ENVIRONMENTAL RESOLUTIONS, INC.

August 28, 2000
ERI 223503.W02

Mr. Dave DeWitt
Tosco Marketing Company
2000 Crow Canyon Place, Suite 400
San Ramon, California 94583

Subject: Work Plan for Supplemental Evaluation of Soil and Groundwater, Tosco 76 Service Station 1156, 4276 MacArthur Boulevard, Oakland, California.

Mr. DeWitt:

At the request of Tosco Marketing Company (Tosco), Environmental Resolutions, Inc. (ERI) is submitting this Work Plan to perform a supplemental evaluation of soil and groundwater at the subject site. The Work Plan was prepared in response to a letter from the Alameda County Health Care Services Agency-Environmental Health Services (the County) dated March 8, 2000 (Attachment A). The purpose of the work is to evaluate the lateral extent of dissolved hydrocarbons observed in soil and groundwater beneath the site.

The scope of work for the investigation includes:

- Obtaining a drilling permit from the Alameda County Public Works Agency (Public Works) to drill three off-site soil borings and convert the three borings into groundwater monitoring wells;
- Obtaining an encroachment permit from the City of Oakland (the City) to drill three soil borings in the City right-of-way;
- Drilling three off-site soil borings (MW5 through MW7), and constructing groundwater monitoring wells MW5 through MW7 in the borings, respectively;
- Collecting soil samples from the borings to evaluate stratigraphy and for potential laboratory analyses;
- Submitting select soil samples for laboratory analysis of petroleum hydrocarbons and related constituents;
- Collecting and submitting for analysis a sample of stockpiled drill cuttings;
- Surveying the locations and top of casing elevations of the newly-installed wells;
- Coordinating with Tosco and Gettler-Ryan, Inc. (GRI) to develop and sample the newly-installed wells in conjunction with quarterly groundwater monitoring and sampling of existing wells at the site;
- Performing a well survey with the State of California Department of Water Resources (DWR);
- Performing a field groundwater receptor survey and underground utility search;
- Preparing a Site Conceptual Model (SCM) for the site;
- Interpreting the data; and,
- Preparing a report presenting the procedures and results of the investigation.

BACKGROUND

The site is located on the northern corner of MacArthur Boulevard and High Street in Oakland, California, as shown on the Site Vicinity Map (Plate 1). The locations of current and former underground storage tanks (USTs), dispenser islands, and other selected site features are shown on the Generalized Site Plan (Plate 2). Properties in the vicinity of the site are occupied by residential and commercial developments.

To date, environmental work at the site has included:

- Removal of two 10,000-gallon, single-wall steel, gasoline USTs, one 280-gallon, single-wall steel, used-oil UST, associated piping, and dispensers (ERI, August 24, 1998);
- Excavation and disposal of approximately 1,350 tons of soil and backfill at Forward Landfill in Manteca, California (ERI, August 24, 1998);
- Installation of on-site groundwater monitoring wells MW1 through MW4 (ERI, October 11, 1999); and,
- Quarterly groundwater monitoring and sampling.

Based upon the results of ongoing environmental activities at the site, hydrocarbons have been detected in soil and groundwater beneath the site. Cumulative results of soil samples are provided in Attachment B (ERI, August 24, 1998 and October 11, 1999). The groundwater flow direction appears to be toward the west to west-northwest at an approximate gradient of 0.05 to 0.1. Cumulative groundwater monitoring and sampling data are provided in Attachment C (GRI, May 22, 2000). The most recent results of laboratory analyses of groundwater samples are shown on Plate 2.

PROPOSED WORK

This investigation is proposed to evaluate the lateral extent of residual and dissolved hydrocarbons detected in soil and groundwater beneath the site. ERI will perform field work in accordance with ERI's standard protocol (Attachment D), and a site-specific Health and Safety Plan. ERI will perform the following tasks:

- Prepare and obtain a drilling permit from Public Works to drill off-site soil borings MW5 through MW7 and install groundwater monitoring wells MW5 through MW7 in the borings, respectively.

- Prepare and obtain an encroachment permit from the City to drill soil borings MW5 through MW7 in the City's MacArthur Boulevard right-of-way.

- Observe the drilling of off-site soil borings MW5 through MW7 utilizing a hollow-stem auger drilling rig, and the construction of groundwater monitoring wells MW5 through MW7 in the respective borings. The borings will be advanced to a minimum depth of 10 feet below first-encountered groundwater. Based on quarterly groundwater monitoring data, ERI anticipates groundwater to be encountered at approximately 5 to 10 feet below ground surface (bgs). The locations of the proposed wells are shown on Plate 2. Well locations were selected to evaluate soil and groundwater conditions downgradient of potential source areas at the site. ERI's typical groundwater monitoring well construction detail is shown on Plate 3.

- Collect soil samples at 5-foot intervals, at obvious changes in lithology as noted by the driller or field geologist, and directly above first-encountered groundwater to evaluate soil stratigraphy and for potential laboratory analyses.

- Select soil samples may be submitted to a California state-certified analytical laboratory for potential analysis of total purgeable petroleum hydrocarbons as gasoline (TPPHg) using Environmental Protection Agency (EPA) Method 8015M, and benzene, toluene, ethylbenzene, total xylene (BTEX), and methyl tertiary butyl ether (MTBE) using EPA Method 8020. Samples with detected concentrations of MTBE will be confirmed using EPA Method 8260.

- Collect a composite soil sample (four brass sleeves) from stockpiled drill cuttings to profile the material for disposal. The composite sample will be analyzed for TPPHg, BTEX, and MTBE using the methods listed above, and total lead using EPA Method 6010.

- Contract with a licensed land surveyor to survey the well locations relative to a permanent datum and the well casing elevations relative to mean sea level.

- Coordinate with Tosco and GRI to develop newly installed wells MW5 through MW7 using surging and pumping techniques, and collect groundwater samples from wells MW1 through MW7 during quarterly groundwater monitoring and sampling at the site. Groundwater samples will be analyzed for TPPHg, BTEX, and MTBE using the methods listed above. Due to the proximity of the former used-oil UST location, the groundwater sample collected from well MW1 will also be analyzed for total extractable petroleum hydrocarbons as diesel (TEPHd) using EPA Method 8015M, total recoverable petroleum hydrocarbons as oil and grease (TRPH) using Method 5520E/F, halogenated volatile organic compounds (HVOCs) using EPA Method 8021, and semivolatile organic compounds (SVOCs) using EPA Method 8270.

- Perform a survey of well records maintained by the DWR to identify registered private and municipal water wells within a one-half mile radius of the site.

- Perform a field groundwater receptor survey to identify groundwater receptors such as wells, basements with sumps, and surface water bodies within a one-half mile radius of the site. Perform as underground utility search of the streets and sidewalks adjacent to the site to identify buried utility lines and vaults that may provide preferential pathways for groundwater flow.

- Prepare a SCM for the site including the sources, transport mechanisms and pathways, and potential receptors of petroleum hydrocarbons and related constituents detected beneath the site. The SCM describes chemical distribution and subsurface characteristics and includes isoconcentration maps, concentrations vs. time graphs for each well, and cross section diagrams.

- Interpret field and laboratory data.

- Prepare a report presenting the procedures and results of the investigation, and the SCM.

Soil cuttings generated during drilling activities will be placed on and covered with visqueen, and temporarily stored on site pending receipt of the stockpiled soil analytical results and subsequent

disposal and/or recycling by Tosco. Rinse water generated during drilling activities will be placed in 55-gallon drums, properly labeled, and temporarily stored on site pending recycling by Tosco.

SCHEDULE OF OPERATIONS

ERI is prepared to implement this Work Plan upon regulatory approval and obtaining the appropriate encroachment and well installation permits. Tosco and the appropriate regulatory agencies will be notified should any unreasonable delays to the project occur.

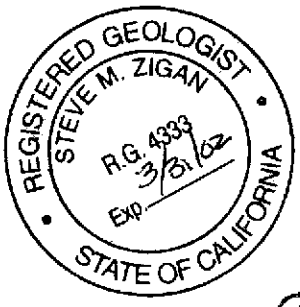
ERI recommends copies of this Work Plan be forwarded to:

Ms. Eva Chu
Alameda County Health Care Services Agency
Department of Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Ms. Jolanta Uchman
California Region Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Please call Mr. Paul Blank, ERI's project manager for the site, at (415) 382-5988 if you have questions regarding this Work Plan.

Sincerely,
Environmental Resolutions, Inc.



Paul D. Blank
Senior Staff Geologist

Steve M. Zigan
R.G. 4333
H.G. 133

Attachments: References

Plate 1: Site Vicinity Map
Plate 2: Generalized Site Plan
Plate 3: Typical Groundwater Monitoring Well Construction Detail

Attachment A: Alameda County Health Care Services Agency-Environmental Health Services Letter Dated March 8, 2000
Attachment B: Cumulative Results of Soil Samples (ERI, August 24, 1998 and October 11, 1999)
Attachment C: Cumulative Groundwater Monitoring and Sampling Data (GRI, May 22, 2000)
Attachment D: Field Protocol

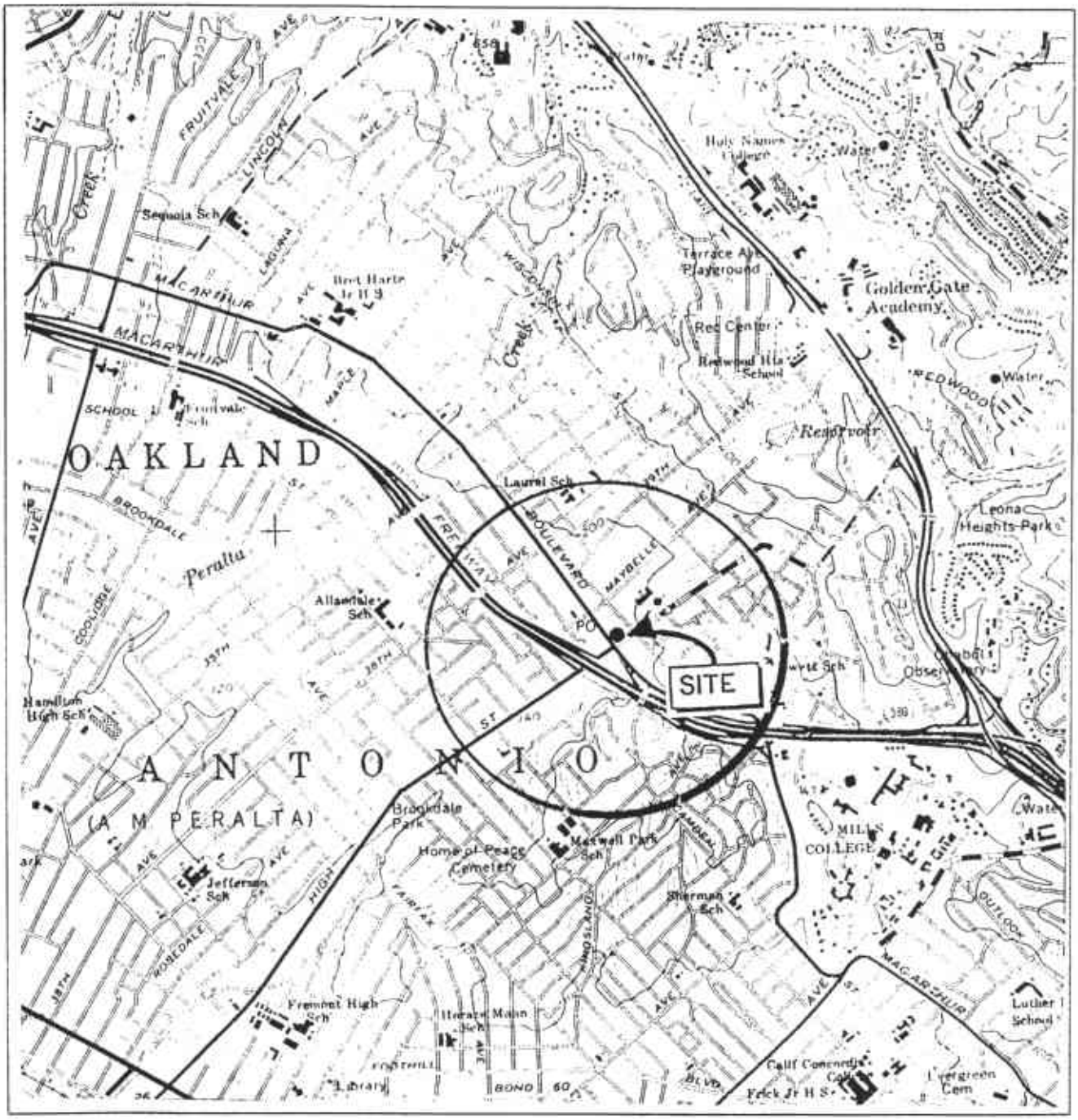
REFERENCES

Environmental Resolutions, Inc. August 24, 1998. Underground Storage Tank and Associated Piping and Dispenser Replacement Report. ERI 223532.R01

Environmental Resolutions, Inc. October 11, 1999. Evaluation of Soil and Groundwater at Tosco 76 Service Station 1156, 4276 MacArthur Boulevard, Oakland, California. ERI 223503.R01

Gettler-Ryan, Inc. (GRI). May 22, 2000. Second Quarter 2000 Groundwater Monitoring & Sampling Report, Tosco 76 Service Station #1156, 4276 MacArthur Boulevard, Oakland, California. G-R Job #180225

United States Geological Survey (USGS). 1980. 7.5-Minute Topographic Quadrangle Map, Oakland West, California.



FN 22350001

N

APPROXIMATE SCALE

0 1/2 1

MILE

Source: U.S.G.S. 7.5 minute topographic quadrangle map Oakland East, California (Photorevised 1980)

ENVIRONMENTAL RESOLUTIONS, INC.

PROJECT ERI 2235

SITE VICINITY MAP

TOSCO 76 SERVICE STATION 1156
4276 MacArthur Boulevard
Oakland, California

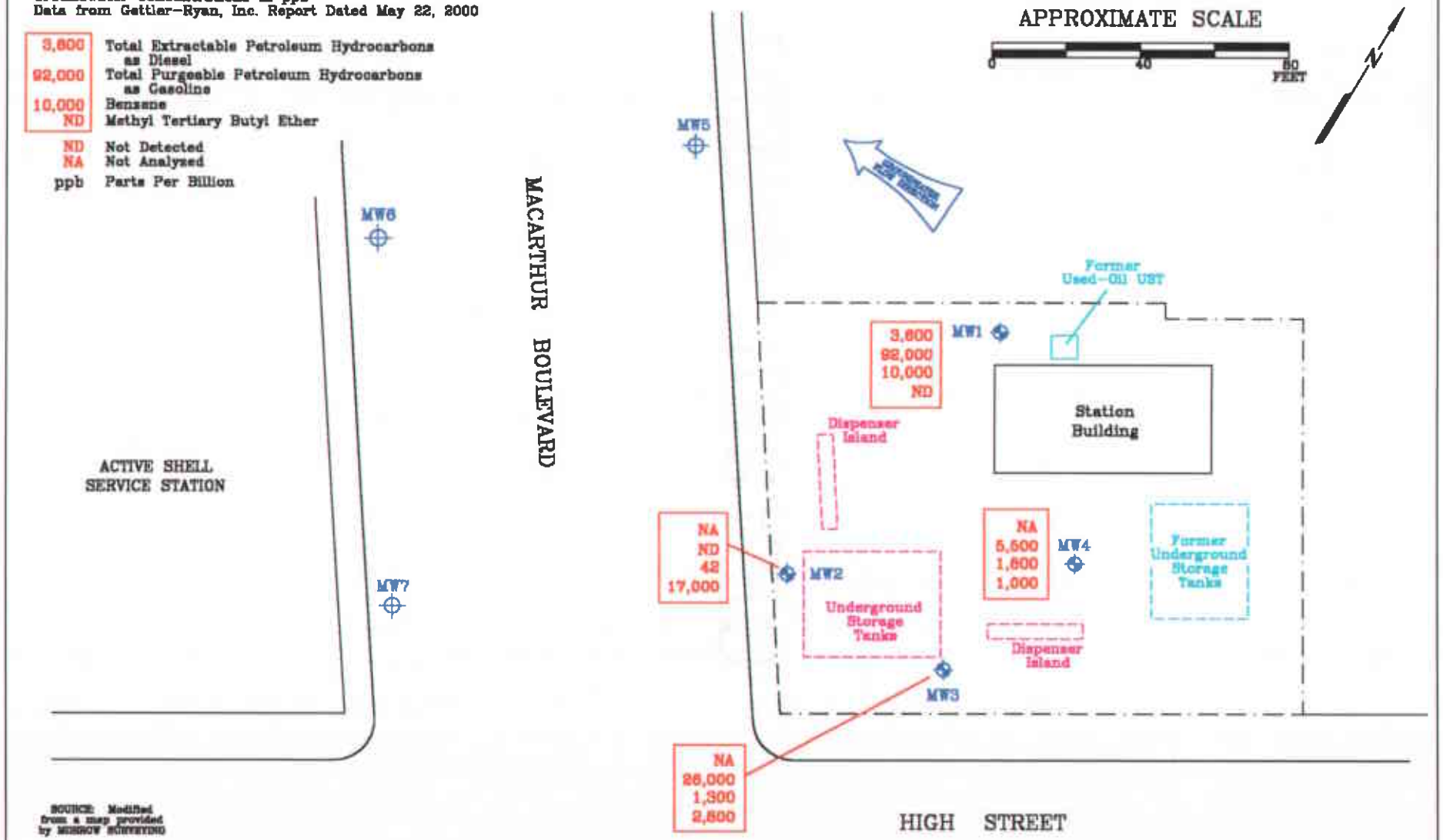
PLATE

1

Groundwater Concentrations in ppb
Data from Gettler-Ryan, Inc. Report Dated May 22, 2000

3,600	Total Extractable Petroleum Hydrocarbons as Diesel
92,000	Total Purgeable Petroleum Hydrocarbons as Gasoline
10,000	Benzene
ND	Methyl Tertiary Butyl Ether

ND Not Detected
NA Not Analyzed
ppb Parts Per Billion



SOURCE: Modified from a map provided by MERROW SURVEYING

FN 22350008

ENVIRONMENTAL RESOLUTIONS, INC.

GENERALIZED SITE PLAN

TOSCO 76 SERVICE STATION 1156
4276 MacArthur Boulevard
Oakland, California

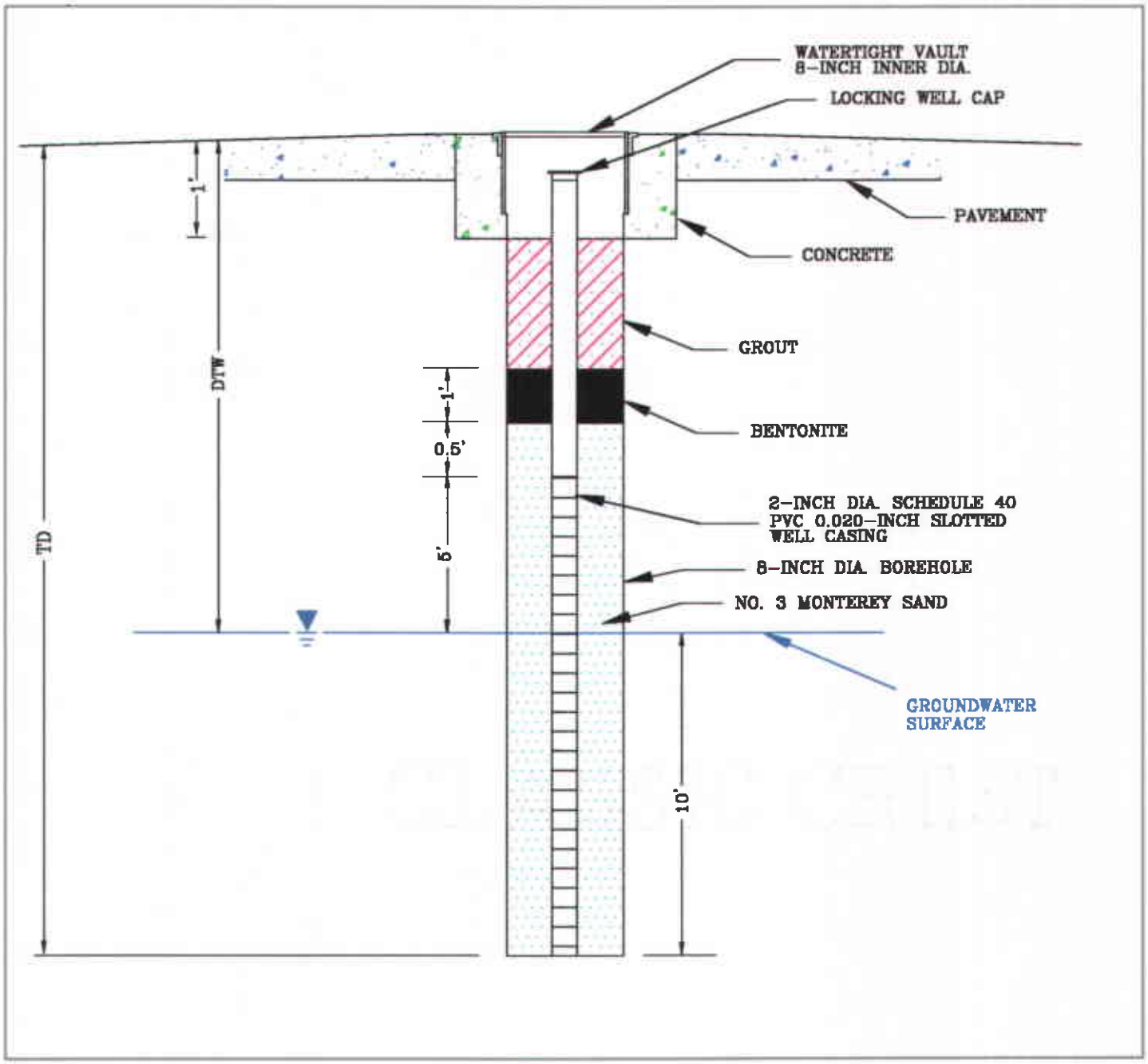
EXPLANATION

MW4 Groundwater Monitoring Well
MW7 Proposed Groundwater Monitoring Well

PROJECT NO.
2235

PLATE
2

August 24, 2000



FN TYPICALGMW

TD = Total Depth of Well
DTW = Depth to Groundwater

NOT TO SCALE

ENVIRONMENTAL RESOLUTIONS, INC.	**TYPICAL GROUNDWATER MONITORING WELL CONSTUCTION DETAIL** TOSCO 76 SERVICE STATION 1156 4276 MacArthur Boulevard Oakland, California	**PLATE** 3
PROJECT 2235		

ATTACHMENT A

ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY-ENVIRONMENTAL HEALTH SERVICES LETTER DATED MARCH 8, 2000

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

2235035T5

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION (LOP)
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

StID 1163

March 8, 2000

Mr. Dave DeWitt
Tosco
P.O. Box 5155
San Ramon, CA 94583

RE: **Offsite Monitoring Wells for 76 Service Station #1156, at 4276 MacArthur Blvd., Oakland, CA**

Dear Mr. DeWitt:

I have completed review of Gettler-Ryan Inc.'s February 2000 *First Quarter 2000 Groundwater Monitoring Well and Sampling Report* prepared for the above referenced site. That report summarized the groundwater sampling event in January 2000. Laboratory analytical results identified up to 33,100 ppb MTBE in Well MW-2.

There appears to be an increase in MTBE concentration in groundwater samples from Wells MW-2, MW-3, and MW-4. At this time, an offsite investigation is required to delineate the extent of the MTBE plume. A workplan for this phase of investigation is due within 90 days of the date of this letter, **or by June 12, 2000.**

If you have any questions, I can be reached at (510) 567-6762.

eva chu
Hazardous Materials Specialist

New due date 8-31-00
• need SCM also

DBO 7-21-00 via phone call

76ss1156-5

Post-it™ Fax Note 7671	Date	# of pages ▶
To Glenn M.	From Dave DeWitt	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

ATTACHMENT B

CUMULATIVE RESULTS OF SOIL SAMPLES (ERI, AUGUST 24, 1998 AND OCTOBER 11, 1999)

TABLE 1
SAMPLE ANALYSIS RESULTS OF SOIL AND GROUNDWATER
Tosco (Union) 76 Service Station 1156
4276 MacArthur Boulevard
Oakland, California

Sample #	Depth	Date	TEPHd	TPPHg	B	T	E	X	TRPH	TTLC Lead	SVOC's	HVOC's
FUEL USTS - SOIL												
S-6-T1N	6.0	3/23/98	NA	1,200	0.90	ND	14	100	NA	6.8	NA	NA
S-9.5-T1S	9.5	3/23/98	NA	590	1.5	ND	5.6	33	NA	NA	NA	NA
S-7-T2S	7.0	3/23/98	NA	670	1.0	0.74	6.8	51	NA	NA	NA	NA
S-6-T2N	6.0	3/23/98	NA	83	ND	ND	0.15	0.41	NA	NA	NA	NA
DISPENSERS - SOIL												
S-2-D1	2.0	4/9/98	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA
S-3-D2	3.0	4/9/98	NA	16	ND	ND	ND	0.13	NA	NA	NA	NA
S-3-D3	3.0	4/9/98	NA	590	1.6	15	18	99	NA	110*	NA	NA
S-3-D4	3.0	4/9/98	NA	ND	ND	ND	ND	0.070	NA	NA	NA	NA
PRODUCT LINES - SOIL												
S-3-PL1	3.0	4/9/98	NA	160	ND	ND	ND	8.4	NA	NA	NA	NA
S-3.5-PL2	3.5	4/9/98	NA	63	ND	ND	ND	0.45	NA	NA	NA	NA
USED - OIL UST - SOIL												
S-6.5-T3S	6.5	3/23/98	78,000	130	0.55	1.3	1.2	11	8,400	7.2	ND	ND**
S-4.5-T3W	4.5	4/9/98	2.3	5.0	ND	0.066	ND	0.011	ND	ND	ND	ND
S-3-T3S	3.0	4/9/98	ND	1.6	0.043	ND	0.0091	ND	ND	ND	ND	ND
S-6-T3S	6.0	4/9/98	560	81	0.64	1.4	1.1	5.9	360	ND	ND***	ND
FUEL UST CAVITY- WATER												
W-7.5-T2	7.5	3/23/98	NA	41,000	ND	400	770	8,900	NA	NA	NA	NA
STOCKPILE												
SP-1-(1-4)	NA	4/3/98	NA	15	0.024	0.034	0.024	0.069	NA	16	NA	NA
SP-1-(5-8)	NA	4/3/98	NA	3.2	0.013	ND	ND	0.014	NA	12	NA	NA
SP-2-(1-4)	NA	4/3/98	NA	13	0.076	ND	0.019	0.060	NA	5.0	NA	NA
SP-2-(5-8)	NA	4/3/98	NA	42	0.19	ND	0.11	0.60	NA	5.4	NA	NA
SP-2-(9-12)	NA	4/3/98	NA	15	0.19	ND	0.034	0.092	NA	ND	NA	NA
SP-2-(13-16)	NA	4/3/98	NA	41	0.66	0.61	0.42	2.2	NA	ND	NA	NA
SP-2-(17-20)	NA	4/3/98	NA	10	0.036	0.027	0.013	0.058	NA	ND	NA	NA
SP-3-(1-4)	NA	4/9/98	290	12	0.13	0.027	0.094	0.53	570	30	ND	ND
SP-4-(A-10)	NA	4/9/98	NA	19	0.0076	0.058	0.068	0.40	NA	10	NA	NA

TABLE 1
SAMPLE ANALYSIS RESULTS OF SOIL AND GROUNDWATER
Tosco (Union) 76 Service Station 1156
4276 MacArthur Boulevard
Oakland, California

Sample #	Depth	Date	TEPHd	TPPHg	B	T	E	X	TRPH	TTLC Lead	SVOC's	HVOC's

Notes:
Soil results (S) in milligrams per kilogram (mg/kg) unless otherwise noted.
Water results (W) in micrograms per liter (ug/L).

ug/kg	=	rograms per liter
TEPHd	=	s as diesel analyzed using modified EPA method 8015.
TPPHg	=	s gasoline analyzed using modified EPA method 8015.
BTEX	=	Total Xylenes analyzed using EPA method 8020.
TRPH	=	carbons analyzed using EPA method 5520 E&F.
TTLC Lead	=	on of lead analyzed using EPA method 6010.
STLC Lead	=	tion of lead analyzed using EPA method 6010.
SVOC's	=	ounds analyzed using EPA method 8270.
HVOC's	=	mpounds analyzed using EPA method 8010.
NA	=	lyzed/Not Applicable
ND	=	Not detected
*	=	sis: STLC Lead = 8.0 mg/L
**	=	cis-1,2-Dichloroethene = 56 ug/kg
***	=	thalene = 580 ug/kg; Naphthalene = 500 ug/kg

Additional Analyses:

Sample S-6.5-T3S analyzed for TTLC Cadmium = ND; Chromium = 50 mg/kg; Nickel = 64 mg/kg; Zinc = 52 mg/kg using EPA method 6010.

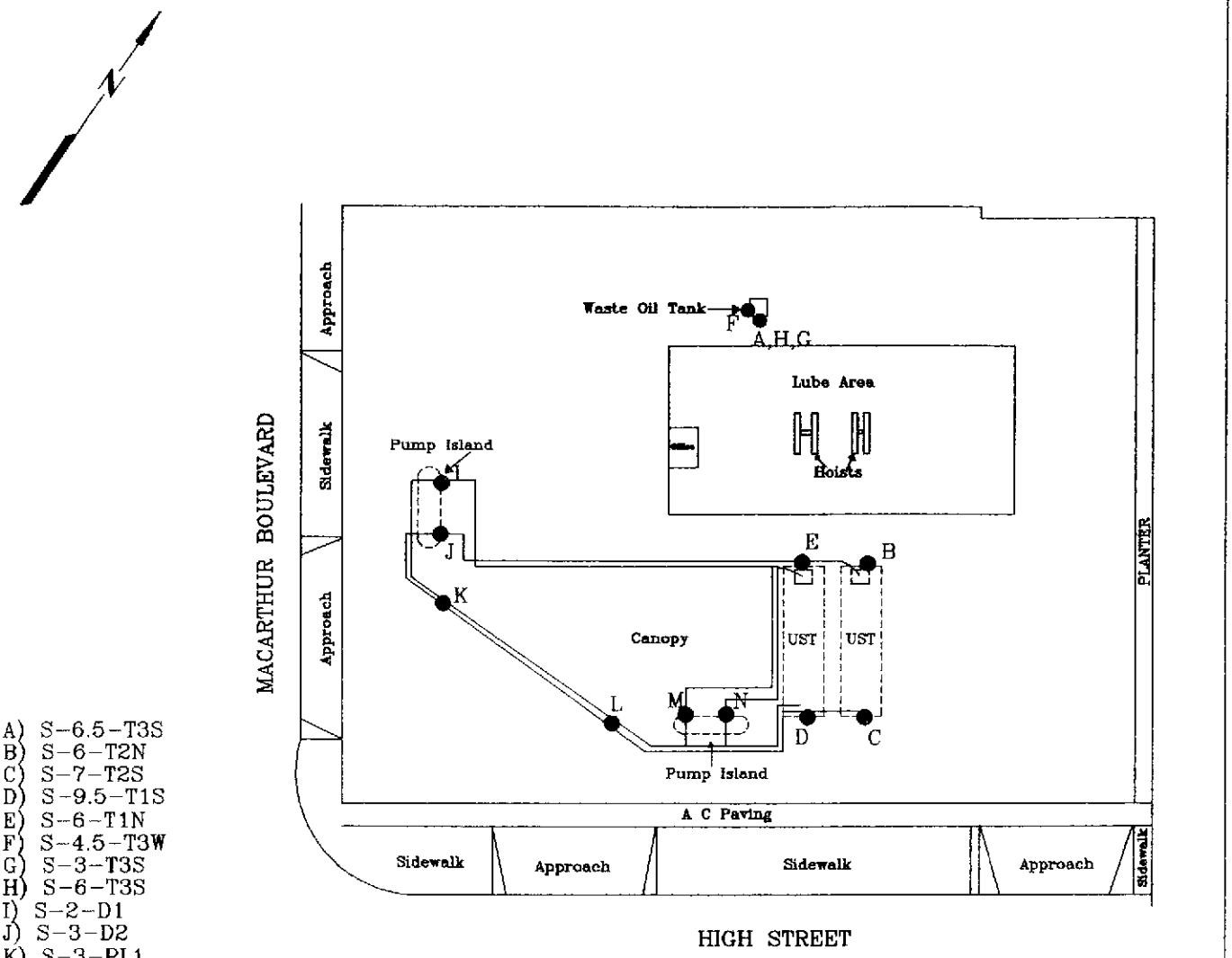
Sample S-4.5-T3W analyzed for TTLC Cadmium = ND; Chromium = 22 mg/kg; Nickel = 70 mg/kg; Zinc = 22 mg/kg using EPA method 6010.

Sample S-3-T3S analyzed for TTLC Cadmium = ND; Chromium = 37 mg/kg; Nickel = 34 mg/kg; Zinc = 34 mg/kg using EPA method 6010.

Sample S-6-T3S analyzed for TTLC Cadmium = ND; Chromium = 27 mg/kg; Nickel = 25 mg/kg; Zinc = 27 mg/kg using EPA method 6010.

Sample SP-3-(1-4) analyzed for TTLC Cadmium = ND; Chromium = 35 mg/kg; Nickel = 40 mg/kg; Zinc = 42 mg/kg using EPA method 6010.

Sample W-7.5-T2 analyzed for methyl tertiary butyl ether = 1,800 ug/L using EPA method 8020.



A) S-6.5-T3S
B) S-6-T2N
C) S-7-T2S
D) S-9.5-T1S
E) S-6-T1N
F) S-4.5-T3W
G) S-3-T3S
H) S-6-T3S
I) S-2-D1
J) S-3-D2
K) S-3-PL1
L) S-3.5-PL2
M) S-3-D3
N) S-3-D4

Source: Modified from a map provided by Tosco

FN 22350002

EXPLANATION

N

● Soil Sample

APPROXIMATE SCALE

0 30 60 FEET

COPY

ERI ENVIRONMENTAL RESOLUTIONS, INC.

GENERALIZED SITE PLAN

TOSCO (UNION) 76 SERVICE STATION 1156
4276 MacArthur Boulevard
Oakland, California

PROJECT NO. 2235

PLATE 2

October 22, 1997

TABLE 1
ANALYTICAL RESULTS of SOIL SAMPLES
(TEPHd, TPPHg, TRPH, MTBE, 5-CAM Metals)
Tosco 76 Service Station 1156
4276 MacArthur Boulevard
Oakland, California

Sample Number	Plate Call-out	Date Sampled	TEPHd	TRPH	TPPHg	MTBE	B	T	E	X	5-CAM METALS				
											Pb	Cd	Cr	Ni	Zn
			<.....ppm.....>												
Soil - Borings															
S-10.5-B1	MW1	7/16/99	140	73	6,800	ND*	2.6	25	110	470	NA	NA	NA	NA	NA
S-10.5-B2	MW2	7/16/99	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
S-10.5-B3	MW3	7/16/99	NA	NA	16	0.36	0.32	0.43	0.28	1.8	NA	NA	NA	NA	NA
S-10.5-B4	MW4	7/16/99	NA	NA	22	0.71	1.1	0.32	0.46	1.3	NA	NA	NA	NA	NA
S-20.5-B4	MW4	7/16/99	ND	ND	ND	ND	ND	ND	0.0069	NA	NA	NA	NA	NA	NA
Soil-Stockpiles															
Comp SP1-(1-4)	----	7/16/99	19	NA	58	ND*	0.074	0.20	0.52	3.7	26	ND	23	28	41

Notes:

TPPHg	=	Total purgeable petroleum hydrocarbons as gasoline analyzed using EPA Method 8015/8020 modified.
TEPHd	=	Total extractable petroleum hydrocarbons as diesel analyzed using EPA Method 3550/8015 modified.
TRPH	=	Total recoverable petroleum hydrocarbons as oil analyzed using EPA Method 5520 E&F.
ppm	=	Parts per million.
S-10.5-B1	=	Soil Sample-depth in feet-Boring 1.
Comp SP1-(1-4)	=	Stock Pile 1, 1 through 4 composite samples.
ND	=	Not detected at or above laboratory reporting limit.
NA	=	Not Analyzed.
MTBE	=	Methyl tertiary butyl ether analyzed using EPA Method 8015/8020 modified .
BTEX	=	Benzene, toluene, ethylbenzene, and total xylenes analyzed using EPA Method 8015/8020 modified.
5-CAM Metals	=	California Assessment Manual Metals analysis performed using EPA Method 6010 A.
*	=	Elevated laboratory method detction limit.

TABLE 2
ANALYTICAL RESULTS OF SOIL SAMPLES
(HVOCs and SVOCs)
Tosco 76 Service Station 1156
4276 MacArthur Boulevard
Oakland, California

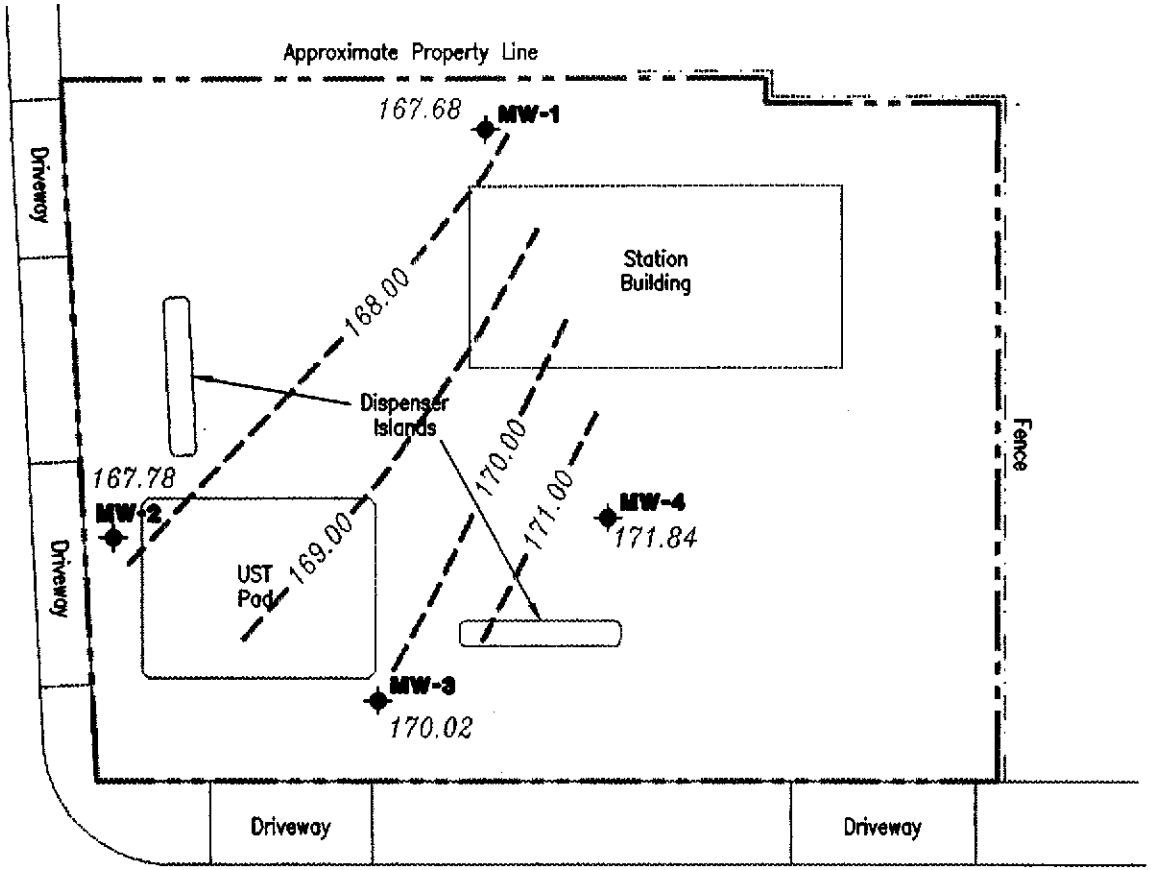
Sample Number	Plate Call-out	Date Sampled	HVOCS			SVOCs	
			Chlorobenzene	1,2-Dichlorobenzene	1,4-Dichlorobenzene	2-Methylnaphthalene	Naphthalene
			<.....ppm.....>				
Soil - Borings							
S-10.5-B1	MW1	7/16/99	0.70	0.87	0.38	12	6.4
S-10.5-B2	MW2	7/16/99	NA	NA	NA	NA	NA
S-10.5-B3	MW3	7/16/99	NA	NA	NA	NA	NA
S-10.5-B4	MW4	7/16/99	NA	NA	NA	NA	NA
S-20.5-B4	MW4	7/16/99	NA	NA	NA	NA	NA
Soil-Stockpiles							
Comp SP1-(1-4)	----	7/16/99	ND	0.077	ND	ND	ND

Notes:

ppm	=	Parts per million.
S-10.5-B4	=	Soil Sample-depth in feet-Boring 4.
Comp SP1-(1-4)	=	Stock Pile 1, 1 through 4 composite samples.
HVOCs	=	Halogenated volatile organic compounds analyzed using EPA Method 8010.
SVOCs	=	Semi-volatile organics compounds analyzed using EPA Method 8270.
ND	=	Not detected at or above laboratory reporting limit.
Plate call out	=	MW1 (Monitoring Well 1).
---	=	Not applicable.
NA	=	Not Analyzed.

ATTACHMENT C

CUMULATIVE GROUNDWATER MONITORING AND SAMPLING DATA (GRI, MAY 22, 2000)



EXPLANATION

- ✦ Groundwater monitoring well
- 99.99 Groundwater elevation in feet referenced to Mean Sea Level (MSL)
- 99.99 Groundwater elevation contour, dashed where inferred.

Approximate groundwater flow direction at a gradient of 0.05 to 0.1 Ft./Ft.

N

0 30

Scale in Feet

BASE MAP: Morrow Surveying and ERI

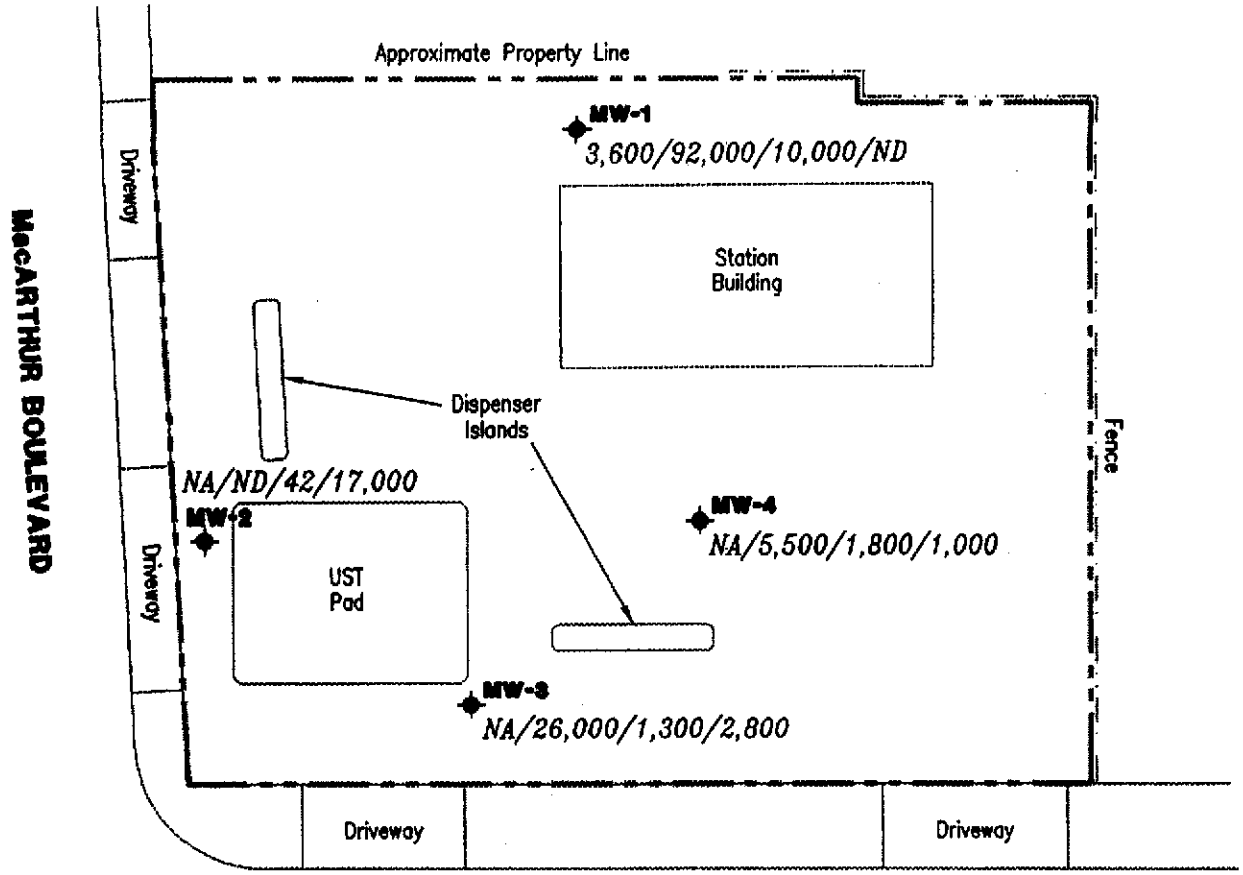
Gettler - Ryan Inc.

6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

POTENTIOMETRIC MAP
Tosco 76 Service Station #1156
4276 MacArthur Boulevard
Oakland, California

FIGURE 1

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
180225		March 31, 2000	



EXPLANATION

✦	Groundwater monitoring well
A/B/C/D	TPH(D) (Total Petroleum Hydrocarbons as Diesel)/TPH(G) (Total Petroleum Hydrocarbons as Gasoline)/Benzene/MTBE concentration in ppb
ND	Not Detected
NA	Not Analyzed

N

0 30

Scale in Feet

BASE MAP: Morrow Surveying and ERI

Gettler - Ryan Inc.

6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

CONCENTRATION MAP
Tosco 76 Service Station #1156
4276 MacArthur Boulevard
Oakland, California

FIGURE
2

JOB NUMBER
180225

REVIEWED BY

DATE
March 31, 2000

REVISED DATE

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco 76 Service Station #1156
4276 MacArthur Boulevard
Oakland, California

Well ID/ TOC*	Date	DTW (ft.)	GWE (msl)	Product Thickness (ppb)	TPH(D) (ppb)	TPH(G) (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
MW-1											
174.86	07/20/99[5]	7.50	167.36	--	16,000[2]	120,000	11,000	27,000	3,300	18,000	ND[1]
	09/28/99	8.75	166.11	<0.01	2,410[2]	6,020[6]	1,030	1,040	68.5	412	321/333[3]
	01/07/00	9.05	165.83**	0.02	7,870[2,4]	72,700[6]	7,410	13,900	2,070	9,620	ND[1]
	03/31/00	**7.18**	**167.68**	**0.00**	**3,600[2]**	**92,000[6]**	**10,000**	**23,000**	**3,200**	**14,000**	**ND[1]**
MW-2											
173.01	07/20/99	5.40	167.61	--	--	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	4,500/11,000[3,4]
	09/28/99	5.60	167.41	0.00	--	1,390[6]	124	ND[1]	62.9	43.1	5,280/6,150[3]
	01/07/00	5.92	167.09	0.00	--	1,450[6]	99.0	ND[1]	23.8	16.0	33,100
	03/31/00	**5.23**	**167.78**	**0.00**	--	**ND[1]**	**42**	**ND[1]**	**ND[1]**	**ND[1]**	**17,000**
MW-3											
178.44	07/20/99	8.50	169.94	--	--	1,000	76	52	79	76	330
	09/28/99	8.31	170.13	0.00	--	1,860[6]	174	95.4	71.8	135	443/288[3]
	01/07/00	8.56	169.88	0.00	--	28,400[6]	2,450	3,090	1,560	3,910	1,940
	03/31/00	**8.42**	**170.02**	**0.00**	--	**26,000[6]**	**1,300**	**2,900**	**2,600**	**3,500**	**2,800**
MW-4											
179.10	07/20/99	7.40	171.70	--	--	69	2.7	0.77	ND	7.1	100
	09/28/99	7.19	171.91	0.00	--	4,050[6]	1,250	72.0	51.3	133	416/459[3]
	01/07/00	8.98	170.12	0.00	--	7,010[6]	2,260	167	271	276	764
	03/31/00	**7.26**	**171.84**	**0.00**	--	**5,500[6]**	**1,800**	**230**	**330**	**400**	**1,000**
Trip Blank											
TB-LB	07/20/99	--	--	--	--	--	--	--	--	--	--
	09/28/99	--	--	--	--	ND	ND	ND	ND	ND	ND
	01/07/00	--	--	--	--	ND	ND	ND	ND	ND	ND
	03/31/00	--	--	--	--	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco 76 Service Station #1156
4276 MacArthur Boulevard
Oakland, California

EXPLANATIONS:

Groundwater monitoring data and laboratory analytical results prior to September 28, 1999, were compiled from reports prepared by Environmental Resolutions, Inc.

TOC = Top of Casing elevation
DTW = Depth to Water
(ft.) = Feet
GWE = Groundwater Elevation
(msl) = Referenced relative to mean sea level
TPH(D) = Total Petroleum Hydrocarbons as Diesel
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 based on City of Oakland Benchmark No. 3967, (Elevation = 174.40 feet msl).

** GWE has been corrected due to the presence of free product; Correction factor: [(TOC - DTW)+(Product Thickness x 0.77)].

[1] Detection limit raised. Refer to analytical reports.

[2] Laboratory report indicates unidentified hydrocarbons C9-C24.

[3] MTBE by EPA Method 8260.

[4] Laboratory analyzed sample past EPA recommended holding time.

[5] Total Recoverable Petroleum Oil was ND.

[6] Laboratory report indicates gasoline C6-C12.

Table 2

Groundwater Analytical Results

Tosco 76 Service Station #1156
4276 MacArthur Boulevard
Oakland, California

Well ID	Date	Ethanol (ppb)	TBA (ppb)	MTBE (ppb)	DIPE (ppb)	ETBE (ppb)	TAME (ppb)	HVOCs (ppb)	SVOCs (ppb)
MW-1	07/20/99	--	--	11,000[3]	--	--	--	ND[1]	ND[2]
	09/28/99	--	ND[6]	333	ND[6]	ND[6]	ND[6]	ND[4]	ND[5]
	01/07/00	--	--	--	--	--	--	ND[7,8]	ND[9]
	03/31/00	--	--	--	--	--	--	--[11]	ND[10]
MW-2	09/28/99	--	ND[6]	6,150	ND[6]	ND[6]	ND[6]	--	--
MW-3	09/28/99	--	ND[6]	288	ND[6]	ND[6]	8.80	--	--
MW-4	09/28/99	--	ND[6]	459	ND[6]	ND[6]	ND[6]	--	--

Table 2

Groundwater Analytical Results

Tosco 76 Service Station #1156

4276 MacArthur Boulevard

Oakland, California

EXPLANATIONS:

Groundwater analytical results prior to September 28, 1999, were compiled from reports prepared by Environmental Resolutions, Inc.

TBA = Tertiary Butyl Alcohol
MTBE = Methyl Tertiary Butyl Ether
DIPE = Di-isopropyl Ether
ETBE = Ethyl Tertiary Butyl Ether
TAME = Tertiary Amyl Methyl Ether
EDB = 1,2-Dibromoethane
HVOCs = Halogenated Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
ppb = Parts per billion
-- = Not Analyzed
ND = Not Detected

[1] All HVOCs were ND except for Chlorobenzene at 12 ppb; 1,2-Dichlorobenzene (1,2-DCB) at 3.9 ppb; 1,1-Dichloroethane (1,1-DCA) at 2.0 ppb; 1,2-Dichloroethane (1,2-DCA) at 20 ppb; cis-1,2-Dichloroethene (cis-1,2-DCE) at 3.6 ppb; and 1,2-Dichloropropane (1,2-DCP) at 0.92 ppb.

[2] All SVOCs were ND except for Benzyl alcohol at 37 ppb; 2,4-Dimethylphenol at 140 ppb; 2-Methylnaphthalene at 240 ppb; 4-Methylphenol at 27 ppb; and Naphthalene at 600 ppb.

[3] Laboratory analyzed sample past EPA recommended holding time.

[4] All HVOCs were ND except for Benzene at 6,130 ppb; Ethylbenzene at 1,590 ppb; Naphthalene at 534 ppb; Toluene at 11,900 ppb; 1,2,4-Trimethylbenzene at 1,240 ppb; 1,3,5-Trimethylbenzene at 318 ppb; and Total Xylenes at 7,360 ppb.

[5] All SVOCs were ND (with a raised detection limit) except for 2,4-Dimethylphenol at 13.6 ppb; 2-Methylnaphthalene at 87.4 ppb; 2-Methylphenol at 26.4; 4-Methylphenol at 35.6; and Naphthalene at 292 ppb.

[6] Detection limit raised. Refer to analytical reports.

[7] All HVOCs were ND (with a raised detection limit) except for Benzene at 8,380 ppb; Ethylbenzene at 2,380 ppb; Naphthalene at 1,050 ppb; n-Propylbenzene at 371 ppb; Toluene at 17,600 ppb; 1,2,4-Trimethylbenzene at 2,210 ppb; 1,3,5-Trimethylbenzene at 597 ppb; and Total Xylenes at 10,800 ppb.

[8] EPA Method 8260A for HVOCs

[9] All SVOCs were ND (with a raised detection limit) except for 2-Methylnaphthalene at 315 ppb and Naphthalene at 615 ppb.

[10] All SVOCs were ND except for Bis(2-ethylhexyl)phthalate at 10 ppb; 1,2-DCB at 6.2 ppb; 2-Methylnaphthalene at 73 ppb; 2-Methylphenol at 31 ppb; 4-Methylphenol at 18 ppb; and Naphthalene at 140 ppb. Laboratory report indicates all SVOCs were analyzed outside the EPA recommended holding time.

[11] Laboratory did not analyze for HVOCs.

ANALYTICAL METHOD:

EPA Method 8260 for Oxygenate Compounds
EPA Method 8010 for HVOCs
EPA Method 8270 for SVOCs

ATTACHMENT D

FIELD PROTOCOL

FIELD PROTOCOL

Site Safety Plan

Field work is performed by ERI personnel in accordance with a site safety plan (SSP) developed for the site. The SSP describes the basic safety requirements for the subsurface investigation and the drilling of soil borings at the work site. The SSP is applicable to personnel and subcontractors of ERI. Personnel at the site are informed of the contents of the SSP before work begins. A copy of the SSP is kept at the work site and is available for reference by appropriate parties during the work. The ERI geologist acts as the Site Safety Officer.

Soil Borings

Prior to the drilling of the soil borings, ERI acquires the necessary permits from the appropriate agency(ies). ERI also contacts Underground Service Alert (USA) and a private underground utility locator before drilling to help locate public utility lines at the site. ERI observes the driller clear boring locations to a depth of approximately 4 feet before drilling to reduce the risk of damaging underground structures.

The soil boring is drilled with a BK-81 (or similar) drill rig with hollow-stem auger. Auger flights and sampling equipment are steam-cleaned before use to minimize the possibility of crosshole contamination. The rinsate is containerized and stored on site. ERI coordinates the appropriate disposal or recycling of the rinsate with Tosco.

Drilling is performed under the observation of a field geologist, and the earth materials in the borings are identified using visual and manual methods, and classified as drilling progresses using the Unified Soil Classification System. Soil borings are drilled to approximately 10 to 15 feet below first-encountered groundwater or 5 feet into any competent clay layer (aquitard) encountered beneath the water-bearing zone. If an aquitard is encountered, the boring is terminated and backfilled with bentonite before installing a groundwater monitoring well.

During drilling, soil samples are collected at 5-foot intervals, obvious changes in lithology, and just above the groundwater surface. Samples are collected with a California-modified, split-spoon sampler equipped with laboratory-cleaned brass sleeves. Samples are collected by advancing the auger to a point just above the sampling depth and driving the sampler into the soil. The sampler is driven 18 inches with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows required to drive the sampler each successive 6-inch interval is counted and recorded to give an indication of soil consistency.

Soil samples are monitored with a photoionization device (PID), which measures hydrocarbon concentrations in the ambient air or headspace above the soil sample. Field instruments such as the PID are useful for indicating relative levels of hydrocarbon vapors, but do not detect concentrations of hydrocarbons with the same precision as laboratory analyses. Soil samples selected for possible chemical analysis are sealed promptly with Teflon® tape and plastic caps. The samples are labeled and placed in iced storage for transport to the laboratory. Chain of Custody Records are initiated by the geologist in the field, updated throughout handling of the samples, and sent with the samples to the laboratory. Copies of these records are included in the final report. Cuttings generated during drilling

are placed on plastic sheeting, covered, and left at the site. ERI will coordinate the appropriate disposal or recycling of the cuttings with Tosco.

Monitoring Well Construction

The monitoring well is constructed in the boring using thread-jointed, 2-inch inner diameter, schedule 40 polyvinyl chloride (PVC) casing. No chemical cements, glues, or solvents are used in well construction. The screened portion of each well consists of factory-perforated casing with 0.020-inch wide slots. If unconfined aquifer conditions exist, the well screen is installed from the total depth of each well to approximately 5 feet above the uppermost water-bearing unit. If confined conditions exist, the uppermost water-bearing unit is screened exclusively. Unperforated casing is installed from the top of each screen to the ground surface. The annular space in the well is packed with number 3 sand to approximately one foot above the slotted interval and a surged and refilled bentonite plug is added above the sand pack to prevent cement from entering the well pack. The remaining annulus is backfilled to grade with a cement/bentonite slurry cement.

The monitoring well is protected with a locking cap and a traffic-rated, bolting, utility box equipped with a galvanized steel skirt. The box has a watertight seal to protect against surface-water infiltration. The design of this box discourages vandalism and reduces the possibility of accidental disturbance of the well.