

17-AUG-1994 10:12:20

tss073

MPCA Leaksite Remarks Screen | Leak ID: 1710

Site N

05/23/90 site closed
06/15/92: RCS-Soil treatment update for DAS. 300 cubic yards of
contaminated soils sent to landfill in Lake Mills, Iowa.



Minnesota Pollution Control Agency

520 Lafayette Road, Saint Paul, Minnesota 55155

Telephone (612) 296-6300



May 23, 1990

Mr. Kelvin Williams
Kelly's Amoco
3010 West Oakland Avenue
Austin, Minnesota 55912

Dear Mr. Williams:

RE: Petroleum Tank Release Site Closure
Site: Kelly's Amoco, 3010 Oakland, Austin
Site ID#: LEAK00001710

The Minnesota Pollution Control Agency (MPCA) staff has determined that the cleanup performed in response to the petroleum tank release at the site referenced above has adequately addressed the petroleum contamination, and therefore the file regarding this release will be closed.

On September 18, 1989, a petroleum tank release was reported to the MPCA. Since then, Kelly's Amoco has taken the following corrective action in response to the release:

1. The leaking underground storage tanks have been removed and approximately 300 cubic yards of petroleum contaminated soil was excavated. Following approval by the Iowa Department of Natural Resources, the soils were hauled to a sanitary landfill in Lake Mills, Iowa.
2. Eight soil borings were conducted to define the extent and magnitude of petroleum contaminated soil remaining on site. Although low levels of organic vapors were detected in borings ST-1, ST-2 and MW-1, the chemical analyses performed on soil samples collected from ST-1, ST-2 and ST-3 did not indicate concentrations of any compounds analyzed for in excess of the method detection limit.
3. Ground water sample analyses did not detect any petroleum related compounds in monitoring wells MW-1 and MW-3. MW-2 detected only 26 micrograms per liter of methyl tertiary butyl ether. These levels are not considered significant. Therefore, no adverse results anticipated from this release.

Based on the currently available information, we believe these actions have adequately addressed the petroleum tank release. Therefore, MPCA staff does not intend to require any more investigation or cleanup work in response to this release. However, the MPCA reserves the right to reopen this file and require additional work if in the future more work is determined to be necessary, and this letter does not release any party from liability for this contamination.

Mr. Kelvin Williams

Page 2

May 23, 1990

Because you performed the requested work, the state may reimburse you for a major portion of your costs. The Petroleum Tank Release Cleanup Act establishes a fund which in certain circumstances provides partial reimbursement for petroleum tank release cleanup costs. This fund is administered by the Petroleum Tank Release Compensation Board (Petro Board). More specific eligibility rules are available from the Petro Board (612/297-4017).

Thank you for your cooperation with the MPCA in responding to this petroleum tank release to protect the public health and the environment of the state of Minnesota. If you have any questions regarding this correspondence, please call me at 612/643-3433.

Sincerely,



David A. Scheer
Pollution Control Specialist, Senior
Tanks and Spills Section
Hazardous Waste Division

DAS:mk

cc: Darrell Stacy, City Administrator, Austin
D. Miller, Fire Chief, Austin
William Buckley, Mower County Solid Waste Officer



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Reply to address/phone #:

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Mpls., MN 55435
(612) 941-5600
FAX #942-4844

May 3, 1990

Kelly's Amoco
ATTN: Mr. Kelvin Williams
3010 West Oakland Avenue
Austin, MN 55912

RE: E90-134/EG-620
REMEDIAL INVESTIGATION
Kelly's Amoco
3010 West Oakland Avenue
Austin, Minnesota

Dear Mr. Williams:

Braun Environmental Laboratories, Inc. (Braun) conducted a remedial investigation at the above-referenced site in accordance with your written authorization of January 30, 1990. The purpose of this work was to evaluate the extent and impact of the petroleum release previously identified on site.

The results of the investigation appeared to indicate only a minor impact to a perched groundwater system below the tank basin. It is our opinion that the release does not appear to pose a significant threat to human health or the environment. We believe that no further investigation is warranted at the site.

Methyl tertiary butyl ether (MTBE), a gasoline additive, was detected in a groundwater monitoring well placed in the perched groundwater system and near the tank basin. Other compounds analyzed for in this well were not detected in concentrations exceeding the method detection limits. Contaminants were also not detected in a second groundwater monitoring well placed in the perched groundwater and located downgradient of the tank basin.

A groundwater monitoring well was placed in the lower groundwater system. Analyses performed on a groundwater sample collected from this monitoring well did not detect any of the compounds analyzed for in concentrations exceeding the method detection limits. The lower groundwater system does not appear to have been impacted by the release.

The eventual receptor of the release is likely Turtle Creek. The impact to Turtle Creek is expected to be minimal. Based upon the results of our investigation, the release does not appear to pose a significant threat to human health or the environment.

B. BACKGROUND

B.1 Site Location and Description: Kelly's Amoco is a service/filling station located at 3010 West Oakland Avenue in Austin, Minnesota (Figure 1). The station was constructed in 1966 and three 6,000-gallon underground storage tanks (USTs) were installed at that time. A fourth UST was installed in 1971. All four USTs were constructed of coated steel and utilized submersible pumps for distributing product. The locations of the tanks, associated plumbing, and last known contents are shown Figure 2.

The site is relatively flat with drainage generally to the north. Cornfields bound the site to the north and to the east. The Cheese Spot, a retail outlet, borders on the west and Oakland Avenue lies at the southern edge of the site.



B.2 General Geologic Conditions: Kelly's Amoco lies in an area of ground moraine material of the Bemis Moraine Association. These soils were deposited by the Des Moines Lobe during the late Wisconsin glacial ice advancement (Geologic Map of Minnesota, *Quaternary Geology*, Hobbs and Goebel, 1982). The materials in the ground moraine include clay, silt, sand and gravel, with local sand lenses buried at various depths. The thickness of the till is believed to be approximately 100 to 200 feet (*Hydrologic Investigations Atlas HA-552*).

The Devonian-age Cedar Valley limestone underlies the till. The Cedar Valley is composed of dolomite and dolomitic limestone and reaches thicknesses of up to 300 feet (*HA-552*). Below Kelly's Amoco, the Cedar Valley forms an east-west trending bedrock valley (*HA-522*).

The Cedar Valley forms the upper part of the Cedar Valley-Maquoketa-Dubuque-Galena aquifer. In the Austin area, the groundwater flow in the aquifer is towards the Cedar River, which it discharges (*HA-522*).

Localized aquifers occur in the ground moraine in sand lenses. Groundwater flow in the surficial deposits near Kelly's Amoco is towards Turtle Creek. The till is hydraulically connected with the underlying Cedar Valley limestone. However, the vertical rate of groundwater flow in the till is quite slow (*HA-522*).

B.3 Chronology of Events: Mr. Williams retained Rochester Petroleum Equipment (RPE) to replace the USTs at Kelly's Amoco to meet current state and federal regulations. After uncovering the USTs on September 18, 1989, RPE detected organic vapors around the fill pipes and submersible pumps, using a photoionization detector (PID). RPE subsequently retained Braun to provide environmental services related to the release.

Braun notified the MPCA of the release on September 18, 1989, and arrived on site September 19, 1989.

Braun monitored the excavation of 300 cubic yards of contaminated soils. Following approval by the Iowa Department of Natural Resources, these soils were hauled to a sanitary landfill located in Lake Mills, Iowa, and operated by Waste Systems Corporation. Following the completion of the excavation, contaminated soils remained in the basin. These soils were primarily concentrated along the east wall of the excavation, adjacent to the building.

The purpose of this investigation was to meet MPCA requirements to evaluate the extent and potential impacts of the remaining contamination.

C. SCOPE OF WORK

As part of this work, Braun provided the following services:

- Reviewed available geologic literature of the area;
- Conducted eight soil borings;
- Collected and chemically analyzed soil samples from three of the soil borings;
- Completed three of the borings as groundwater monitoring wells;
- Collected and chemically analyzed groundwater samples from the groundwater monitoring wells;



D.3 Contamination Conditions: Soil discoloration as a result of possible petroleum contamination was not noted in any of the borings performed. Apparent organic vapors were noted with the PID field screening in borings ST-1, ST-2, ST-3, and MW-1. Table I summarizes the soil vapor data. In ST-1 and ST-2, only very low levels of organic vapors, ranging from 0 to 4 parts per million (ppm), were recorded in the clay till overlying the first sand layer. Slightly higher levels were observed in the first sand layer, increasing to 13 ppm in ST-1 and 6.5 ppm in ST-2. The readings were highest above the groundwater in the first sand layer.

Organic vapor levels determined using jar headspace analyses procedures in ST-3 were measured at 22 ppm to 28 ppm in the clay till overlying the first sand layer at the 10-foot and 15-foot intervals. In the sand below the water level in the upper perched groundwater system, the organic vapor levels decreased to 5.6 ppm at 20 feet and 6.2 ppm at 25 feet below the land surface. Very low organic vapor levels, 0.4 ppm, were detected in the underlying clay at 30 feet. Below 30 feet organic vapors were not encountered in this boring.

Low levels of organic vapor were detected in MW-1 over the depth of the entire boring. Jar headspace readings ranged from 0 ppm to 4.2 ppm. The majority of the readings were at 1 ppm or less. At 32.5 feet the PID readings increased to 2.8 ppm, and at the water-bearing sand at 35 feet the readings increased to 4.2 ppm. However, there was a delay in analyzing the samples due to a malfunctioning PID.

Four soil samples were collected for chemical analyses of BETX, THC, and lead from borings ST-1, ST-2, and ST-3. One soil sample was collected at a depth of 25 feet in each of the three borings, and an additional sample was collected from 37.5 feet in ST-3. The results of the analyses did not indicate quantities of the tested parameters in excess of their respective method detection limits.

Groundwater samples collected from the groundwater monitoring wells were analyzed for VOCs, THC, and lead. In addition to the standard VOCs, MTBE was also analyzed for. The results of these analyses indicate a concentration of 26 ug/l of MTBE in MW-2, with no other parameter detected above its method detection limit. None of the tested compounds were detected in the groundwater samples collected from the other monitoring wells.

E. DISCUSSION

E.1 Sources of Contamination: A gasoline release had previously been identified at the site. The quantity released is unknown but the source appears to have been from around the fill pipe and submersible pumps.

Some of the released gasoline appears to have reached the shallow perched groundwater table below the tank basin. As noted earlier, the flow of the perched groundwater appears to be controlled by the topography of the underlying clay till. The basin shape funnels the groundwater to the north. From the tank basin, the groundwater appears to be channeled towards MW-3. No contaminants analyzed for were detected in the groundwater sample collected from MW-3.

E.2 Extent of Contamination: Organic vapors were detected in boring ST-3 near the southern edge of the tank basin. Low levels of organic vapors were also detected in borings ST-1, ST-2, and MW-1. The chemical analyses performed on the soil samples collected from ST-1, ST-2, and ST-3 did not indicate concentrations of any of the compounds analyzed for in excess of the method detection limit. Therefore, soil contamination, if present, does not appear to be significant and is likely limited to the immediate area near the tank basin.

The presence of MTBE, a highly mobile gasoline additive, in MW-2 was the only evidence detected of petroleum contamination in the groundwater. None of the compounds analyzed for were detected in monitoring well MW-3, which was placed downgradient of the tank basin.

Despite the detection of low levels of apparent organic vapors during installation of MW-1, none of the compounds analyzed for were detected during the analyses of the groundwater samples collected from MW-1.

The release does not appear to have penetrated the clay till overlying the lower groundwater system.

E.3 Environmental Impacts: The eventual receptor of this release will likely be Turtle Creek. The primary impact of the release is the upper perched groundwater system. The release does not appear to have impacted the lower groundwater system, nor does there appear to be migration along utility lines or the threat of vapor build-up in the building.

F. CONCLUSIONS

The following conclusions are made with respect to Kelly's Amoco:

- A release of gasoline has occurred at Kelly's Amoco;
- The release is likely the result of overflowing/spilling and releases from around the submersible pumps;
- The release has impacted the perched groundwater system below the tank basin;

- The flow in the perched groundwater system is to the north and is controlled by the subsurface topography;
- The observed contamination occurs at relatively low concentrations and appears to be localized; and
- The regional water table aquifer has apparently not been impacted.

G. RECOMMENDATIONS

The release appears to have made only a minor impact to the shallow perched groundwater underlying the site. Additionally, migration of the contaminants off-site does not appear to be occurring. The regional water table aquifer does not appear to have been affected by this release. It is our opinion that no further investigation or remedial action is warranted at this time.

H. STANDARD OF CARE

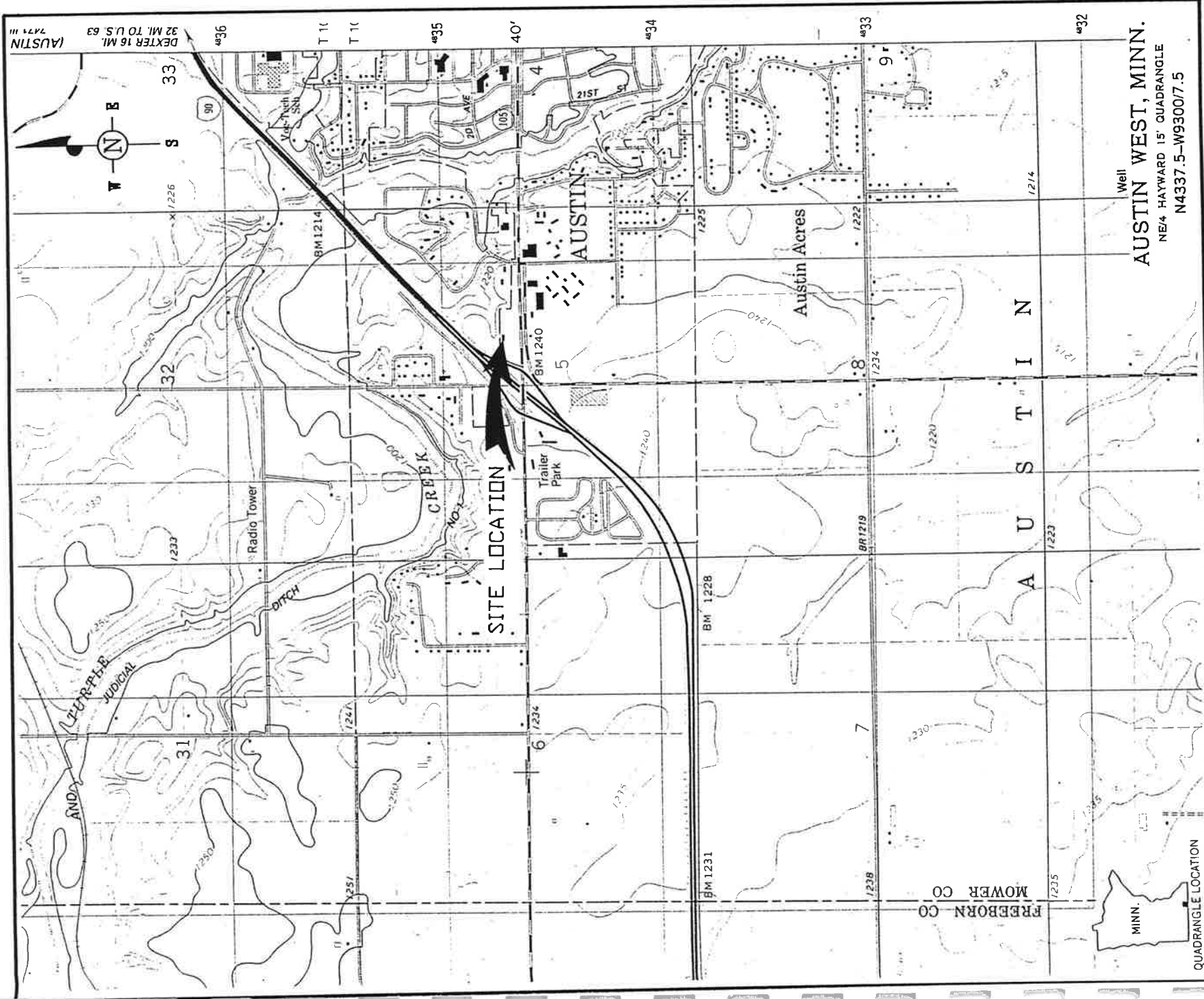
Services performed by the geologists and environmental scientists for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed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

JED:sm7\EG-620.apr



FIGURES





(AUSTIN 7473 III
DEXTER 16 MI. 32 MI. TO U.S. 63
33

Well
AUSTIN WEST, MINN.
NE/4 HAYWARD 15' QUADRANGLE
N4337.5-W9300/7.5

SITE LOCATION

QUADRANGLE LOCATION

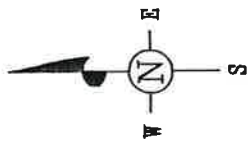


TITLE SITE LOCATION MAP
Remedial Investigation
Kelly's Amoco
Austin, Minnesota

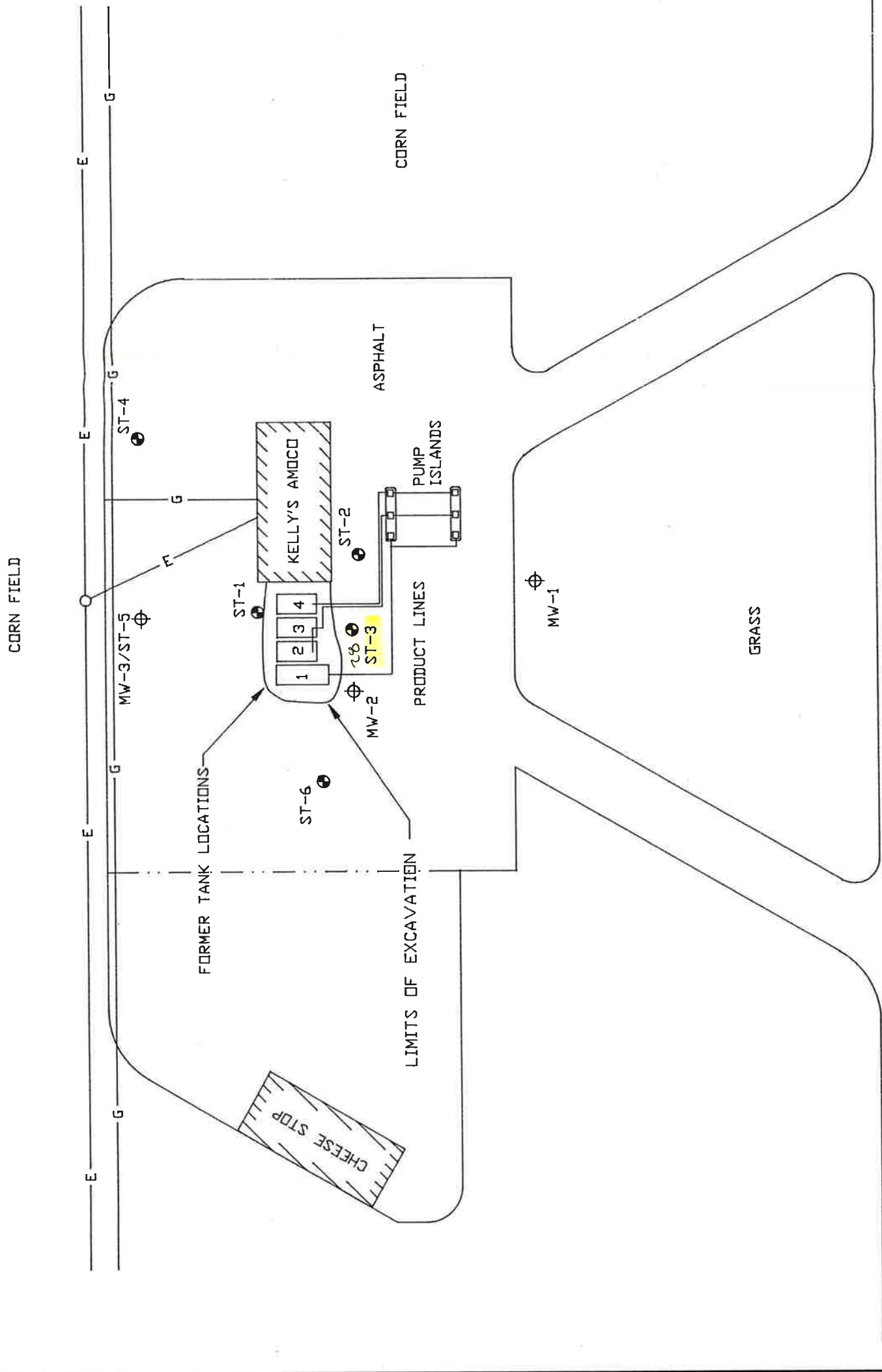
DRAWN BY: KMR **DWG. No.:** EG-620A **APP'D BY:** JED

JOB I.D.#: EG-620 **PLOT SCALE:** 1:1

REVISED	SHEET
DATE	INT
3-9-90	KMR
	OF
SCALE 1:24000	FIGURE# 1



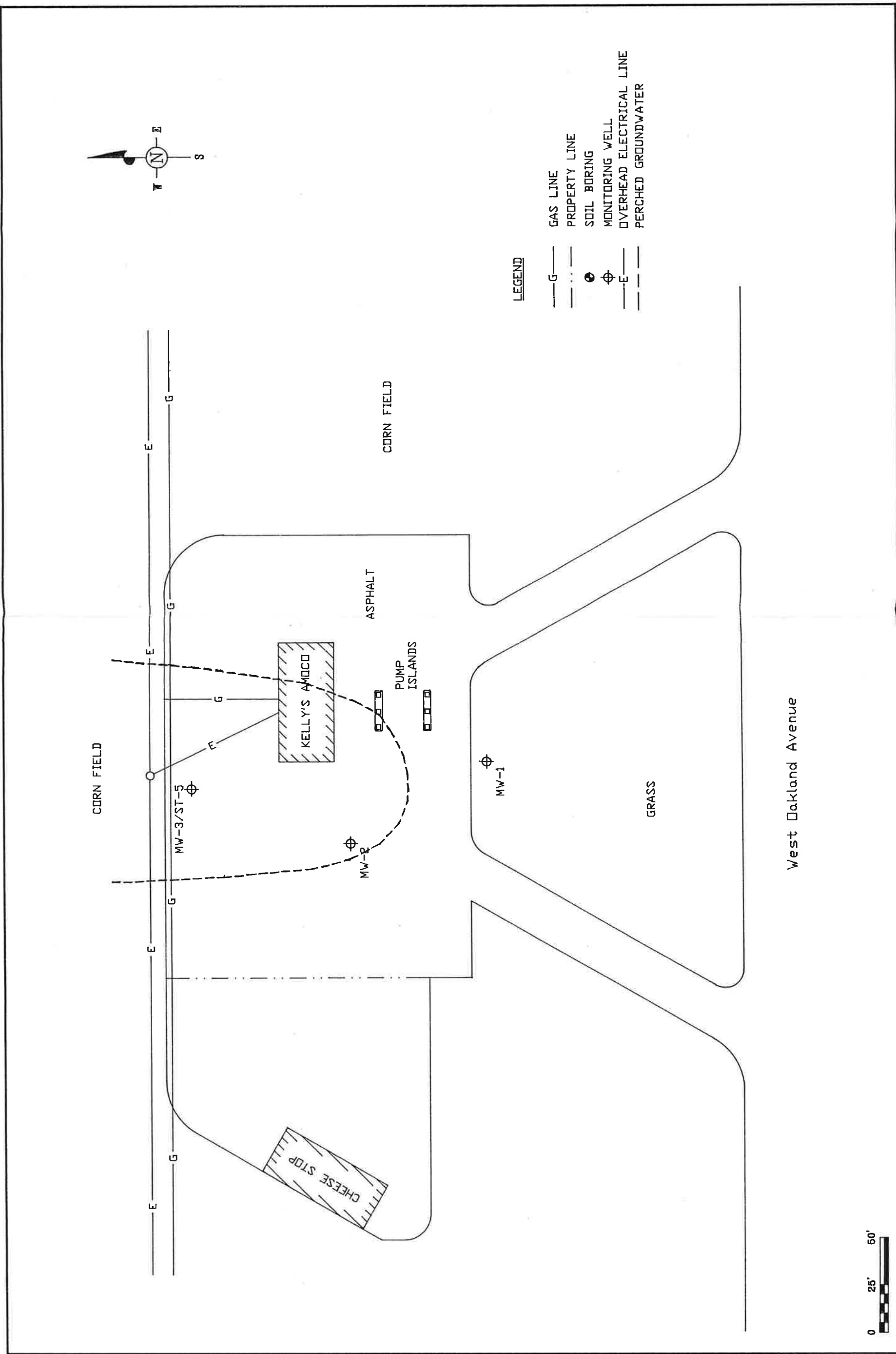
- LEGEND**
- G— GAS LINE
 - - - - - PROPERTY LINE
 - SOIL BORING
 - ⊕ MONITORING WELL
 - E— OVERHEAD ELECTRICAL LINE



TANK CHART

TANK #	CAPACITY	CONTENTS
1	8,000 GALLON	'SILVER' UNLEADED GASOLINE
2	6,000 GALLON	'BLUE' UNLEADED GASOLINE
3	6,000 GALLON	'BLUE' UNLEADED GASOLINE
4	6,000 GALLON	'PREMIUM' UNLEADED GASOLINE



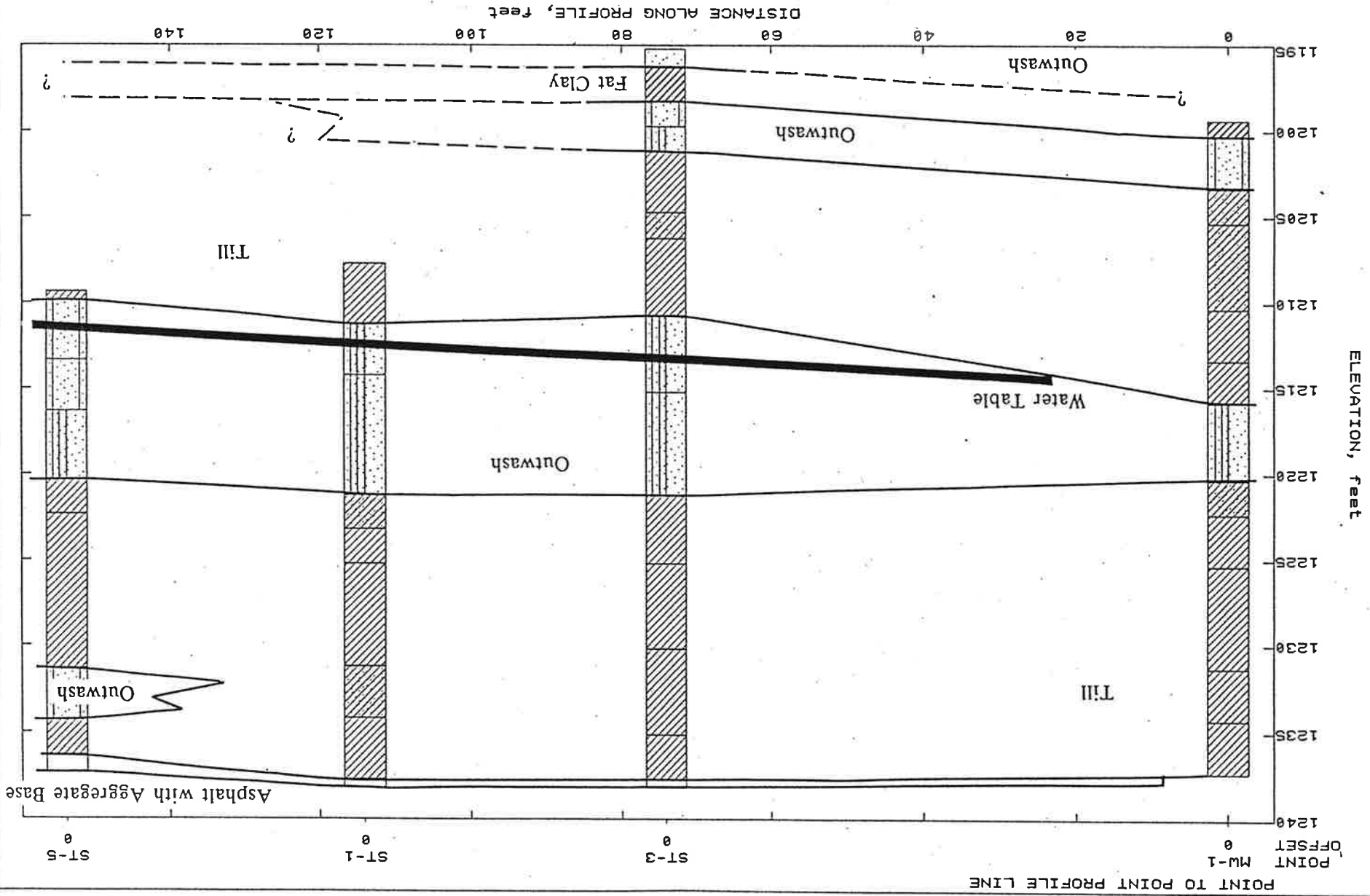


March 19, 1990

Kelly's Amoco - 3010 West Oakland Avenue

SUBSURFACE PROFILE

BRAUN Environmental Laboratories - Minneapolis, Minnesota

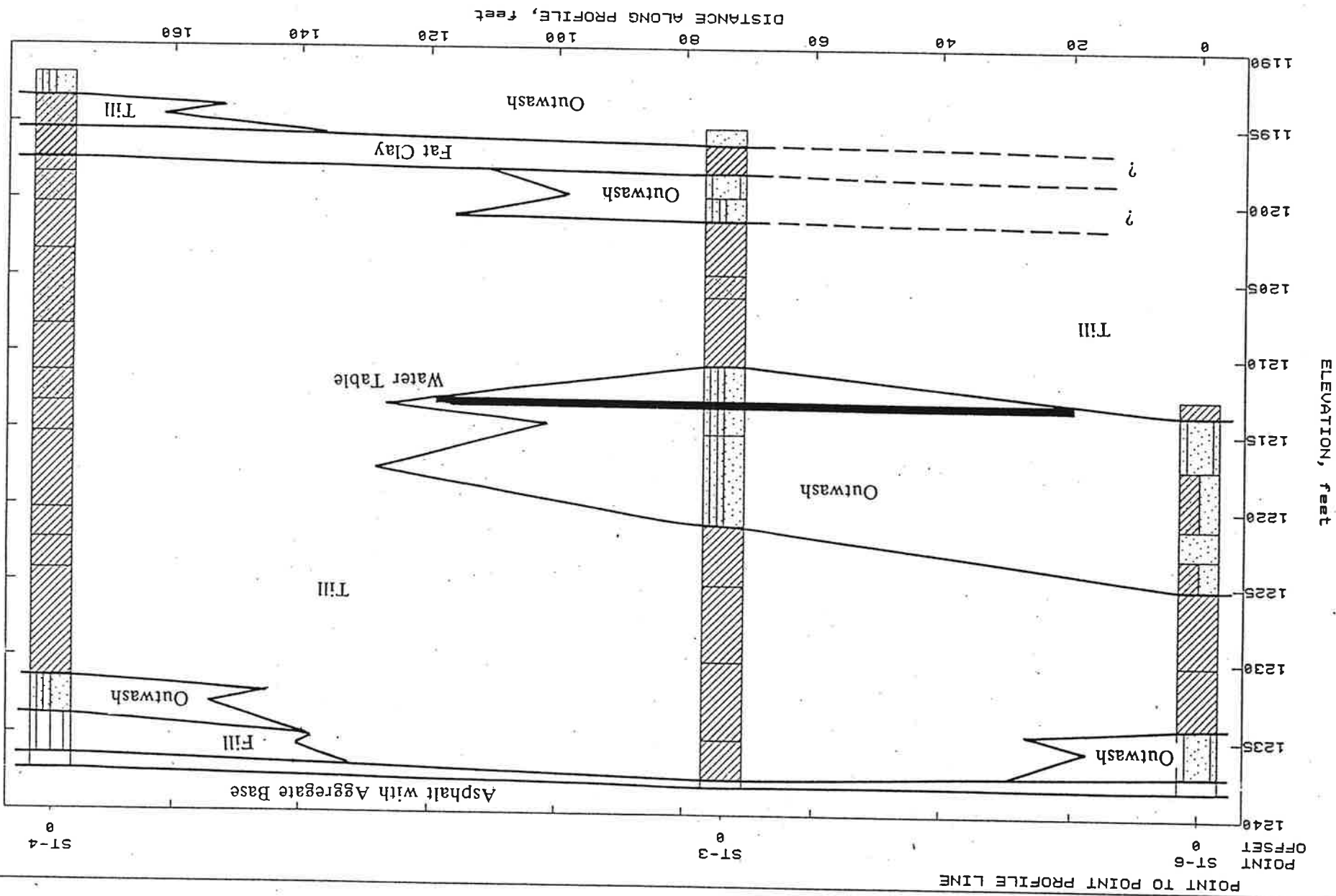


March 19, 1998

Kelly's Amoco - 3018 West Oakland Avenue

SUBSURFACE PROFILE

BRAUN Environmental Laboratories - Minneapolis, Minnesota



TABLES



Table I

Soil Vapor Data
Jar Headspace Analyses
Readings in Parts Per Million

<u>Depth</u>	<u>ST-1</u>	<u>ST-2</u>	<u>ST-3</u>	<u>ST-4</u>	<u>ST-5</u>	<u>ST-6</u>	<u>MW-1</u>
2.5	--	--	--	--	--	--	--
5	2.0	0.2	2.0	0.0	--	0.0	0.8
7.5	--	--	--	--	--	--	--
10	1.6	0.6	28	0.0	--	0.0	0.6
12.5	--	--	--	--	--	--	--
15	0.8	4.0	22	0.0	0.0	0.0	1.7
17.5	--	--	--	--	--	--	--
20	2.4	6.2	5.6	0.0	0.0	0.0	0.0
22.5	--	5.0	--	0.0	0.0	0.0	0.6
25	13.0	1.8	6.2	0.0	0.0	0.0	0.0
27.5	--	0.8	--	0.0	--	--	1.0
30	6.2	0.8	0.4	0.0	--	--	1.0
32.5	--	--	0.0	0.0	--	--	2.8
35	--	--	0.0	0.0	--	--	4.2
37.5	--	--	0.0	0.0	--	--	1.0
40	--	--	0.0	0.0	--	--	--
42.5	--	--	--	0.0	--	--	--
45	--	--	--	0.0	--	--	--



Table II

Monitoring Well Construction Data
Elevations in Feet, Referenced to NGVD

<u>Well</u>	<u>Top of Casing Elevation</u>	<u>Top of Seal Elevation</u>	<u>Top of Filter Elevation</u>	<u>Top of Screen Elevation</u>	<u>Bottom of Screen Elevation</u>
MW-1	1239.38	1218.0	1215.8	1214.3	1204.3
MW-2	1240.84	1222.7	1227.7	1218.7	1208.7
MW-3	1240.04	1222.8	1220.8	1218.8	1208.8

Table III

Groundwater Elevation Data, 2/15/90
Elevations in Feet, Referenced to NGVD

<u>Well</u>	<u>Top of Casing Elevation</u>	<u>Depth to Groundwater</u>	<u>Groundwater Elevation</u>
MW-1	1239.38	26.73	1212.65
MW-2	1240.84	28.15	1212.69
MW-3	1240.04	28.11	1211.93



LOG OF BORING



PROJECT: E90-134/EG-620
REMEDIAL INVESTIGATION
 Kelly's Amoco
 3010 West Oakland Avenue
 Austin, MN

BORING: MW-1
LOCATION: See Attached Sketch
DATE: SCALE: 1" = 4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1237.3	0.0	CL	SANDY LEAN CLAY, dark brown to brown, moist. (Glacial Till)			
1234.3	3.0	CL	SANDY LEAN CLAY, with trace Gravel, brown, moist, rather stiff. (Glacial Till)	4		
1231.3	6.0	CL	LEAN CLAY with SAND, with trace Gravel, brown mottled with red, wet, rather stiff. (Glacial Till)	4		
1225.3	12.0	CL	LEAN CLAY with SAND, gray, moist, stiff. (Glacial Till)			
1222.3	15.0	SC	CLAYEY SAND, fine- to medium-grained, orangish brown mottled with rusty red, moist, medium dense. (Glacial Till)	19		
1220.3	17.0	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, brown, moist, dense. (Glacial Outwash)	38		
1215.8	21.5	CL	SANDY LEAN CLAY, with trace Gravel, with lense of Sand, orangish brown to reddish brown mottled with red, very stiff. (Glacial Till)	19		
1213.3	24.0	CL	SANDY LEAN CLAY, with trace Gravel, orangish brown to reddish brown mottled with red, moist, stiff. (Glacial Till)	16		
1210.3	27.0	SC	CLAYEY SAND, fine- to medium-grained, with trace Gravel, orangish brown to reddish brown mottled with red, moist to wet, loose to medium dense. (Glacial Till)	10		
1205.3	32.0			11		

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

LOG OF BORING



**PROJECT: E90-134/EG-620
REMEDIAL INVESTIGATION**

**Kelly's Amoco
3010 West Oakland Avenue
Austin, MN**

BORING: MW-1 (cont.)

LOCATION:

See Attached Sketch

DATE:

SCALE: 1" = 4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF WL	Tests or	Notes
		SC		19		
1203.3	34.0	SM	SILTY SAND, fine-grained, brown, mottled with dark gray and red, waterbearing, medium dense. (Glacial Outwash)	28		
1200.3	37.0					
1199.3	38.0	CH	FAT CLAY, contains some Sand, near contact with overlying Silty Sand, dark gray, moist, very stiff. (Glacial Till)	21		
END OF BORING.						
Water level down 35 feet with 35 feet of hollow-stem auger in the ground.						
Water level down 30.2 feet with 36.5 feet of hollow-stem auger in the ground.						
Water level down 28 feet with 36.5 feet of hollow-stem auger in the ground, 2.5 days after completion of boring.						
Water level down 26.2 feet with 35 feet of hollow-stem auger in the ground, 3 days after completion of boring.						
Monitoring well MW-1 installed in boring.						

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

LOG OF BORING



PROJECT: E90-134/EG-620
REMEDIAL INVESTIGATION

Kelly's Amoco
3010 West Oakland Avenue
Austin, MN

BORING: ST-1

LOCATION:

See Attached Sketch

DATE:

SCALE: 1" = 4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1237.7	0.5	CL	2" of Bituminous Pavement. Aggregate base, coarse.			
1234.2	4.0		SANDY LEAN CLAY, with few cobbles. (Glacial Till)	8		
1231.2	7.0	SC	CLAYEY SAND, fine- to medium-grained, with trace of coarse Sand and Gravel, brown mottled with red, moist, loose. (Glacial Outwash)			
		CL	LEAN CLAY with SAND, brown with minor mottling of rusty reddish brown, wet, soft. (Glacial Till)	2		
1225.2	13.0	CL	SANDY LEAN CLAY, grayish brown, moist, medium.			
1223.2	15.0	SC	CLAYEY SAND, fine- to medium-grained, orangish brown, moist, medium dense. (Glacial Till)	14		
1221.2	17.0	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, brown mottled with red, moist, dense. (Glacial Outwash)	38		
1214.2	24.0	SP SM	POORLY GRADED SAND with SILT, medium-grained, brown, waterbearing, dense. (Glacial Outwash)	42		
1211.2	27.0	CL	SANDY LEAN CLAY, with trace of Gravel, brown, wet, rather soft. (Glacial Till)			
1207.7	30.5			11		
			END OF BORING			

BENCHMARK: Brass plug, southeast corner, top of wingwall on bridge where Oakland Avenue crosses Interstate-90.

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

LOG OF BORING



PROJECT: E90-134/EG-620 REMEDIAL INVESTIGATION Kelly's Amoco 3010 West Oakland Avenue Austin, MN		BORING: ST-1 (cont.) LOCATION: See Attached Sketch DATE: SCALE: 1" = 4'					
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or	Notes
			Water level down 26 feet with 30 feet of hollow-stem auger in the ground. Water level not encountered to cave-in depth of 23.9 feet immediately after withdrawal of auger. Boring then backfilled.				

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

LOG OF BORING



**PROJECT: E90-134/EG-620
REMEDIAL INVESTIGATION**

**Kelly's Amoco
3010 West Oakland Avenue
Austin, MN**

BORING: ST-2

LOCATION:

See Attached Sketch

DATE: SCALE: 1" = 4'

		Description of Materials (ASTM D2488)		BPF	WL	Tests	or	Notes
Elev.	Depth	ASTM D2487 Symbol						
1237.7	0.0	CL	6" of concrete.					
	0.5		LEAN CLAY with SAND, brown. (Glacial Till)					
1234.2	4.0	SC	CLAYEY SAND, fine- to medium-grained, brown, moist, loose. (Glacial Outwash)	7				
1232.2	6.0	CL	SANDY LEAN CLAY, with trace of Gravel, brown mottled with red, wet, medium. (Glacial Till)	7				
1226.2	12.0	CL	LEAN CLAY with SAND, with some Gravel and lenses of Sand, brown, wet, rather stiff. (Glacial Till)	12				
1221.2	17.0	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, with trace of Gravel and Cobbles, orangish brown mottled with red, moist, dense. (Glacial Outwash)	35				
1217.2	21.0	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, brown, wet, dense. (Glacial Outwash)	35				
1214.2	24.0	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, brown, waterbearing, dense. (Glacial Outwash)	37				
1211.2	27.0	CL	SANDY LEAN CLAY, with trace of Gravel, brown mottled with red, wet, very stiff. (Glacial Till)	22				
1209.2	29.0	CL	SANDY LEAN CLAY, with trace Gravel, orangish brown to reddish brown, wet, rather soft.	11				
1207.7	30.5							

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

LOG OF BORING



PROJECT: E90-134/EG-620 REMEDIAL INVESTIGATION Kelly's Amoco 3010 West Oakland Avenue Austin, MN		BORING: ST-2 (cont.) LOCATION: See Attached Sketch					
		DATE:	SCALE: 1" = 4'				
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or	Notes
			(Glacial Till)				
			END OF BORING Water level down 26.1 feet with 30 feet of hollow-stem auger in the ground. Water level down 25 feet in open boring 1 day after boring completed. Boring then backfilled.				

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

LOG OF BORING



PROJECT: E90-134/EG-620
 REMEDIAL INVESTIGATION
 Kelly's Amoco
 3010 West Oakland Avenue
 Austin, MN

BORING: ST-3

LOCATION:
 See Attached Sketch

DATE: SCALE: 1" = 4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1237.7	0.5	CL	2" of Bituminous Pavement, Aggregate base, coarse.			
1235.2	3.0	CL	SANDY LEAN CLAY, brown. (Glacial Till)			
1230.2	8.0	CL	LEAN CLAY, with trace of Gravel, and lenses of Sandy Clay, brown, moist, loose. (Glacial Till)	8		
1225.2	13.0	CL	SANDY LEAN CLAY, with trace of Gravel, brown mottled with red, moist, rather soft. (Glacial Till)	5		
1221.2	17.0	CL	SANDY LEAN CLAY, with trace of Gravel, brown mottled with red, wet, rather soft. (Glacial Till)	4		
		SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, yellowish brown, moist, dense. (Glacial Outwash)	42		
1215.2	23.0	SP SM	POORLY GRADED SAND with SILT, medium-grained, with lense of gray silt, brown, waterbearing, dense. (Glacial Outwash)	39		
1210.7	27.5	CL	SANDY LEAN CLAY, with trace Gravel, orangish brown to reddish brown, mottled with red, wet, rather soft. (Glacial Till)	11		
1206.2	32.0					

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

LOG OF BORING



PROJECT: E90-134/EG-620
 REMEDIAL INVESTIGATION

Kelly's Amoco
 3010 West Oakland Avenue
 Austin, MN

BORING: ST-3 (cont.)

LOCATION:
 See Attached Sketch

DATE: SCALE: 1" = 4'

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1204.7	33.5	SC	CLAYEY SAND, fine- to medium-grained, with trace Gravel, orangish brown, wet, medium dense. (Glacial Till)	14		
1201.2	37.0	CL	SANDY LEAN CLAY, with trace Gravel, brown, moist, very stiff. (Glacial Till)	19		
1199.7	38.5	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, brown, waterbearing, dense. (Glacial Outwash)	45		
1198.2	40.0	CH	SILTY SAND, fine- to medium-grained, mixed with lenses of Clay, brown, waterbearing, medium dense. (Glacial Outwash)	15		
1196.2	42.0		FAT CLAY, with some Sand, gray, moist, stiff. (Glacial Till)			
1195.2	43.0	SP	POORLY GRADED SAND, fine- to medium-grained, brown, waterbearing. (Glacial Outwash)			
END OF BORING						
Water level down 30.6 feet with 42.5 feet of hollow-stem auger in the ground.						
Water level not encountered to cave-in depth of 21.6 feet immediately after withdrawal of auger.						
Boring then backfilled.						

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

LOG OF BORING



PROJECT: E90-134/EG-620 REMEDIAL INVESTIGATION Kelly's Amoco 3010 West Oakland Avenue Austin, MN		BORING: ST-4				
		LOCATION: See Attached Sketch				
		DATE: 2/12/90	SCALE: 1" = 4'			
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1237.3	0.0		2" of Bituminous Pavement. Aggregate base, coarse.			
1236.3	1.0	ML	FILL: SANDY SILT, with Clay, brown, moist.			
1233.8	3.5	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, brown, moist, loose. (Glacial Outwash)	5		
1231.3	6.0	CL	SANDY LEAN CLAY, with trace of Gravel, brown mottled with red, wet, very soft. (Glacial Till)	1		
1224.3	13.0	CL	LEAN CLAY with SAND, with trace Gravel, brown, wet, rather soft. (Glacial Till)	5		
1222.3	15.0	CL	LEAN CLAY, with trace Sand, dark gray to brown, mottled with black, moist.			
1220.3	17.0	CL	LEAN CLAY with SAND, with trace Gravel, olive green and gray, mottled with red and black, moist, stiff. (Glacial Till)	16		
1215.3	22.0	CL	LEAN CLAY with SAND, orangish brown, mottled with black and rusty brown, moist, very stiff. (Glacial Till)	17		
1213.3	24.0	SC	CLAYEY SAND, fine- to medium-grained, with trace Gravel, orangish brown, mottled with black and rusty brown, moist, medium dense. (Glacial Till)	15		
1211.3	26.0	CL	LEAN CLAY with SAND, with trace of Gravel, reddish brown, mottled with rusty brown, moist, stiff. (Glacial Till)	13		
1208.3	29.0	SC	LEAN CLAY with SAND, with trace of Gravel, reddish brown, mottled with rusty brown, moist, stiff. (Glacial Till)	16		

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

LOG OF BORING



PROJECT: E90-134/EG-620 REMEDIAL INVESTIGATION		BORING: ST-4 (cont.)				
Kelly's Amoco 3010 West Oakland Avenue Austin, MN		LOCATION: See Attached Sketch				
DATE: 2/12/90		SCALE: 1" = 4'				
Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1203.3	34.0	CL	CLAYEY SAND, fine- to medium-grained, with trace Gravel, reddish brown mottled with rusty brown and red, moist, medium dense. (Glacial Till)	22		
1200.3	37.0	SC	LEAN CLAY with SAND, with trace Gravel, reddish brown mottled with rusty brown, moist, stiff. (Glacial Till)	23		
1198.3	39.0	CL	CLAYEY SAND, fine- to medium-grained, with coarse Sand and trace Gravel, reddish brown mottled with rusty brown and red, moist, medium dense. (Glacial Till)	11		
1197.3	40.0	CH		28		
1195.3	42.0	SC	SANDY LEAN CLAY, with trace Gravel, gray, moist, medium dense, rather stiff. (Glacial Till)	34		
1193.3	44.0	SP				
1191.8	45.5	SM				
			FAT CLAY, reddish brown to gray, moist, rather stiff. (Glacial Till)			
			CLAYEY SAND, medium- to coarse-grained, with trace Gravel, gray, moist, medium dense. (Glacial Till)			
			POORLY GRADED SAND with SILT, medium- to coarse-grained, dark brown to blue gray, waterbearing, dense. (Glacial Outwash)			
			END OF BORING.			
			Water level down 41.9 feet with 40 feet of hollow-stem auger in the ground.			
			Water level down 39.3 feet with 30 feet of hollow-stem auger in the ground, 20 minutes after completion of boring.			
			Water level down 38.6 feet in open boring, 40 minutes after completion.			
			Water level down 36.7 feet in open boring, 2			

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

LOG OF BORING



PROJECT: E90-134/EG-620 REMEDIAL INVESTIGATION Kelly's Amoco 3010 West Oakland Avenue Austin, MN		BORING: ST-4 (cont.) LOCATION: See Attached Sketch						
		DATE: 2/12/90	SCALE: 1" = 4'					
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests	or	Notes
			hours 40 minutes after completion. Boring then backfilled.					

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

LOG OF BORING



PROJECT: E90-134/EG-620
 REMEDIAL INVESTIGATION
 Kelly's Amoco
 3010 West Oakland Avenue
 Austin, MN

BORING: **ST-5**

LOCATION:

See Attached Sketch

DATE: SCALE: 1" = 4'

Tests or Notes

BPF WL

Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1237.3	0.0		2" of Bituminous Pavement Aggregate base, coarse.			
1236.3	1.0	CL				
1234.3	3.0	SM	SANDY LEAN CLAY, brown. (Glacial Till)			
1231.3	6.0	CL	SILTY SAND, fine- to medium-grained, brown, moist, loose. (Glacial Outwash)	5		
1222.3	15.0	CL	SANDY LEAN CLAY, with trace Gravel, brown mottled with rusty brown and red, wet, medium to rather soft. (Glacial Till)	6		
1220.3	17.0	CL	SANDY LEAN CLAY, reddish brown to gray mottled with rusty brown, moist, rather soft. (Glacial Till)	5		
1216.3	21.0	SP SM	POORLY GRADED SAND with SILT, fine- to medium-grained, orangish brown, moist, dense. (Glacial Outwash)	34		
1213.3	24.0	SM	SILTY SAND, fine-grained, brown lightly mottled with rusty brown, wet, medium dense. (Glacial Outwash)	28		
1211.3	26.0	SM	SILTY SAND, fine-grained, grayish brown, wet, medium dense. (Glacial Outwash)	29		
1209.8	27.5	SM	SILTY SAND, very fine- to fine-grained, orangish brown to brown, waterbearing. (Glacial Outwash)	16		
1209.3	28.0	CL				
			SANDY LEAN CLAY, with trace Gravel, reddish brown, wet, stiff. (Glacial Till)			
			END OF BORING.			

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

LOG OF BORING



PROJECT: E90-134/EG-620 REMEDIAL INVESTIGATION		BORING: ST-6				
Kelly's Amoco 3010 West Oakland Avenue Austin, MN		LOCATION: See Attached Sketch				
		DATE:	SCALE: 1" = 4'			
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
1238.2	0.0		2" of Bituminous Pavement. Aggregate Base, coarse.			
1237.2	1.0	SM	SILTY SAND, fine- to medium-grained, brown, moist. (Glacial Outwash)			
1234.2	4.0	CL	SANDY LEAN CLAY, brown mottled with rusty brown, moist, soft. (Glacial Till)	3		
1230.2	8.0	CL	SANDY LEAN CLAY, with trace Gravel, brown, wet, rather soft. (Glacial Till)	5		
1225.2	13.0	SP SC	POORLY GRADED SAND with CLAY, fine- to medium-grained, orangish brown, moist, medium dense. (Glacial Outwash)	15		
1223.2	15.0	SP	POORLY GRADED SAND, fine- to medium-grained, light brown mottled with dark brown, moist, (Glacial Outwash)	34		
1221.2	17.0	SP SC	POORLY GRADED SAND with CLAY, fine- to medium-grained, with trace coarse-grained sand, orangish brown, moist, dense. (Glacial Outwash)	38		
1217.3	20.9	SM	SILTY SAND, fine- to medium-grained, orangish brown to brown, wet, dense. (Glacial Outwash)	25		
1213.8	24.4	CL	SANDY LEAN CLAY, with trace Gravel, reddish brown, moist, very stiff. (Glacial Till)			
1212.7	25.5		END OF BORING			
Water level not encountered with 25 feet of hollow-stem auger in the ground.						

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

LOG OF BORING



PROJECT: E90-134/EG-620 REMEDIAL INVESTIGATION Kelly's Amoco 3010 West Oakland Avenue Austin, MN		BORING: ST-6 (cont.) LOCATION: See Attached Sketch				
		DATE:	SCALE: 1" = 4'			
Elev.	Depth	ASTM D2487 Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
			Water level not encountered to cave-in depth of 18.5 feet immediately after withdrawal of auger. Boring then backfilled.			

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

Kelly's Amoco
3010 West Oakland Avenue
Austin MN 55912

PROJECT: EG-620
COLLECTED: Braun
RECEIVED: 02/16/90
SAMPLE MATRIX: Aqueous

PARAMETER	--UNITS--	BRAUN I.D.: CLIENT I.D.:	9648-01 MW-1	9648-02 MW-2	9648-03 MW-3	9648-04 Field Blank
Chloromethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl Chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Chloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorofluoromethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Methylene Chloride	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
Trichlorofluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
Allyl Chloride (3-Chloropropene)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene (cis & trans)	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chloroform	ug/L	<1.5	<1.5	<1.5	<1.5	<1.5
1,1,2-Trichlorotrifluoroethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
Dibromomethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,1-Trichloroethane	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0
Carbon Tetrachloride	ug/L	<1.6	<1.6	<1.6	<1.6	<1.6
Bromodichloromethane	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
2,3-Dichloro-1-propene	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dichloroacetone trile	ug/L	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloro-1-propene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene (trans)	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-Trichloroethylene	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	ug/L	<1.2	<1.2	<1.2	<1.2	<1.2
Chlorodibromomethane	ug/L	<2.5	<2.5	<2.5	<2.5	<2.5
1,3-Dichloro-1-propene (cis)	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dibromoethane	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2

< = less than; compound not detected at or above indicated detection limit
- = Analysis not requested

All quality control checks were within acceptable limits.
Reviewed by: WLO

BRAUNTM

BRAUN I.D.: 9648-01 9648-02 9648-03 9648-04
 CLIENT I.D.: MW-1 MW-2 MW-3 Field Blank

PARAMETER	--UNITS--			
2-Chloroethyl Vinyl Ether	ug/L	<5.0	<5.0	<5.0
Bromoform	ug/L	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	ug/L	<0.5	<0.5	<0.5
Pentachloroethane	ug/L	<1.0	<1.0	<1.0
Tetrachloroethylene	ug/L	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/L	<1.2	<1.2	<1.2
1,2,3-Trichloropropane	ug/L	<1.0	<1.0	<1.0
Chlorobenzene	ug/L	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	ug/L	<1.5	<1.5	<1.5
1,2-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2
1,4-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2
Acetone	ug/L	<10	<10	<10
Tetrahydrofuran	ug/L	<5.0	<5.0	<5.0
Ethyl Ether	ug/L	<1.0	<1.0	<1.0
Methyl Ethyl Ketone	ug/L	<5.0	<5.0	<5.0
Benzene	ug/L	<1.0	<1.0	<1.0
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	<5.0
Toluene	ug/L	<1.0	<1.0	<1.0
Ethyl Benzene	ug/L	<1.0	<1.0	<1.0
Cumene	ug/L	<3.0	<3.0	<3.0
Xylenes, Total	ug/L	<1.0	<1.0	<1.0
Methyl Tertiary Butyl Ether	ug/L	<1.0	26	<1.0
Total Hydrocarbons as Gasoline	ug/L	<100	<100	<100
Total Hydrocarbons as Fuel Oil	ug/L	<500	<500	<500
Lead, Dissolved	ug/L	<2.0	<2.0	<2.0

< = less than; compound not detected at or above indicated detection limit

- = Analysis not requested

All quality control checks were within acceptable limits.
 Reviewed by: URD

BRAUNTM

03/06/90

Page 1 of 1

ADDENDUM: 9648

Parameter

VOC's
THC's
Lead, Total

Date Analyzed

02/26/90
02/22/90
02/21/90



CHAIN OF CUSTODY RECORD



Client Name, Address, Phone		Report to:		Samplers:		Project #/Department #		Log-In Sample #		Sample Description		#	
Kelly's Amoco 3010 W. Oakland Ave. Austin, MN.		Copy of Report To:		Project Manager:		E-90-134/EG-620		9648		MW# 1		-1	
Verbal Results To:		Samples Returned To:		Samples Retained By:		Type/# of Containers		Analysis/Remarks		Date		Time	
VOC, THC + Pb (dissolved)		VOC, THC + Pb (dissolved)		VOC, THC + Pb (dissolved)		VOC, THC + Pb (dissolved)		VOC, THC + Pb (dissolved)		2-15-90		4:00	
MW# 2		MW# 2		MW# 2		MW# 2		MW# 2		2:25		7	
MW# 3		MW# 3		MW# 3		MW# 3		MW# 3		5:15		7	
Field Blank		Field Blank		Field Blank		Field Blank		Field Blank		5:00		3	
Trip Blank		Trip Blank		Trip Blank		Trip Blank		Trip Blank		2/13/90		3	
Retinquished By:		Retinquished By:		Retinquished By:		Retinquished By:		Retinquished By:		Date		Time	
Received For Laboratory By: <i>J. D. Oster</i>		Received For Laboratory By: <i>J. D. Oster</i>		Received For Laboratory By: <i>J. D. Oster</i>		Received For Laboratory By: <i>J. D. Oster</i>		Received For Laboratory By: <i>J. D. Oster</i>		2/16/90		2:55	
White Copy - Client		Yellow Copy - Laboratory		Pink Copy - Originating Department		F:CHAIN		Comments: 9-3/12/90 PE					



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February 28, 1990

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MONTANA
Billings
Bozeman

Kelly's Amoco
Attn: Mr. Kelvin Williams
3010 West Oakland Avenue
Austin, MN 55912

ILLINOIS
Chicago

WISCONSIN
Milwaukee
Somerset

Project #: E90-134/EG-620/
9605

Roger V. Blomquist, Ph.D.
Paul R. Book, CPG
J.S. Braun, P.E.
C.G. Kruse, P.E.
Anne L. Ochs
Gregory G. Olson

Dear Mr. Williams,

AFFILIATED COMPANIES
Braun Engineering
Testing
Braun Pavement
Technologies, Inc.

Braun Environmental Laboratories, Inc. is pleased to provide our report for the analyses you requested. Data for the following sample(s) are enclosed:

Your I.D. Number/Description

Work Requested

Soil Samples

Organic and Metal Analyses

All samples were analyzed according to EPA or other standard methods. Any anomalies which were encountered in the analyses are referenced on the laboratory report. Method references and quality control information are available upon request.

If you have any questions or need additional information regarding this report or other Braun Environmental Laboratories services please contact us.

Very truly yours,

BRAUN ENVIRONMENTAL LABORATORIES, INC.

Linda C. Crawford
Linda C. Crawford
Organic Supervisor

Anne L. Ochs
Anne L. Ochs
Laboratory Manager

LCC/ALO:krf

Attachment

