HYDROGEOLOGIC EVALUATION

GASOLINE SPILL INVESTIGATION

TIGER OIL

YAKIMA, WASHINGTON

May 8, 1985

#120-12955

SOIL EXPLORATION COMPANY

SOIL EXPLORATION COMPANY

662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-6446

a sister corporation to TWIN CITY TESTING AND ENGINEERING LABORATORY INC.

May 8, 1985

Federated Insurance Company
129 East Broadway
Owatonna, Minnesota 55060

Attn: Mr. Brad Nesseth

Subj: Hydrogeologic Evaluation
Gasoline Spill Investigation
Tiger Oil
Yakima, Washington
#120-12955

Gentlemen:

We have completed our subsurface investigation for the above referenced site as verbally authorized by Mr. Brad Nesseth on November 16, 1984. We are transmitting five copies of our report to you. Additional copies will be forwarded as noted below.

All the samples received from our test borings will be held at this office for a period of three months following the date of this report. The samples will then be discarded unless we are notified to hold them for a longer period of time.

We appreciate the opportunity to have served you in regard to this project. If you have any questions regarding the information in this report, or if we can be of additional service, please contact us.

Very truly yours,

Soil Exploration Company

Mark S. Mason
Project Manager/Environmental Geologist

MSM/pp

Encs.

cc: 1 - Washington Department of Ecology
Attn: Mr. Al Newman
1 - IT Corporation
Attn: Mr. John Clark
1 - Zaremba Claims Services
Attn: Mr. Ronald Zaremba
1 - Weeks, Dietzen & Skala
Attn: Mr. Roland Skala

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

HYDROGEOLOGIC EVALUATION

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YAKIMA, WASHINGTON

120-12955

1.0 INTRODUCTION

The purpose of our work performed at this site was to define hydrogeologic conditions influencing the movement and migration of petroleum products and to provide information relative to evaluating the horizontal and vertical distribution of petroleum product contamination.

The scope of our services provided on this project consisted of the following.

1. Mobilizing to the site on November 30, 1984, to evaluate site conditions, and meet with local representatives and the Washington Department of Ecology.
2. Installing 12 monitoring wells for providing water level and water quality information.
3. Pumping all monitoring wells at a rate of 7 GPM for a minimum of 10 minutes or until clear discharge water was observed.
4. Collecting water samples from the previously mentioned monitoring wells and 9 private residences.
5. Analyzing all water samples for the presence of total hydrocarbons expressed as gasoline, benzene, toluene and xylene concentrations.
6. Preparing a final report which presents information regarding ground water remediation.

2.0 BACKGROUND INFORMATION

2.1 Project History

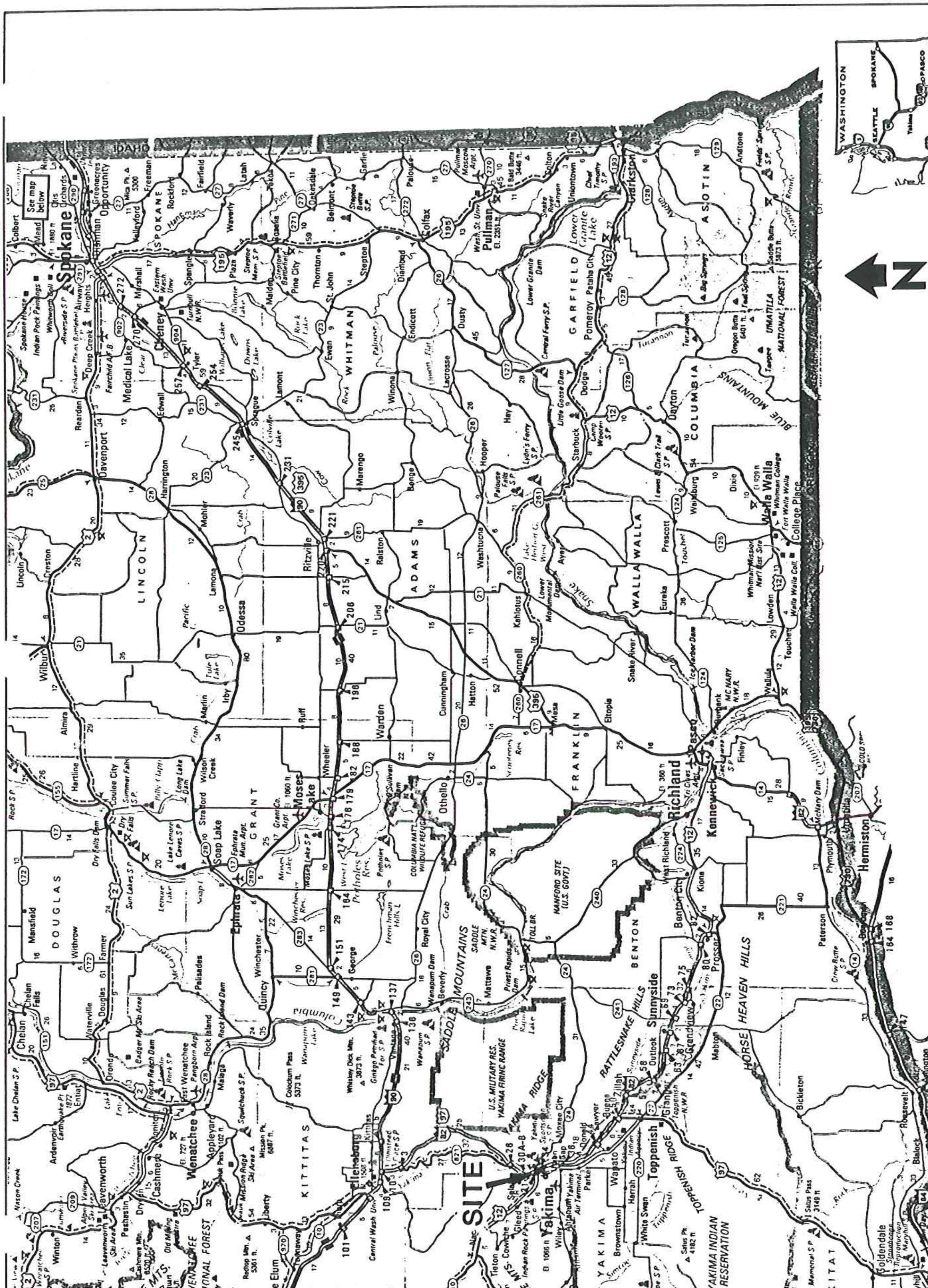
The Tiger Oil Exxon station is located on North First Street, Yakima, Washington (Figure 1). As we understand, the station was constructed in May and June, 1979. Regular, premium, unleaded and diesel petroleum products are stored below ground and distributed.

Hydrostatic testing of all dispenser lines was conducted during September, 1982. At that time, all lines produced a positive test (indicating leakage). All lines were subsequently replaced.

An environmental consultant from Seattle was retained by Tiger Oil to assess the environmental impact of the lost petroleum products. Fourteen monitoring wells were installed as part of their effort. At that time, petroleum product contamination appeared to be confined locally, and two recovery wells and one injection well were drilled to facilitate free product removal. Approximately 40 gallons of gasoline were recovered. Pumpage exceeded 100 GPM and minimal drawdown in the recovery well was achieved.

An additional three monitoring wells were later installed to further delineate the extent of hydrocarbon contamination (May 9, 1983). This extended study concluded that hydrocarbon migration was still limited to an area approximately 250' downgradient from the Tiger Oil station.

Due to unknown monitoring well construction details and previous monitoring well abandonment, only three of the seventeen monitoring wells were included in our study.



YAKIMA, WASHINGTON

FIGURE #1 SITE LOCATION

soil exploration company

2.2 Site Information

The Tiger Oil Exxon station is located in a business/residential district on North First Street, Yakima, Washington (Figure 2). U.S. Highway 12 is located approximately 850' north of the station. The station is constructed on the alluvial floodplain of the Yakima River. Parent material for the alluvium is derived from the surrounding basaltic bluffs. Local relief on the floodplain is minimal, with a low gradient maintained toward the Yakima River. The Yakima River is approximately 1000' NE of the Tiger Oil station, and is the local ground water discharge point.

3.0 PROJECT RESULTS

3.1 Soil Conditions

Twelve additional soil borings were drilled at this site between November 17, 1984, and February 20, 1985 (Figure 2). All soil borings were finished as monitoring wells. A W-22 Bucyrus Erie cable tool drilling rig was used to advance all borings. Using this method, only composite samples were recovered.

The results of the soil borings are presented on the attached logs in Appendix 1. A review of these logs indicates that the upper 21' of soil are primarily alluvial deposits consisting of lean clay to silty clay, with a little gravel from 0'-6'. In all borings the clays were underlain by coarse alluvium consisting of silty sand with a little gravel. Cobbles and boulders were encountered at all depths.

FIGURE #2
SITE MAP & CROSS SECTION LOCATIONS
TIGER OIL, YAKIMA, WA.

N

1" = 200'

LEGEND:

⊕ 1985 MONITORING WELL

● PREVIOUSLY INSTALLED MONITORING WELLS

A-A' CROSS SECTION LOCATIONS

A ⊕12-85

B ⊕10-85

5-85 ⊕ D

C

1-85 ⊕

11-85 ⊕3

●2

●1

TIGER OIL

No. First Street

A'
⊕4-85

Knight
⊕8-85

Knight

McGahan

Corbin Residence

7-85 ⊕

Knight

Yocham Residence

Knight

Schooley

Knight

"S" Street

Hutsoni Residence

Wilton. Owner

Hernandez Residence

McEntire Residence

Third Street

May Tangeman Residence

John Tangeman

9-85 ⊕

6-85 ⊕ D'

C'

2-85 ⊕

3-85 ⊕
B'

"R" Street

Fourth Street

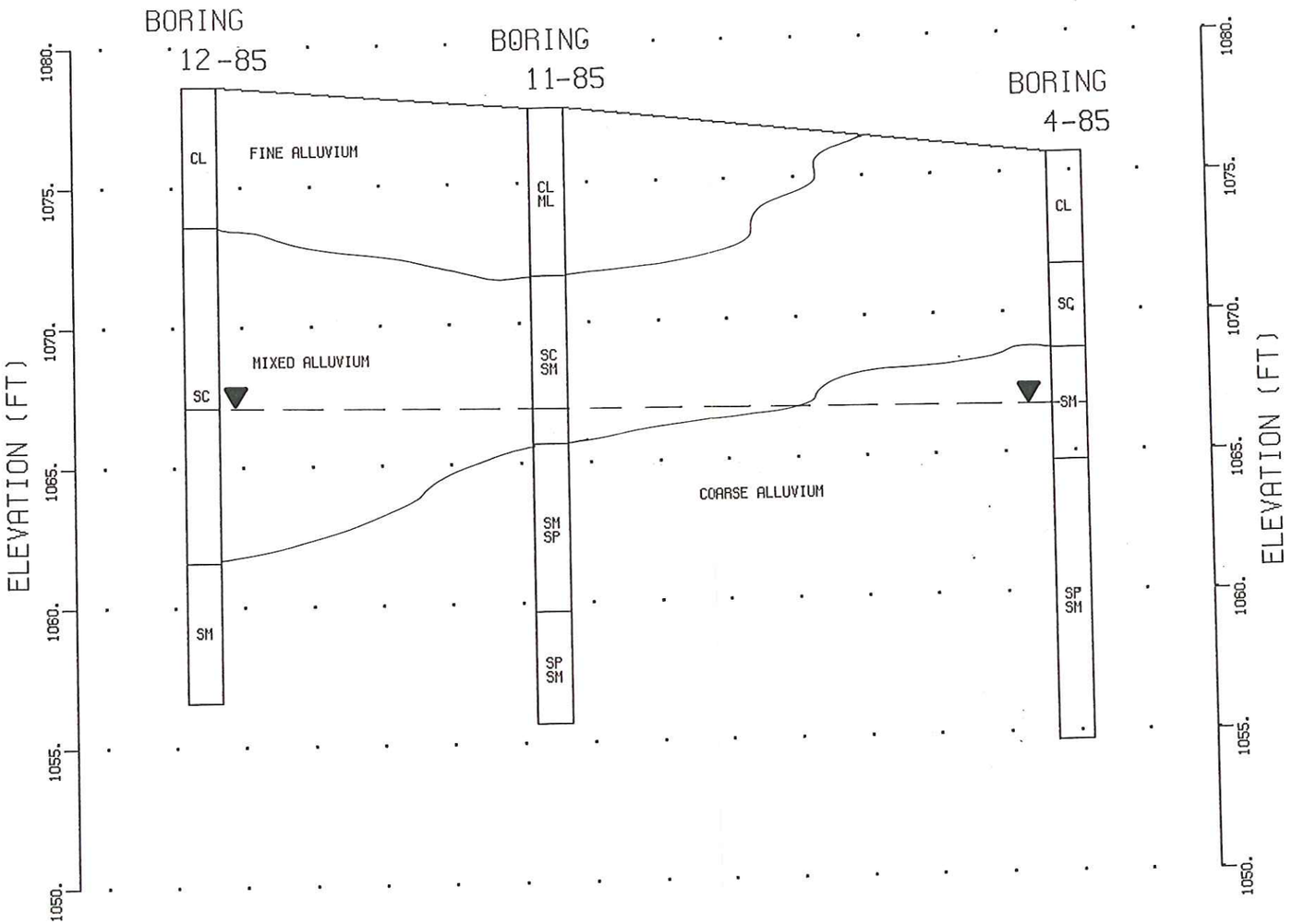
"Q" Street

SOIL EXPLORATION COMPANY

JOB #120-12955

A ⟷ A'

CROSS SECTION LOCATIONS SHOWN ON FIGURE #2



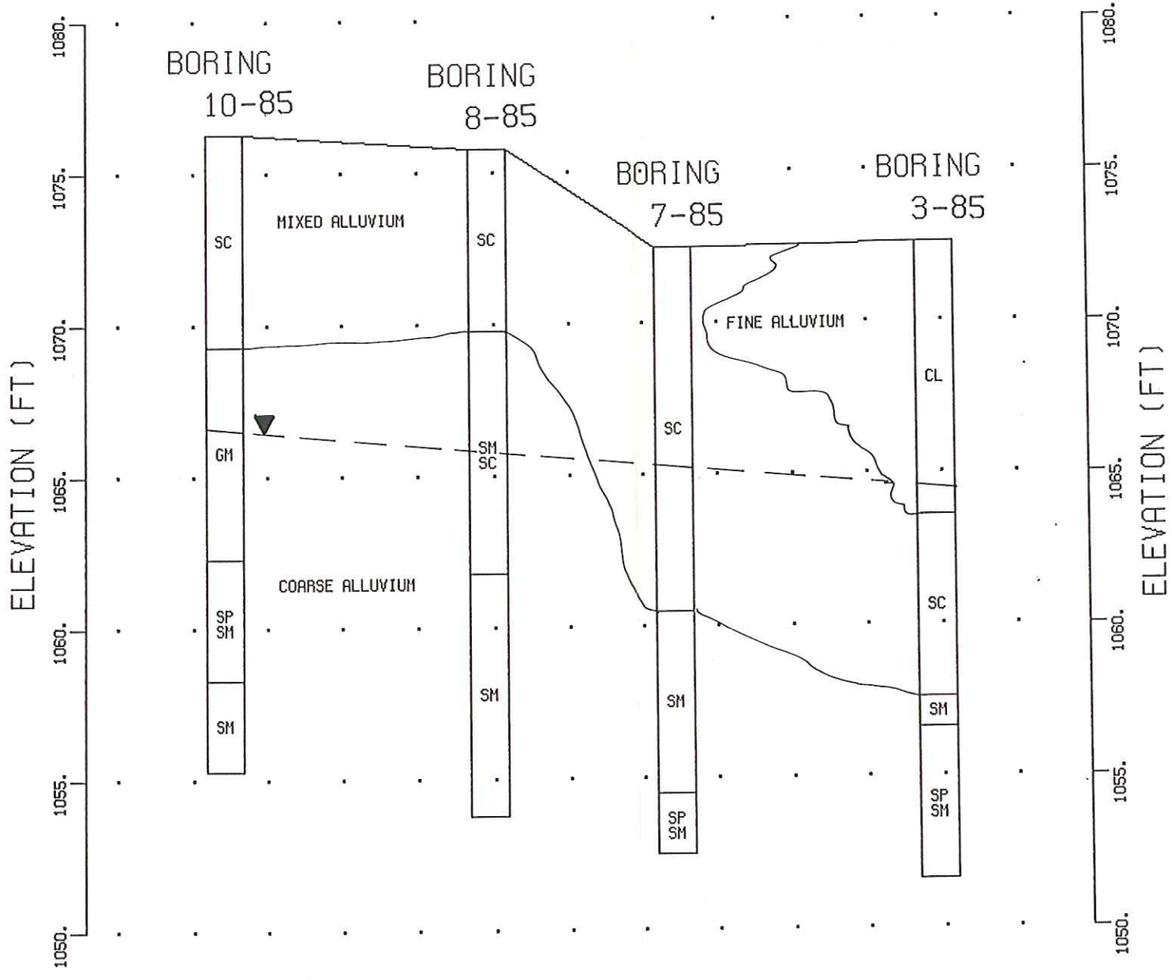
NOTE: EXCEPT AT BORING LOCATIONS THE GROUND SURFACE, WATER LEVEL, AND BOUNDARIES BETWEEN SOIL LAYERS ARE INFERRED.

FIGURE #3

SOIL PROFILE
GASOLINE SPILL INVESTIGATION YAKIMA, WASHINGTON W.O. 120-12955
SOIL EXPLORATION COMPANY
SCALE: VERT: 1 IN = 5. FT HORZ: 1 IN = 200. FT

B ⟷ B'

CROSS SECTION LOCATIONS SHOWN ON FIGURE #2



NOTE: EXCEPT AT BORING LOCATIONS THE GROUND SURFACE, WATER LEVEL, AND BOUNDARIES BETWEEN SOIL LAYERS ARE INFERRED.

FIGURE #4

SOIL PROFILE
GASOLINE SPILL INVESTIGATION YAKIMA, WASHINGTON W.O. 120-12955
SOIL EXPLORATION COMPANY
SCALE: VERT: 1 IN = 5. FT HORZ: 1 IN = 200. FT

C ⟷ C'

CROSS SECTION LOCATIONS SHOWN ON FIGURE #2

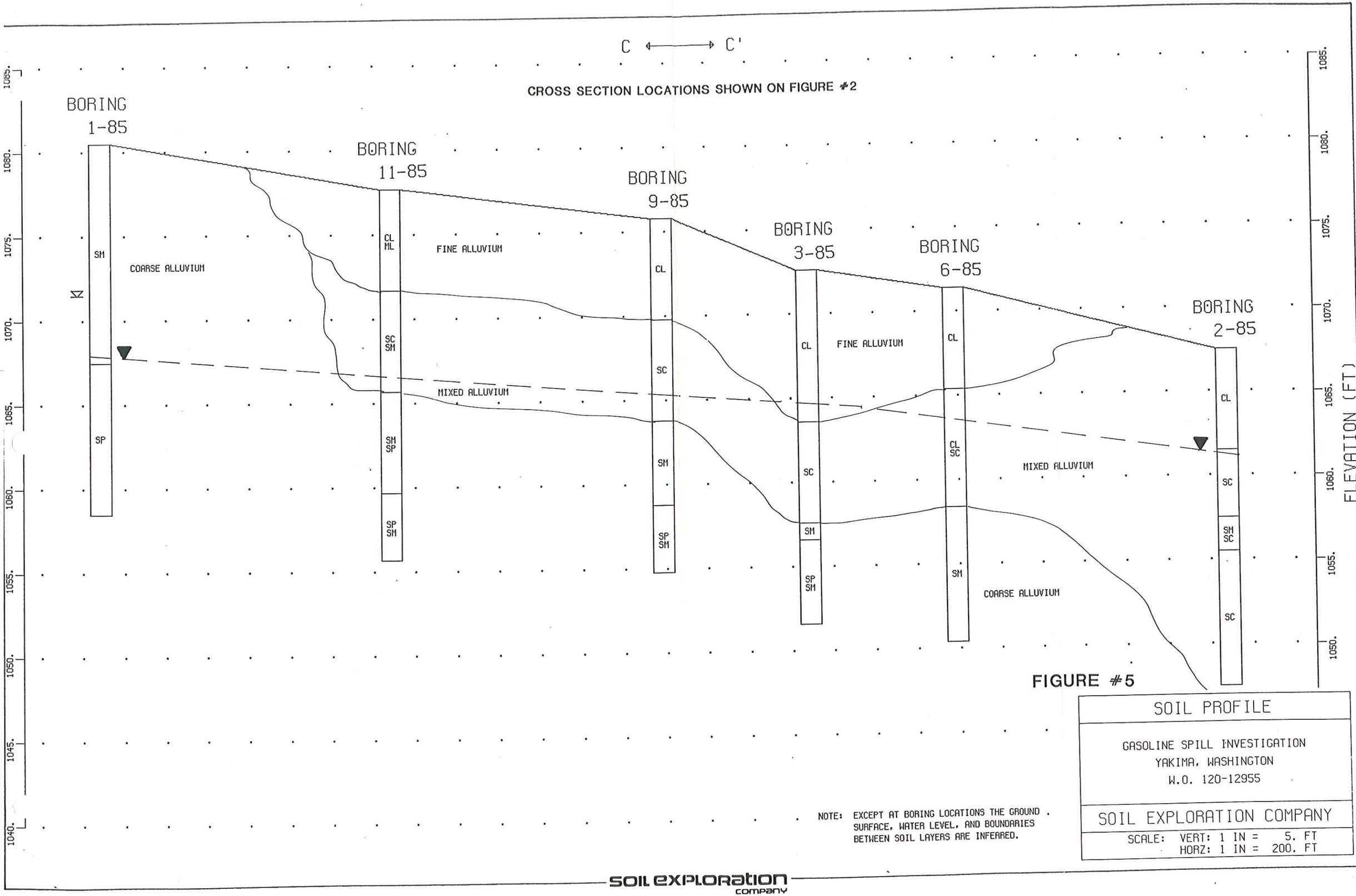


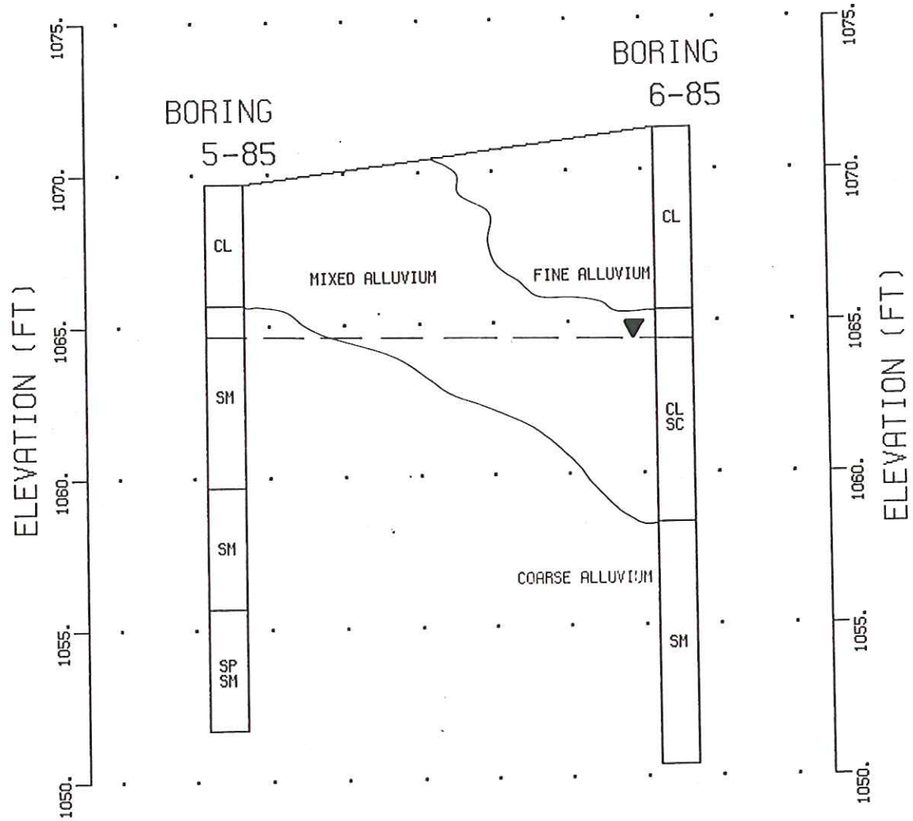
FIGURE #5

NOTE: EXCEPT AT BORING LOCATIONS THE GROUND SURFACE, WATER LEVEL, AND BOUNDARIES BETWEEN SOIL LAYERS ARE INFERRED.

SOIL PROFILE
GASOLINE SPILL INVESTIGATION YAKIMA, WASHINGTON W.O. 120-12955
SOIL EXPLORATION COMPANY
SCALE: VERT: 1 IN = 5. FT HORZ: 1 IN = 200. FT

D ⟷ D'

CROSS SECTION LOCATIONS SHOWN ON FIGURE #2



NOTE: EXCEPT AT BORING LOCATIONS THE GROUND SURFACE, WATER LEVEL, AND BOUNDARIES BETWEEN SOIL LAYERS ARE INFERRED.

FIGURE #6

SOIL PROFILE
GASOLINE SPILL INVESTIGATION YAKIMA, WASHINGTON W.O. 120-12955
SOIL EXPLORATION COMPANY
SCALE: VERT: 1 IN = 5. FT HORZ: 1 IN = 200. FT

Figures 3, 4, 5 and 6 present cross-sectional illustrations of soil conditions inferred from our boring logs.

3.2 Monitoring Wells

Two inch diameter flush thread schedule 40 PVC monitoring wells were installed in all borings. All monitoring wells are equipped with 15' of screen. The final screening interval was decided in the field after depth to ground water data was available. All wells with the exception of 2-85 and 5-85 are installed such that 10' of screen extends below the water table and 5' extends above the static water table on the day that they were installed. Monitoring wells 2-85 and 5-85 are screened such that approximately 11' of screen extends into the water table. This decision was based on depth to ground water data of approximately 6' and a minimum criteria of one foot of filter sand above the screen before the grout seal. All monitoring wells were filter packed with coarse sand.

3.3 Ground Water

Stabilized ground water elevations and surface elevation data are presented on Tables 1 and 2. A review of these tables indicates that depth to ground water varies from 5.43' below the surface at monitoring well 5-85 to 12.96' below the surface at monitoring well 1. Figure 7 presents a ground water contour map generated from the water level data recorded on February 20, 1985.

Table 2

Ground Water and Surface Elevation Data (2-21-85)

Location	Date	Ground Elevation	Reference Elevation*	Depth to Water From Top of 2" PVC Riser	Ground Water Elevation
1-85	2-21-85	1080.5	1080.34	12.78	1067.56
2-85	2-21-85	1067.5	1066.98	5.79	1061.19
3-85	2-21-85	1072.6	1072.18	7.69	1064.49
4-85	2-21-85	1075.7	1075.74	9.00	1066.74
5-85	2-21-85	1069.7	1069.38	5.10	1064.28
6-85	2-21-85	1071.4	1071.13	7.17	1063.96
7-85	2-21-85	1072.5	1072.15	7.14	1065.01
8-85	2-21-85	1075.8	1075.66	9.53	1066.13
9-85	2-21-85	1075.8	1075.48	9.54	1065.94
10-85	2-21-85	1076.3	1076.03	9.38	1066.65
11-85	2-21-85	1077.7	1077.21	10.48	1066.73
12-85	2-21-85	1078.6	1078.24	11.25	1066.99
1	2-21-85	1078.1	1080.34	13.72	1066.62
2	2-21-85	1078.0	1080.45	13.88	1066.57
3	2-21-85	1076.9	1079.49	12.70	1066.79

* Reference Elevation = Top of 2" PVC riser.

All reference and ground surface elevations were surveyed by a local professional land surveyor and referenced to Yakima county datum (same as USC and GS sea level datum).

Table 1

Ground Water and Surface Elevation Data (2-20-85)

Location	Date	Ground Elevation	Reference Elevation*	Depth to Water From Top of 2" PVC Riser	Ground Water Elevation
1-85	2-20-85	1080.5	1080.34	--	--
2-85	2-20-85	1067.5	1066.98	5.74	1061.24
3-85	2-20-85	1072.6	1072.18	7.60	1064.58
4-85	2-20-85	1075.7	1075.74	9.00	1066.74
5-85	2-20-85	1069.7	1069.38	5.11	1064.27
6-85	2-20-85	1071.4	1071.13	7.17	1063.96
7-85	2-20-85	1072.5	1072.15	7.11	1065.04
8-85	2-20-85	1075.8	1075.66	9.51	1066.15
9-85	2-20-85	1075.8	1075.48	9.54	1065.94
10-85	2-20-85	1076.3	1076.03	9.38	1066.65
11-85	2-20-85	1077.7	1077.21	10.48	1066.73
12-85	2-20-85	1078.6	1078.24	11.25	1066.99
1	2-20-85	1078.1	1080.34	--	--
2	2-20-85	1078.0	1080.45	--	--
3	2-20-85	1076.9	1079.49	--	--

* Reference Elevation = Top of 2" riser.

All reference and ground surface elevations were surveyed by a local professional land surveyor and referenced to Yakima county datum (same as USC and GS sea level datum).

FIGURE # 7
GROUND WATER CONTOUR MAP
TIGER OIL, YAKIMA, WA.

N
1" = 200'

LEGEND:
⊕ 1985 MONITORING WELL
● PREVIOUSLY INSTALLED MONITORING WELL

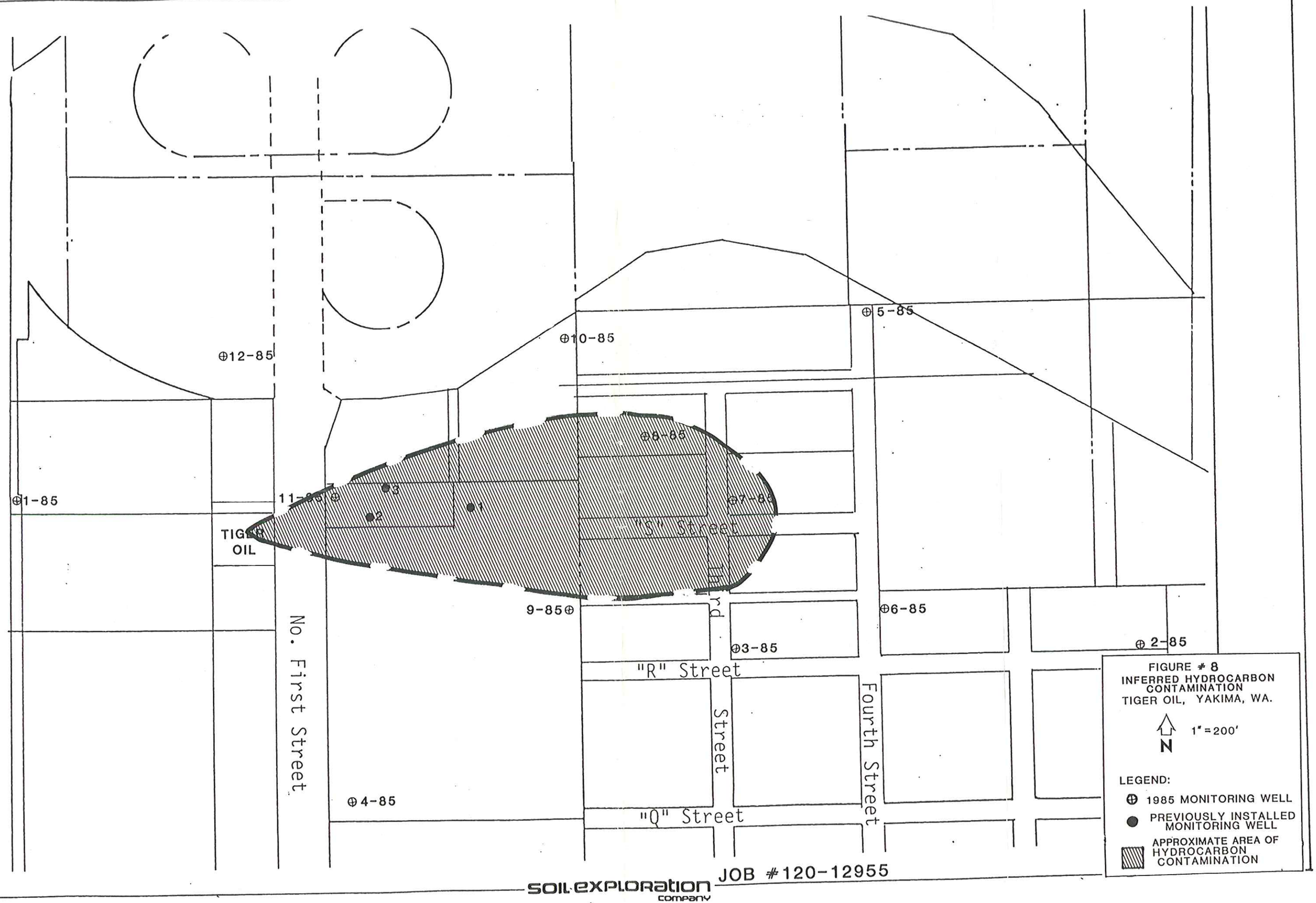
CONTOUR INTERVAL 0.50'
ARROWS INDICATE GENERALIZED DIRECTION OF GROUND WATER FLOW
LINE CONNECTING POINTS OF EQUAL ELEVATION ON THE WATER TABLE SURFACE

1067.00
1066.50
1066.00
1065.50
1065.00
1064.50
1064.00
1063.50
1063.00
1062.50
1062.00
1061.50
1061.00

⊕12-85 1066.99
⊕10-85 1065.94
⊕5-85 1064.27
⊕8-85 1066.13
⊕1-85 1067.56
11-85 ⊕ 1066.73
3 ● 1066.79
2 ● 1066.57
1 ● 1066.62
⊕7-85 1065.0
9-85 ⊕ 1065.94
⊕6-85 1063.96
⊕3-85 1064.49
⊕2-85 1061.19
⊕4-85 1066.74

TIGER OIL

"S" Street
"R" Street
"Q" Street
No. First Street
Third Street
Fourth Street



SOIL EXPLORATION COMPANY JOB #120-12955

TABLE 4

Volatile Analysis

(Sampled February 21, 1985)

Parameter	MW-1 (ug/L)	MW-2 (ug/L)	MW-3 (ug/L)	MW-4 (ug/L)	MW-5 (ug/L)	MW-6 (ug/L)	MW-7 (ug/L)	MW-8 (ug/L)	MW-9 (ug/L)	MW-10 (ug/L)	MW-11 (ug/L)	MW-12 (ug/L)	Lower Detectable Limit (ug/L)
Total Hydrocarbons as Gasoline	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23390	ND	1
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1460	ND	1
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5300	ND	1
Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6260	ND	1

For purposes of these samples ug/L = ppb

ND = Not Detected

SEC 120-12955

Laboratory No 2A-3512

Examination of Table 3 indicates that residual hydrocarbon contamination of the soils appears to be confined to the areas near borings 11-85 and 8-85 (Figure 8).

3.5 Chemical Analysis Results

Water samples collected on February 19, February 21, and March 25, 1985 were forwarded to our sister company, Twin City Testing and Engineering Laboratory, Inc., for analysis to quantify concentrations of benzene, toluene, xylene and total hydrocarbons expressed as gasoline. Table 4 presents the results for the chemical analysis. Sampling information forms for all samples collected on February 19 and 21, 1985 are located in Appendix II. Chain of custody forms for all samples are attached in Appendix III.

Review of the data presented in Table 4 indicates that monitoring well 11 and the Yocham residence private water supply well contain hydrocarbon contamination. Hydrocarbon contamination of the Yocham well appears to have increased when sampled on March 25, 1985. This may be due to increased ground water infiltration caused by spring thawing. Chemical analysis methodology procedures are included in Appendix IV.

Water level measurements combined with vertical and horizontal controls indicate that potential for ground water flow is generally eastward through the study area (Figure 7). We have calculated the hydraulic gradient to be 0.0023. The local ground water discharge point is the Yakima River, which is approximately 2,500 feet downgradient from the site. We have been informed by Washington Department of Ecology personnel that the hydraulic gradient generally increases during the summer due to irrigation.

3.4 Petroleum Product Observations

As our borings were advanced, all recovered soil samples were examined for the presence of fuel oil using visual appearance and odor as criteria. Table 3 summarizes the vertical zone of petroleum product contamination as inferred from the boring data.

Table 3

Petroleum Product Observations

Boring #	Interval of Contamination	Comments
1-85	--	Not detected
2-85	--	Not detected
3-85	--	Not detected
4-85	--	Not detected
5-85	--	Not detected
6-85	--	Not detected
7-85	--	Not detected
8-85	Sample designated as 14-22'	Slight gasoline odor
9-85	--	Not detected
10-85	--	Not detected
11-85	6-12'	Strong gasoline odor
	12-18'	Slight gasoline odor
12-85	--	Not detected

TABLE 4 (cont)

Volatile Analysis

(Sampled February 19, 1985)

Parameter	Wilton (ug/L)	Hernand. (ug/L)	Corbin (ug/L)	Tangeman (ug/L)	Yocham (ug/L)	McGohan (ug/L)	Hutson (ug/L)	Suddeth (ug/L)	Knight (ug/L)	Lower Detectable Limit (ug/L)
Total Hydrocarbons as Gasoline	ND	ND	ND	ND	14	ND	ND	ND	ND	1
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Xylene	ND	ND	ND	ND	5	ND	ND	ND	ND	1

For purposes of this sample ug/L = ppb

ND = Not Detected

NOTE: Well locations are shown on Figure 2.

TABLE 4 (cont)

Volatile Analysis

(Sampled March 25, 1985)

Parameter	#3003 Knight (ug/L)	#3004 Yocham (ug/L)	Lower Detectable Limit (ug/L)
Total Hydrocarbons as Gasoline	ND	3120	1
Benzene	ND	28	1
Toluene	ND	680	1
Xylene	ND	980	1

For purposes of these samples ug/L = ppb

ND = Not Detected

4.0 DISCUSSION

Based on the data presented, we feel that low concentrations of dissolved hydrocarbons are present in the surficial aquifer. Water quality data, combined with soil contamination observations, indicate that a vertical zone of residual soil contamination may exist.

During periods of high infiltration (i.e., spring thaw, irrigation season), percolating ground water removes adsorbed hydrocarbons from the soils. Generally, this type of infiltration is usually associated with increased ground water elevations. Dissolved hydrocarbons will in turn be transported and diffused downgradient, which will eventually result in an enlarging plume.

As infiltration decreases, ground water elevations may drop. As the water table drops, some dissolved hydrocarbons will again adsorb to soil particles and be rendered immobile.

This cycling of the water table will produce maximum dissolved hydrocarbon contamination during the mobile phase, and minimal dissolved hydrocarbon contamination during the immobile phase, or low water phase, when water flows through the lower soils that have reduced or no residual hydrocarbon contamination.

This hypothesis is supported by contaminated soils being observed at monitoring well 8-85 (using odor as a criterion) and no dissolved hydrocarbon contamination being detected in the water sample collected at MW-8 on February 21, 1985.

We should point out that shallow private water supply wells may act as gradient control wells, which may concentrate hydrocarbons locally and produce potable water of unacceptable quality.

5.0 RECOMMENDATIONS

5.1 General

Based on our findings, we feel that a "pocket" of free gasoline does not exist. In view of this, ground water depression for product recovery is not recommended. Due to the high hydraulic conductivity, past efforts to significantly depress the water table failed. Considering this, gradient control should not be used as a feasible alternative to cleaning up hydrocarbon contamination.

As we understand, alternative water supplies (deep wells, city water supply) have been provided for area residents that have wells which have been affected by hydrocarbon contamination. Due to the remedial nature of this action, we recommend that a monitoring program be implemented to document ground water flow and quality over a period of one year before re-evaluating site conditions and possible implementation of other remedial measures.

5.2 Monitoring Program

Table 5 outlines the schedule for monitoring and sampling through April, 1986. Should unusually high hydrocarbon concentrations occur in any of our monitoring wells during this monitoring period, we will evaluate this anomaly accordingly.

We propose to submit factual reports to the Washington Department of Ecology on a quarterly basis. Summary reports will include water level and quality data generated during the quarterly sampling/monitoring interval. Field observations and our interpretation of the data will be included in these reports.

Table 5

Monitoring and Sampling Schedule

Date	Task					
	Water Levels all Monitoring Wells	Sample all 1985 MW	Sample Knights Residence	Sample* Select Private Wells	Qtrly Report	Annual Report
May 1985	X	X	X	X		
June 1985	X		X		X	
July 1985	X		X			
Aug 1985	X	X	X	X		
Sept 1985	X				X	
Oct 1985	X					
Nov 1985	X	X	X	X		
Dec 1985	X				X	
Jan 1986	X					
Feb 1986	X	X	X	X		
March 1986	X					
April 1986	X					X

* Private wells to be sampled will be decided on a quarterly basis.

6.0 METHODS

6.1 Soil Sampling and Classification

As our borings were advanced, composite soil samples were collected when a change in soil conditions or hydrocarbon contamination was noted. All soil samples were visually and manually classified by our geologist in accordance

with ASTM: D 2487-83. Representative samples were returned to our laboratory for further examination and verification of field classification. Charts illustrating the soil classification procedures and descriptive terminology and symbols used on the soil boring logs are attached in Appendix V.

All borings were put down using a 6" cable tool. Only disturbed composite samples were recovered. Because of this method, our determination of the depth and extent of the various layers of soil and the consistency of cohesive soils are only approximate.

6.2 Monitoring Well Installation

Information regarding monitoring well construction and installation is provided on the attached monitoring well construction sheets (Appendix VI).

6.3 Water Sampling

Ground water samples were collected after a minimum of 3 well volumes of ground water were extracted from the monitoring well. Water samples were collected using dedicated "clean" bottom loading Teflon bailers with virgin rope. All samples were preserved with blue ice and transported to Twin City Testing and Engineering Laboratory, Inc. for analysis before a 14-day holding time elapsed.

Water samples collected from private wells were collected after a non-filtered, non-aereated cold water faucet had been running at a rate of approximately 1 GPM for a 30-minute period. All samples were preserved with blue ice.

7.0 REMARKS

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted engineering practices at this time and location. Other than this, no warranty is implied or intended.

This report was written by: Mark S. Mason

Mark S. Mason
Project Manager/Environmental Geologist

Date: May 8, 1985

This report was reviewed by: Jerry R. Rick

Jerry R. Rick, Manager
Environmental Department

Date: May 8, 1985

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 3-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1072.6')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	COMMENTS
	LEAN CLAY, dark brown (CL)	FINE ALLUVIUM		▼	1	CT	
9	CLAYEY SAND W/GRAVEL, brown (SC)	MIXED ALLUVIUM			2	CT	
15	SILTY SAND W/A LITTLE GRAVEL, brownish gray, wet (SM)	COARSE ALLUVIUM			3	CT	
16	SAND W/SILT AND GRAVEL, medium to coarse grained, brownish gray, waterbearing (SP-SM)				4	CT	
21	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-9	12:30	16'	16'		to	8'
1-10	1:00		SEE NOTE		to	
					to	
					to	

START 1-9-85 COMPLETE 1-10-85

METHOD 6DC 0-19' @ 8:30

CT (Cable Tool) 0-21'

CREW CHIEF Mason

862 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

APPENDIX I

BORING LOGS

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 1-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH IN FEET	DESCRIPTION OF MATERIAL SURFACE ELEVATION 1080.5	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	COMMENTS
	SILTY SAND W/A GRAVEL TO A LITTLE GRAVEL, cobbles above 4', brownish gray, moist to wet (SM)	COARSE ALLUVIUM			1	CT	
					2	CT	
13	SAND W/A LITTLE GRAVEL, AND WITH GRAVEL BELOW 19', medium to coarse grained, brownish gray, waterbearing *Drilling slurry				3	CT	
21	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

START 11-17-84 COMPLETE 11-18-84

METHOD 6DC 0-17' @ 4:00

CT (Cable Tool) 0-21'

CREW CHIEF Mason

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
11-18	3:00	17'	17'		to	9' *
11-18	4:15	21'	17'		to	9½'*
11-20	9:00		See Note		to	
					to	

882 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 2-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1067.5')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	COMMENTS
	SANDY LEAN CLAY W/A LITTLE GRAVEL, dark brown (CL)	MIXED ALLUVIUM			1	CT	
6	CLAYEY SAND W/A LITTLE GRAVEL, dark brown (SC)			▼	2	CT	
10	SILTY SAND W/A LITTLE GRAVEL, brownish gray, wet (SM/SC)				3	CT	
2	CLAYEY SAND W/A LITTLE GRAVEL, brownish gray with a little reddish brown and green below about 17' (SC)				4	CT	
20	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

START 1-7-85 COMPLETE 1-8-85

METHOD 6DC 0-19' @ 8:00

CT (Cable Tool) 0-21'

CREW CHIEF Mason

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-7	3:00	17'	19'		to	7'
1-8	8:00	20'	19'		to	NMR
1-8	2:00		SEE NOTE		to	
					to	

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 4-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1075.7')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	COMMENTS
	SANDY LEAN CLAY W/A LITTLE GRAVEL, dark brown (CL)	MIXED ALLUVIUM			1	CT	
4	CLAYEY SAND W/GRAVEL, brown (SC)				2	CT	
7	SILTY SAND W/A LITTLE GRAVEL, grayish brown, wet (SM)	COARSE ALLUVIUM		▼	3	CT	
11	SAND W/SILT AND GRAVEL, grayish brown, waterbearing (SP-SM)				4	CT	
21	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

START 1-10-85 COMPLETE 1-14-85

METHOD 6DC 0-20' @ 8:30

CT (Cable Tool) 0-21'

CREW CHIEF Mason

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
1-14	2:00		SEE NOTE		to	
					to	

682 CROMWELL AVENUE SOIL EXPLORATION company ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 5-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH (FEET)	DESCRIPTION OF MATERIAL — SURFACE ELEVATION 1069.7'	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	COMMENTS
	CLAYEY SAND W/A LITTLE GRAVEL, brown (SC)	MIXED ALLUVIUM			1	CT	
4	SILTY SAND W/A LITTLE GRAVEL, grayish brown, moist to wet (SM)	COARSE ALLUVIUM		▼	2	CT	
10	SILTY SAND W/GRAVEL, brownish gray, wet (SM)				3	CT	
14	SAND W/SILT AND A LITTLE GRAVEL, medium to fine grained, grayish brown, waterbearing (SP-SM)				4	CT	
18	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
1-16	9:00		SEE NOTE		to	
					to	

START 1-14-85 COMPLETE 1-15-85

METHOD 6DC 0-17' @ 2:00

CT (Cable Tool) 0-18'

CREW CHIEF Mason

682 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 7-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

FEET	DESCRIPTION OF MATERIAL SURFACE ELEVATION 1072.5'	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	COMMENTS
	CLAYEY SAND W/A LITTLE GRAVEL, some cobbles, brownish gray (SC)	MIXED ALLUVIUM			1	CT	
					2	CT	
12	SILTY SAND W/GRAVEL, brownish gray, wet (SM)	COARSE ALLUVIUM			3	CT	
18	SAND W/SILT AND A LITTLE GRAVEL, medium to fine grained, grayish brown, waterbearing (SP-SM)				4	CT	
20	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
1-22	3:30		SEE NOTE		to	
					to	

START 1-21-85 COMPLETE 1-22-85

METHOD 6DC 0-18' @ 1:00

CT (Cable Tool) 0-20'

CREW CHIEF Mason

862 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 6-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH IN FEET	DESCRIPTION OF MATERIAL SURFACE ELEVATION 1071.4'	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	COMMENTS
	LEAN CLAY W/A LITTLE GRAVEL, dark brown (CL)	FINE ALLUVIUM			1	CT	
6	SANDY LEAN CLAY W/A LITTLE GRAVEL, brown (CL/SC)	MIXED ALLUVIUM		▼	2	CT	
13	SILTY SAND W/A LITTLE GRAVEL, brownish gray, wet (SM)	COARSE ALLUVIUM			3	CT	
					4	CT	
21	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
1-18	1:00		SEE NOTE		to	
					to	

START 1-17-85 COMPLETE 1-18-85

METHOD 6DC 0-19' @ 10:00

CT (Cable Tool) 0-21'

CREW CHIEF Mason

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 8-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1075.8')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	COMMENTS
	CLAYEY SAND W/A LITTLE GRAVEL, dark brown (SC)	MIXED ALLUVIUM			1	CT	
6	SILTY SAND W/A LITTLE GRAVEL, some cobbles, moist to wet, brownish gray (SM/SC)	COARSE ALLUVIUM		▼	2	CT	
14	SILTY SAND W/GRAVEL, a few cobbles, brownish gray, wet (SM)				3	CT	
					4	CT	Slight gasoilne odor
22	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
2-14	3:00		SEE NOTE		to	
					to	

START 2-13-85 COMPLETE 2-14-85

METHOD 6DC 0-20' @ 1:00

CT (Cable Tool) 0-22'

CREW CHIEF Mason

862 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

SAMPLING INFORMATION

Sampling Point MW 11-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02211300 Date Sampled 2/21/85 Time 1300 AM/PM
Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 20 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 10.48 ft. Date 2/20/85 Time 1510 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at ft. below MP. cleaned
Tubing (type: Teflon), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: Cloudy Odor: strong gasoline-like odor
Note any Sampling Problems:

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1516				10.60		
1524				10.60		
Date Time						
2-21 1300				10.47		

Pumping start time 1512 WL 10.48
Pumping stop time 1524 WL 10.60

Comments: Developed with pump prior to extracting three well volumes with bailer

Form Completed by: MSM Witnessed by:

SOIL EXPLORATION company

SE-V-2(84-B)

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 9-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1075.8')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	COMMENTS
	LEAN CLAY, dark brown (CL)	FINE ALLUVIUM			1	CT	
6	CLAYEY SAND W/GRAVEL, grayish brown (SC)	MIXED ALLUVIUM		▼	2	CT	
12	SILTY SAND W/GRAVEL, brownish gray, wet (SM)	COARSE ALLUVIUM			3	CT	
17	SAND W/SILT AND GRAVEL, medium grained, brownish gray, water-bearing (SP-SM)				4	CT	
21	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
1-24	3:00		SEE NOTE		to	
					to	

START 1-23-85 COMPLETE 1-24-85

METHOD 6DC 0-20' @ 1:00

CT (Cable Tool) 0-21'

CREW CHIEF Mason

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

SAMPLING INFORMATION

Sampling Point Yocham Residence Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02191400 Date Sampled 02/19/85 Time 1400 AM/PM
Describe Sampling Point Kitchen sink

Well Depth 28 ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date ___/___/___ Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: clear Odor: none
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before collecting water samples

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point Suddeth Residence Project Tiger Oil #3
Location 302 "S" Street, Yakima, WA W.O. # 120-12955

Sample ID # 02191540 Date Sampled 02 / 19 / 85 Time 1540 AM/PM
Describe Sampling Point Kitchen sink

Well Depth 18 ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date / / Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: Clear Odor: None
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before collecting water samples

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point McGahan Residence Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02191337 Date Sampled 02 / 19 / 85 Time 1337 AM/PM
Describe Sampling Point Kitchen sink

Well Depth 70 ft. below MP Casing Diameter 6" inches
Depth to Water (below MP) _____ ft. Date / / Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: clear Odor: None
Note any Sampling Problems: _____

Samples Collected: _____

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before collecting water samples

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point Tangemon Residence Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02191415 Date Sampled 02 / 19 / 85 Time 1415 AM/PM
Describe Sampling Point Kitchen sink

Well Depth _____ ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date / / Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: Clear Odor: None
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before collecting samples

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point Hutson Residence Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02191515 Date Sampled 02 / 19 / 85 Time 1515 AM/PM
Describe Sampling Point Kitchen sink

Well Depth 28 ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date / / Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒x Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: Clear Odor: None
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before collecting water samples

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION COMPANY

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-5-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02210949 Date Sampled 2/21/85 Time _____ AM/PM
Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 14.95 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 5.90 ft. Date 2/20/85 Time 1016 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other _____
Pump intake or bailer set at 8 ft. below MP.
Tubing (type: Teflon), (new or previously used) cleaned was used to collect all samples (yes, no)
and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: brown cloudy Odor: none
Note any Sampling Problems: none

Samples Collected: volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1020				11.78		5 gpm
1025				11.80		
Date Time						
2-21 0949				5.11		

Pumping start time 1018 WL 5.11
Pumping stop time 1029 WL 11.80

Comments: Developed with pump prior to extracting 3 well volumes with bailers.

Form Completed by: MSM Witnessed by: _____

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-6-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02211007 Date Sampled 2 /21 /85 Time 1007 AM/PM
Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 19 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 7.17 ft. Date 2/20/85 Time 1037 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 9 ft. below MP.
Tubing (type: Teflon), (new or previously used) cleaned was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: cloudy Odor: none
Note any Sampling Problems: none

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1047				7.50		5
1051				7.50		
Date Time						
2-21 1007				7.17		

Pumping start time 1042 WL 7.17
Pumping stop time 1052 WL 7.50

Comments: Developed with pump prior to extracting 3 well volumes with bailers

Form Completed by: MSM Witnessed by:

SOIL EXPLORATION COMPANY

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-8-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02211040 Date Sampled 2/21/85 Time 1040 AM/PM
Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 19.90 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 9.53 ft. Date 2/20/85 Time 1150 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 11 ft. below MP.
Tubing (type: Teflon), (new or previously used) was cleaned used to collect all samples (yes, no)
and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate =

Sample Appearance: cloudy Odor: none
Note any Sampling Problems: None

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1157				9.60		
1701				9.60		
Date Time						
2-21 1040				9.51		

Pumping start time 1153 WL 9.51
Pumping stop time 1203 WL 9.60

Comments: Developed with pump prior to extracting 3 well volumes with bailer

Form Completed by: MSM Witnessed by:

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-7-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02211022 Date Sampled 2/21/85 Time 1022 AM/PM
Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 18.90 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 7.14 ft. Date / / Time 1104 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 9 ft. below MP cleaned
Tubing (type: Teflon), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: cloudy Odor: none
Note any Sampling Problems: none

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1121				7.48		5
1125				7.50		
Date Time						
2-21 1022				7.11		

Pumping start time 1117 WL 7.11
Pumping stop time 1127 WL 7.50

Comments: Developed with pump, prior to extracting 3 well volumes with bailer

Form Completed by: MSM Witnessed by:

SOIL EXPLORATION COMPANY

V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-9-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02211135 Date Sampled 2 / 21 / 85 Time 1135 AM/PM
Describe Sampling Point 2" Flush with grade PVC monitoring well

Well Depth 19.50 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 9.54 ft. Date 2 /20 /85 Time 1336 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 12 ft. below MP cleaned
Tubing (type: Teflon), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate =

Sample Appearance: cloudy Odor: none
Note any Sampling Problems: none

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1343				9.78		
1348				9.78		
Date Time						
2-21 1135				9.55		

Pumping start time 1338 WL 9.54
Pumping stop time 1349 WL 9.78

Comments: Developed with bailer prior to extracting 3 well volumes with bailer

Form Completed by: MSM Witnessed by:

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-4-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02211200 Date Sampled 2 /21 /85 Time 1200 AM/PM
Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 19.90 ft. below MP Casing Diameter 2" inches
Depth to Water (below MP) 9.00 ft. Date 2 /20/ 85 Time 1245 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 11 ft. below MP cleaned
Tubing (type: Teflon), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: cloudy Odor:
Note any Sampling Problems: none

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1253				10.10		
1257				10.10		
Date Time						
2-21 1200				8.99		

Pumping start time 1248 WL 9.00
Pumping stop time 1258 WL 10.10

Comments: Developed with pump prior to extracting 3 well volumes with bailer

Form Completed by: MSM Witnessed by:

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point Knight Residence Project Tiger Oil #3
Location 1815 Third St., Yakima, WA W.O. # 120-12955

Sample ID # 02191830 Date Sampled 02 / 19 / 85 Time 1830 AM/PM
Describe Sampling Point Kitchen sink

Well Depth _____ ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date ___/___/___ Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: Clear Odor: None
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before collecting samples

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION COMPANY

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-1-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02210846 Date Sampled 02 / 21 / 85 Time 0846 AM/PM
Describe Sampling Point 2" Flush with grade PVC monitoring well

Well Depth 21 ft. below MP Casing Diameter 2" inches
Depth to Water (below MP) 12.78 ft. Date 02 / 21 / 85 Time 0846 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at ft. below MP.
Tubing (type: Teflon), (~~new~~ or previously cleaned) was used to collect all samples (yes, ~~no~~)
and all field measurements (yes, ~~no~~) Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: Clear Odor: None
Note any Sampling Problems:

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
	Pumped on December 17, 1984 by well driller					
Date Time						
022185 0846				12.78		

Pumping start time WL
Pumping stop time WL

Comments: Well developed with pump prior to extracting three well volumes with bailer

Form Completed by: Mark Mason Witnessed by:

SOIL EXPLORATION COMPANY

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-2-85 Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02210910 Date Sampled 02/21/85 Time 0910 AM/PM
Describe Sampling Point 2" Flush with grade PVC monitoring well

Well Depth 18 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 5.79 ft. Date 02/20/85 Time 0859 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.5115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 20 ft. below MP. cleaned
Tubing (type: Teflon), (~~new~~ or previously used) was used to collect all samples (yes, ~~no~~)
and all field measurements (yes, ~~no~~). Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: Clear Odor: None
Note any Sampling Problems: None

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

02-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
0902				5.75		8
0913				5.76		
Date Time						
022185 0910				5.74		

Pumping start time 0900 WL 5.74
Pumping stop time 0915 WL 5.79

Comments: Developed with pump prior to extracting three well volumes with bailer

Form Completed by: Mark Mason Witnessed by:

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW-3-85 Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02210928 Date Sampled 02 /21 /85 Time 0928 AM/PM
Describe Sampling Point 2" Flush with grade PVC Monitoring Well

Well Depth 18.70 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 7.69 ft. Date 02/ 20/ 85 Time 0950 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 9.5' ft. below MP. cleaned
Tubing (type: Teflon), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: Cloudy Odor: None
Note any Sampling Problems: None

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

02-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
0954				8.30		5
0957				8.35		5
Date Time						
022185 0928				7.67		

Pumping start time 0951 WL 7.60
Pumping stop time 0900 WL 8.35

Comments: Developed with pump prior to extracting three well volumes with bailer

Form Completed by: Mark Mason Witnessed by:

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW 10-85 Project Tiger #3

Location Yakima, WA W.O. # 120-12955

Sample ID # 02211245 Date Sampled 2 / 21 / 85 Time 1245 AM/PM

Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 19 ft. below MP Casing Diameter 2" inches

Depth to Water (below MP) 9.38 ft. Date 2 / 20 / 85 Time 1410 AM/PM

Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.

At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other _____

Pump intake or bailer set at 12 ft. below MP.

Tubing (type: Teflon), (new or previously used) cleaned was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: Cloudy Odor: None

Note any Sampling Problems: None

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
				9.68		
1416				9.72		
1421						
Date Time				9.38		
2-21 1245						

Pumping start time 1412 WL 9.38

Pumping stop time 1423 WL 9.72

Comments: Developed with pump prior to extracting three well volumes with bailer

Form Completed by: MSM Witnessed by: _____

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point MW 12-85 Project Tiger #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02211225 Date Sampled 2 / 21 / 85 Time 1225 AM/PM
Describe Sampling Point 2" flush with grade PVC monitoring well

Well Depth 21 ft. below MP Casing Diameter 2 inches
Depth to Water (below MP) 11.25 ft. Date 2 / 20 / 85 Time 1440 AM/PM
Discharge Rate = 5 gpm x 0.00223 = 0.05115 cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☐ Submersible Pump ☐ Bailer ☒ Other
Pump intake or bailer set at 13' ft. below MP
Tubing (type: Teflon), (new or previously used) cleaned was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for

Approximate sample collection and field measurement discharge rate = N/A

Sample Appearance: cloudy Odor: none
Note any Sampling Problems: none

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

2-20-85 TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)
1448				11.30		
1452				11.20		
Date Time						
2-21 1225				11.23		

Pumping start time 1443 WL 11.25
Pumping stop time 1454 WL 11.20

Comments: Developed with pump prior to extracting three well volumes with bailer.

Form Completed by: MSM Witnessed by:

SOIL EXPLORATION company

APPENDIX III

CHAIN OF CUSTODY

Project: Tiger Oil #3, Yakima, WA

W.O. # 120-12955

Shipped by:

Shipped to:

Comments:

Attention of:

Hazardous materials suspected? (yes/no)

Sampling Point	Location	Field ID #	Date	Sample Type	No. of Containers	Analysis Required	(optional) Lab ID
MW-1-95	Yakima, WA	C2210846	02-21-95	Water	2	Volatiles	
MW-2-95	"	C2210910	"	"	2	"	
MW-3-95	"	0221 0928	"	"	2	"	
MW-4-95	"	C2211200	"	"	2	"	
MW-5-95	"	C2210949	"	"	2	"	
MW-6-95	"	0221 1007	"	"	2	"	
MW-7-95	"	C2211022	"	"	2	"	
MW-8-95	"	02211040	"	"	2	"	
MW-9-95	"	0221 1135	"	"	2	"	
MW-10-95	"	0221 1245	"	"	2	"	
MW-11-95	"	0221 1300	"	"	2	"	
MW-12-95	"	0221 1225	"	"	2	"	

Sampler(s) (signature) Mark S. Mason

Field ID	Relinquished by: (signature)	Received by: (signature)	Date/Time		Comments
	Mark S. Mason		2-21-95	9:00AM	

Sealed for shipment by: (signature) _____ Date/Time _____ Shipment method: _____

Received for Lab by: (signature) _____ Date/Time _____ Comments Report to Mark Mason

Receiving Laboratory: Please return original form after signing for receipt of samples.

SOIL EXPLORATION COMPANY

SE-V-1 (83-A)

Sample Identification/Field Chain of Custody Record

Project: Tiger Oil #3, Yakima, WA. W.O. # 1204295S

Shipped by:

Shipped to: Attention of:

Comments: Hazardous materials suspected? (yes/no)

Sampling Point	Location	Field ID #	Date	Sample Type	No. of Containers	Analysis Required	(optional), Lab ID
Wilton Residence	Yakima, WA.	02191500	02-19-85	Water	2	Volatiles	
Hernandez Residence	"	02191445	"	"	2	"	
Corbin Residence	"	02191430	"	"	2	"	
Tangeman Residence	"	02191415	"	"	2	"	
Yocham Residence	"	02191400	"	"	2	"	
McGahan Residence	"	02191337	"	"	2	"	
Hutson Residence	"	02191515	"	"	2	"	
Suckdell Residence	"	02191540	"	"	2	"	
Knight Residence	"	02191830	"	"	2	"	

Sampler(s) (signature) Mark E. Mason

Field ID	Relinquished by: (signature)	Received by: (signature)	Date/Time		Comments
	Mark E. Mason		2-21-85	9:05 AM	

Sealed for shipment by: (signature) Date/Time Shipment method:

Received for Lab by: (signature) Date/Time Comments Report to Mark E. Mason

Receiving Laboratory: Please return original form after signing for receipt of samples.

SOIL EXPLORATION COMPANY

SE-V-1 (83-A)

Sample Identification/Field Chain of Custody Report

Project: TIGER OIL #3
Shipped by: ZAREMBA CLAIMS
Shipped to: TWIN CITY TESTING
Comments:

W.O. #

Attention of:
Hazardous materials suspected? (yes/no)

Sampling Point	Location	Field ID #	Date	Sample Type	No. of Containers	Analysis Required	(optional) Lab ID
KNIGHT	WELL #8		3/25		2		
YOCHAM	TAP-KITCHEN		3/25		2		
			PRESENCE of GASOLINE				

Sampler(s) (signature)

Field ID	Relinquished by: (signature)	Received by: (signature)	Date/Time	Comments

Sealed for shipment by: (signature) Date/Time 3/27/95 7:30P Shipment method: Federal Express

Received for Lab by: (signature) Date/Time Comments

Receiving Laboratory: Please return original form after signing for receipt of samples.

SOIL EXPLORATION company

SE-V-1 (83-A)

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 11-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1077.7')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	COMMENTS
	SILTY CLAY W/SAND, dark brown (CL-ML)	FINE ALLUVIUM			1	CT	
6	CLAYEY SAND W/GRAVEL, brownish gray (SC/SM)	MIXED ALLUVIUM			2	CT	Strong gasoline odor
2	SILTY SAND W/A LITTLE GRAVEL, brownish gray, wet (SM/SP)	COARSE ALLUVIUM			3	CT	Slight gasoline odor
18	SAND W/SILT AND A LITTLE GRAVEL, medium grained, brown, water-bearing (SP-SM)				4	CT	
22	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
1-31	11:00		SEE NOTE		to	
					to	

START 1-29-85 COMPLETE 1-30-85

METHOD 6DC 0-20' @ 3:00

CT (Cable Tool) 0-22'

CREW CHIEF Mason

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 10-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1076.3')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	COMMENTS
	CLAYEY SAND W/GRAVEL, COBBLES AND BOULDERS, brownish gray (may be fill) (SC)	FILL OR MIXED ALLUVIUM			1	CT	
7	SILTY GRAVEL, brownish gray, wet (GM)	COARSE ALLUVIUM		▼	2	CT	
14	SAND W/SILT AND GRAVEL, brownish gray, waterbearing (SP-SM)				3	CT	
18	SILTY SAND W/A LITTLE GRAVEL, brownish gray, wet (SM)				4	CT	
21	End of Boring Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.						

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
1-29	11:30		SEE NOTE		to	
					to	

START 1-25-85 COMPLETE 1-28-85

METHOD 6DC 0-20' @ 3:00

CT (Cable Tool) 0-21'

CREW CHIEF Mason

862 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-12955 VERTICAL SCALE 1" = 3' BORING NO. 12-85

PROJECT TIGER OIL #3 - YAKIMA, WASHINGTON

FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1078.6')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	COMMENTS
	LEAN CLAY, dark brown (CL)	FINE ALLUVIUM			1	CT	
5	CLAYEY SAND W/GRAVEL, a few cobbles, brownish gray (SC)	MIXED ALLUVIUM			2	CT	Very slight gasoline odor
					3	CT	Very slight gasoline odor
17	SILTY SAND W/GRAVEL, grayish brown, wet (SM)	COARSE ALLUVIUM			4	CT	
22	End of Boring						

Note: Monitoring well installed in boring. See attached "Installation of Monitoring Well" sheet.

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
2-20	2:00		SEE NOTE		to	
					to	

START 2-19-85 COMPLETE 2-20-85

METHOD 6DC 0-20' @ 1:00

CT (Cable Tool) 0-22'

CREW CHIEF Mason

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

APPENDIX II

SAMPLING INFORMATION FORMS

SAMPLING INFORMATION

Sampling Point Wilton Residence Project Tiger Oil #3
Location Takima, WA W.O. # 120-12955

Sample ID # 02191500 Date Sampled 02/19/85 Time 1500 AM/PM
Describe Sampling Point _____

Well Depth 23 ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date / / Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: Clear Odor: None
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before sampling

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION COMPANY

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point Corbin Residence Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02191430 Date Sampled 02 / 19 / 85 Time 1430 AM/PM
Describe Sampling Point Kitchen sink

Well Depth 90' ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date / / Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: clear Odor: None
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before collecting samples

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION company

SE-V-2(84-B)

SAMPLING INFORMATION

Sampling Point Hernandez Residence Project Tiger Oil #3
Location Yakima, WA W.O. # 120-12955

Sample ID # 02191445 Date Sampled 02 / 19 / 85 Time 1445 AM/PM
Describe Sampling Point Bathroom sink

Well Depth _____ ft. below MP Casing Diameter _____ inches
Depth to Water (below MP) _____ ft. Date / / Time _____ AM/PM
Discharge Rate = _____ gpm x 0.00223 = _____ cfs.
At least 3 bore volumes have been evacuated before sampling.

Sampling Method: Tap ☒ Submersible Pump ☐ Bailer ☐ Other _____
Pump intake or bailer set at _____ ft. below MP.
Tubing (type: _____), (new or previously used) was used to collect all samples (yes, no) and all field measurements (yes, no). Tubing used only for _____

Approximate sample collection and field measurement discharge rate = _____

Sample Appearance: Clear Odor: None
Note any Sampling Problems: _____

Samples Collected: Volatiles

EVACUATION / STABALIZATION TEST DATA

TIME	pH (UNITS)	TEMPERATURE CORRECTED CONDUCTANCE (umhos/cm)	TEMPERATURE (°C)	WATER LEVEL (NEAREST 0.01 ft)	CUMULATIVE VOLUME OF WATER REMOVED FROM WELL (gallons)	PUMPING RATE (gpm)

Pumping start time _____ WL _____
Pumping stop time _____ WL _____

Comments: Water running for 20 minutes before sampling

Form Completed by: Mark Mason Witnessed by: _____

SOIL EXPLORATION COMPANY

SE-V-2(84-B)

TABLE 1

(continued)

Volatile Analysis

SAMPLE IDENTIFICATION:

Tiger Oil #3, Yakima, WA

TCT #1919	MW-1-85	TCT #1925	MW-7-85
1920	MW-2-85	1926	MW-8-85
1921	MW-3-85	1927	MW-9-85
1922	MW-4-85	1928	MW-10-85
1923	MW-5-85	1929	MW-11-85
1924	MW-6-85	1930	MW-12-85

Parameter	#1919 MW-1 (ug/L)	#1920 MW-2 (ug/L)	#1921 MW-3 (ug/L)	#1922 MW-4 (ug/L)	#1923 MW-5 (ug/L)	#1924 MW-6 (ug/L)	#1925 MW-7 (ug/L)	#1926 MW-8 (ug/L)	#1927 MW-9 (ug/L)	#1928 MW-10 (ug/L)	#1929 MW-11 (ug/L)	#1930 MW-12 (ug/L)	Lower Detectable Limit (ug/L)
Total Hydrocarbons as Gasoline	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23390	ND	1
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1460	ND	1
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5300	ND	1
Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6260	ND	1

For purposes of these samples ug/L = ppb

ND - Not Detected

TABLE 1

Volatile Analysis

SAMPLE IDENTIFICATION:

Tiger Oil #3, Yakima, WA

TCT #1910	Wilton	TCT #1915	McGohan
1911	Hernandez	1916	Hutson
1912	Corbin	1917	Suddeth
1913	Tangeman	1918	Knight
1914	Yochan		

Parameter	#1910 Wilton (ug/L)	#1911 Hernand. (ug/L)	#1912 Corbin (ug/L)	#1913 Tangeman (ug/L)	#1914 Yochan (ug/L)	#1915 McGohan (ug/L)	#1916 Hutson (ug/L)	#1917 Suddeth (ug/L)	#1918 Knight (ug/L)	Lower Detectable Limit (ug/L)
Total Hydrocarbons as Gasoline	ND	ND	ND	ND	14	ND	ND	ND	ND	1
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Xylene	ND	ND	ND	ND	5	ND	ND	ND	ND	1

For purposes of this sample ug/L = ppb

ND - Not Detected

MEMO TO: Mark Mason, SEC

FROM: Harry Fisher, TCT

DATE: March 9, 1985

SUBJ: Purge and Trap
SEC 120-12955
TCT 2A-3512

INTRODUCTION:

This memo presents the results of our analysis of water samples for volatiles. The samples were received on February 25, 1985. The scope of our work was limited to analyzing the samples for the presence of benzene, toluene, xylenes and total hydrocarbons as gasoline using gas chromatographic techniques.

SAMPLE IDENTIFICATION:

Tiger Oil #3, Yakima, WA
TCT #1910-1930

METHODOLOGY:

These samples were analyzed using a Tekmar LSC-2 Liquid Sample Concentrator linked to a Perkin-Elmer Sigma 300 Gas Chromatograph with FID on a six-foot stainless steel column packed with SP-1000 100/120 mesh packing. Xylene, benzene, and toluene were identified by retention time and quantified by comparison with known standards using a SP-4000 data system. We calculated gasoline concentration by ratioing total peak area to a gasoline standard total peak area.

RESULTS:

These are summarized in Table 1.

REMARKS:

The samples were consumed in the analysis.

Credt 4416 - $2310

Harry Fisher

HDF/ma

APPENDIX IV

CHEMICAL ANALYSIS METHODOLOGY

MEMO TO: Mark Mason, SEC

FROM: Harry Fisher, TCT

DATE: April 5, 1985

SUBJ: Purge and Trap
SEC 120-12955
TCT 2A-3632

INTRODUCTION:

This memo presents the results of our analysis of water samples for volatiles. The samples were received on March 27, 1985. The scope of our work was limited to analyzing the samples for the presence of benzene, toluene, xylenes and total hydrocarbons as gasoline using gas chromatographic techniques.

SAMPLE IDENTIFICATION:

Tiger Oil #3

TCT #3003 Knight
TCT #3004 Yocham

METHODOLOGY:

These samples were analyzed using a Tekmar LSC-2 Liquid Sample Concentrator linked to a Perkin-Elmer Sigma Gas Chromatograph with FID on a six-foot stainless steel column packed with SP-1000 100/120 mesh packing. Xylene, benzene, and toluene were identified by retention time and quantified by comparison with known standards using a SP-4000 data system. We calculated gasoline concentration by ratioing total peak area to a gasoline standard total peak area.

RESULTS:

These are summarized in Table 1.

REMARKS:

The samples were consumed in the analysis.

Credit 4416 - $220.00

HDF/ma

Harry Fisher

TABLE 1

Volatile Analysis

SAMPLE IDENTIFICATION:

Tiger Oil #3

TCT #3003 Knight
TCT #3004 Yocham

Parameter	#3003 Knight (ug/L)	#3004 Yocham (ug/L)	Lower Detectable Limit (ug/L)
Total Hydrocarbons as Gasoline	ND	3120	1
Benzene	ND	28	1
Toluene	ND	680	1
Xylene	ND	980	1

For purposes of these samples ug/L = ppb

ND - Not Detected

APPENDIX V

SOILS TERMINOLOGY

GENERAL NOTES

DRILLING AND SAMPLING SYMBOLS

SYMBOL	DEFINITION
HSA	3 1/4" I.D. Hollow Stem Auger
_FA	4", 6" or 10" Diameter Flight Auger
_HA	2", 4" or 6" Hand Auger
_DC	2 1/2", 4", 5" or 6" Steel Drive Casing
_RC	Size A, B, or N Rotary Casing
PD	Pipe Drill or Cleanout Tube
CS	Continuous Split Barrel Sampling
DM	Drilling Mud
JW	Jetting Water
SB	2" O.D. Split Barrel Sample
_L	2 1/2" or 3 1/2" O.D. SB Liner Sample
_T	2" or 3" Thin Walled Tube Sample
3TP	3" Thin Walled Tube (Pitcher Sampler)
_TO	2" or 3" Thin Walled Tube (Osterberg Sampler)
W	Wash Sample
B	Bag Sample
P	Test Pit Sample
_Q	BQ, NQ, or PQ Wireline System
_X	AX, BX, or NX Double Tube Barrel
CR	Core Recovery - Percent
NSR	No Sample Recovered, classification based on action of drilling equipment and/or material noted in drilling fluid or on sampling bit.
NMR	No Measurement Recorded, primarily due to presence of drilling or coring fluid.
▼	Water Level Symbol

TEST SYMBOLS

SYMBOL	DEFINITION
W	Water Content - % of Dry Wt. - ASTM D 2216
D	Dry Density - Pounds Per Cubic Foot
LL, PL	Liquid and Plastic Limit - ASTM D 4318
	Additional Insertions in Last Column
Qu	Unconfined Comp. Strength-psf - ASTM D 2166
Pq	Penetrometer Reading - Tons/Square Foot
Ts	Torvane Reading - Tons/Square Foot
G	Specific Gravity - ASTM D 854
SL	Shrinkage Limits - ASTM D 427
OC	Organic Content - Combustion Method
SP	Swell Pressure - Tons/Square Foot
PS	Percent Swell
FS	Free Swell - Percent
pH	Hydrogen Ion Content, Meter Method
SC	Sulfate Content - Parts/Million, same as mg/L
CC	Chloride Content - Parts/Million, same as mg/L
C*	One Dimensional Consolidation - ASTM D 2435
Qc*	Triaxial Compression
D.S.*	Direct Shear - ASTM D 3080
K*	Coefficient of Permeability - cm/sec
D*	Dispersion Test
DH*	Double Hydrometer - ASTM D 4221
MA*	Particle Size Analysis - ASTM D 422
R	Laboratory Resistivity, in ohm - cm - ASTM G 57
E*	Pressuremeter Deformation Modulus - TSF
PM*	Pressuremeter Test
VS*	Field Vane Shear - ASTM D 2573
IR*	Infiltrometer Test - ASTM D 3385
RQD	Rock Quality Designation - Percent

* See attached data sheet or graph

WATER LEVEL

Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In sand, the indicated levels may be considered reliable ground water levels. In clay soil, it may not be possible to determine the ground water level within the normal time required for test borings, except where lenses or layers of more pervious waterbearing soil are present. Even then, an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed texture soils may not indicate the true level of the ground water table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the log sheet.

DESCRIPTIVE TERMINOLOGY

DENSITY TERM	"N" VALUE	CONSISTENCY TERM
Very Loose	0-4	Soft
Loose	5-8	Medium
Medium Dense	9-15	Rather Stiff
Dense	16-30	Stiff
Very Dense	Over 30	Very Stiff

Standard "N" Penetration: Blows Per Foot of a 140 Pound Hammer Falling 30 inches on a 2 inch OD Split Barrel Sampler

Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Lens	1/2" to 6" discontinous stratum, pocket
Varved	Alternating laminations of clay, silt and /or fine grained sand, or colors thereof
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Waterbearing	Pervious soil below water

RELATIVE GRAVEL PROPORTIONS

CONDITION	TERM	RANGE
Coarse Grained Soils	A little gravel	2 - 14%
	With gravel	15 - 49%
Fine Grained Soils		
15-29% + No. 200	A little gravel	2 - 7%
15-29% + No. 200	With gravel	8 - 29%
30% + No. 200	A little gravel	2 - 14%
30% + No. 200	With gravel	15 - 24%
30% + No. 200	Gravelly	16 - 49%

RELATIVE SIZES

Boulder	Over 12"
Cobble	3" - 12"
Gravel	
Coarse	3/4" - 3"
Fine	#4 - 3/4"
Sand	
Coarse	#4 - #10
Medium	#10 - #40
Fine	#40 - #200
Silt & Clay	- #200, Based on Plasticity

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
ASTM Designation: D 2487 - 83
(Based on Unified Soil Classification System)

SOIL ENGINEERING

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,Q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat
Fibric Peat >67% Fibers		Hemic Peat 33%-67% Fibers		Sapric Peat <33% Fibers	

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥30% plus no. 200, predominantly sand, add "sandy" to to group name.

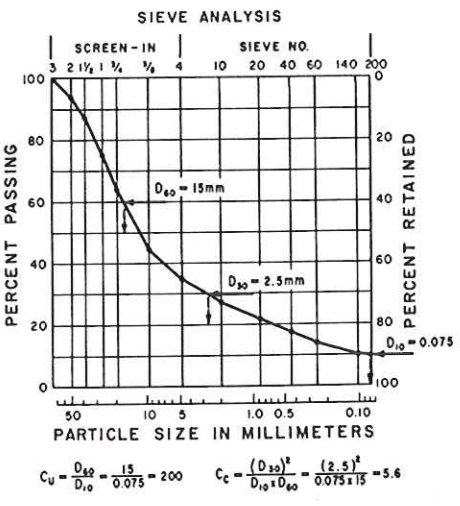
[M] If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

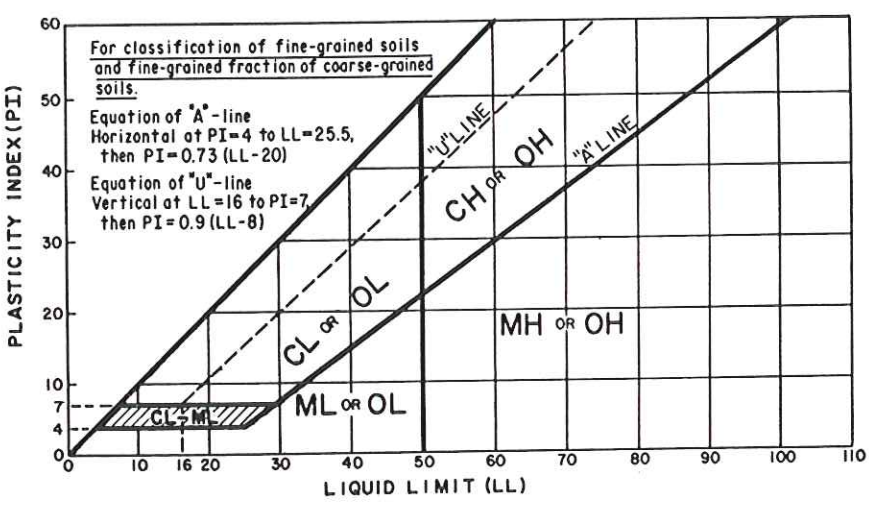
[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



$C_u = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200$ $\quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{(2.5)^2}{0.075 \times 15} = 5.6$



APPENDIX VI

MONITORING WELL CONSTRUCTION SHEETS

INSTALLATION OF MONITORING WELL

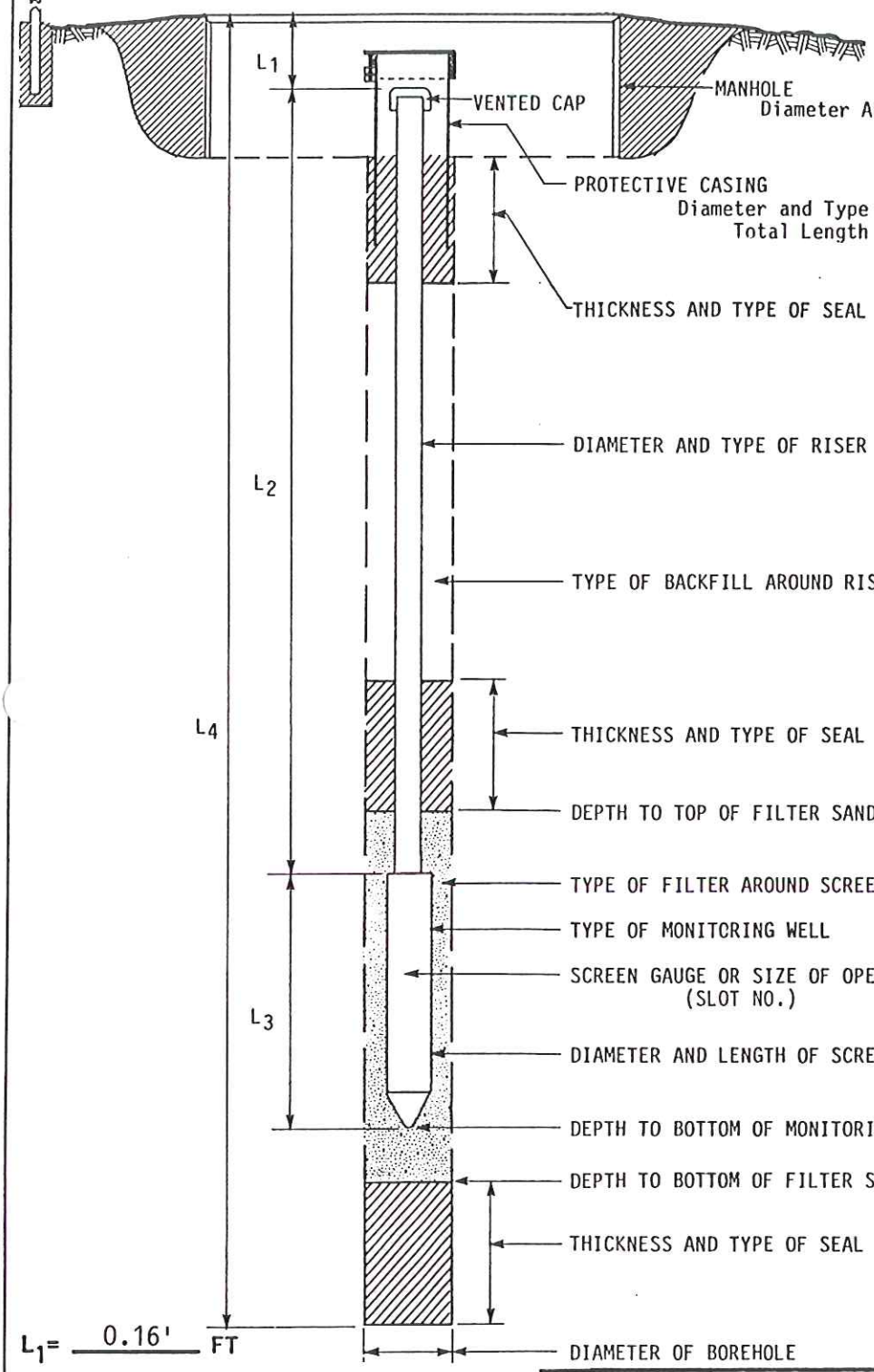
JOB NO. 120-12955

MONITORING WELL NO. 1-85

MARKER HEIGHT 4'

GROUND SURFACE ELEVATION 1080.5'

TOP OF RISER ELEVATION 1080.34' (With Cap Removed)



Manhole Diameter And Type	12" steel
Manhole Depth	5"
Protective Casing Diameter and Type	6" steel
Protective Casing Total Length	2'
Thickness and Type of Seal	4' Grout
Diameter and Type of Riser Pipe	2" FT PVC
Type of Backfill Around Riser	Filter Gravel
Thickness and Type of Seal	-
Depth to Top of Filter Sand	4'
Type of Filter Around Screen	Filter Grout
Type of Monitoring Well	2' FT PVC
Screen Gauge or Size of Openings (Slot No.)	#10 Slot
Diameter and Length of Screen	2" X 15'
Depth to Bottom of Monitoring Well	21.0'
Depth to Bottom of Filter Sand	21.0'
Thickness and Type of Seal	None
Diameter of Borehole	6"

L_1 = 0.16' FT

L_2 = 5.84' FT

L_3 = 15' FT

L_4 = 21' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
11-20-84	9:00am	13.0'	
1-7-85	10:18	12.60'	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED:

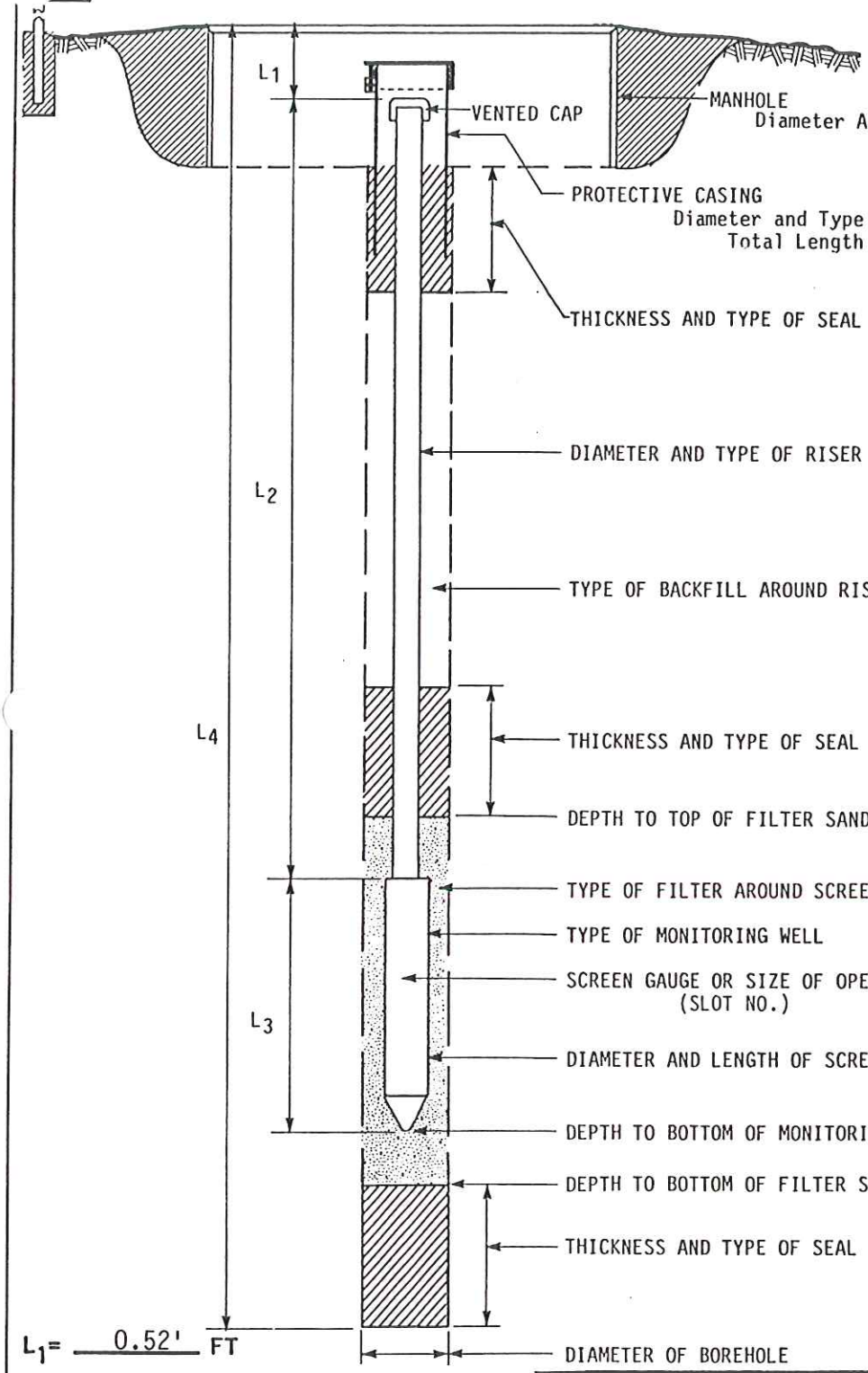
Date _____ Time _____

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

JOB NO. 120-12955 MONITORING WELL NO. 2-85

MARKER HEIGHT 4' GROUND SURFACE ELEVATION 1067.5' TOP OF RISER ELEVATION 1066.98' (With Cap Removed)



Diameter And Type	12" steel
Depth	5"
Diameter and Type	6" steel
Total Length	2'
THICKNESS AND TYPE OF SEAL	2.5' Grout
DIAMETER AND TYPE OF RISER PIPE	2" FT PVC
TYPE OF BACKFILL AROUND RISER	Filter Gravel
THICKNESS AND TYPE OF SEAL	-
DEPTH TO TOP OF FILTER SAND	2.5'
TYPE OF FILTER AROUND SCREEN	Filter Gravel
TYPE OF MONITORING WELL	2" FT PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	#10 Slot
DIAMETER AND LENGTH OF SCREEN	2" X 15'
DEPTH TO BOTTOM OF MONITORING WELL	18.52'
DEPTH TO BOTTOM OF FILTER SAND	20.0'
THICKNESS AND TYPE OF SEAL	None
DIAMETER OF BOREHOLE	6"

L_1= 0.52' FT

L_2= 3' FT

L_3= 15' FT

L_4= 20.0' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-21-85	9:10 am	5.79'	

(1) DEPTH BELOW TOP OF RISER PIPE

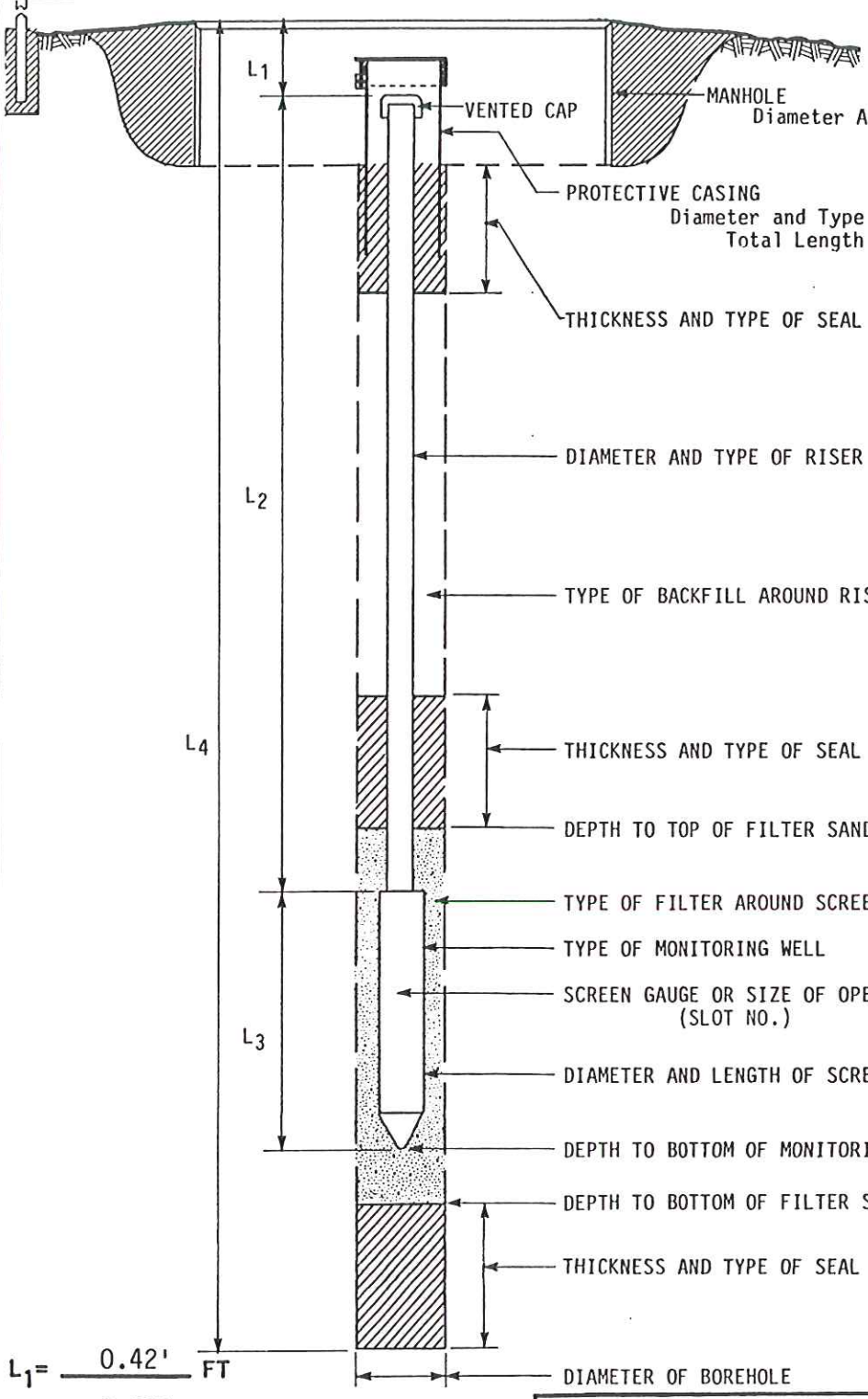
INSTALLATION COMPLETED: Date 1-8-85 Time 2:00 pm

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

JOB NO. 120-12955 MONITORING WELL NO. 3-85

MARKER HEIGHT 4' GROUND SURFACE ELEVATION 1072.6' TOP OF RISER ELEVATION 1072.18' (With Cap Removed)



MANHOLE Diameter And Type	12" steel
Depth	5"
PROTECTIVE CASING Diameter and Type	6" steel
Total Length	2'
THICKNESS AND TYPE OF SEAL	3' Grout
DIAMETER AND TYPE OF RISER PIPE	s" FT PVC
TYPE OF BACKFILL AROUND RISER	Filter Gravel
THICKNESS AND TYPE OF SEAL	-
DEPTH TO TOP OF FILTER SAND	3'
TYPE OF FILTER AROUND SCREEN	Filter Gravel
TYPE OF MONITORING WELL	2" FT PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	#10 Slot
DIAMETER AND LENGTH OF SCREEN	2" X 15'
DEPTH TO BOTTOM OF MONITORING WELL	19.12'
DEPTH TO BOTTOM OF FILTER SAND	21.0'
THICKNESS AND TYPE OF SEAL	None
DIAMETER OF BOREHOLE	6"

L_1= 0.42' FT

L_2= 3.70' FT

L_3= 15' FT

L_4= 21' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-21-85	9:28 am	7.69'	

(1) DEPTH BELOW TOP OF RISER PIPE

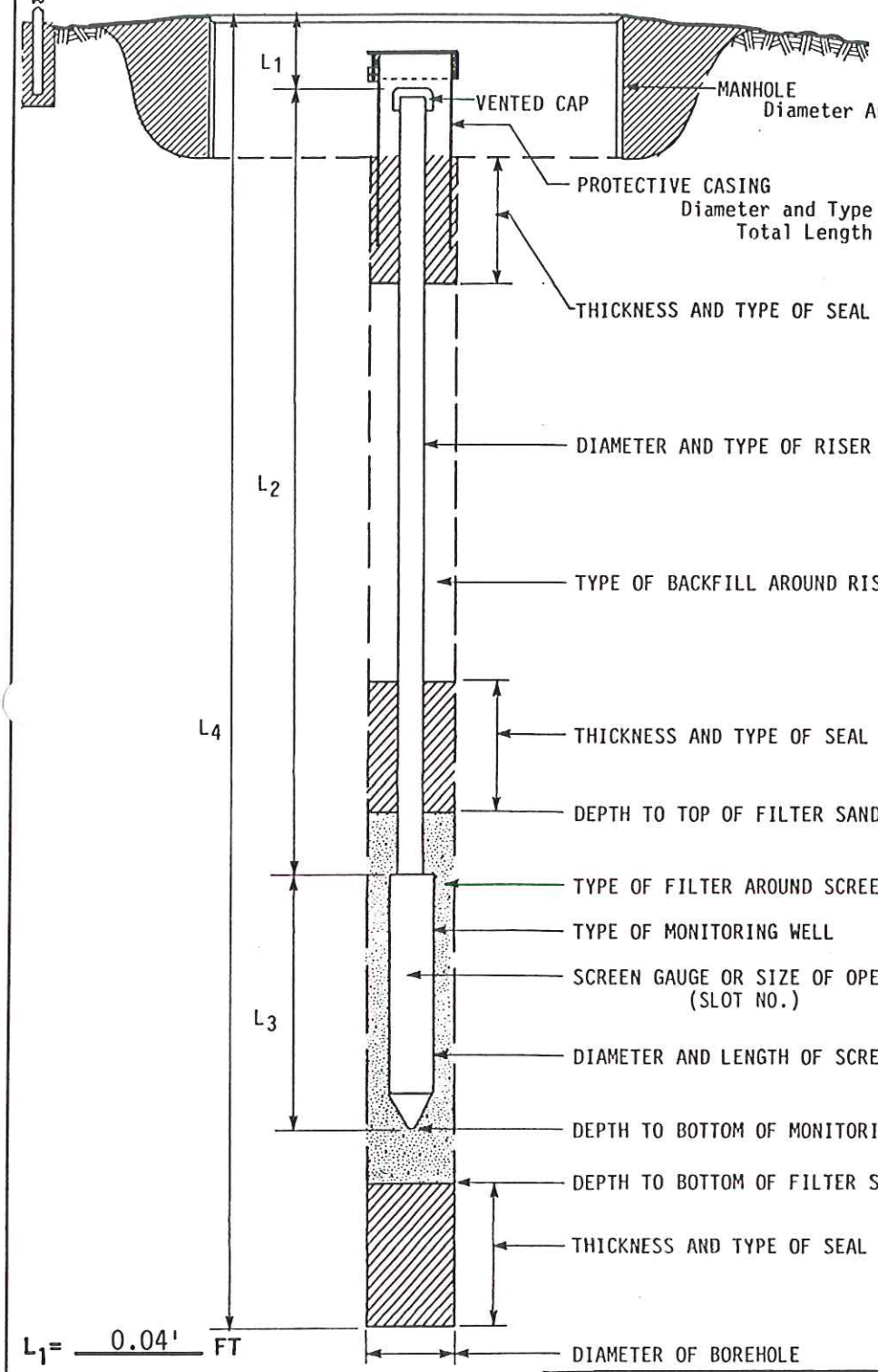
INSTALLATION COMPLETED: Date 1-10-85 Time 1:00 pm

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

JOB NO. 120-12955 MONITORING WELL NO. 4-85

MARKER HEIGHT 4' GROUND SURFACE ELEVATION 1075.7' TOP OF RISER ELEVATION 1075.74' (With Cap Removed)



Diameter And Type: N/A
Depth: N/A

6" steel
2'

3' Grout

2" FT PVC

Filter Gravel

-

3'

Filter Gravel

2" FT PVC

#10 Slot

2" X 15'

19.94'

21.0'

-

6"

L_1= 0.04' FT

L_2= 4.90' FT

L_3= 15' FT

L_4= 21' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	12:00	9.00'	
2-21-85	12:00	9.00'	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED:
Date 1-14-85 Time 2:00 pm

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

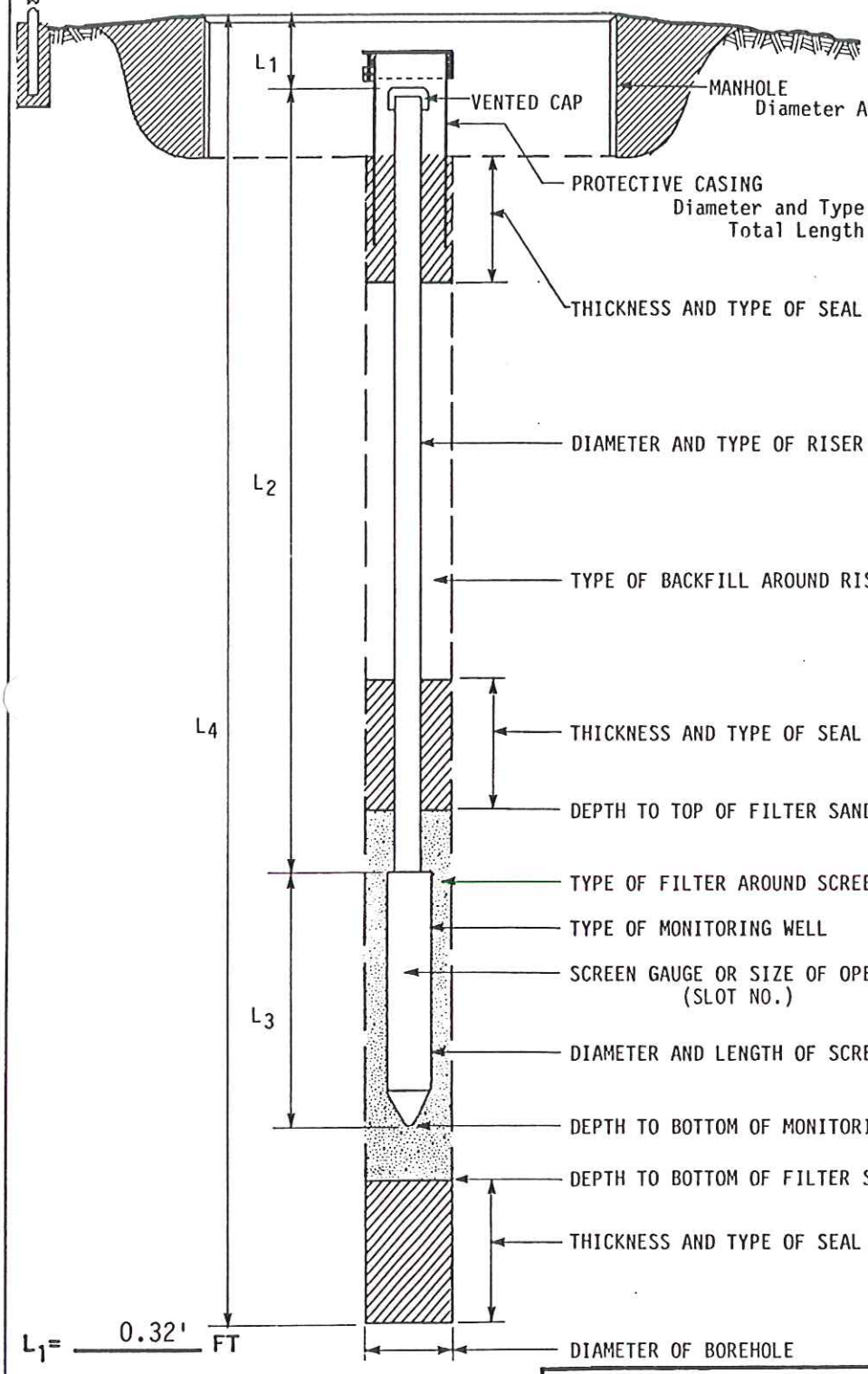
JOB NO. 120-12955

MONITORING WELL NO. 5-85

MARKER HEIGHT 4'

GROUND SURFACE ELEVATION 1069.7'

TOP OF RISER ELEVATION 1069.38' (With Cap Removed)



Manhole Diameter And Type	12" steel
Manhole Depth	5"
Protective Casing Diameter and Type	6" steel
Protective Casing Total Length	2'
Thickness and Type of Seal	1.0' Grout
Diameter and Type of Riser Pipe	2" FT PVC
Type of Backfill Around Riser	Filter Gravel
Thickness and Type of Seal	-
Depth to Top of Filter Sand	1.0'
Type of Filter Around Screen	Filter Gravel
Type of Monitoring Well	2" FT PVC
Screen Gauge or Size of Openings (Slot No.)	#10 Slot
Diameter and Length of Screen	2" X 15'
Depth to Bottom of Monitoring Well	16.82'
Depth to Bottom of Filter Sand	18.0'
Thickness and Type of Seal	None
Diameter of Borehole	6"

L_1 = 0.32' FT

L_2 = 1.5' FT

L_3 = 15' FT

L_4 = 18' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	10:18 am	5.11'	
2-21-85	9:49	5.10	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED:

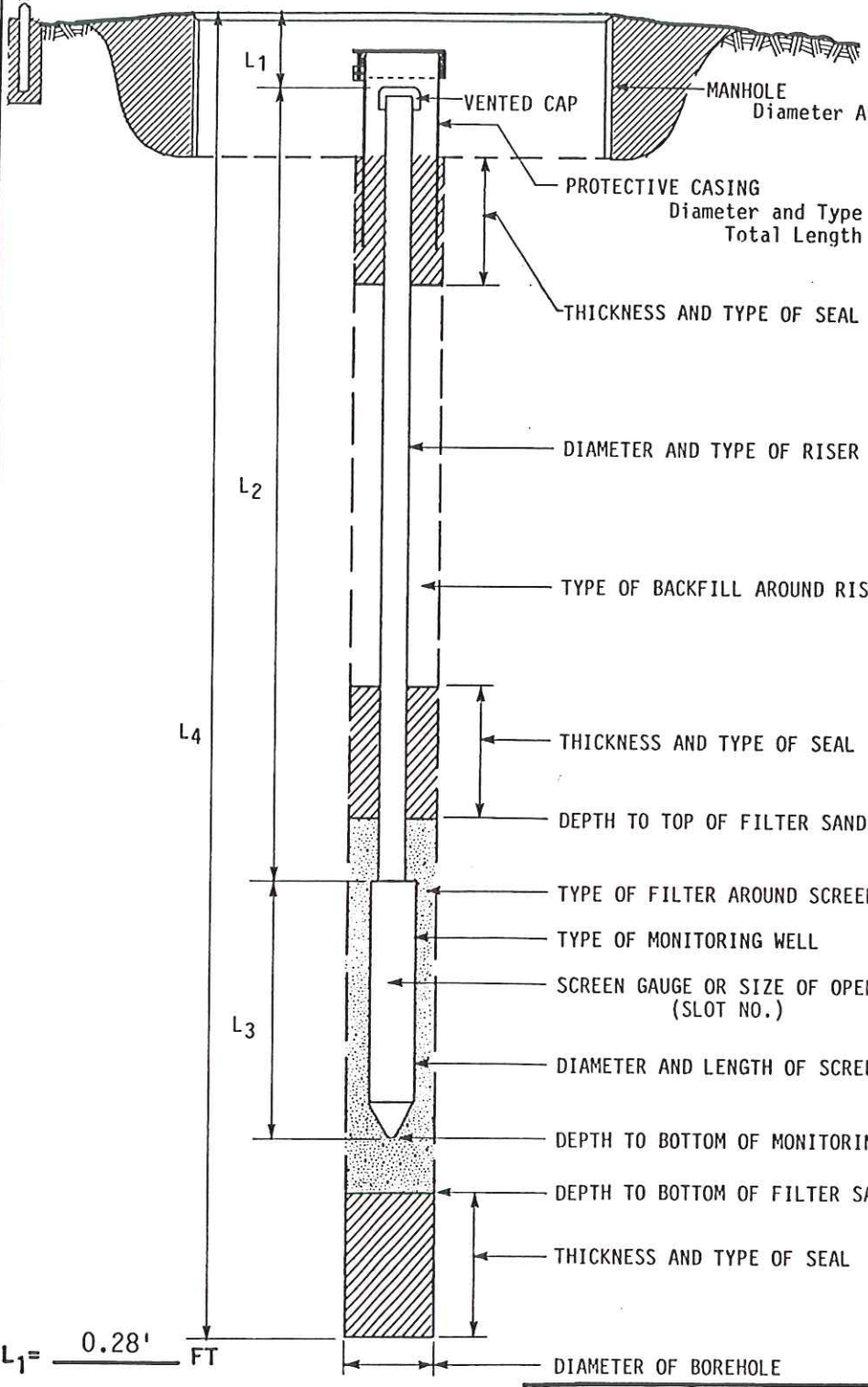
Date _____ Time _____

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

JOB NO. 120-12955 MONITORING WELL NO. 6-85

MARKER HEIGHT 4' GROUND SURFACE ELEVATION 1071.4' TOP OF RISER ELEVATION 1071.12' (With Cap Removed)



Diameter And Type: 12" steel
Depth: 5"

Diameter and Type: 6" steel
Total Length: 2'

THICKNESS AND TYPE OF SEAL: 2' Grout

DIAMETER AND TYPE OF RISER PIPE: 2" FT PVC

TYPE OF BACKFILL AROUND RISER: Filter Gravel

THICKNESS AND TYPE OF SEAL: -

DEPTH TO TOP OF FILTER SAND: 2'

TYPE OF FILTER AROUND SCREEN: Filter Gravel

TYPE OF MONITORING WELL: 2" FT PVC

SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.): #10 Slot

DIAMETER AND LENGTH OF SCREEN: 2" X 15'

DEPTH TO BOTTOM OF MONITORING WELL: 19.28'

DEPTH TO BOTTOM OF FILTER SAND: 21.0'

THICKNESS AND TYPE OF SEAL: -

DIAMETER OF BOREHOLE: 6"

L_1 = 0.28' FT

L_2 = 4' FT

L_3 = 15' FT

L_4 = 12' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	10:42am	7.17'	
2-21-85	10:07	7.17'	

(1) DEPTH BELOW TOP OF RISER PIPE

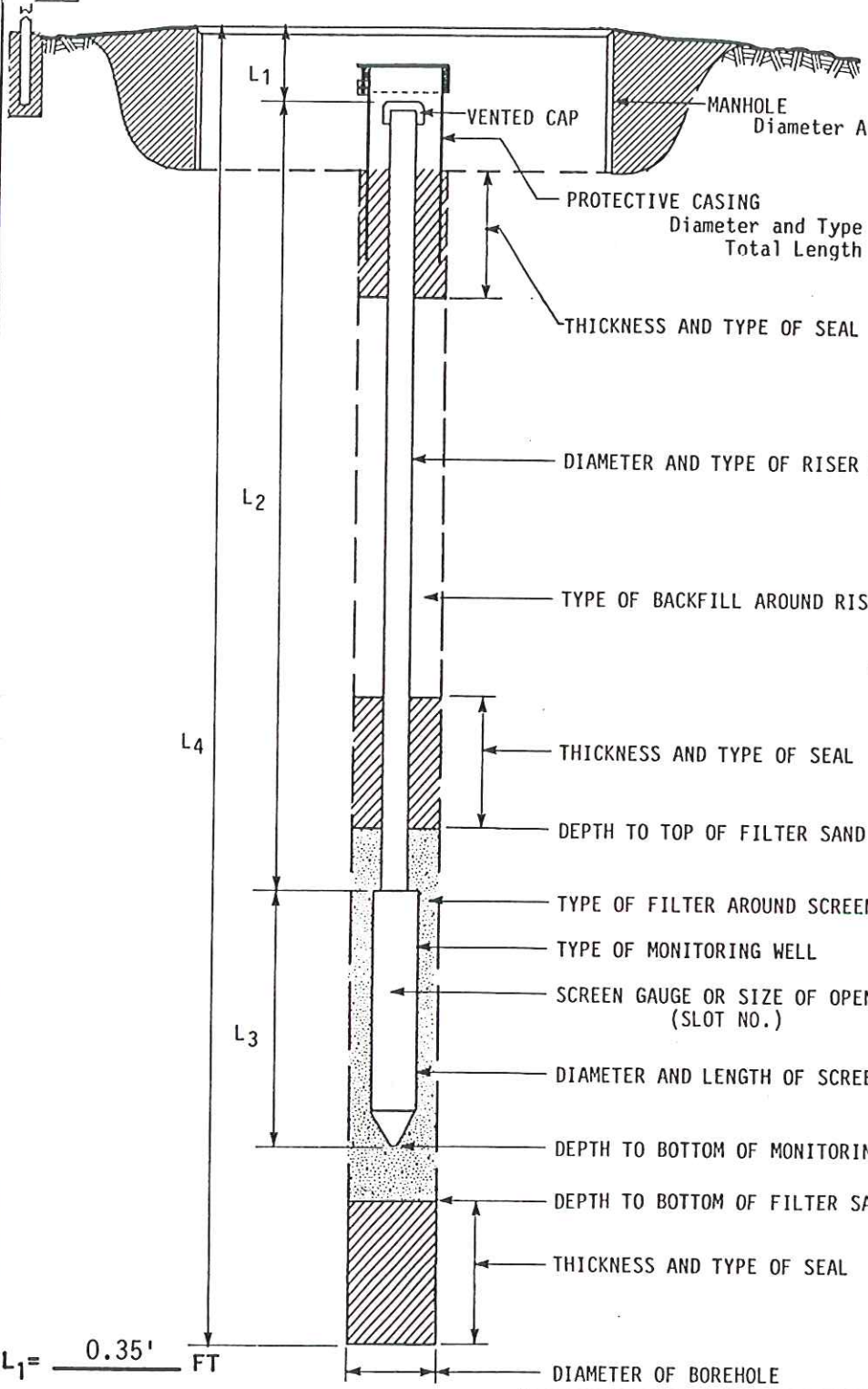
INSTALLATION COMPLETED: Date 1-18-85 Time 1:00 pm

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

JOB NO. 120-12955 MONITORING WELL NO. 7-85

MARKER HEIGHT 4' GROUND SURFACE ELEVATION 1072.5' TOP OF RISER ELEVATION 1072.15' (With Cap Removed)



Diameter And Type	12" steel
Depth	5"
Diameter and Type	6" steel
Total Length	2'
THICKNESS AND TYPE OF SEAL	2' Grout
DIAMETER AND TYPE OF RISER PIPE	2" FT PVC
TYPE OF BACKFILL AROUND RISER	Filter Gravel
THICKNESS AND TYPE OF SEAL	-
DEPTH TO TOP OF FILTER SAND	2'
TYPE OF FILTER AROUND SCREEN	Filter Gravel
TYPE OF MONITORING WELL	2" FT PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	#10 Slot
DIAMETER AND LENGTH OF SCREEN	2" X 15'
DEPTH TO BOTTOM OF MONITORING WELL	19.25'
DEPTH TO BOTTOM OF FILTER SAND	20.0'
THICKNESS AND TYPE OF SEAL	-
DIAMETER OF BOREHOLE	6"

L_1 = 0.35' FT

L_2 = 3.90'' FT

L_3 = 15' FT

L_4 = 20' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	11:17am	7.11'	
2-21-85	10:22	7.15'	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED: Date 1-22-85 Time 3:30 pm

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

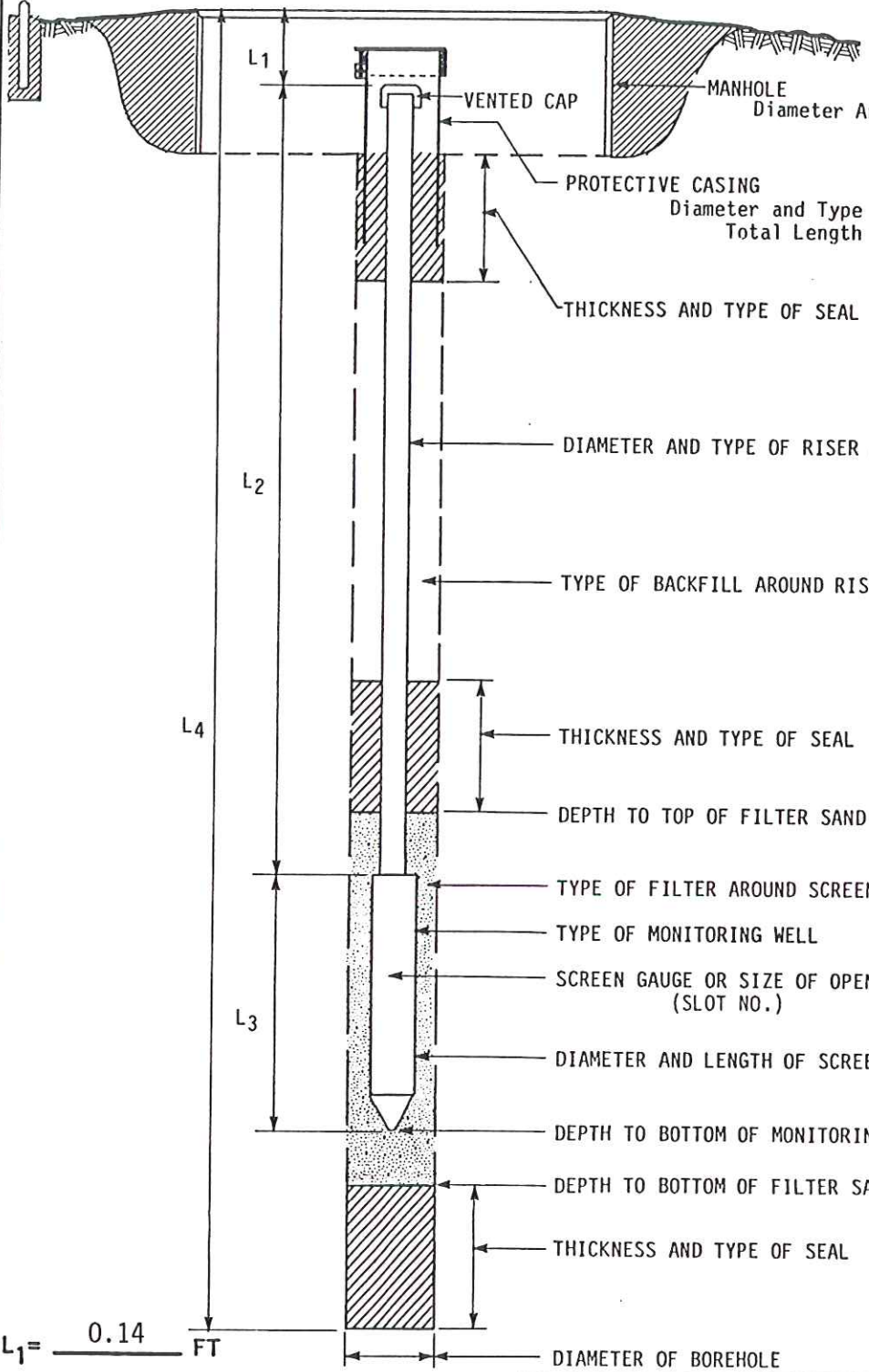
JOB NO. 120-12995

MONITORING WELL NO. 8-85

MARKER HEIGHT 4'

GROUND SURFACE ELEVATION 1075.8'

TOP OF RISER ELEVATION 1075.66' (With Cap Removed)



MANHOLE Diameter And Type	N/A
Depth	N/A
PROTECTIVE CASING Diameter and Type	6" steel
Total Length	2'
THICKNESS AND TYPE OF SEAL	3' grout
DIAMETER AND TYPE OF RISER PIPE	2" FT PVC
TYPE OF BACKFILL AROUND RISER	Filter gravel
THICKNESS AND TYPE OF SEAL	None
DEPTH TO TOP OF FILTER SAND	3'
TYPE OF FILTER AROUND SCREEN	Filter gravel
TYPE OF MONITORING WELL	2" FT PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	#10 slot
DIAMETER AND LENGTH OF SCREEN	2" x 15'
DEPTH TO BOTTOM OF MONITORING WELL	20.04'
DEPTH TO BOTTOM OF FILTER SAND	22.0'
THICKNESS AND TYPE OF SEAL	None
DIAMETER OF BOREHOLE	6"

L_1= 0.14 FT

L_2= 4.90 FT

L_3= 15.0 FT

L_4= 22.0 FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	11:53	9.51	
2-21-85	10:40	9.51	

(1) DEPTH BELOW TOP OF RISER PIPE

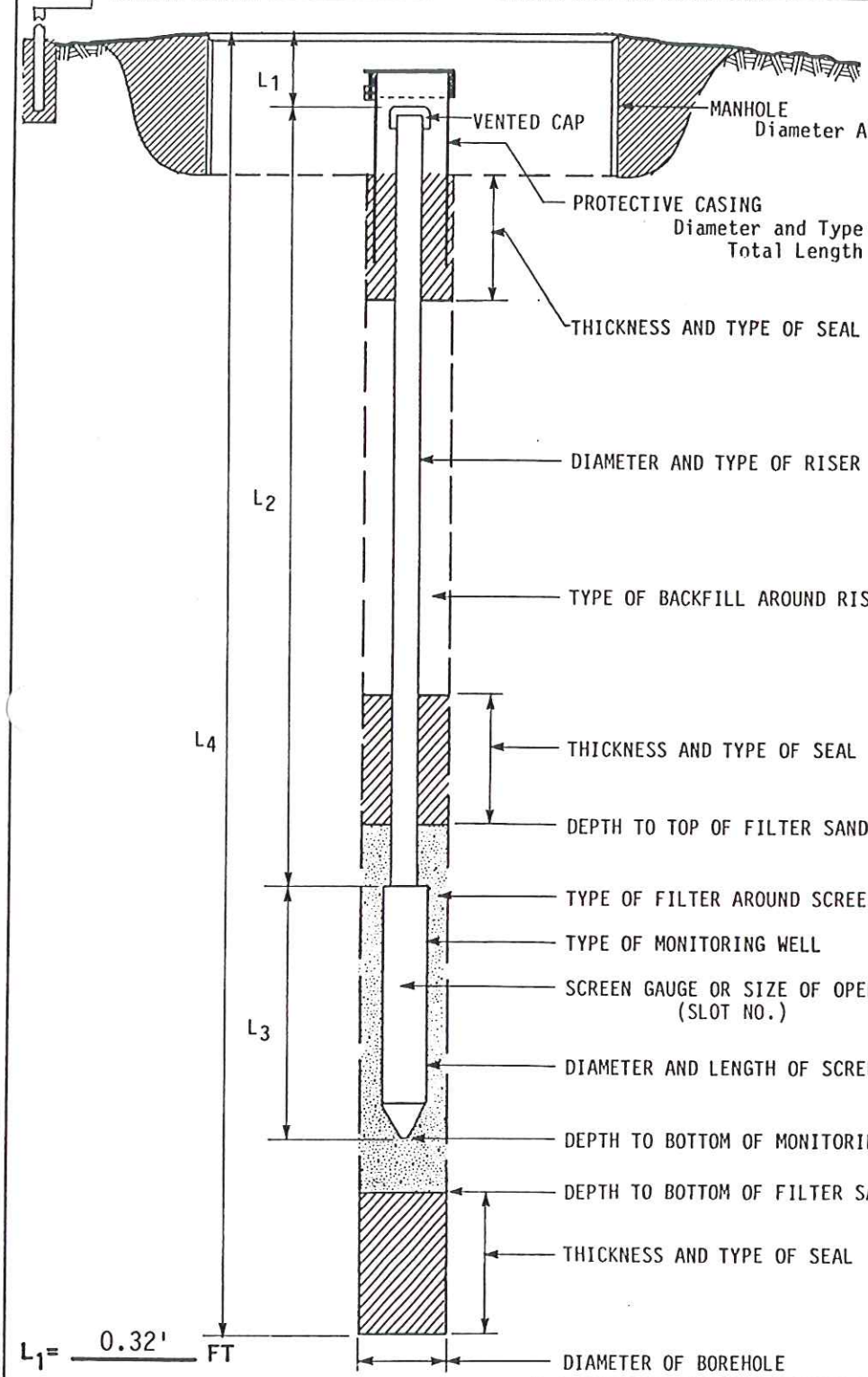
INSTALLATION COMPLETED:
Date 2/14/85 Time 3:00 PM

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

JOB NO. 120-12955 MONITORING WELL NO. 9-85

MARKER HEIGHT 4' GROUND SURFACE ELEVATION 1075.8' TOP OF RISER ELEVATION 1075.48' (With Cap Removed)



Manhole Diameter And Type	N/A
Depth	N/A
Protective Casing Diameter and Type	6" steel
Total Length	2'
Thickness and Type of Seal	N/A
Diameter and Type of Riser Pipe	2" FT PVC
Type of Backfill Around Riser	Filter Gravel
Thickness and Type of Seal	-
Depth to Top of Filter Sand	3'
Type of Filter Around Screen	Filter Gravel
Type of Monitoring Well	2" FT PVC
Screen Gauge or Size of Openings (Slot No.)	#10 Slot
Diameter and Length of Screen	2" X 15'
Depth to Bottom of Monitoring Well	19.82'
Depth to Bottom of Filter Sand	21.0'
Thickness and Type of Seal	-
Diameter of Borehole	6"

L_1 = 0.32' FT

L_2 = 4.50' FT

L_3 = 15' FT

L_4 = 21' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	1:38 pm	9.54'	
2-21-85	11:35 am	9.54'	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED:
Date 1-24-85 Time 3:00 pm

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

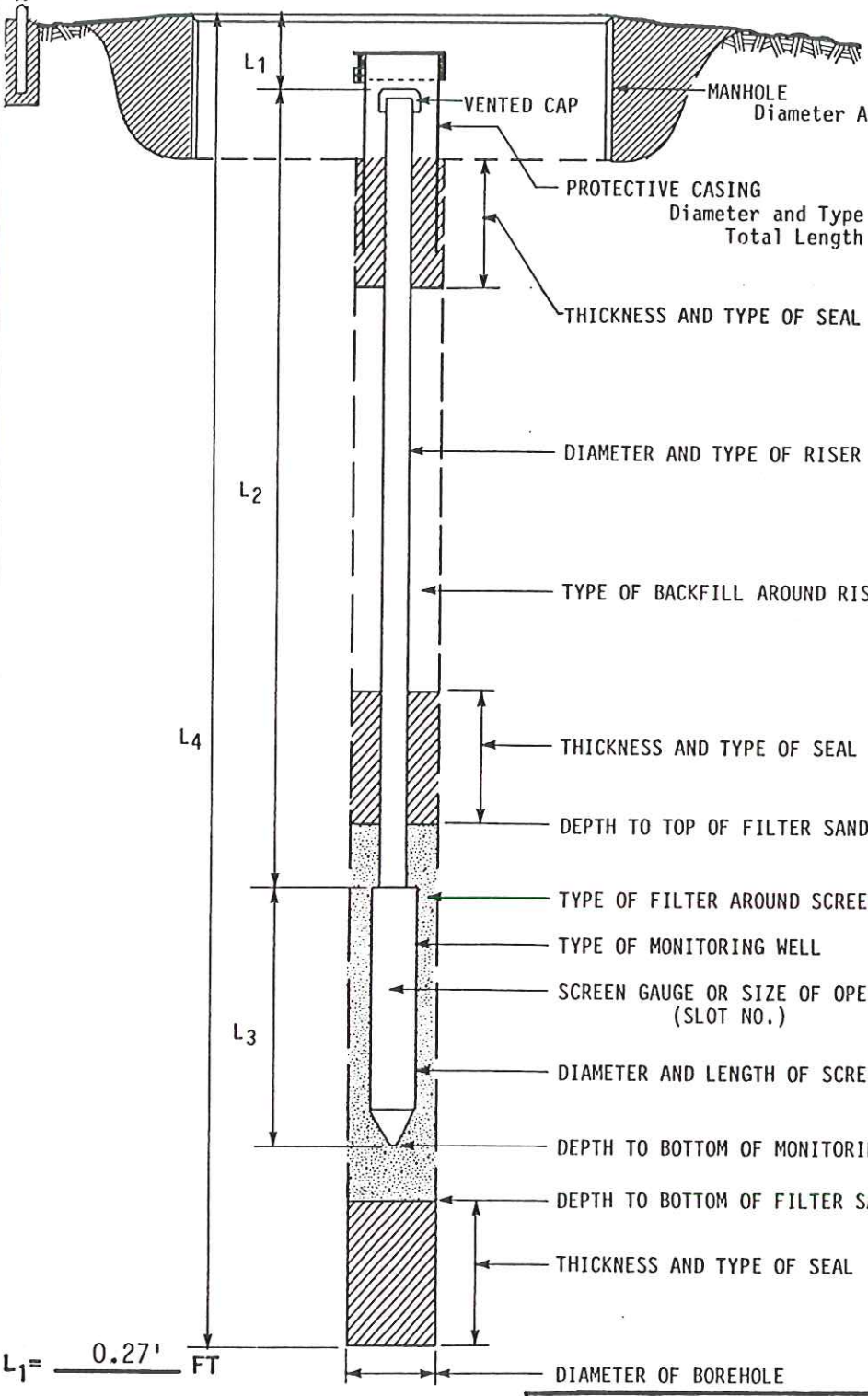
JOB NO. 120-12955

MONITORING WELL NO. 10-85

MARKER HEIGHT 4'

GROUND SURFACE ELEVATION 1076.3'

TOP OF RISER ELEVATION 1076.03' (With Cap Removed)



Diameter And Type	12" steel
Depth	5"
Diameter and Type	6"steel
Total Length	2'
THICKNESS AND TYPE OF SEAL	3' Grout
DIAMETER AND TYPE OF RISER PIPE	2" FT PVC
TYPE OF BACKFILL AROUND RISER	Filter Gravel
THICKNESS AND TYPE OF SEAL	-
DEPTH TO TOP OF FILTER SAND	3'
TYPE OF FILTER AROUND SCREEN	Filter Gravel
TYPE OF MONITORING WELL	2" FT PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	#10 Slot
DIAMETER AND LENGTH OF SCREEN	2" X 15'
DEPTH TO BOTTOM OF MONITORING WELL	19.27'
DEPTH TO BOTTOM OF FILTER SAND	21.0'
THICKNESS AND TYPE OF SEAL	-
DIAMETER OF BOREHOLE	6"

L_1= 0.27' FT

L_2= 4' FT

L_3= 15' FT

L_4= 21' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	2:12 pm	9.38'	
2-21-85	12:45	9.38	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED: Date 1-29-85 Time 11:30

SOIL EXPLORATION COMPANY

INSTALLATION OF MONITORING WELL

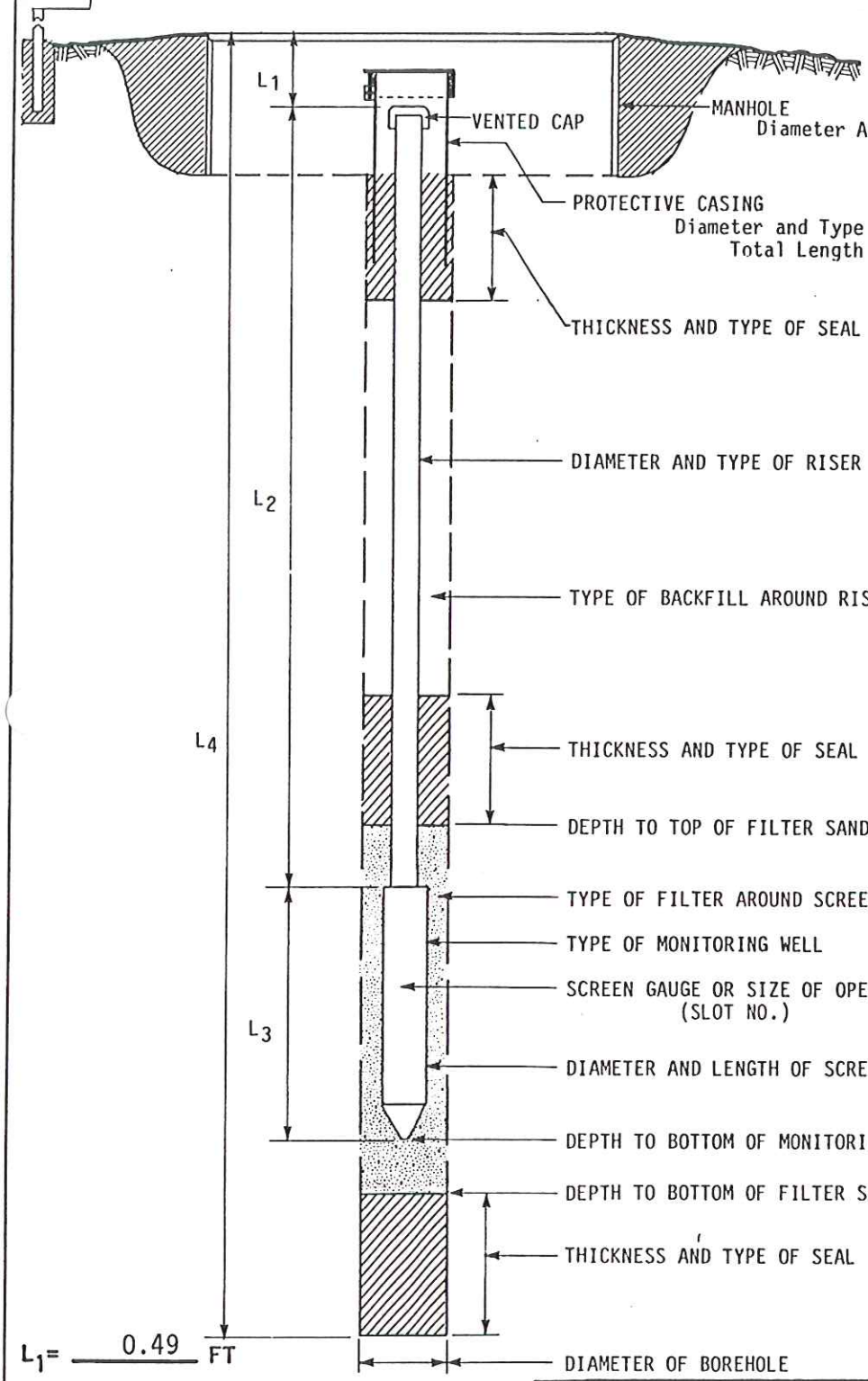
JOB NO. 120-12955

MONITORING WELL NO. 11-85

MARKER HEIGHT 4'

GROUND SURFACE ELEVATION 1077.7'

TOP OF RISER ELEVATION 1077.21' (With Cap Removed)



MANHOLE Diameter And Type	N/A
Depth	N/A
PROTECTIVE CASING Diameter and Type	6" steel
Total Length	2'
THICKNESS AND TYPE OF SEAL	3' grout
DIAMETER AND TYPE OF RISER PIPE	2" FT PVC
TYPE OF BACKFILL AROUND RISER	Filter gravel
THICKNESS AND TYPE OF SEAL	None
DEPTH TO TOP OF FILTER SAND	3'
TYPE OF FILTER AROUND SCREEN	Filter gravel
TYPE OF MONITORING WELL	2" FT PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	#10 slot
DIAMETER AND LENGTH OF SCREEN	2" x 15'
DEPTH TO BOTTOM OF MONITORING WELL	20.49'
DEPTH TO BOTTOM OF FILTER SAND	22.0'
THICKNESS AND TYPE OF SEAL	None
DIAMETER OF BOREHOLE	6"

L_1= 0.49 FT

L_2= 5.0 FT

L_3= 15.0 FT

L_4= 22.0 FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	3:12pm	10.48	
2-21-85	3:00pm	10.48	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED:
Date 1-31-85 Time 10:00 am

SOIL EXPLORATION company

INSTALLATION OF MONITORING WELL

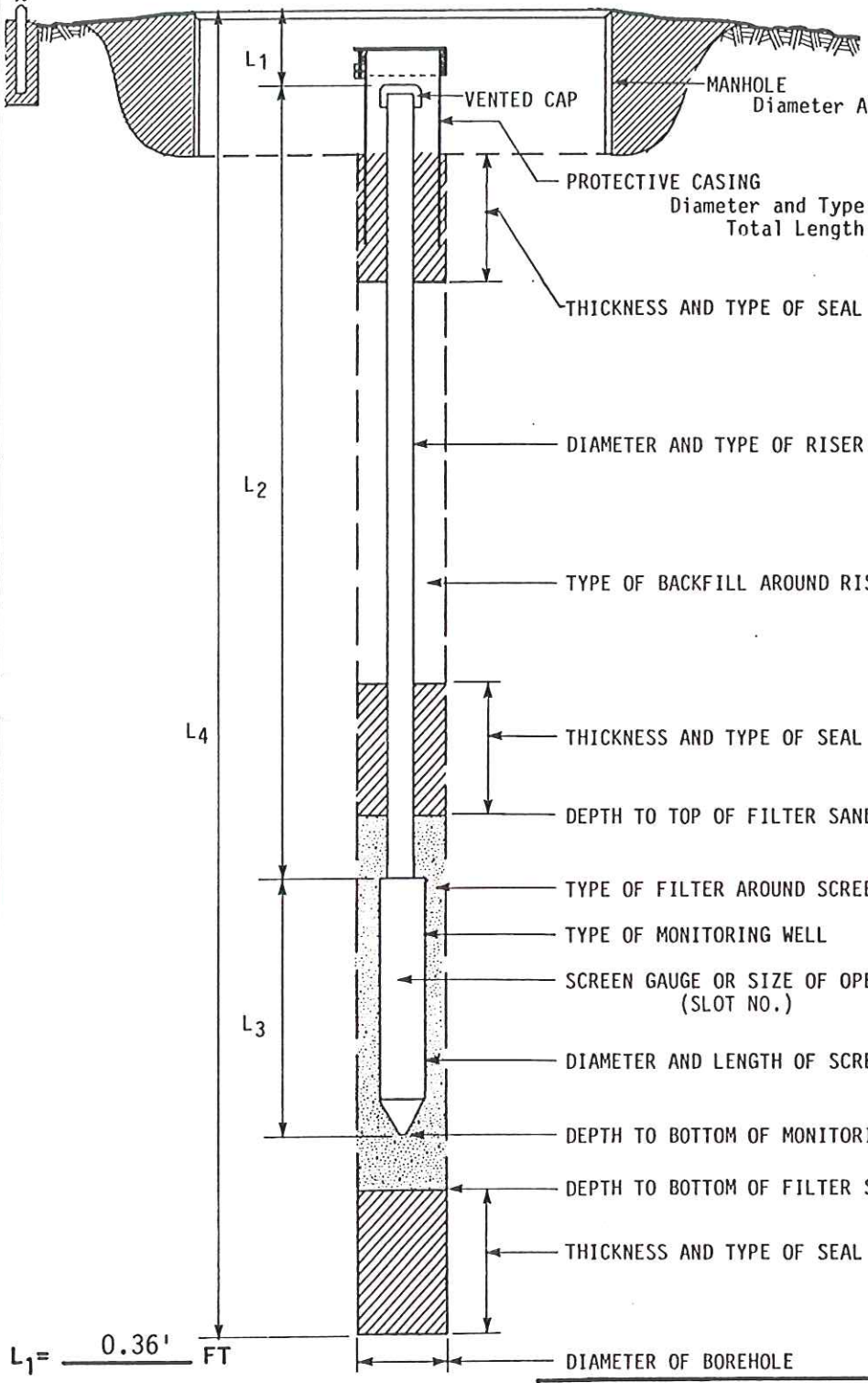
JOB NO. 120-12955

MONITORING WELL NO. 12-85

MARKER HEIGHT 4'

GROUND SURFACE ELEVATION 1078.6'

TOP OF RISER ELEVATION 1078.24' (With Cap Removed)



Diameter And Type	12"steel
Depth	5"
Diameter and Type	6" steel
Total Length	2'
THICKNESS AND TYPE OF SEAL	3' Grout
DIAMETER AND TYPE OF RISER PIPE	2" FT PVC
TYPE OF BACKFILL AROUND RISER	Filter Gravel
THICKNESS AND TYPE OF SEAL	-
DEPTH TO TOP OF FILTER SAND	3'
TYPE OF FILTER AROUND SCREEN	Filter Gravel
TYPE OF MONITORING WELL	2" FT PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT NO.)	#10 slot
DIAMETER AND LENGTH OF SCREEN	2" X 15'
DEPTH TO BOTTOM OF MONITORING WELL	21.36'
DEPTH TO BOTTOM OF FILTER SAND	22.0'
THICKNESS AND TYPE OF SEAL	-
DIAMETER OF BOREHOLE	6"

L_1= 0.36' FT

L_2= 6' FT

L_3= 15' FT

L_4= 22' FT

MONITORING WELL WATER LEVEL MEASUREMENTS

DATE	TIME	WATER LEVEL (1)	OBSERVATIONS
2-20-85	3:12	10.48'	
2-12-85	3:00	10.48	

(1) DEPTH BELOW TOP OF RISER PIPE

INSTALLATION COMPLETED:
Date 2-20-85 Time 2:00 pm

SOIL EXPLORATION company