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DEPT. OF ECOLOGY

Engineers

April 28, 1997

Consulting Engineers
and Geoscientists
Offices in Washington,
Oregon, and Alaska

City of Snohomish
116 Union Avenue
Snohomish, Washington 98290

Attention: Mick Monken, P.E.

Site Visit
Terry Nation Complaint
Snohomish, Washington
File No. 0161-394-00

On behalf of Tosco Marketing Company (Tosco), this letter documents the site visit to the residence of Terry Nation that Leigh Carlson of 76 Products Company and Lisa Bona of GeoEngineers conducted on April 22, 1997. The visit was made at the request of Mick Monken of the City of Snohomish, who responded to a complaint that Terry Nation made earlier in the day.

Terry Nation resides at 120 Avenue "D" in Snohomish, approximately 1/2 block south of the Tosco former Unocal Site No. 4165. We interviewed Terry Nation during our site visit. Terry Nation observed on April 20 that water was flowing down the sidewalk in front of her house, down the hill to the south. The water appeared to be coming from the vicinity of a water meter located in the parkstrip to the east of her property. Terry Nation complained to the City that when she was hand digging in the parkstrip east of her property on April 22, in an attempt to locate an apparent leaking water line, she came in contact with mud and experienced burning skin on her arms and dizziness. She did not find a leaking copper water line near the water meter, but did find a wire-wrapped, wooden pipe in her excavation. The 4- to 6-inch-diameter pipe, buried approximately 1 foot below the ground surface, extended from the north and did not appear to continue to the south. The excavation was completed to a depth of approximately 1.5 feet. As she was excavating, a plug of soil in the pipe was released. She reported that vapors with gasoline and sewer odors came out of the pipe rapidly and then rapidly dissipated.

GeoEngineers, Inc.
8410 15+th Avenue N.E.
Redmond, WA 98052
Telephone (206) 861-6000
Fax (206) 861-6050

Terry Nation observed that water appeared to seep from the soil in the north wall of her excavation. She detected an odor in the water and a sheen on the water surface as it entered the excavation.

Terry Nation exposed the copper water line near the water meter, but could not detect a leak in the line. She then excavated to the west of the water meter, in her front yard adjacent to the sidewalk. Apparently, the western 1 to 2 feet of her front yard is city property. As she was excavating, she encountered a clay tile pipe with a broken joint buried approximately 6 inches below the ground surface. As the pipe was uncovered, water flowed out of it onto the sidewalk. She called the City, who visited her property on April 22. The City repaired the clay tile pipe with quick-set concrete. The City also installed a 2-inch-diameter PVC pipe approximately 6 inches below the ground surface next to the water meter. The PVC pipe is intended to serve as a drain and carry the seeping water into the street. The excavation around the clay tile pipe, which the City expanded for their repair, was approximately 1 foot deep. The excavation continued to fill and overflow with water after the pipe was repaired.

Leigh Carlson and I observed the repaired clay tile pipe and slow to moderate seepage in the excavation surrounding it; however, the source of the seep was not apparent. We also observed rapid seepage into the excavation surrounding the water meter; this seepage entered the excavation from the north, just above the wooden pipe. We attempted to expose the wooden pipe, but could not remove water from the excavation rapidly enough to expose the pipe. A slight odor and sheen were observed on the water in the water meter excavation.

Leigh Carlson and I explained that the burning sensation of Terry Nation's skin could be caused by petroleum hydrocarbons. We recommended that she should not expose bare skin to mud if she digs again. We informed her of the results of our February 1997 direct-push soil sampling in the vicinity of the intersection between Avenue "D" and Second Street, to the north of her property. We indicated that soil contamination was not found southeast of Bullet Graphics during our study and, if she wishes to review the results, the report is on file at the Washington State Department of Ecology and the City of Snohomish.

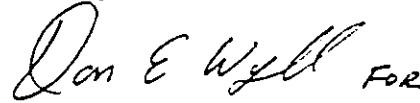
Based on preliminary (unreported) results of our March 1997 ground water sampling, petroleum-related ground water contamination was confirmed south of former Unocal Site No. 4165, adjacent to Bullet Graphics. To date, Tosco has not determined that former Unocal Site No. 4165 is the sole source of petroleum-related ground water contamination to the south of the former Unocal service station. Our report summarizing our March 1997 subsurface explorations and ground water sampling currently is in preparation and should be completed by mid May 1997. In the meantime, GeoEngineers is available to be "on call" to sample apparently petroleum-contaminated soil, if it is encountered during utility work on or adjacent to the Terry Nation property. The purposes of the sampling would be to document soil conditions and to characterize the soil for disposal if it is contaminated.

City of Snohomish
April 28, 1997
Page 3

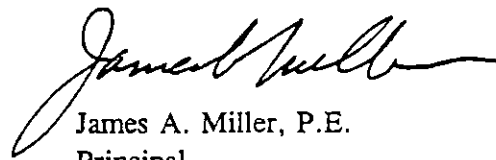
Please contact Tim Johnson of Tosco at (206) 442-7434 or Lisa Bona of GeoEngineers at (206) 861-6057 if you wish to discuss the contents of this letter.

Yours very truly,

GeoEngineers, Inc.

Handwritten signature of Lisa J. Bona in cursive, followed by the word "FOR" in capital letters.

Lisa J. Bona
Project Geologist

Handwritten signature of James A. Miller in cursive.

James A. Miller, P.E.
Principal

LJB:JAM:cms
Document ID: P:\0161394.LET

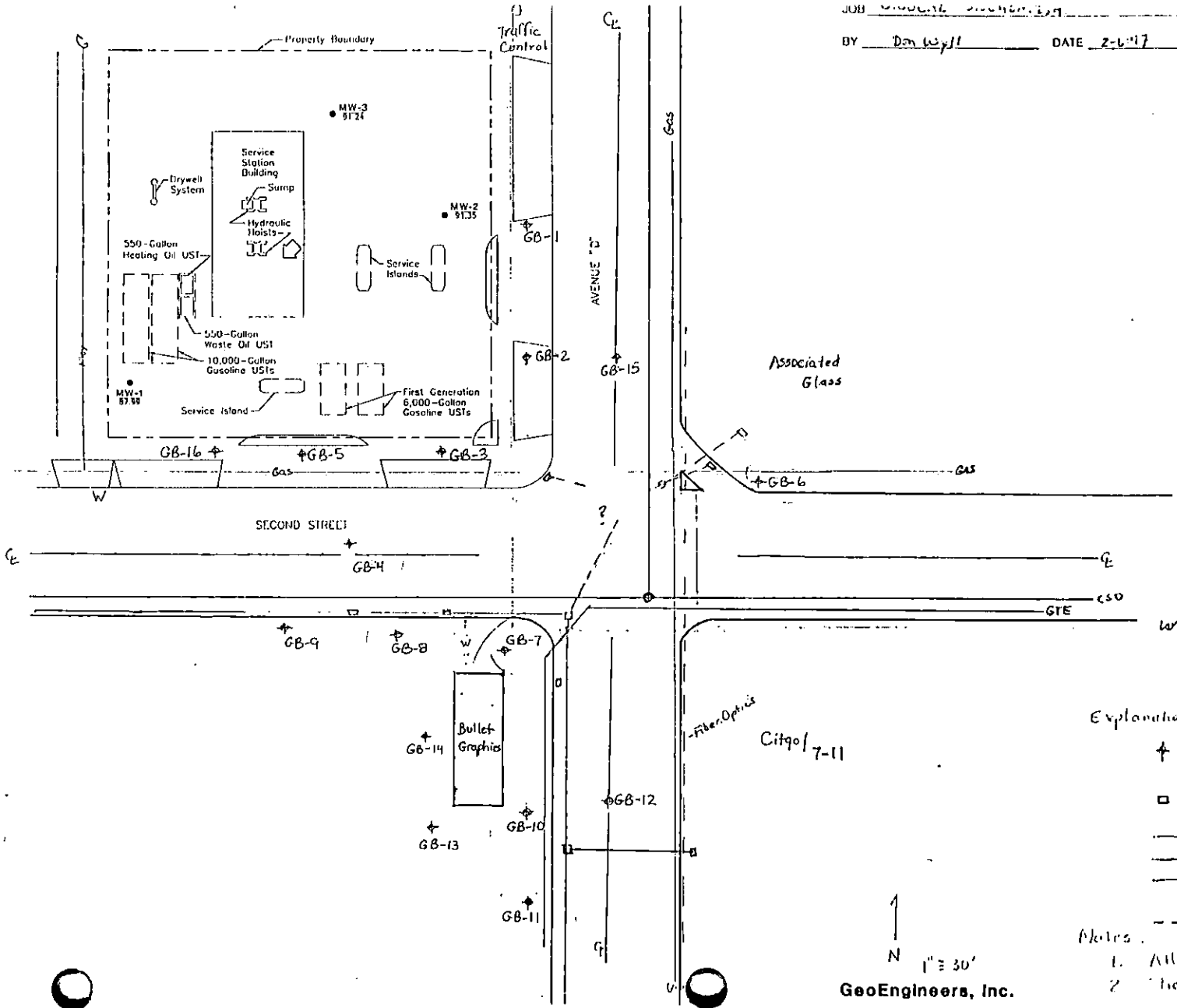
Two copies submitted

cc: Timothy D. Johnson
Tosco Marketing Company
601 Union Street, Ste. 3920
Seattle, WA 98101

Wally Moon
✓ Washington State Dept. of Ecology
3190 - 160th Ave. SE
Bellevue, WA 98008-5452

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JOB PROJECT 123456789 FILE NO. 0123456789
 BY Don Wylf DATE 2-6-17 SHEET 1 OF 1



Explanation:

- † GB-7 Geoprobe™ boring completed by GeoEngineers on 01/29/97
- Catch Basin
- Storm sewer and sanitary sewer
- Traffic Control
- GTE
- Water
- - - Fiber Optics

Notes:

1. All locations are approximate.
2. The streets are 40' wide.

TABLE 1
SUMMARY OF FIELD SCREENING AND CHEMICAL ANALYTICAL RESULTS
GEOPROBE™ BORINGS
FORMER UNOCAL SERVICE STATION 4165
SNOHOMISH, WASHINGTON

Sample/Boring Number-Depth ¹ (feet)	Date Sampled	Field Screening Results ²		BETX ³ (mg/kg)				Gasoline- range Hydrocarbons ⁴ (mg/kg)	Diesel- range Hydrocarbons ⁵ (mg/kg)	Heavy Oil- range Hydrocarbons ⁵ (mg/kg)
		Headspace Vapors (ppm)	Sheen	B	E	T	X			
GB-1-8.0	01/29/97	4	SS	<0.0500	<0.0500	<0.0500	<0.100	<5.00	<10.0	<25.0
GB-2-8.0	01/29/97	85	MS	<0.0500	<0.0500	<0.0500	<0.100	8.24	11.3	<25.0
GB-3-7.0	01/29/97	11	SS	<0.0500	<0.0500	<0.0500	<0.100	<5.00	<10.0	<25.0
GB-4-7.0	01/29/97	--	--	<0.0500	<0.0500	<0.0500	<0.100	<5.00	39.9	128
GB-4-11.0	01/29/97	1,500	MS	0.722	2.76	<0.500	2.42	860	41.1	43.9
GB-5-12.0	01/29/97	11	SS	<0.0500	<0.0500	<0.0500	<0.100	50.9	<10.0	<25.0
GB-6-8.0	01/29/97	1,650	MS	<2.00 ⁶	<6.00	<2.00	<4.00	1,290	46.4	<25.0
GB-7-8.0	01/29/97	1,100	MS	<1.00	<2.00	<0.0500	2.04	459	20.2	<25.0
GB-8-8.0	01/29/97	--	NS	<0.100	<0.500	<0.0500	<0.500	182	11.8	<25.0
GB-9-12.0	01/29/97	--	SS	<0.0500	<0.0500	<0.0500	<0.100	<5.00	30.1	<25.0
GB-10-7.0	01/29/97	1,200	MS	<0.0500	<0.0500	<0.0500	<0.100	7.38	<10.0	<25.0
GB-11-8.0	01/29/97	1,050	MS	<0.0500	<0.200	<0.0500	<0.200	58.2	32.0	<25.0
GB-12-9.0	01/29/97	--	MS	<0.0500	<0.0500	<0.0500	<0.100	<5.0	<10.0	<25.0
GB-13-8.0	01/29/97	5	SS	<0.0500	<0.0500	<0.0500	<0.100	<5.0	<10.0	<25.0
GB-14-8.0	01/29/97	2	SS	<0.0500	<0.0500	<0.0500	<0.100	<5.0	<10.0	<25.0
GB-15-8.0	01/29/97	6	SS	<0.0500	<0.0500	<0.0500	<0.100	<5.0	<10.0	<25.0
GB-16-10.0	01/29/97	4	SS	<0.0500	<0.0500	<0.0500	<0.100	<5.0	<10.0	<25.0
MTCA Method A Cleanup Level				0.5	20	40	20	100	200	200

Notes:

¹Approximate boring locations are shown in Figure 1.

²Field screening boring methods are described in Attachment A. NS = no sheen, SS = slight sheen, MS = moderate sheen.

³B = benzene, E = ethylbenzene, T = toluene, X = xylenes. BETX analyzed by EPA Method 8020.

⁴Analyzed by Ecology Method WTPH-G.

⁵Analyzed by Ecology Method WTPH-D extended with a silica gel cleanup.

⁶Detection limit exceeds the MTCA Method A cleanup level.

*-- = parts per million; ppm = parts per million; mg/kg = milligrams per kilogram.

Shading indicates a concentration exceeding the MTCA Method A cleanup level.

Chemical analyses conducted by North Creek Analytical of Bothell, Washington.

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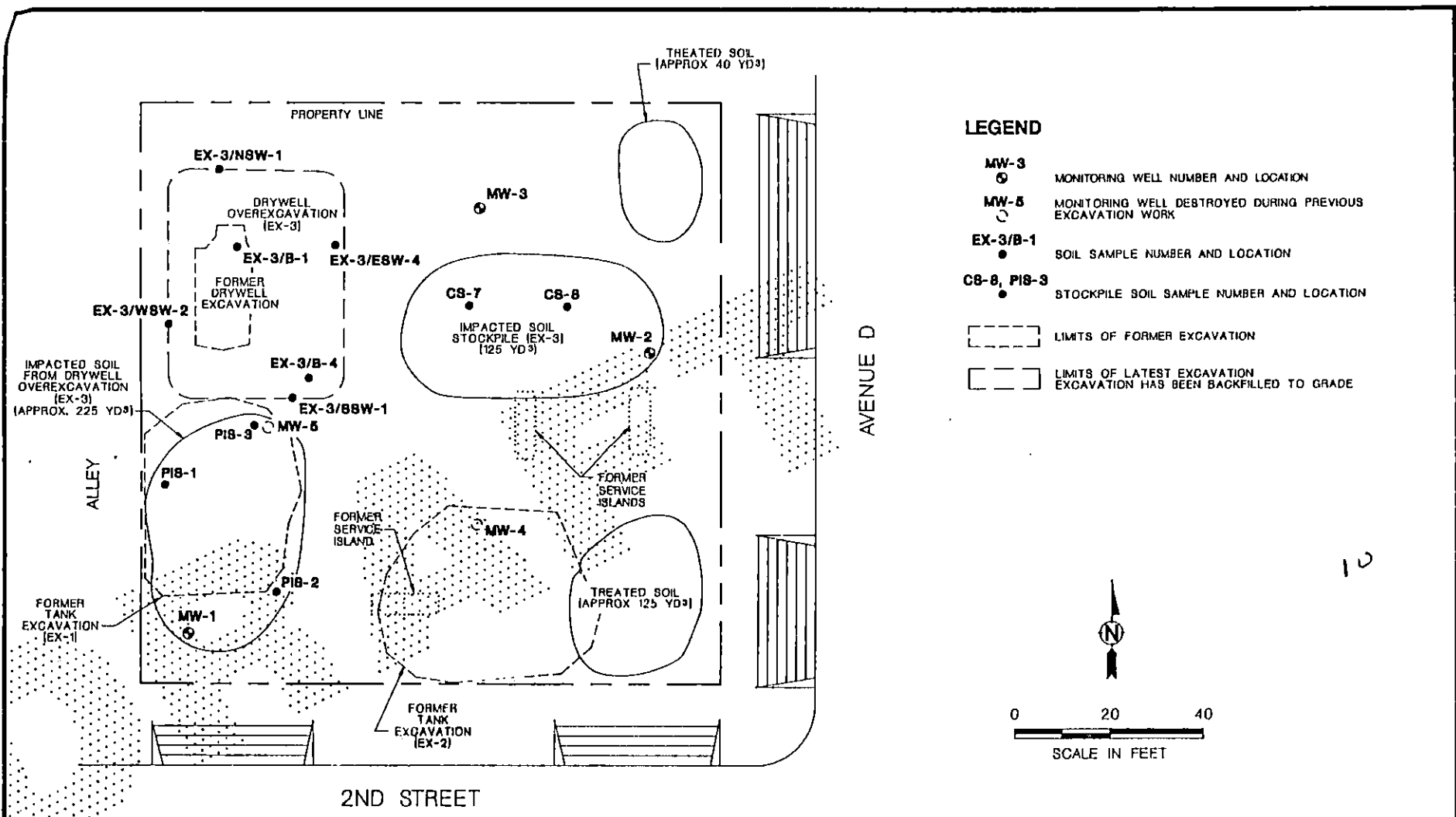
TABLE 2
SUMMARY OF GROUND WATER CHEMICAL ANALYTICAL RESULTS
BORING GB-6
FORMER UNOCAL SERVICE STATION 4165
SNOHOMISH, WASHINGTON

Sample Number ¹	Date Sampled	BETX ² (mg/kg)				Gasoline-range Hydrocarbons ³ (mg/l)	Diesel-range Hydrocarbons ⁴ (mg/l)	Heavy Oil-range Hydrocarbons ⁴ (mg/l)
		B	E	T	X			
GB-6-W	01/29/97	48.0	79.2	29.8	160	27.8	60.9	4.11
MTCA Method A Cleanup Level		3	30	40	20	1.0		

Notes:

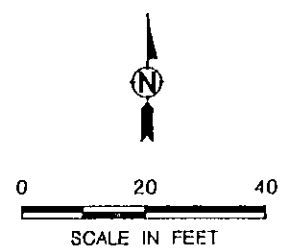
- ¹The sample was obtained from a Geoprobe™ boring using a vacuum pump and Teflon tubing.
 - ²B = benzene, E = ethylbenzene, T = toluene, X = xylenes. BETX analyzed by EPA Method 8020.
 - ³Analyzed by Ecology Method WTPH-G.
 - ⁴Analyzed by Ecology Method WTPH-D extended with a silica gel cleanup.
- µg/l = micrograms per liter
mg/l = milligrams per liter
- Shading indicates a concentration exceeding the MTCA Method A cleanup level.
Chemical analyses conducted by North Creek Analytical of Bothell, Washington.

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LEGEND

- MW-3**
○ MONITORING WELL NUMBER AND LOCATION
- MW-5**
○ MONITORING WELL DESTROYED DURING PREVIOUS EXCAVATION WORK
- EX-3/B-1**
● SOIL SAMPLE NUMBER AND LOCATION
- CS-8, PIS-3**
● STOCKPILE SOIL SAMPLE NUMBER AND LOCATION
- LIMITS OF FORMER EXCAVATION
- LIMITS OF LATEST EXCAVATION HAS BEEN BACKFILLED TO GRADE



10

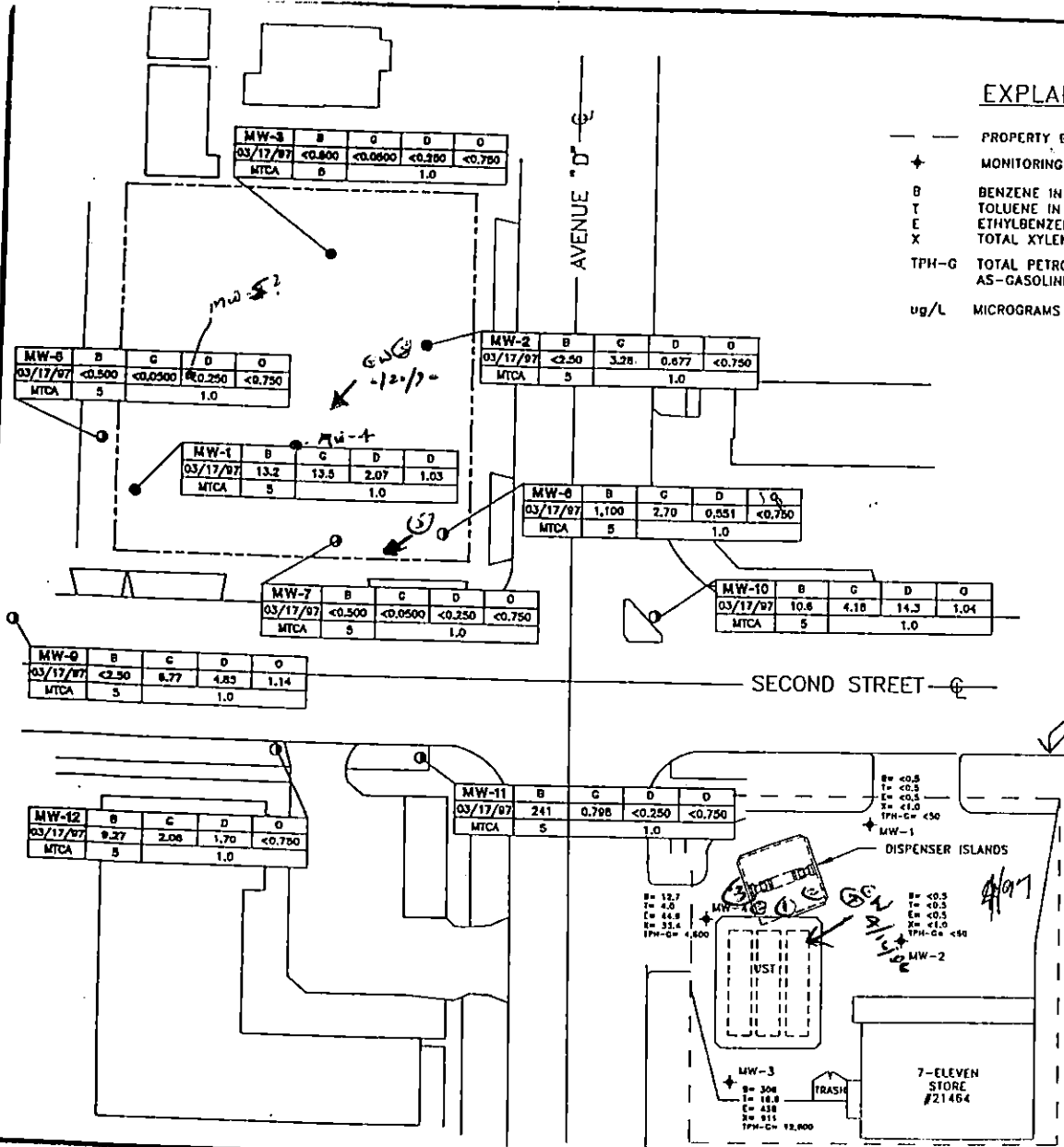
RZA AGRA, INC.
Engineering & Environmental Services
11335 N.E. 122nd Way
Suite 100
Kirkland, Washington 98034-6918

W.O. W-8799-11
DESIGN AJS
DRAWN MJF
DATE SEP 1992
SCALE 1"=20'

UNOCAL SERVICE STATION No. 4185
SNOHOMISH, WASHINGTON
SITE AND EXPLORATION PLAN

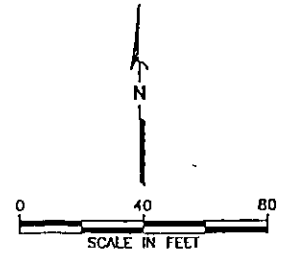
FIGURE 1

05/15/97
 D:\1\384\0181394G.DWG
 LIB-HCA



EXPLANATION

- — — PROPERTY BOUNDARY
- ★ MONITORING WELL
- B BENZENE IN ug/L
- T TOLUENE IN ug/L
- E ETHYLBENZENE IN ug/L
- X TOTAL XYLENES IN ug/L
- TPH-G TOTAL PETROLEUM HYDROCARBONS-GASOLINE IN ug/L
- ug/L MICROGRAMS PER LITER



EXPLANATION:

- MW-1 ● MONITORING WELL INSTALLED BY AGRA E & E
- GB-1 ⊕ GEOPROBE™ BORING COMPLETED BY GEOENGINEERS ON 01/29/97
- MW-6 ○ MONITORING WELL INSTALLED BY GEOENGINEERS IN MARCH 1997
- B BENZENE (ug/l) BY EPA METHOD 8020
- C GASOLINE-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-G
- D DIESEL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D
- O HEAVY OIL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D EXTENDED
- MTCA MODEL TOXICS CONTROL ACT METHOD A GROUND WATER CLEANUP LEVELS
- ug/l MICROGRAMS PER LITER
- mg/l MILLIGRAMS PER LITER

Locations of all features shown are approximate. Refer to Figure 2 for facilities identification.

Drawing entitled "Service Station #4165, General Arrangement, Avenue D & Second St., Snohomish, WA", by Unocal, revision dated 12/31/87, and drawing provided by City of Snohomish Engineering, undated.

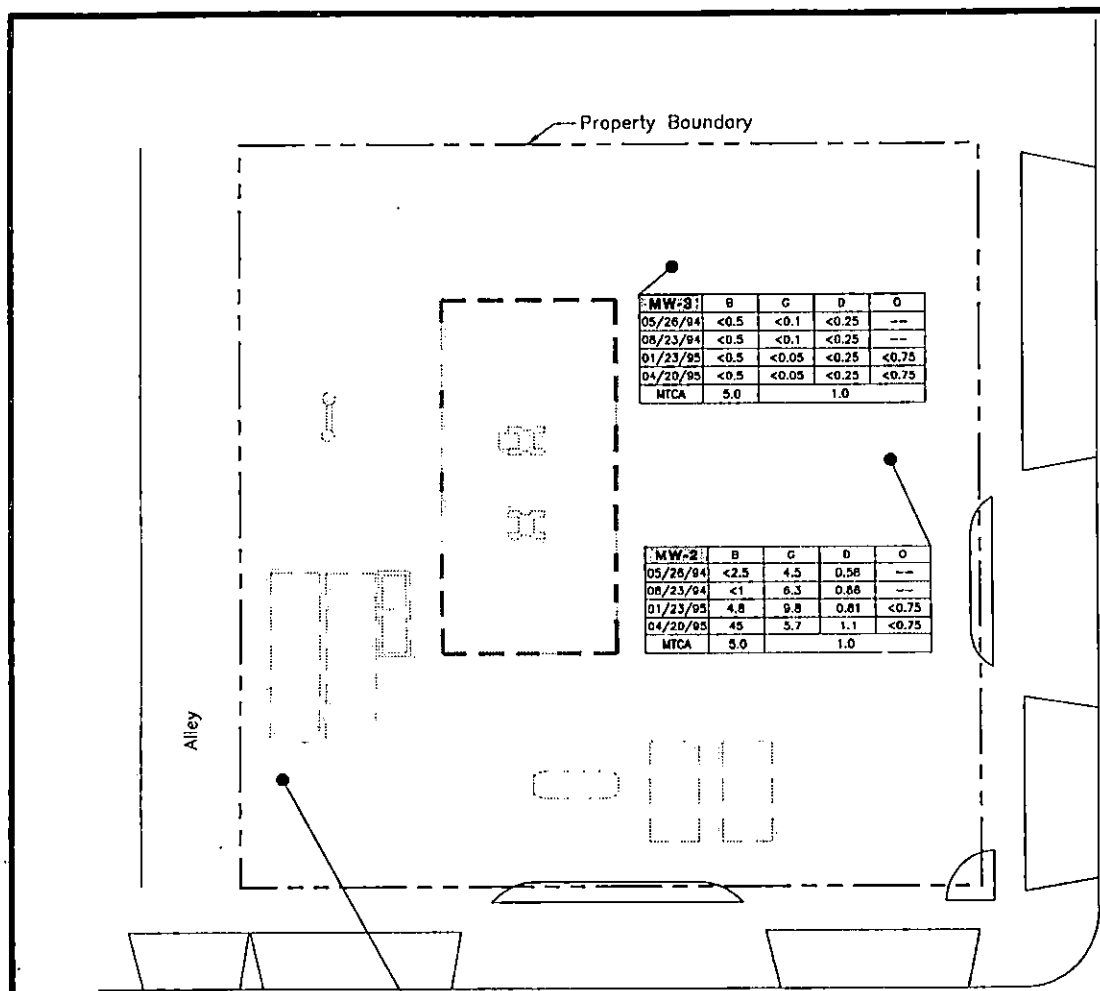


CONCENTRATIONS OF PETROLEUM RELATED HYDROCARBONS IN GROUND WATER

FIGURE 4

(12)

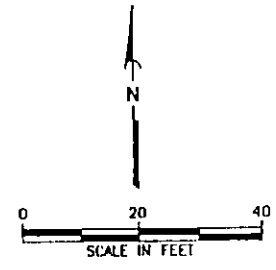
05/23/95
LIB:BDH
C:\0161\394\0161394C.DWG



MW-1	B	G	D	O
05/26/94	<2.5	23	1.6	ND
08/23/94	<2.5	8.2	1.5	<0.75
01/26/95	32	26	2.4	<0.75
04/20/95	100	40	1.5	<0.75
MTCA	5.0		1.0	

MW-2	B	G	D	O
05/26/94	<0.5	<0.1	<0.25	---
08/23/94	<0.5	<0.1	<0.25	---
01/23/95	<0.5	<0.05	<0.25	<0.75
04/20/95	<0.5	<0.05	<0.25	<0.75
MTCA	5.0		1.0	

MW-2	B	G	D	O
05/26/94	<2.5	4.5	0.58	---
08/23/94	<1	6.3	0.88	---
01/23/95	4.8	9.8	0.61	<0.75
04/20/95	45	5.7	1.1	<0.75
MTCA	5.0		1.0	



EXPLANATION:

- MW-1 ● MONITORING WELL INSTALLED BY AGRA E & E, INC.
- B BENZENE (µg/l) BY EPA METHOD 8020
- G GASOLINE-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-G
- D DIESEL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D EXTENDED
- O HEAVY OIL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D EXTENDED
-
- ND NOT DETECTED (DETECTION LIMITS NOT PROVIDED BY AGRA E & E)
- MTCA MODEL TOXICS CONTROL ACT METHOD A GROUND WATER CLEANUP LEVELS

- Notes:
1. The locations of all features shown are approximate.
 2. All site facilities were removed in 1991 and 1992.
 3. See Figure 2 for site facilities identification.
 4. Samples dated 01/23/95 and after were obtained by GeoEngineers. Samples prior to 01/23/95 were sampled by Agra E & E.

Re: Drawing entitled "Service Station #4165, General Arrangement, Avenue D & Second Snohomish, WA," by Unocal, revision dated 12/31/87.



CONCENTRATIONS OF PETROLEUM-RELATED HYDROCARBONS IN GROUND WATER
FIGURE 4

26 March 1992

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Table 2 Analytical Tests Results of Soil Samples									
Sample No.	Location	Depth Collected (feet)	TPH by 418.1 (ppm)	TPH by 8015 (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl Benzene (ppm)	Xylenes (ppm)	Total Lead (ppm)
Initial Gasoline/Heating Oil/Waste Oil Tank Excavation and Stockpiles									
S-1	West Sidewall	8.0	—	113.0	0.34	1.67	1.41	9.96	—
S-2	West Sidewall	7.0	—	57.4	0.29	1.00	1.26	9.91	<1.3
S-4	East Sidewall (WO)	4.0	91.3	—	—	—	—	—	—
S-5	South Sidewall	5.0	—	<10.0	0.47	0.46	0.08	0.47	—
S-6	South Sidewall	7.0	—	5.1	<0.05	0.07	<0.05	0.21	<1.3
S-12	East Sidewall	7.5	—	<1.0	<0.05	<0.05	<0.05	<0.05	5.9
S-13	North Sidewall	4.0	39.0	—	—	—	—	—	—
S-14	North Sidewall	7.0	1720.0	52.0	<0.05	<0.05	0.70	1.12	—
S-3	HO/WO Stockpile	N/A	2,583.0	—	—	—	—	—	—
S-7	Stockpile	N/A	—	1.4	<0.05	<0.05	<0.05	<0.05	<1.3
S-8	Stockpile	N/A	—	4.7	<0.05	<0.05	<0.05	0.30	<1.3
S-18	Stockpile	N/A	—	91.0	<0.05	0.18	<0.05	0.78	—
S-19	Stockpile	N/A	—	2684.0	<0.05	3.03	2.40	6.59	—
Pump Island/Product Line Excavations									
S-10	Below Steel Piping	2.5	—	<1.0	<0.05	<0.05	<0.05	0.10	22.2
S-11	Below FRP Piping	2.5	—	<1.0	<0.05	<0.05	<0.05	<0.05	12.1
Hoist and Sump Excavations									
S-15	Below South Hoist	7.5	3920.0	—	—	—	—	—	—
S-16	TP-1 (Near Drywell)	4.0	2030.0	452.0	<0.05	0.20	0.14	0.16	—
S-17	Below Sump	4.0	8680.0	6515.0	<0.05	0.31	2.79	2.06	—
S-20	Below Center Hoist	8.0	43.1	—	—	—	—	—	—
Initial Relic Gasoline Tank Excavation and Stockpile									
S-23	South Sidewall	7.0	—	<10.0	<0.05	<0.05	<0.05	0.79	11.1
S-24	West Sidewall	7.0	—	<10.0	<0.05	<0.05	<0.05	<0.05	31.2
S-25	North Sidewall	7.0	—	406.0	0.25	3.02	3.51	18.30	5.8
S-26	East Sidewall	7.0	—	365.0	0.14	1.16	3.30	4.72	14.1
S-27	SW Corner Sidewall	3.5	200.0	—	—	—	—	—	—
S-21	Stockpile	N/A	1091.0	980.0	0.08	2.91	6.77	19.40	—
S-22	Stockpile	N/A	1678.0	1098.0	<0.05	0.99	2.04	4.74	—
Overexcavated Relic Gasoline Tank Excavation									
S-29	South Sidewall	7.0	27.5	<10.0	<0.05	0.25	1.35	3.06	—
S-33	North Sidewall	6.0	5850.0	440.0	0.85	18.20	12.00	64.30	—
S-35	West Sidewall	5.0	4490.0	32.0	<0.05	<0.05	0.34	1.82	—
Additional Site Characterization									
S-28	Below UST Exc.	11.0	1520.0	807.0	—	—	—	—	—
S-31	Test Pit TP-1	3.0	273.0	23.0	<0.05	0.88	0.56	1.86	—
S-32	Test Pit TP-1	8.0	47.4	34.0	<0.05	3.73	6.01	12.10	—
S-101A	Test Pit TP-2	11.0	368.0	—	—	—	—	—	—
S-101B	Test Pit TP-2	11.5	676.0	602.0	0.16	3.70	2.69	4.09	—
Characterization of Large Stockpile									
C-1	Stockpile	N/A	467.0	15.0	0.06	1.02	2.27	12.20	—
C-2	Stockpile	N/A	605.0	20.0	0.14	0.97	2.96	15.70	—
C-3	Stockpile	N/A	395.0	<10.0	0.10	<0.05	0.36	1.32	—
C-4	Stockpile	N/A	878.0	15.0	<0.05	0.50	1.19	8.36	—
MTCA Cleanup Levels:			200.0	100.0	5.00	40.00	20.00	20.00	250.0
Notes: (<) indicates less than the detection limit specified. Values are expressed in parts per million (ppm) concentrations which are equal to milligrams per kilogram (mg/kg) units. Samples S-3 and S-4 were also analyzed for total metals by TCLP, halogenated volatiles (S-3 only), and PCBs (S-3 only) and did not exhibit detectable concentrations of any of these compounds except barium and lead with concentrations of 0.5 ppm and 0.2 ppm, respectively. Samples S-16, S-14, and S-17 were also analyzed for halogenated volatiles and did not exhibit detectable concentrations of any of these compounds.									

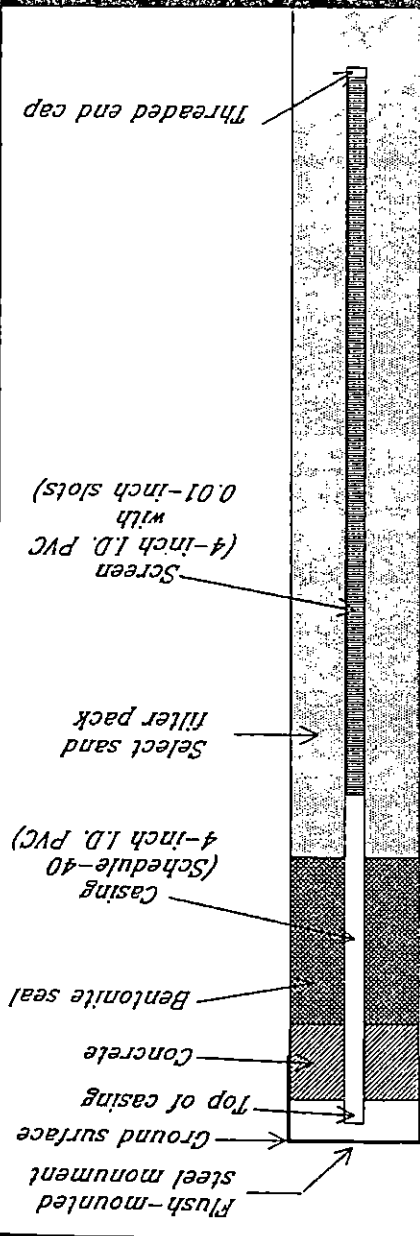
Well completed: 12 June 1990
 Site Datum elevation reference: 98.35 feet
 Casing elevation: 98.11 feet
 Ground surface elevation: 98.11 feet

AS-BUILT DESIGN

(feet)

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	HEAD SPACE	GROUND WATER
Asphalt (2") over base rock (6") over asphalt (2") over base rock.		S-1	34	1	
Dense, damp, grey-brown, silty fine SAND.		S-1	34	1	
Medium stiff, moist, tan to grey, fine sandy SILT, with clay.		S-2	26	289	6/20/90
Dense, moist to wet, brown to grey, well graded SAND, trace gravel.		S-2	26	289	6/20/90
Dense to very dense, damp to moist, brownish grey, silty fine SAND.		S-3	38	2	
Very dense, increasing gravel becomes very silty.		S-4	50/6	239	1
		S-1	50/5	1	

Boring terminated at 24 feet.



LEGEND

2-inch O.D. spill-spoon sample

▲ Observed groundwater level (measured on 6/20/90)

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
 Geotechnical & Environmental Consultants
 1400 140th Ave NE



05/15/97

D:\0161\394\0161394G.DWG

LJB:HLA

MW-3	B	G	D	O
03/17/97	<0.500	<0.0500	<0.250	<0.750
MTCA	5	1.0		

AVENUE "D" —

MW-8	B	G	D	O
03/17/97	<0.500	<0.0500	<0.250	<0.750
MTCA	5	1.0		

MW-2	B	G	D	O
03/17/97	<2.50	3.28	0.677	<0.750
MTCA	5	1.0		

MW-1	B	G	D	O
03/17/97	13.2	13.5	2.07	1.03
MTCA	5	1.0		

MW-6	B	G	D	O
03/17/97	1,100	2.70	0.551	<0.750
MTCA	5	1.0		

MW-7	B	G	D	O
03/17/97	<0.500	<0.0500	<0.250	<0.750
MTCA	5	1.0		

MW-10	B	G
03/17/97	10.6	4.18
MTCA	5	

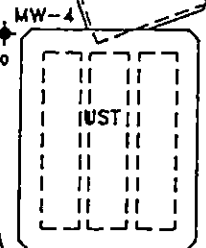
SECOND STR

MW-9	B	G	D	O
03/17/97	<2.50	6.77	4.85	1.14
MTCA	5	1.0		

MW-12	B	G	D	O
03/17/97	9.27	2.08	1.70	<0.750
MTCA	5	1.0		

MW-11	B	G	D	O
03/17/97	241	0.798	<0.250	<0.750
MTCA	5	1.0		

B= 12.7
 T= 4.0
 E= 44.9
 X= 33.4
 TPN-G= 4,600



MW-3
 B= 306
 T= 18.6
 E= 438
 X= 911
 TPN-G= 12,800

TRASH

23 July 1990

TABLE 1
SOIL SAMPLE ANALYSES

Sample Number	Field Head-Space (ppm)	TPH (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl Benzene (ppm)	Xylenes (ppm)
B1-S2	289	39.2	0.22	0.84	0.33	1.09
B2-S2	407	525	<0.05	<0.05	<0.05	0.13
B3-S2	0	13.8	<0.05	<0.05	<0.05	<0.05
B4-S2	0	12.5	<0.05	0.11	0.18	0.28
B5-S2	185	291	0.41	0.12	1.21	3.75

Notes:

Field headspace readings obtained using an OVM equipped with a 10.0 eV photoionization detector

TPH (Total petroleum hydrocarbons) by EPA Method 418.1

BTEX by EPA Method 602

Concentration of TPH and BTEX expressed in mg/kg, equivalent to parts per million (ppm)

5.2 Subsurface Petroleum Hydrocarbon Occurrence - Groundwater

Following purging of 3 to 5 well casing volumes of groundwater from each of the monitoring wells, representative groundwater samples were collected and transported to an analytical laboratory. Results of groundwater sampling indicate TPH concentrations below the method detection limit of 10 ppm in samples collected from each of the monitoring wells, with the exception of MW-1, which exhibited a TPH concentration of 26 ppm. The type of petroleum hydrocarbon in this sample was identified by the analytical laboratory as gasoline. BTEX concentrations in groundwater samples collected from monitoring wells MW-2, MW-3 and MW-4 were near or below method detection limits. Benzene concentrations in samples from MW-1 and MW-5 were reported as 345 ppb and 145 ppb, respectively, which are above the current WDOE draft clean-up level of 66 ppb for benzene. Table 2, below, summarizes these results.

TABLE 2
GROUNDWATER ANALYSES

Sample Number	TPH (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Xylenes (ppb)
MW-1	26	345	179	266	2,260
MW-2	<10	<1	<1	<2	5
MW-3	<10	<1	<1	<1	<1
MW-4	<10	144	279	187	422
MW-5	<10	<1	<1	<1	<1

Notes:

TPH (Total petroleum hydrocarbons) by EPA Method 8015

BTEX by EPA Method 601

Concentration of TPH and BTEX expressed in mg/l, equivalent to parts per million (ppm) BTEX expressed in parts per billion (ppb)

MW-3 and MW-5 were also analyzed for purgeable halocarbons, by EPA Method 602. Summarized results are presented in Table 3.