above "A" line j	Silty sand g, h, i Clayey sand g, h, i
	Organic PI < 4 or plots below "A" line j	Lean clay k, l, m Silt k, l, m
FINE-GRAINED SOILS 50% or more passed the No. 200 sieve	Liquid limit - oven dried Liquid limit - not dried < 0.75	Organic clay k <sub>1</sub> , l <sub>1</sub> , m <sub>1</sub> , n Organic silt k <sub>2</sub> , l <sub>2</sub> , m <sub>2</sub> , o
	Inorganic PI plots on or above "A" line	Fat clay k, l, m Elastic silt k, l, m
Highly organic soils	Liquid limit - oven dried Liquid limit - not dried < 0.75	Organic clay k <sub>1</sub> , l <sub>1</sub> , m <sub>1</sub> , p Organic silt k <sub>2</sub> , l <sub>2</sub> , m <sub>2</sub> , q
	Primarily organic matter, dark in color, and organic odor	Peat PT

- Based on the material passing the 3-in (75-mm) sieve.
- If field sample contained cobbles and/or boulders, add "with cobbles and/or boulders" to group name.
- If gravels with 5 to 12% fines require dual symbols:
  - GW-GH well graded gravel with silt
  - GW-GC well graded gravel with clay
  - GP-GH poorly graded gravel with silt
  - GP-GC poorly graded gravel with clay
- Sands with 5 to 12% fines require dual symbols:
  - SW-SH well graded sand with silt
  - SW-SC well graded sand with clay
  - SP-SH poorly graded sand with silt
  - SP-SC poorly graded sand with clay
- $C_u = D_{60}/D_{10}$      $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
- If soil contains  $\geq 15\%$  sand, add "with sand" to group name.
- If fines classify as CL-MU, use dual symbol GC-GH, SC-SH.
- If fines are organic, add "with organic fines" to group name.
- If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.
- If Aterberg limits plot in hatched area, soil is a CL-MU, silty clay.
- If soil contains 15 to 25% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
- If soil contains  $\geq 30\%$  plus No. 200, predominantly sand, add "sandy" to group name.
- If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.
- PI  $\geq 4$  and plots on or above "A" line.
- PI  $\geq 4$  or plots below "A" line.
- PI plots on or above "A" line.
- PI plots below "A" line.



### LABORATORY TESTS

- DD Dry Density, pcf
- WD Wet Density, pcf
- MC Natural Moisture Content, %
- LL Liquid Limit, %
- PL Plastic Limit, %
- PI Plasticity Index, %
- OC Organic Content, %
- S Percent of Saturation
- SG Specific Gravity
- C Cohesion
- $\phi$  Angle of Internal Friction
- qu Unconfined Compressive Strength

### PARTICLE SIZE IDENTIFICATION

- Boulders ..... over 12"
- Cobbles ..... 3" to 12"
- Gravel ..... 3/4" — 3"
- Coarse Fine ..... No. 4 — 3/4"
- Sand ..... No. 4 — No. 10
- Coarse ..... No. 10 — No. 40
- Medium ..... No. 40 — No. 200
- Fine ..... No. 200 — .005 mm
- Silt ..... less than .005 mm
- Clay

### RELATIVE DENSITY OF COHESIONLESS SOILS

- very loose ..... 0 — 4 BPF
- loose ..... 5 — 10 BPF
- medium dense ..... 11 — 30 BPF
- dense ..... 31 — 50 BPF
- very dense ..... 50+ BPF

### CONSISTENCY OF COHESIVE SOILS

- very soft ..... 0 — 1 BPF
- soft ..... 2 — 3 BPF
- rather soft ..... 4 — 5 BPF
- medium ..... 6 — 8 BPF
- rather stiff ..... 9 — 12 BPF
- stiff ..... 13 — 16 BPF
- very stiff ..... 17 — 30 BPF
- hard ..... 30+ BPF

### DRILLING NOTES

Standard penetration test borings were advanced by 3/4" or 6/4" I.D. hollow-stem augers unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube).

Power auger borings were advanced by 4" or 6" diameter, continuous-flite, solid stem augers. Soil classification and strain depths are inferred from disturbed samples augered to the surface and are therefore somewhat approximate. Power auger borings are designated by the prefix "B".

Hand probings were advanced manually with a 1/2" diameter probe and are limited to the depth from which the probe can be manually withdrawn. Hand probings are indicated by the prefix "H".

**SAMPLING** — All samples are taken with the standard 2" O.D. split tube sampler, except where noted. TW indicates thin-wall (undisturbed) sample.

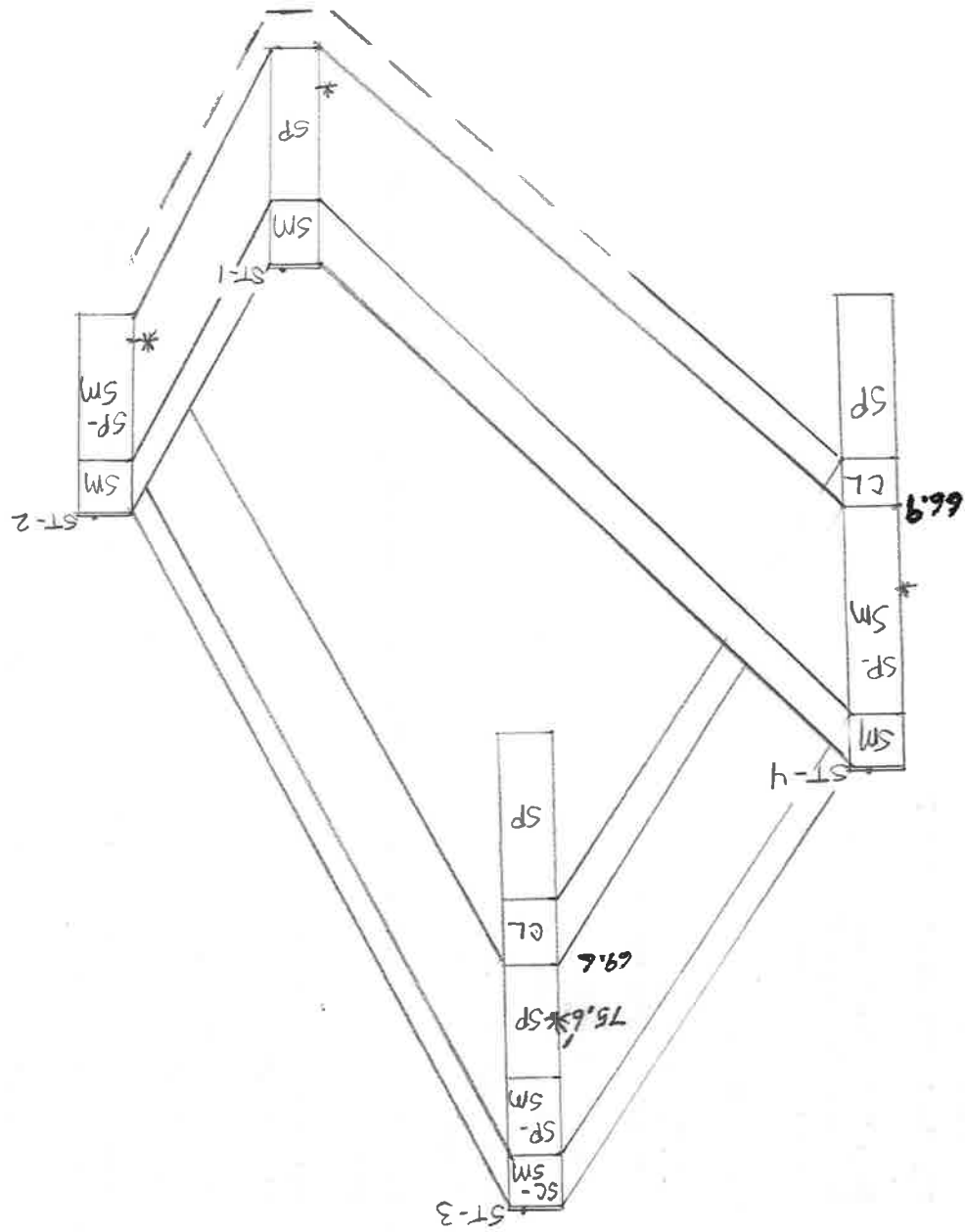
**BPF** — Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler is set 6" into undisturbed soil below the hollow-stem auger. Driving resistances are then counted for second and third 6" increments and added to get BPF. Where they differ significantly, they are reported in the following form — 2/12 for the second and third 6" increments respectively.

**WH** — WH indicates that sampler penetrated soil under weight of hammer and rods alone, driving not required.

**NOTE** — All tests run in accordance with applicable ASTM standards.







Royal Plastics  
P.O. Box 396  
Lakeville, Minnesota 55044

Leo Shattuck  
567 State Street  
St. Paul, Minnesota 55107

Tote Bulk Handling, Inc.  
350 West Highway 13  
Burnsville, Minnesota 55337

We also depend upon:

N.E.W. Plastics  
Luxemburg, Wisconsin

Midwest Plastics  
Madison, Wisconsin

Eaglebrook Plastics  
Chicago, Illinois

Contacts for plastic recycling at the State of Minnesota, Minnesota Pollution Control Agency are:

Cathy Berg Moeger  
612/296-8439

Catherine Thayer  
612/296-7271

Their address is Minnesota Pollution Control Agency, 520 Lafayette Road,  
St. Paul, Minnesota, 55155.

The plastic recycling contact at the Metropolitan Council is:

Susan Von Mosch  
612/291-6389

Her address is Metropolitan Council, 300 Metro Square Building, St. Paul,  
Minnesota, 55101.

Thank you for your request. Will you please send me a copy of the result of  
your study?

Sincerely,



E87-190

Underground Storage Tank Investigation  
Union 76 Gasoline Station  
Prior Lake, MN

Scale: 1" = 20'

Drawn: CRG

Revised:

8/4/87

Date:

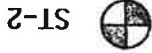
Dakota Street

Main Street

B.M.



ST-1



ST-2



ST-4



ST-3

Existing  
Gasoline  
Station

- Represents penetration test boring locations.
- Represents Bench Mark. Top of hydrant Assumed elevation = 100.0'.

