

# GETTLER-RYAN INC.

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TRANSMITTAL

TO: Ms. Eva Chu  
Alameda County Environmental Health Services  
1131 Harbor Bay Parkway  
Alameda, CA 94502

DATE: May 15, 2000  
PROJECT NO. 140175.04  
SUBJECT: Site Conceptual Model  
Tosco Station No. 4186  
Livermore, CA

From: Jed Douglas

**WE ARE SENDING YOU:**

COPIES	DATED	DESCRIPTION
1	5/12/00	Site Conceptual Model

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**IMPORTANT NOTE:**

Appendix A of this report contains well location and construction details obtained from water well driller's reports filed with DWR. California Water Code Section 13753 states that these reports are confidential and not for public use or inspection. Therefore, this report or its attachments should not be placed in files accessible to the general public.

Signed: 

COPIES TO: David De Witt - Tosco Marketing Company

*Don't agree w/ proposed NW locations. Recommend one NW + across (S of).*

*Fax (707) 789-3218 Jed Douglas*



# GETTLER-RYAN Inc.

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May 12, 2000

Ms. Eva Chu  
Alameda County Environmental Health Services  
1131 Harbor Bay Parkway  
Alameda, CA 94502

**Subject: Site Conceptual Model for Tosco (76) Service Station No. 4186,  
located at 1771 First Street, Livermore, California.**

Ms. Chu:

At the request of Tosco Marketing Company (Tosco), Gettler-Ryan Inc. (GR), has prepared this Site Conceptual Model (SCM) for the subject site. This SCM was prepared in response to a letter from the Alameda County Environmental Health Services (ACEHS), dated March 13, 2000. The ACEHS letter requested the preparation of an SCM based on an apparent increasing trend in the concentration of methyl tert-butyl ether (MtBE) in a monitoring well downgradient of the underground storage tanks (USTs).

## **Site Description**

The subject site is an operating service station located on the southwest corner of the intersection of First Street and N Street in Livermore, California (Figure 1). The site is bounded to the north by First Street, to the east by N Street, and to the south and west by commercial buildings. Properties in the immediate site vicinity are used for a mix of commercial purposes that include restaurants, automobile repair shops, and shopping facilities. The site is located at an approximate elevation of 480 feet above sea level.

Current aboveground site facilities consist of two dispenser islands, a canopy and a station building/convenience store. Two 10,000-gallon gasoline USTs are located in a common pit immediately east of the station building. A former waste oil UST was removed in June of 1993. Pertinent site features are shown on Figure 2.

## **Regional Geology and Hydrogeology**

The subject site is located in the Livermore Valley and is underlain by Holocene age alluvial fan and gravel facies. These deposits are composed of semi-consolidated deposits of sand and gravel in a matrix of clayey sand. The Livermore Valley contains many northwest trending faults. The site is approximately 1 mile southwest of the Mocho Fault and approximately 1½ miles northeast of the Livermore Fault (California Department of Water Resources, 1974). Previous investigations performed by GeoStrategies, Inc. (GSI) determined that the unsaturated (vadose) zone is comprised predominantly of gravel with

varying amounts of clay, silt and sand. The saturated zone is comprised predominantly of clay with varying amounts of silt, sand and gravel. A cross-section of the site subsurface geology is presented in Figure 3.

During the June 1998 subsurface investigation conducted by GR, groundwater was initially encountered at depths ranging from 24 to 25 feet below ground surface (bgs). Groundwater flow direction has varied over the last seven quarters from north to southwest. A historical groundwater flow directions diagram is presented on Figure 4. The nearest surface water to the site is Arroyo Mocho Creek, located approximately 2,900 feet south of the site.

### **PREVIOUS ENVIRONMENTAL WORK**

On June 6, 1996, GSI collected six soil samples from beneath the fuel dispensers and along the product delivery piping during dispenser and piping replacement activities. A total of 25 cubic yards of soils was excavated and transported to Forward Landfill located in Manteca, California. Analytical results were reported as not detected (ND) for Total Petroleum Hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene and xylenes (BTEX) for all samples collected beneath the dispenser islands and product delivery piping (GSI, 1996).

On September 10, 1997, Pacific Environmental Group (Pacific) conducted a soil gas survey as part of a baseline site evaluation associated with the property transfer from Unocal Corporation to Tosco. Six soil gas probes were advanced and samples collected at 3 or 15 feet bgs in the vicinity of the UST complex, dispenser islands, and product lines. Analytical results ranged from 41 to 4,500 parts per billion (ppb) of TPHg, ND to 110 ppb of benzene and ND to 8,000 ppb of MtBE. Field data sheets indicate that no petroleum hydrocarbon odors were noted. The area of primary impact appeared to be localized around the UST complex, where TPHg concentrations were reported up to 4,500 ppb, benzene up to 110 ppb and MtBE concentrations up to 8,000 ppb (Pacific, 1997).

On April 8, 1998, GR reviewed files at the Alameda County Zone 7 Water Agency to identify water supply wells located within a one half mile radius from the site. Two municipal wells were identified approximately 1,500 and 1,800 feet northwest of the site, and two domestic wells were located approximately 1,900 and 2,800 feet southwest and west of the site. Well search results are presented in Appendix A.

On June 16, 1998, GR installed three 2-inch diameter groundwater monitoring wells designated as U-1 through U-3. The wells were installed to a depth of approximately 34 feet bgs. Soil samples collected from the three wells were reported as ND for TPHg, benzene, and MtBE. Groundwater monitoring and sampling of the wells was initiated in July of 1998, and has continued on a quarterly basis to the present time.

## Site Conceptual Model

The SCM is summarized on Figure 5. Information utilized to create the SCM include figures, tables and charts, as outlined in the State Water Resources Control Board's Final Draft Guidelines for Investigation and Cleanup of MTBE and Other Ether-Based Oxygenates, Appendix C. The figures, tables and charts are presented in the appendices of this report and include:

- Vicinity and site maps showing site location, site features, locations of groundwater monitoring wells, and locations of geologic cross-sections.
- Potentiometric surface contour map with groundwater elevations, flow direction and calculated gradient.
- Historical groundwater flow directions
- Groundwater concentration maps with iso-contours for TPHg and MtBE.
- Geologic cross-sections with subsurface features.
- Graphs of historical TPHg, benzene and MtBE concentrations
- Graphs of TPHg, benzene and MtBE concentrations versus distance from the UST pit (assumed source area).
- Historical groundwater data tables.
- Historical soil data tables.
- One half mile radius well search report

The site is located in an commercial area of Livermore, and a one half mile radius well search performed by GR identified two domestic and two industrial wells in the search area. The municipal and industrial wells are potential sensitive receptors, however, the ~~nearest downgradient well is located approximately 1,500 feet northwest of the site,~~ and is screened below 280 feet bgs. This report and attachments contain well location and construction details obtained from water well driller's reports filed with the State of California Department of Water Resources. California Water Code Section 13753 states that these reports are confidential and not for public use or inspection. Therefore, this report or its attachments should not be placed in files accessible to the general public.

## Discussion of Site Conceptual Model

The SCM and geologic cross-sections (Figures 3 and 5) show that the site is underlain primarily with coarse-grained gravel with minor amounts of clay, silt and sand to a depth of approximately 24 feet bgs. This gravel is in turn underlain by an approximately 10 foot thick section of clay, with minor amounts of silt and sand. The clay is underlain by another coarse grained gravel section of unknown thickness. Groundwater occurs near the boundary between the upper gravel section and the clay section at a depth of approximately 24 feet bgs.

Review of the graphs showing change in hydrocarbon concentrations in groundwater over time at the site (Appendix A) reveal the following trends. MtBE concentrations in the source area (U-1 by UST pit) predominantly follows the change in groundwater elevation. MtBE concentrations in the wells at distance from the source area (U-2 and

U-3) also tend to follow the rise and fall in groundwater levels. As distance from the source area increases, concentrations of TPHg, benzene and MtBE decrease.

TPHg impacted groundwater is limited to the vicinity of monitoring well U-3 (Figure 6) and does not appear to be migrating laterally. The MtBE groundwater plume at the site (Figure 7) appears to be restricted to the subject site and immediate vicinity. Due to the reluctance of MtBE to bio-degrade as quickly as other petroleum hydrocarbons, MtBE appears in groundwater further from the source area. Historical groundwater data collected at the site is presented in Appendix B.

Depth to groundwater at the site is approximately 25 feet bgs. This is deeper than the utilities present at and in the site vicinity. Therefore, utility trenches do not appear to be acting as conduits for impacted groundwater.

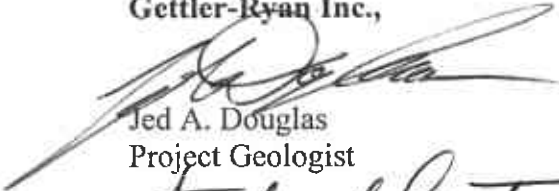
### Recommendations

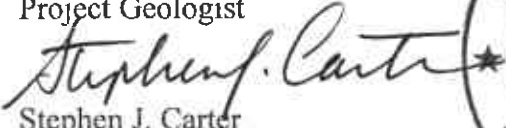
Based on: 1) the Final Draft Guidelines for Investigation and Cleanup of MtBE dated March 27, 2000; and 2) concentrations of MtBE at the site; and, 3) the distance to the nearest sensitive receptor (approximately 1,500 feet), Tosco Service Station No. 4186 is assigned an investigation priority category of Class A. Class A requires determination of cleanup priority as soon as possible. GR calculated a groundwater flow velocity in order to determine the plume travel time to the nearest receptor (Appendix B). Groundwater velocity was calculated at 46 feet per year. Based on this calculation, the MtBE plume would be expected to reach the vicinity of the nearest municipal well in approximately 33 years.

Based on the SCM, hydrocarbon impact to groundwater appears to fluctuate with the historical rise and fall of the groundwater surface beneath the site. Impact to groundwater has not been defined, however the hydrocarbon plumes appear to be stable. Due to the current extent of MtBE impact apparently confined to the immediate vicinity of the site, the distance to sensitive receptors in the site vicinity, and the calculated groundwater velocity, GR makes the following recommendations: 1) continued monitoring of groundwater chemical concentrations; and, 2) installation of three monitoring wells in the west, southwest, and southern directions from the UST area (Figure 2) to complete the lateral delineation of hydrocarbon impact to groundwater.

If you have any questions or comments please feel free to call either of us.

Sincerely  
Gettler-Ryan Inc.,

  
Jed A. Douglas  
Project Geologist

  
Stephen J. Carter  
Senior Geologist  
R.G. 5577



Attachments: Figure 1 – Vicinity Map  
Figure 2 – Site Plan and Cross-Section Locations  
Figure 3 – Cross-Section A – A'  
Figure 4 – Historical Groundwater Flow Directions  
Figure 5 – Site Conceptual Model  
Figure 6 – TPHg Iso-concentration Map  
Figure 7 – MtBE Iso-concentration Map  
Appendix A – Graphs and Well Search  
Appendix B – Historical Groundwater Data  
Appendix C – Historical Soil Data

cc: Mr. David De Witt, Tosco Marketing Company, San Ramon, California

## References

U.S. Geological Survey, 1961, Livermore Quadrangle, California, 7.5 Minute Series (Topographic): Scale 1:24,000, photorevised 1980.

State Water Resources Control Board, 2000, Final Draft Guidelines for Investigation and Cleanup of MTBE and Other Ether-Based Oxygenates, dated March 27, 2000.

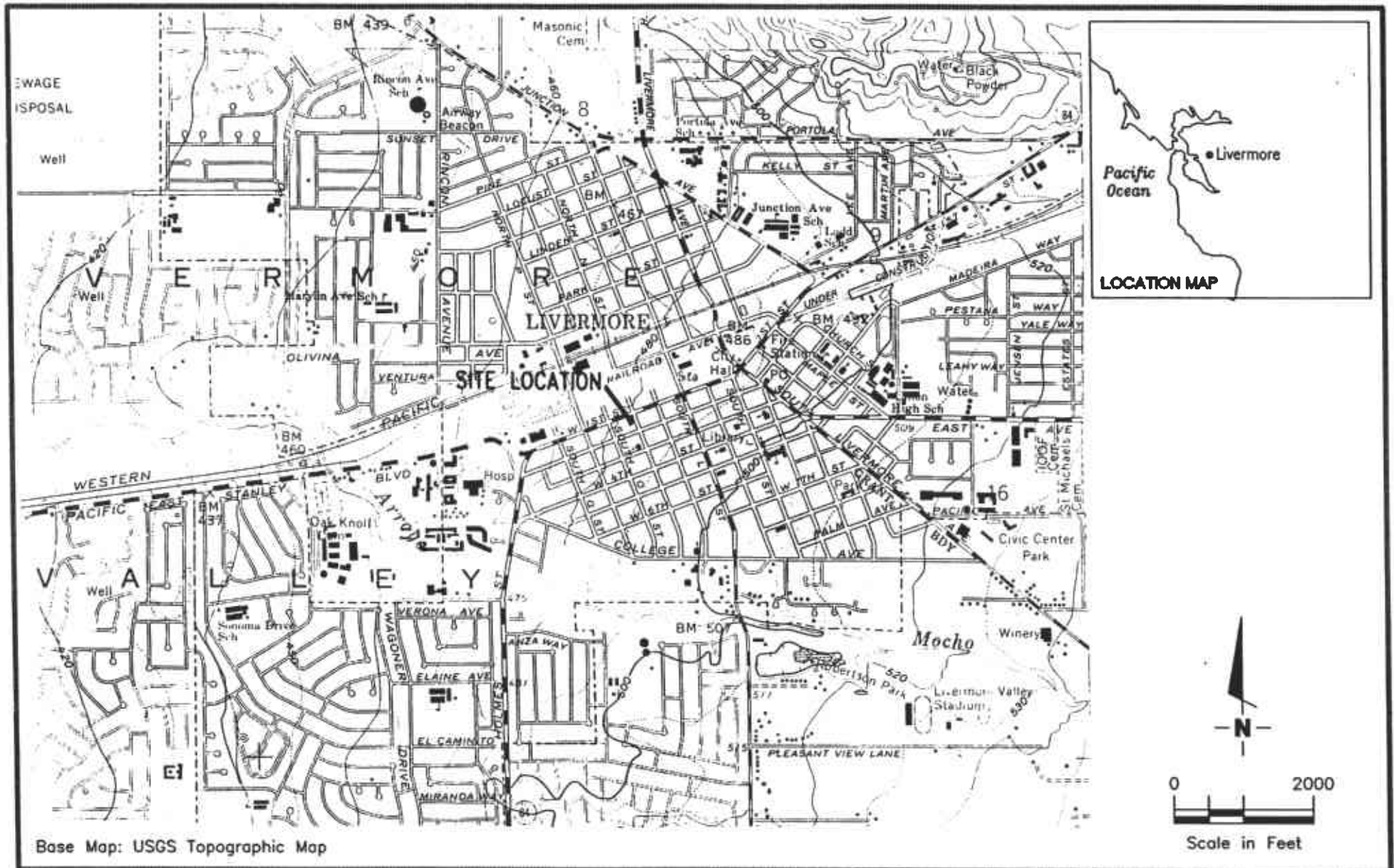
Gettler-Ryan Inc., 2000, Groundwater Monitoring and Sampling Report, First Quarter 2000 – Event of January 24, 2000, dated February 22, 2000.

Gettler-Ryan Inc., 1998, Well Installation Report, Tosco (Unocal) Service Station No. 4186, 1771 First Street, Livermore, California, dated November 23, 1998.

Gettler-Ryan Inc., 1998, Well Search Unocal Service Station No. 4186, 1771 1st Street, Livermore, California, dated April 8, 1998.

Pacific Environmental Group, 1997, Soil Gas Survey Results Report, Unocal Service Station No. 4186, 1771 1st Street, Livermore, California, dated October 29, 1997.

GeoStrategies, Inc., 1996, Product Line Replacement Report, Unocal Service Station No. 4186, 1771 First Street, Livermore, California, dated August 7, 1996.



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**VICINITY MAP**

Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

FIGURE

**1**

JOB NUMBER  
140175

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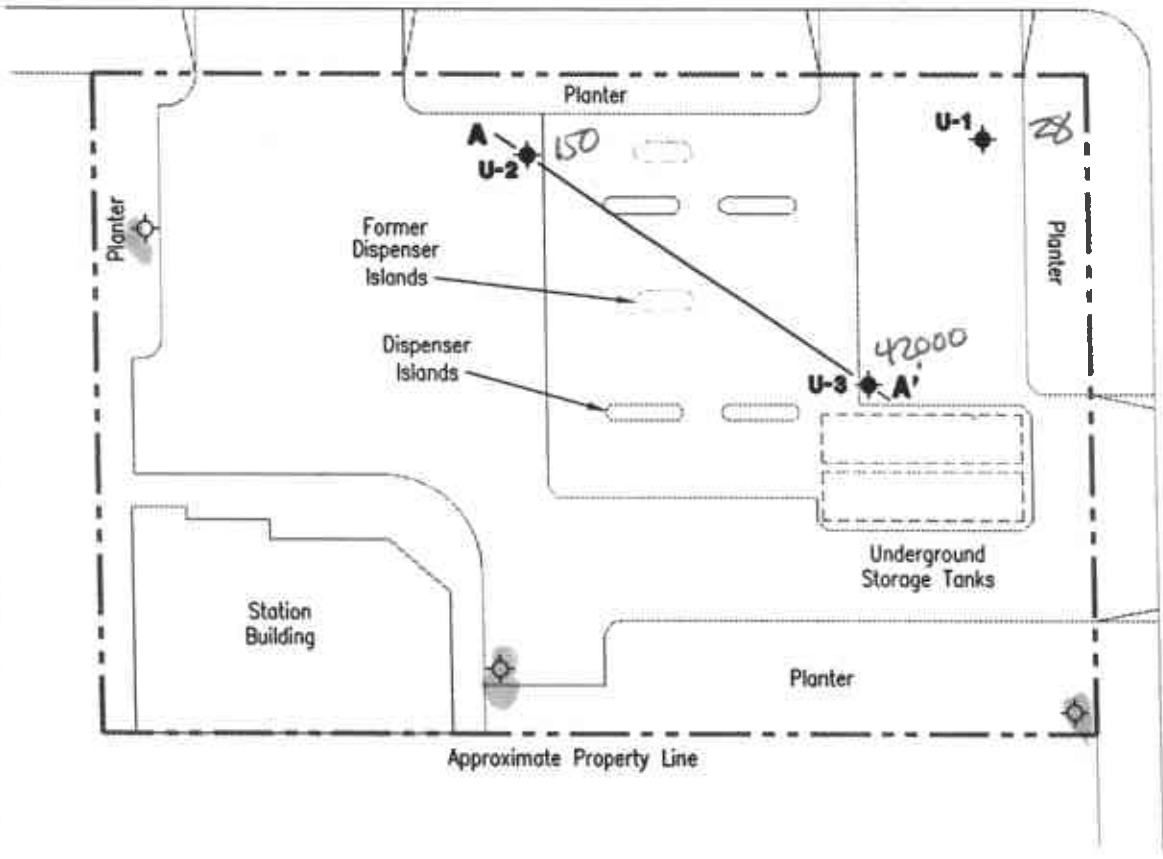
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**EXPLANATION**

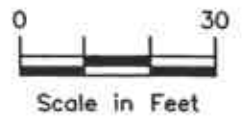
- ◆ Groundwater monitoring well
- ◇ Proposed groundwater monitoring well
- A — A' Cross section line

42,000 ppb MTBE

**FIRST STREET**



**N STREET**



Source: Virgil Chavez Land Surveying dated August, 1998



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**SITE PLAN**  
Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

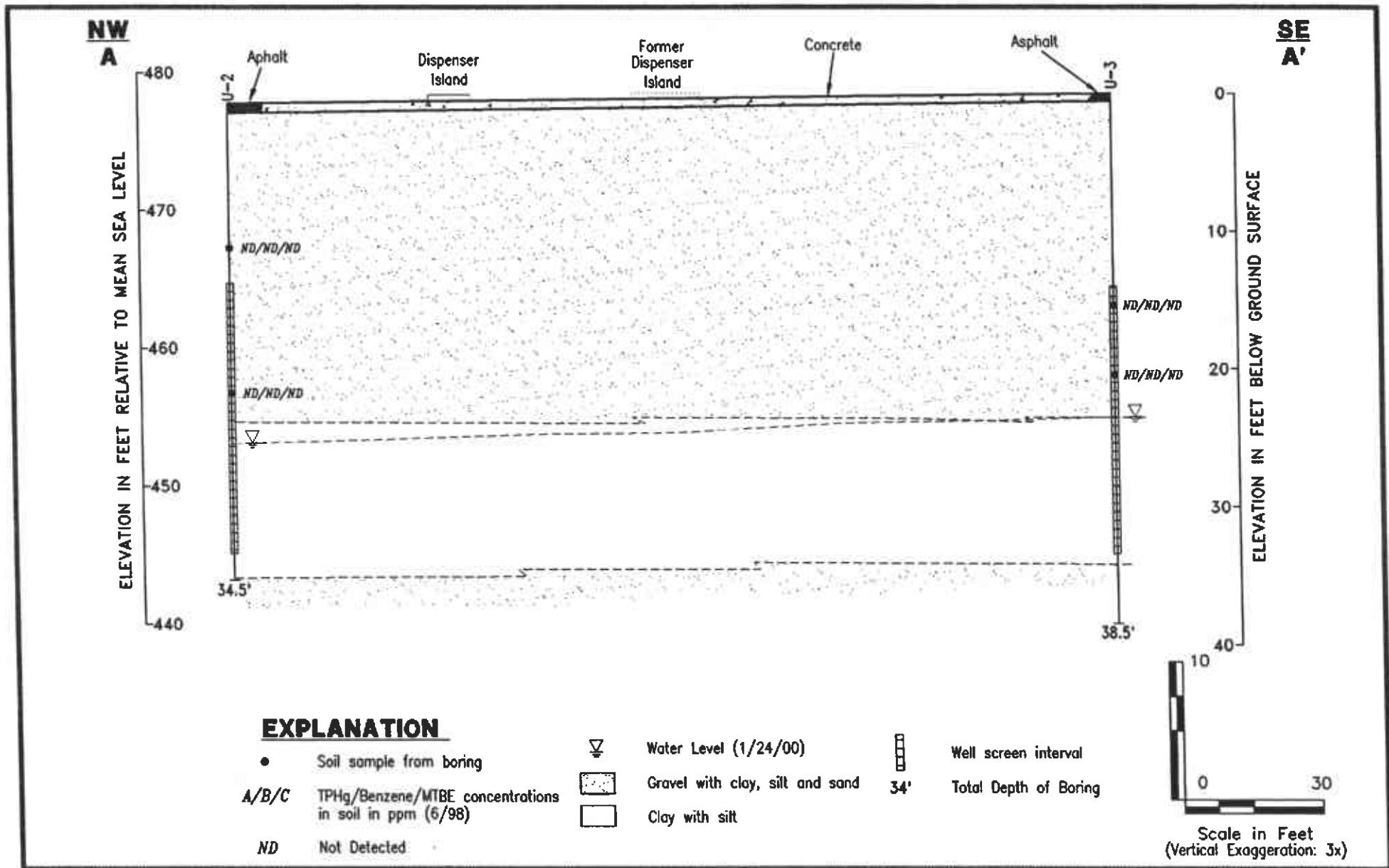
FIGURE  
**2**

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**CROSS SECTION A-A'**  
Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

FIGURE

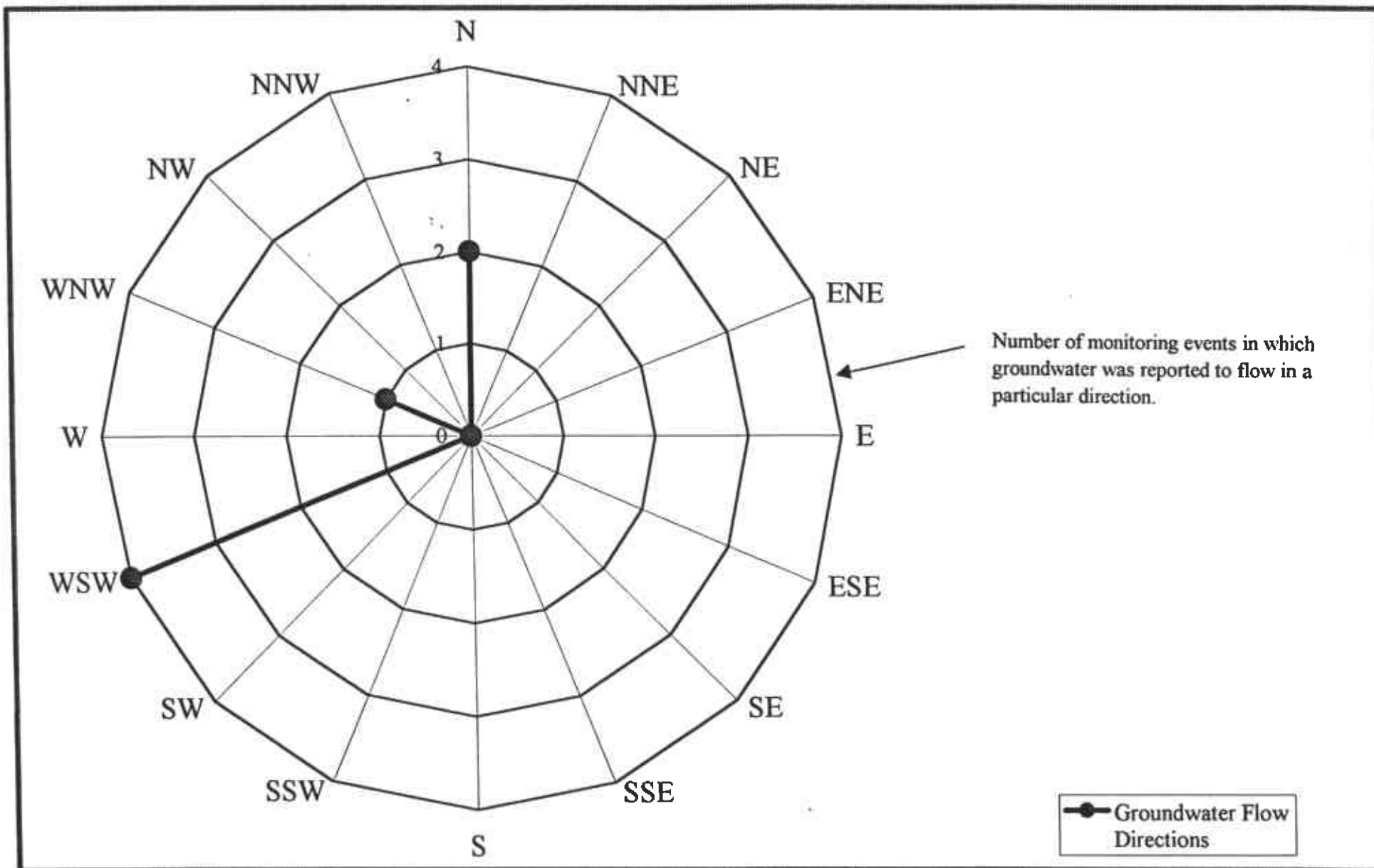
**3**

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**HISTORICAL GROUNDWATER FLOW DIRECTIONS**

Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

FIGURE

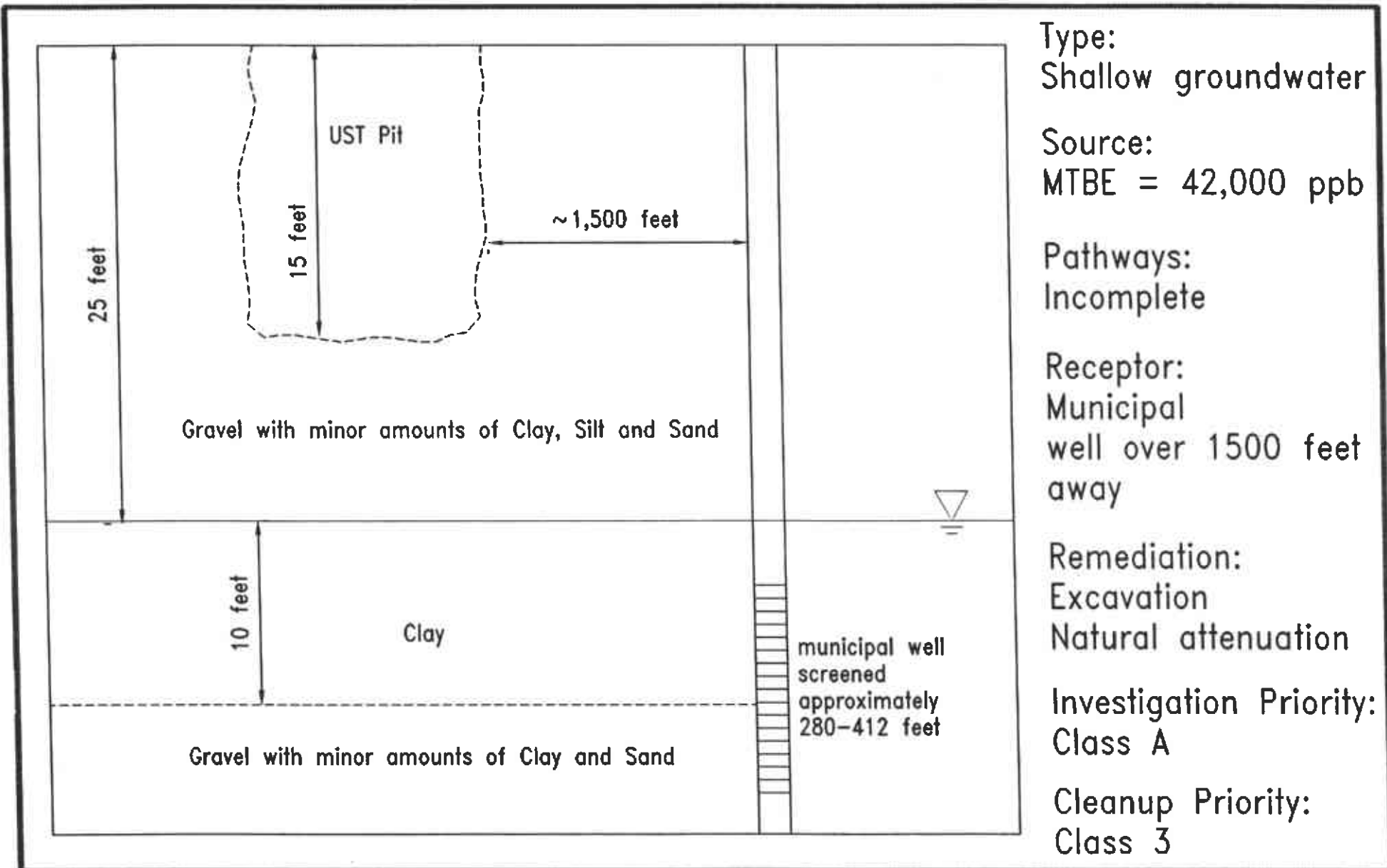
**4**

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**SITE CONCEPTUAL MODEL**  
Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

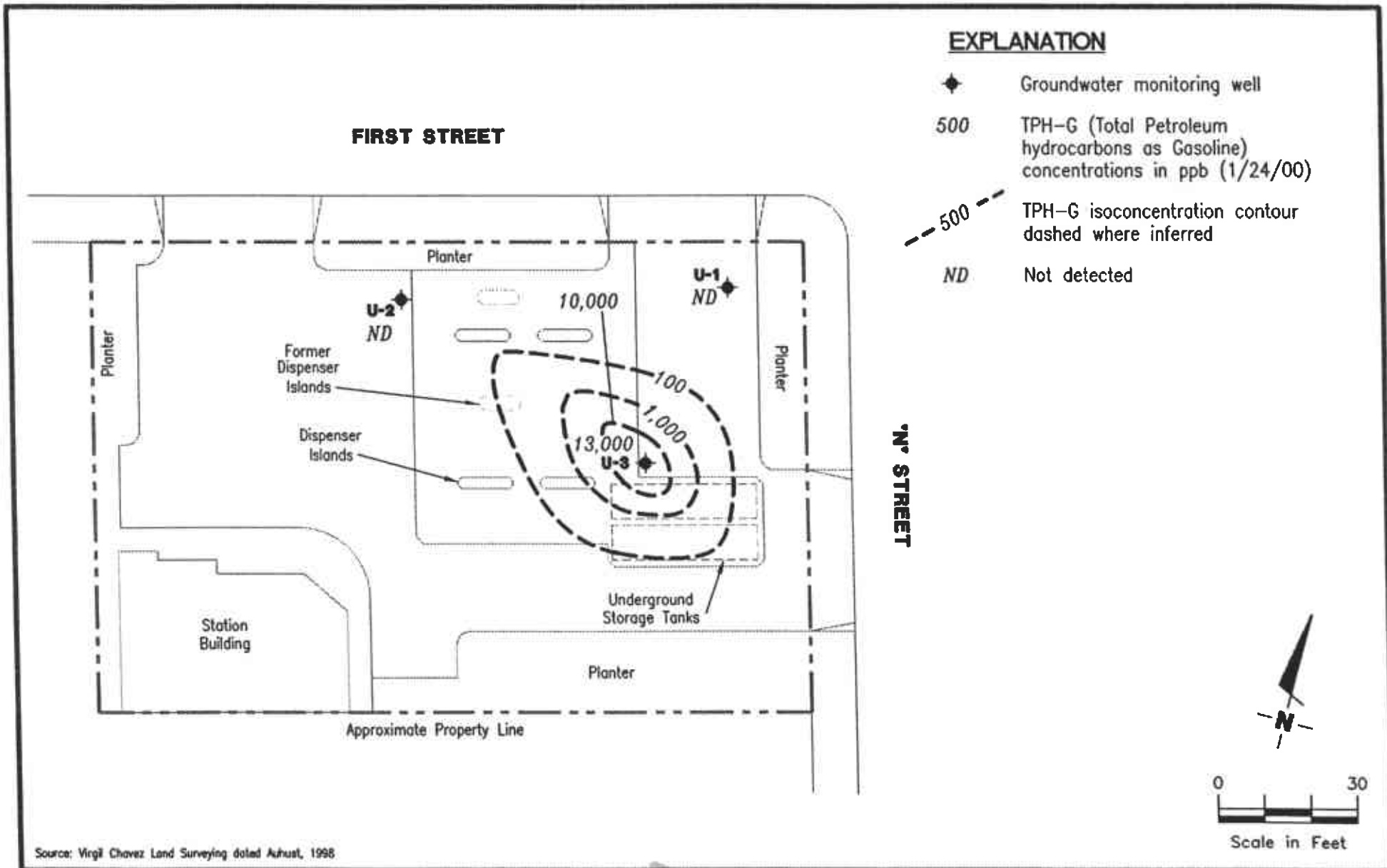
FIGURE  
**5**

JOB NUMBER  
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**TPHG ISOCONCENTRATION MAP**  
Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

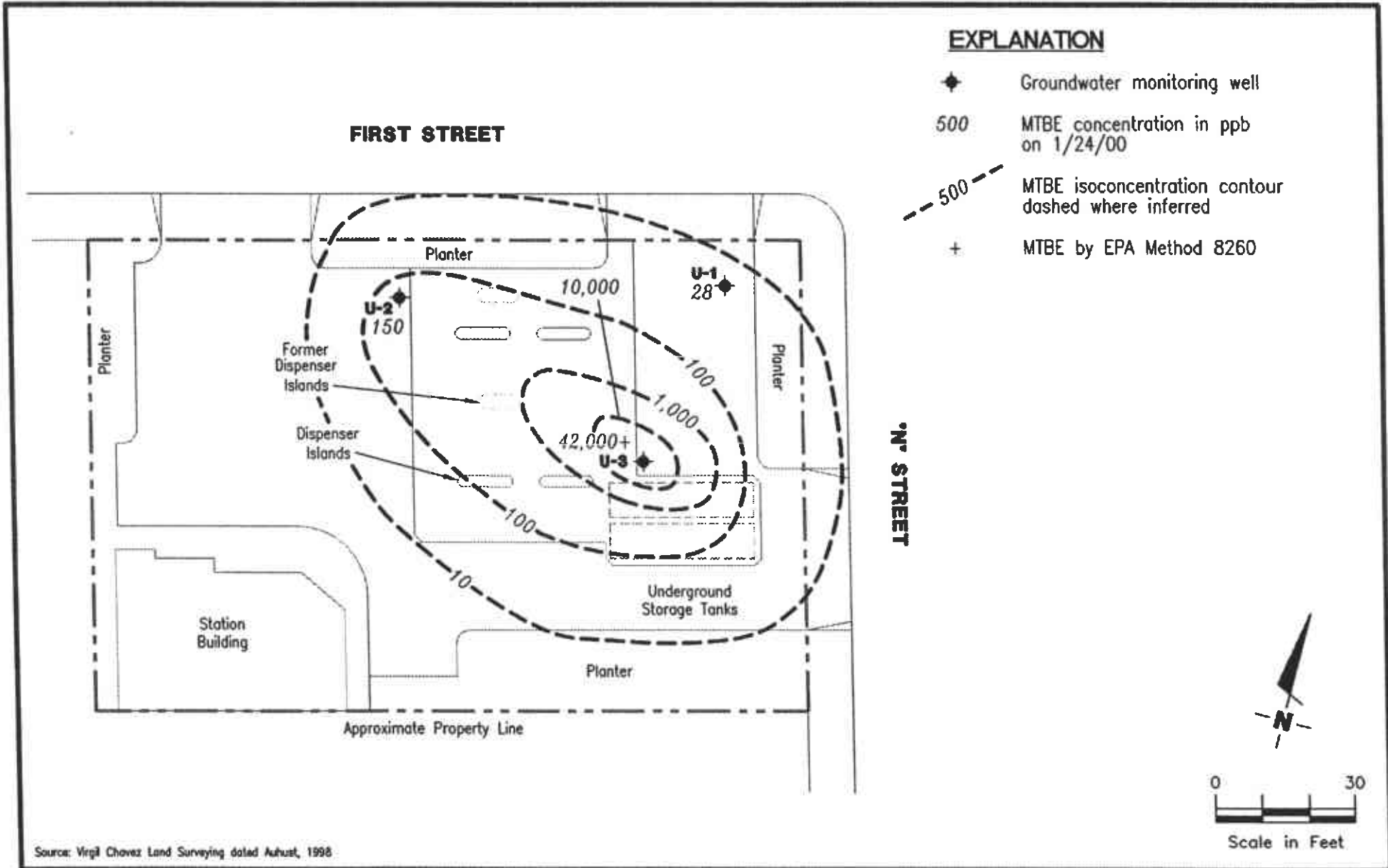
FIGURE  
**6**

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**MTBE ISOCONCENTRATION MAP**

Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

FIGURE

**7**

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140175.04

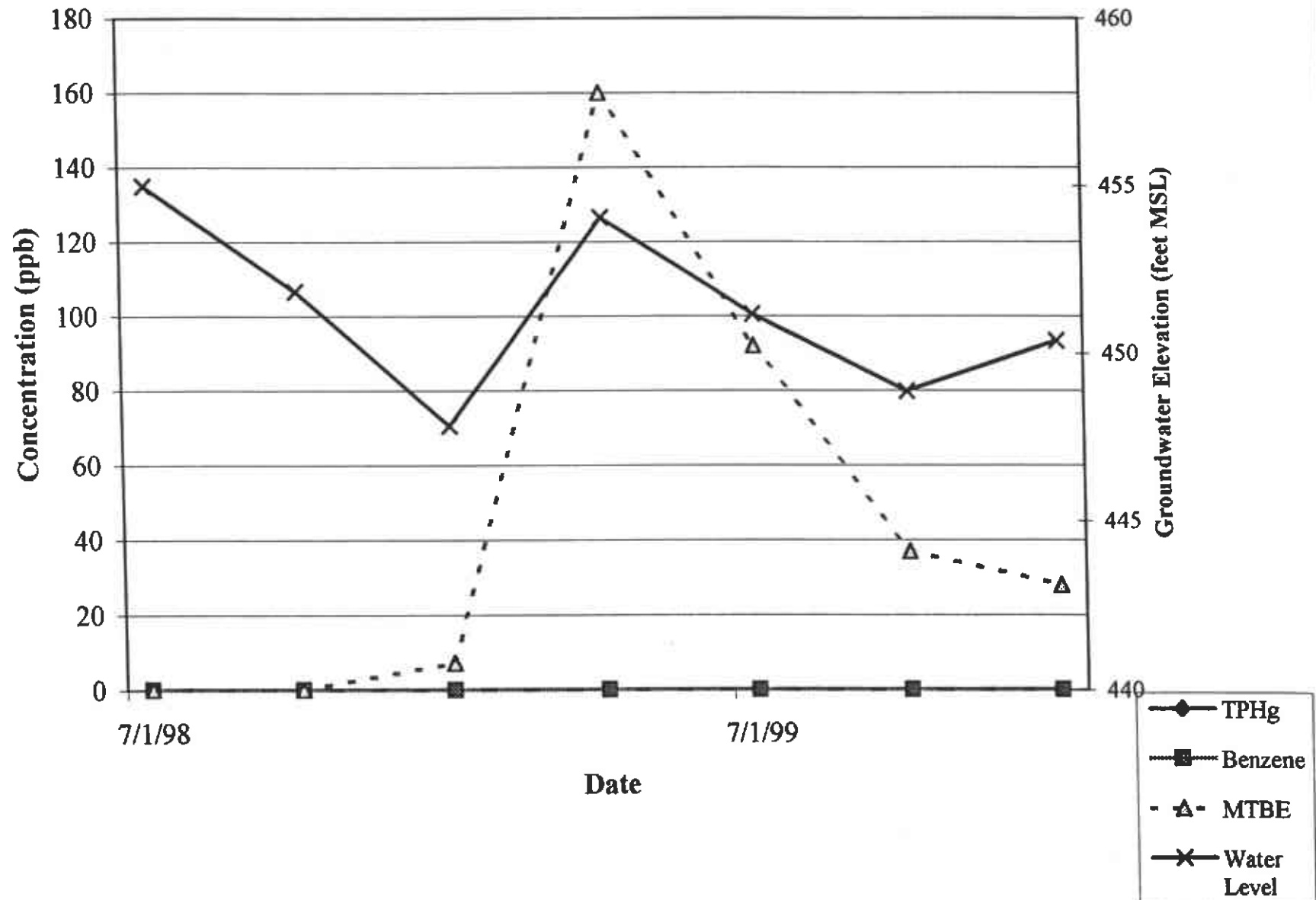
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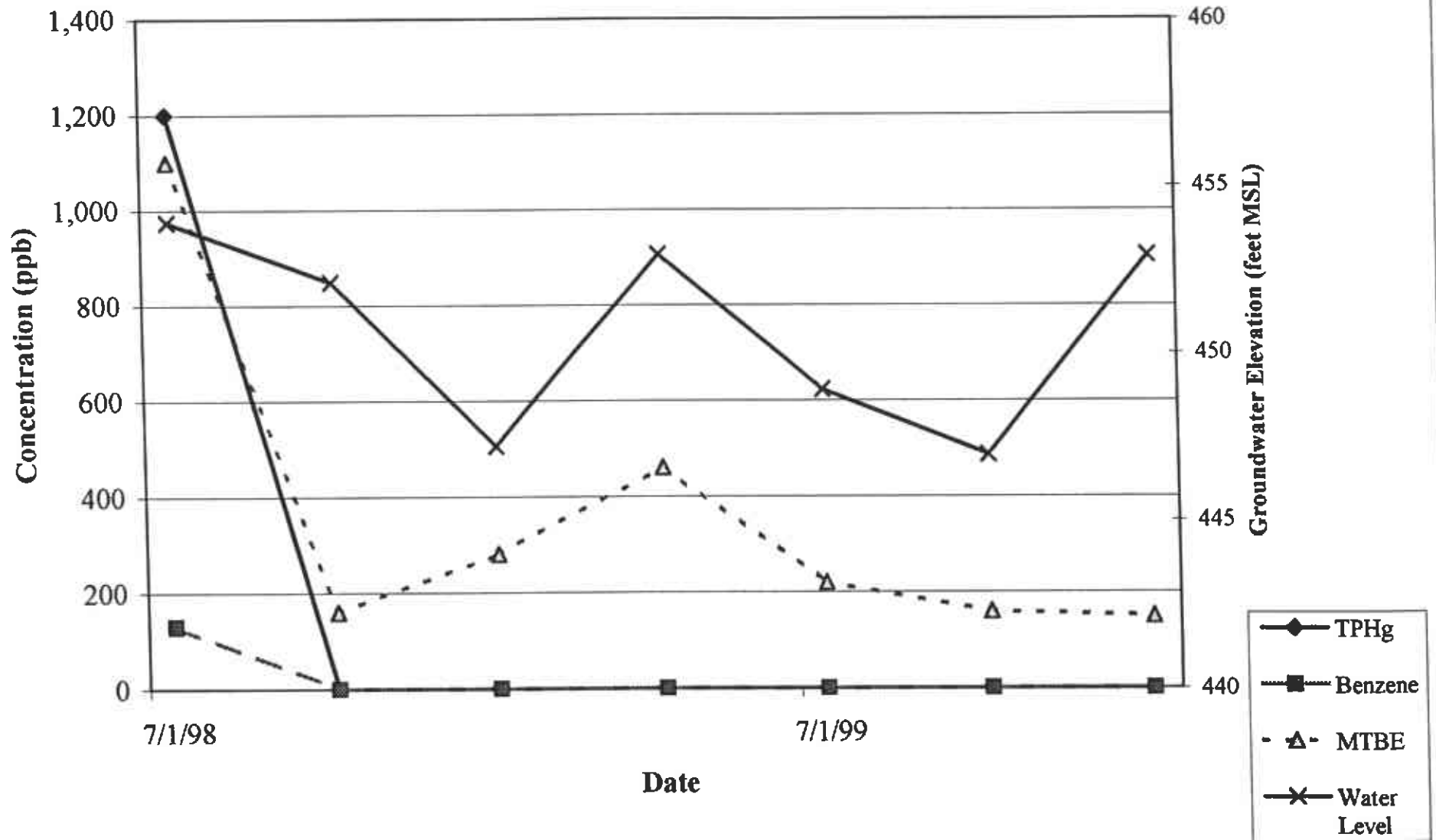
**APPENDIX A**  
**GRAPHS AND WELL SEARCH**

**Tosco (76) Service Station No. 4186**  
**Groundwater Concentration vs. Time**  
**U-1**

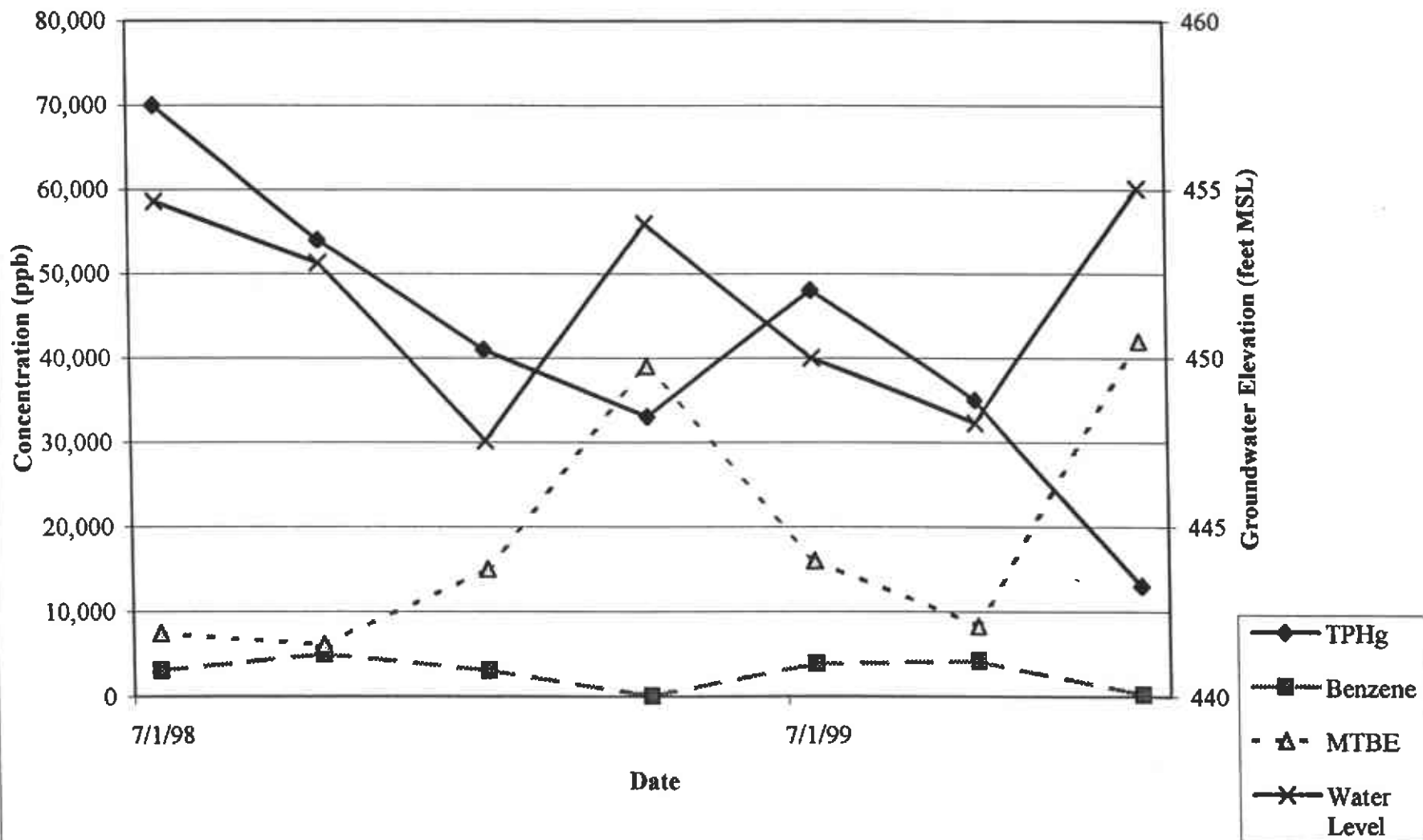




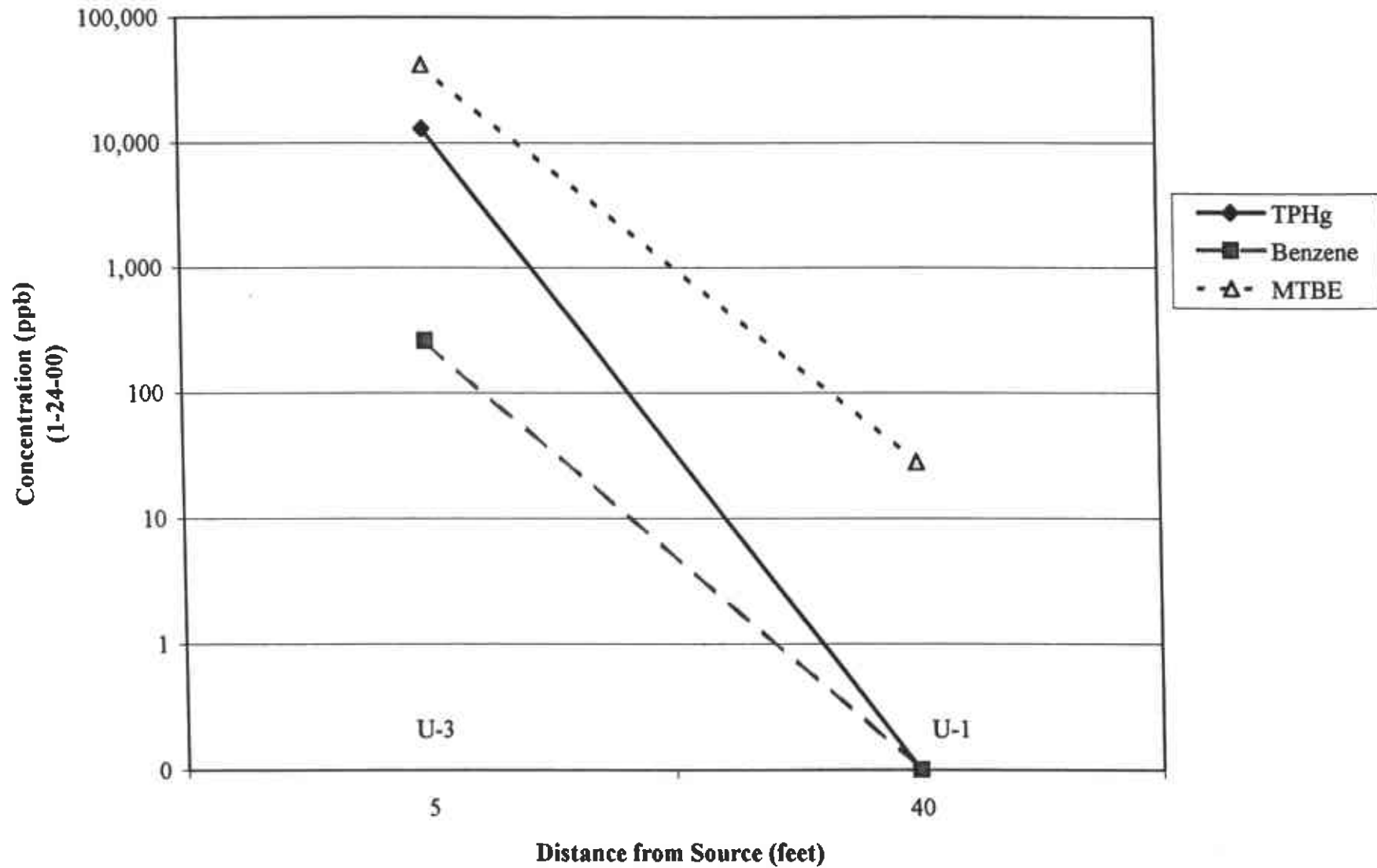
Tosco (76) Service Station No. 4186  
Groundwater Concentration vs. Time  
U-2



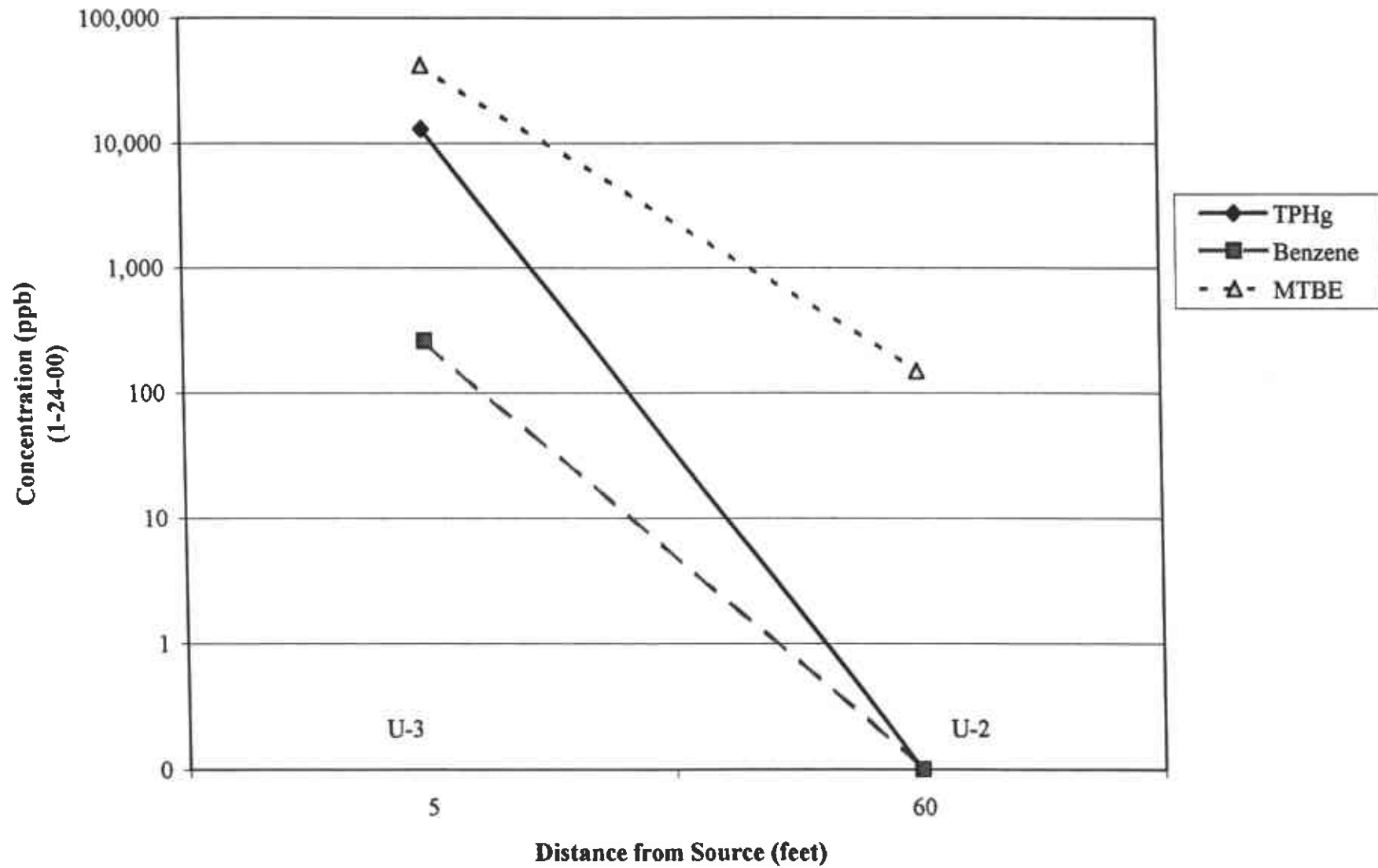
**Tosco (76) Service Station No. 4186**  
**Groundwater Concentration vs. Time**  
**U-3**

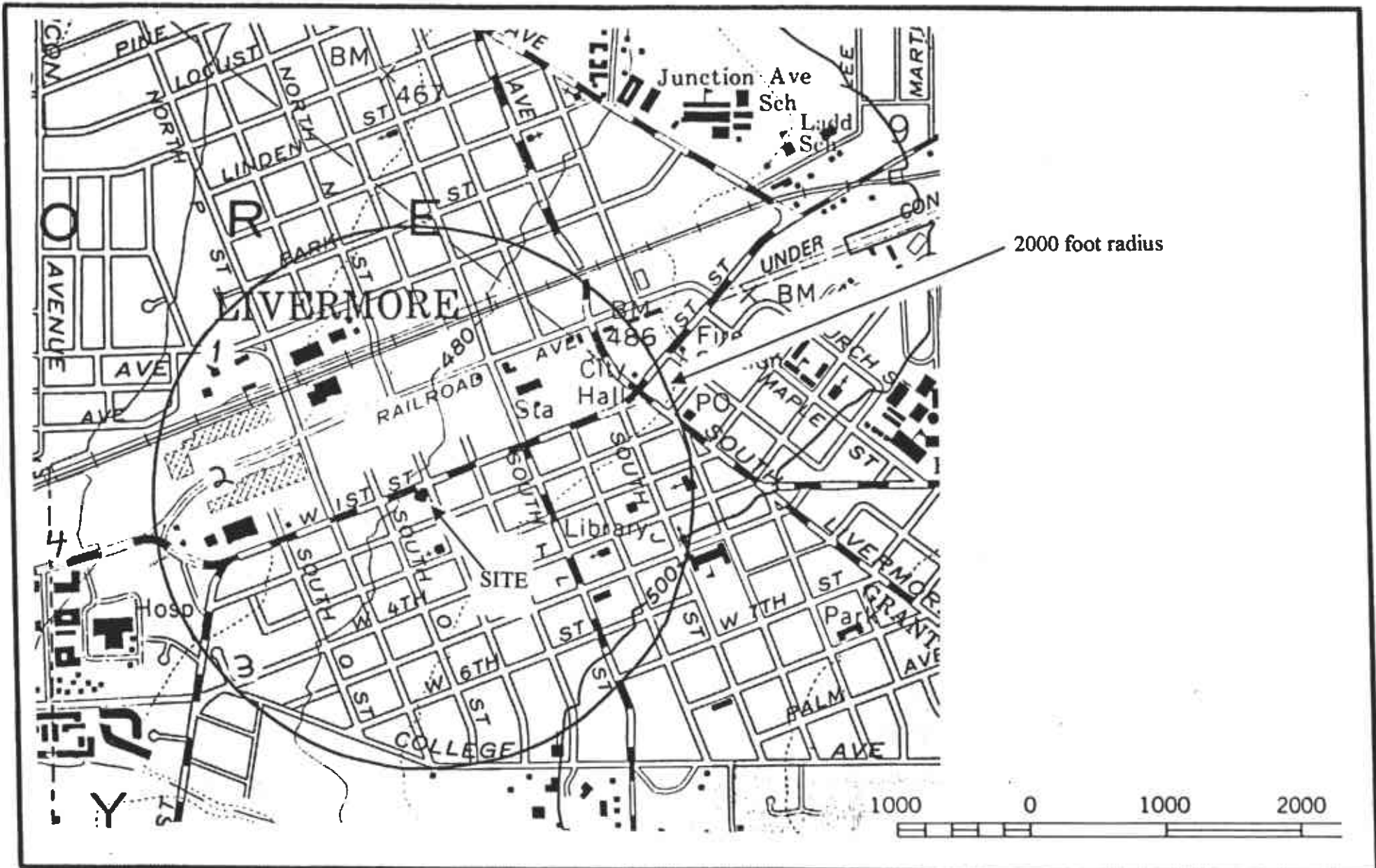


### Tosco (76) Service Station No. 4186 Groundwater Concentrations vs. Distance from Tank Pit



### Tosco (76) Service Station No. 4186 Groundwater Concentrations vs. Distance from Tank Pit





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Dublin, CA 94568

**WELL SEARCH MAP**

Tosco 76 Service Station No. 4186  
1771 First Street  
Livermore, California

FIGURE

**1**

JOB NUMBER  
140175

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DATE  
4/00

REVISED DATE

## Table 1 Well Search Data

Station Number: Tosco 4186  
 Site Location: 1771 First Street, Livermore, CA  
 Performed by: Clyde Galantine  
 Zone 7 Water Agency Office: Pleasanton

Job#: 140175.04  
 Date: 3/16/98

Map ID	Well Owner	Well Location	Well Use	State Well #	Year Installed	Well Depth (feet)	Screen Interval From (feet)	Screen Interval To (feet)	Well Diameter (inches)	DTW (feet)
1	California Water Service Company	1493 Olivina Avenue	M	3S/2E-8P1	1948	273	122	263	10	-
2	California Water Service Company	Railroad Ave between North P & Stanley Blvd	M	3S/2E-8P2	1924	415	280	412	16	-
3	Geoffrey Davies	1416 Fourth Street	D	3S/2E-17B2	1945	442	221	427	10	-
4	Fred Holdener	985 East Stanley	D	3S/2E-17C1	1943	412	62	410	12	-

### Explanation

DTW = depth to water  
 M = municipal  
 D = domestic  
 - = information not available

**APPENDIX B**  
**HISTORICAL GROUNDWATER DATA**

**TABLE 2 - SOIL CHEMICAL ANALYTICAL DATA**

Tosco (Unocal) Service Station No. 4186  
 1771 First Street  
 Livermore, California

Sample Location and ID	Sample Depth (feet)	Date Collected	TPHg (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	MTBE by 8020 (ppm)
<b>Boring U-1</b>								
U-1-21.5	21.5	6/15/98	ND	ND	ND	ND	ND	ND
<b>Boring U-2</b>								
U-2-10.5	10.5	6/16/98	ND	ND	ND	ND	ND	ND
U-2-21	21	6/16/98	ND	ND	ND	ND	ND	ND
<b>Boring U-3</b>								
U-3-15.5	15.5	6/16/98	ND	ND	ND	ND	ND	ND
U-3-20.5	20.5	6/16/98	ND	ND	0.009	ND	0.007	ND
<b>Stockpile</b>								
US-1(comp) <sup>1</sup>	----	5/12/98	ND	ND	ND	ND	ND	ND

**EXPLANATION:**

TPHg = Total Petroleum Hydrocarbons as gasoline  
 BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes  
 MTBE = Methyl t-Butyl Ether  
 feet = feet below ground surface  
 ppm = parts per million  
 ND = Not Detected

<sup>1</sup> Sample also analyzed for total lead (9 ppm).

**ANALYTICAL METHODS:**

TPHg/BTEX/MTBE = CA/LUFT/EPA Method 8020  
 Lead = EPA Methods 3050BM/6010A

**ANALYTICAL LABORATORY:**

Columbia Analytical Services (ELAP #1426)



Table 1. Soil Analytical Results - Unocal Service Station #4168, 1771 First Street, Livermore, California.

Sample ID	Depth (ft)	Date	Analytic Method	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	Total Lead	Soluble Lead
				←-----ppm----->						
<b>Product Line Trench Samples</b>										
PL1-3	3	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
PL2-3	3	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
PL3-3	3	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
PL4-3	3	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
PL5-3	3	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
PL5-4	4	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
PL6-3	3	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
PL7-3	3	06/06/96	8015/8020	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	—	—
<b>Stockpile Sample</b>										
SP-(A-D)	—	06/06/96	8015/8020/6010	300	<0.0050	<0.0050	0.77	4.9	59	3.0

**EXPLANATION:**

TPHg - Total Petroleum Hydrocarbons as Gasoline  
 ft - Feet  
 ppm - Parts per million  
 — - Not analyzed/not applicable

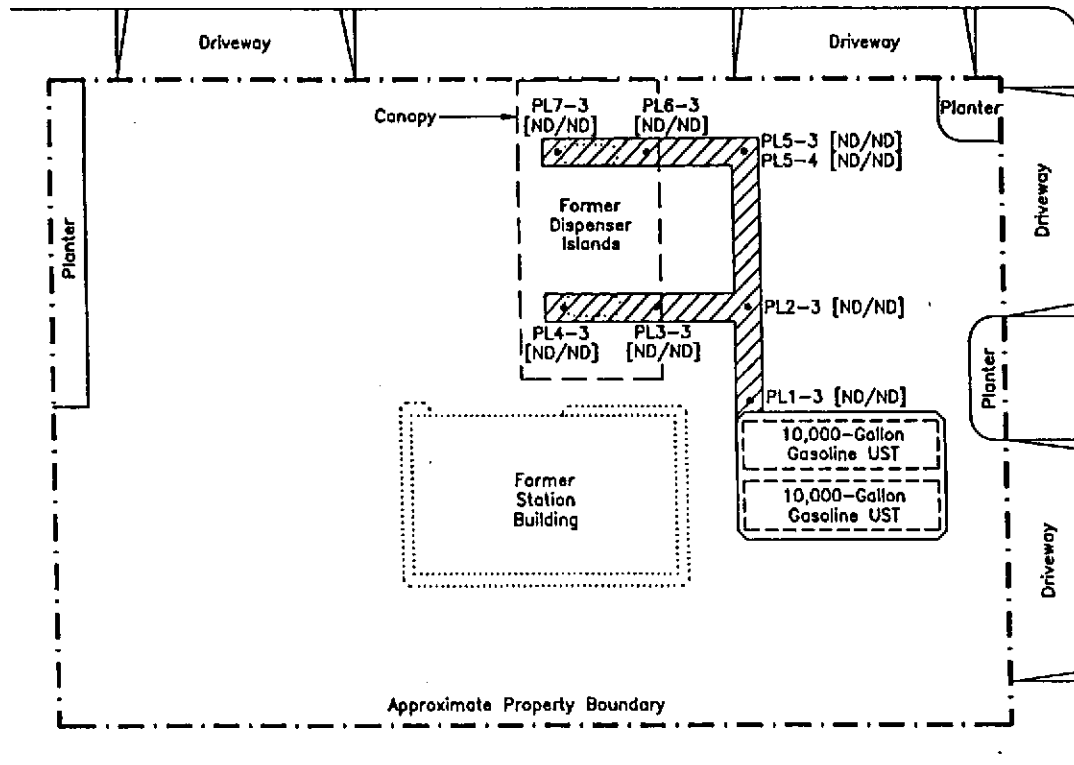
**ANALYTICAL METHODS:**

8015 - EPA Method 8015Mod for TPHg  
 8020 - EPA Method 8020 for BTEX  
 6010 - EPA Method for Lead


**ANALYTICAL LABORATORY:**

Sequoia Analytical of Redwood City, California (ELAP #1210).

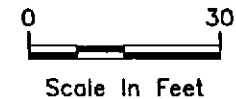
**FIRST STREET**



**EXPLANATION:**

- PL7-3 • Soil Sample Location
-  Product Line Trench
- [ND/ND] TPHg/Benzene Concentrations Measured In Parts Per Million
- ND Not Detected

**'N' STREET**



Source: Figure Modified From Drawing Provided By Unocal.

**SOIL CONCENTRATION MAP**  
 Unocal Service Station No. 4186  
 1771 First Street  
 Livermore, California

FIGURE

**2**



JOB NUMBER  
6797

REVIEWED BY  
*BS*

DATE  
7/96

REVISION DATE

**APPENDIX C**  
**HISTORICAL SOIL DATA**

**Table 1**  
**Groundwater Monitoring Data and Analytical Results**  
**Tosco (Unocal) Service Station #4186**  
**1771 First Street**  
**Livermore, California**

Well ID/ TOC*	Date	DTW (ft.)	GWE (msl)	TPH(G) (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
<b>U-1</b>									
478.27	07/13/98	23.28	454.99	ND	ND	ND	ND	ND	ND
	10/07/98	26.43	451.84	ND	ND	ND	ND	ND	ND
	01/15/99	30.42	447.85	ND	ND	ND	ND	1.1	7.3
	04/14/99	24.21	454.06	ND	ND	ND	ND	ND	160
	07/19/99	27.10	451.17	ND	ND	ND	ND	ND	92
	10/12/99	29.40	448.87	ND	ND	ND	ND	ND	37
	01/24/00	27.90	450.37	ND	ND	ND	ND	ND	28
<b>U-2</b>									
477.44	07/13/98	23.52	453.92	1,200	130	12	62	180	1,100
	10/07/98	25.31	452.13	ND	ND	ND	ND	ND	160
	01/15/99	30.22	447.22	ND	ND	ND	ND	ND	280
	04/14/99	24.50	452.94	ND	ND	ND	ND	ND	460
	07/19/99	28.54	448.90	ND	ND	ND	ND	ND	220
	10/12/99	30.48	446.96	ND	ND	ND	ND	ND	160
	01/24/00	24.52	452.92	ND	ND	ND	ND	ND	150
<b>U-3</b>									
478.46	07/13/98	23.82	454.64	70,000	3,100	5,500	2,700	16,000	7,500
	10/07/98	25.64	452.82	54,000	5,000	1,100	3,100	14,000	6,100
	01/15/99	30.92	447.54	41,000 <sup>1</sup>	3,100	ND <sup>2</sup>	1,800	3,800	15,000
	04/14/99	24.48	453.98	33,000	86	290	2,200	7,800	39,000
	07/19/99	28.46	450.00	48,000	3,900	2,500	3,600	14,000	12,000/16,000 <sup>3</sup>
	10/12/99	30.39	448.07	35,000 <sup>4</sup>	4,200	ND <sup>2</sup>	2,300	1,800	22,000/8,300 <sup>5</sup>
	01/24/00	23.43	455.03	13,000 <sup>4</sup>	260	ND <sup>2</sup>	770	3,200	53,000/42,000 <sup>3</sup>

**Table 1**  
**Groundwater Monitoring Data and Analytical Results**  
**Tosco (Unocal) Service Station #4186**  
**1771 First Street**  
**Livermore, California**

Well ID/ TOC*	Date	DTW (ft.)	GWE (msl)	TPH(G) (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
<b>Trip Blank</b>									
TB-LB	07/13/98	--	--	ND	ND	ND	ND	ND	ND
	10/07/98	--	--	ND	ND	ND	ND	ND	ND
	01/15/99	--	--	ND	ND	ND	ND	ND	ND
	04/14/99	--	--	ND	ND	ND	ND	ND	ND
	07/19/99	--	--	ND	ND	ND	ND	ND	ND
	10/12/99	--	--	ND	ND	ND	ND	ND	ND
	01/24/00	--	--	ND	ND	ND	ND	ND	ND

**Table 1**  
**Groundwater Monitoring Data and Analytical Results**  
Tosco (Unocal) Service Station #4186  
1771 First Street  
Livermore, California

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**EXPLANATIONS:**

TOC = Top of Casing elevation

DTW = Depth to Water

(ft.) = Feet

GWE = Groundwater Elevation

msl = Relative to mean sea level

TPH(G) = Total Petroleum Hydrocarbons as Gasoline

B = Benzene

T = Toluene

E = Ethylbenzene

X = Xylenes

MTBE = Methyl tertiary butyl ether

ppb = Parts per billion

ND = Not Detected

-- = Not Measured/Not Analyzed

- \* TOC elevations are relative to Mean Sea Level (msl) in feet. The benchmark used was a City of Livermore survey monument at First & "Q" Streets.
- 1 Laboratory report indicates gasoline and unidentified hydrocarbons C6-C12.
- 2 Detection limit raised. Refer to analytical reports.
- 3 MTBE by EPA Method 8260.
- 4 Laboratory report indicates gasoline C6-C12.
- 5 MTBE by EPA Method 8260 analyzed past EPA recommended holding time.