PES Environmental, Inc.
Engineering & Environmental Services

A Report Prepared For:

Pacific Electric Motor Company
1009 66th Avenue
Oakland, California 94601

Attention: Mr. Rand Perry

GROUNDWATER FIRST QUARTER 2000 MONITORING REPORT PACIFIC ELECTRIC MOTOR COMPANY 1009 66TH AVENUE OAKLAND, CALIFORNIA

#565

AUGUST 22, 2000

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618.001.02.002

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1.0 INTRODUCTION

This report presents the results of quarterly groundwater monitoring performed by PES Environmental, Inc. (PES) during the first quarter of 2000 at Pacific Electric Motor Company (PEM) in Oakland, California (Plate 1). The current groundwater monitoring program consists of measuring the depth to groundwater in four onsite monitoring wells, and purging and sampling the monitoring wells (Wells MW-1, MW-2, MW-3, and MW-4) on a quarterly basis.

The groundwater monitoring program is designed to: (1) evaluate the presence of petroleum hydrocarbons in groundwater; and (2) monitor water-level variations at the site. The quarterly monitoring program was performed in accordance with the sampling program specified in the Alameda County Environmental Health Services (ACEHS) December 1, 1998 letter *Additional Soil and Groundwater Investigation Report, 1009-66th Ave., Oakland, CA 94601* (ACEHS, 1998b) and the procedures outlined in PES' proposal dated December 11, 1998 (PES, 1998b).

In addition, as requested by ACEHS, this report presents the results of an evaluation of various techniques to remediate MTBE in groundwater. The feasibility evaluation is presented in Appendix A.

2.0 BACKGROUND INFORMATION

The site is located in a residential and light industrial area of Oakland, California and is presently used to repair large electric motors. PEM formerly operated a 2,000-gallon steel gasoline underground storage tank (UST) on the east side of the warehouse building (Plate 2). The tank was reportedly installed in approximately 1975 (ENVIRON, 1997). In February 1995, the UST was removed by W. A. Craig, Inc. (WAC). Observations at the time of removal indicated that the tank was in good condition and no holes were evident. However, free-phase gasoline product was observed on the water surface in the tank excavation. Soil samples collected from the UST excavation and associated piping trenches detected total petroleum hydrocarbons as gasoline (TPH-g) at concentrations up to 10,000 milligrams per kilogram (mg/kg).

In April 1995, WAC performed a soil investigation consisting of nine soil borings to delineate the lateral and vertical extent of the petroleum hydrocarbons in soil. On the basis of the results of the soil investigation, WAC prepared and implemented a remediation program to remove soil affected by petroleum hydrocarbons. Approximately 1,500 cubic yards of soil were excavated and stockpiled onsite, and 116,000 gallons of petroleum hydrocarbon-affected water were pumped from the excavation and disposed. A dewatering sump installed by WAC during soil excavation was later converted to groundwater monitoring well WAC-1 (Plate 2). Because of its uncertain construction, ACEHS stated that no monitoring of Well WAC-1 is required (ACEHS, 1997). WAC summarized the results of their remediation program in a report entitled *Excavation and Sampling Report, Pacific Electric Motor Co., 1009 66th Avenue, Oakland, California*, dated May 12, 1997 (WAC, 1997).

ENVIRON, Inc. (ENVIRON) installed and sampled three shallow monitoring wells (MW-1, MW-2, MW-3) in June 1997 to evaluate groundwater conditions in the vicinity of the former UST. Well completion details are summarized in Table 1. The well installation program and associated soil and groundwater sampling program was summarized in the ENVIRON report *Soil and Ground Water Investigation, Summary Report, Pacific Electric Motor Co., 1009-66th Avenue, Oakland, California*, dated July 17, 1997 (ENVIRON, 1997). ENVIRON concluded that the remediation performed had successfully removed the source of the petroleum hydrocarbons (i.e., the former UST), and that residual concentrations of petroleum hydrocarbons in soil and groundwater were present only in the immediate vicinity of the former UST.

In September 1998, PES conducted additional soil and groundwater sampling in the vicinity of the former UST, as requested by the ACEHS in a May 13, 1998 letter to PEM (ACEHS, 1998a). Two soil borings were drilled within the backfill of the former UST excavation, and one monitoring well was installed downgradient of the former UST. Petroleum hydrocarbons were generally not detected in the excavation backfill, although groundwater samples collected from both soil borings indicated the presence of methyl tert-butyl ether (MTBE), a gasoline additive. Elevated concentrations of petroleum hydrocarbons were found in soil and groundwater downgradient of the UST excavation during installation and groundwater sampling of monitoring well MW-4. On the basis of the elevated concentrations of petroleum hydrocarbons, PES recommended four additional quarters of groundwater monitoring be performed. The additional investigation was summarized in the PES report *Results of Additional Soil and Groundwater Investigation, 1009 66th Avenue, Oakland, California*, dated November 11, 1998 (PES, 1998a).

In response to a letter from ACEHS to Mr. Rand Perry dated July 14, 1999, PES prepared a Corrective Action Plan (CAP). The CAP, dated December 20, 1999 (PES, 1999), summarized site soil and groundwater conditions, presented the findings of a risk-based determination of cleanup goals, and discussed potentially-applicable remediation technologies to achieve the cleanup goals. The cleanup goals for benzene, toluene, ethylbenzene, xylenes and MTBE were determined following American Society for Testing and Materials (ASTM) Guide for Risk-Based Corrective Action (RBCA) Applied at Petroleum Release Sites (ASTM E 1739-95). The RBCA evaluation suggested that chemical concentrations in soil were below levels that would be deleterious to human health and therefore no soil remediation was warranted. Concentrations of benzene in groundwater, however slightly exceeded risk-based cleanup levels for outdoor air exposure and therefore remedial action to reduce benzene concentrations in groundwater appear appropriate. To provide a more conservative health-based cleanup goal, the evaluation included an indoor-air exposure scenario which involves the presence of a building above affected groundwater. No such exposure scenario currently exists at the site. Concentrations of benzene and toluene in groundwater exceeded the indoor air exposure pathway and PES recommended that cleanup goals of 150 micrograms per liter (μg/L) for benzene and 25,000 μg/L for toluene be established. To achieve these cleanup goals, PES recommended that an enhanced in-situ bioremediation program be instituted that involves injection of oxygen-release compound (ORC) into the saturated zone to accelerate the rate of degradation of petroleum hydrocarbons by indigenous microorganisms.

ACEHS responded to the CAP in a letter dated December 28, 1999 that presented concerns regarding the suitability of the proposed remediation technique to address MTBE concentrations. (It should be noted that MTBE concentrations in groundwater do not exceed health-based cleanup goals and therefore do not appear to warrant remedial action). ACEHS requested that PEM provide a Site Conceptual Model (SCM) and modified CAP.

Following discussions with PES, ACEHS prepared a letter dated January 24, 2000 (ACEHS, 2000) that requested preparation of a feasibility study to address MTBE remediation. This report includes an evaluation of remedial technologies to address groundwater affected by releases of petroleum hydrocarbons including MTBE.

3.0 WATER-LEVEL MEASUREMENTS

Water levels in four onsite groundwater monitoring wells (Wells MW-1, MW-2, MW-3, and MW-4) were measured by Blaine Tech Services, Inc. (Blaine Tech) of San Jose, California, under the direct supervision of PES, prior to sampling on March 24, 2000. Depth-to-water in the monitoring wells was measured from the top-of-casing (TOC) reference benchmark to a precision of 0.01-feet using an electronic water-level indicator/interface probe. Depth-to-water measurements were converted to water-level elevations by subtracting the depth to water from the TOC elevation referenced to a site datum established by ENVIRON (ENVIRON, 1997). Free product was not observed in any of the monitoring wells.

To prevent cross-contamination between wells, the portion of the water-level indicator that was submerged in the well was cleaned between well measurements using a laboratory grade detergent and double rinsed with deionized water.

4.0 GROUNDWATER SAMPLING

On March 24, 2000, Blaine Tech, under the direct supervision of PES, collected groundwater samples from wells MW-1, MW-2, MW-3, and MW-4. Groundwater samples were collected from each well after removing approximately three well volumes of water with disposable bailers. During well purging, the discharged water was monitored for pH, temperature, electrical conductivity, and turbidity.

Following purging, samples were collected from the wells using a disposable bailer and transferred to the appropriate laboratory sample containers. The sample containers were filled slowly to minimize sample volatilization and to ensure that the sample was free of air bubbles. The samples were labeled to designate sample number, time and date collected, and analysis required. The samples were immediately placed in a chilled, thermally-insulated cooler. To prevent cross-contamination between wells, disposable bailers were used at one well and then discarded. Sampling procedures are documented in the groundwater sampling report prepared by Blaine Tech, included in Appendix B.

Groundwater samples were transported under chain-of-custody protocol to a state-certified laboratory. Entech Analytical Labs of Sunnyvale, California analyzed samples for: (1) TPH-g using EPA Test Method 8015 Modified; (2) benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Test Method 8020; and (3) MTBE using EPA Test Method 8020. The laboratory reports and chain-of-custody records are included in Appendix C.

5.0 DISCUSSION OF MONITORING RESULTS

This section presents a summary of water-level measurements and groundwater analyses results from the March 2000 sampling event.

5.1 Water-Level Measurements

Depth-to-water measurements during the March 2000 event ranged from 3.29 feet (MW-3) to 3.59 feet (MW-4) below TOC. Groundwater water-level elevations ranged from 96.30 feet (MW-2) to 97.20 feet (MW-1) referenced to site datum established by ENVIRON (ENVIRON, 1997). Historical and current depth-to-water measurements and calculated water-level elevations are presented in Table 2.

Plate 3 presents water-level elevation contours developed from water levels measured on March 24, 2000. The water-level elevation contours indicate that groundwater flow is generally to the south. The observed flow direction differs slightly from the west-southwest flow direction observed during the November 1999 monitoring event, but is within the historical range of observed groundwater flow direction. The groundwater gradient is approximately 0.006 foot per foot (ft/ft).

5.2 Groundwater Sample Analytical Results

A summary of current and historical laboratory chemical results for petroleum hydrocarbons in groundwater is presented in Table 3. The analytical data sheets and chain-of-custody records for groundwater samples collected on March 24, 2000 are presented in Appendix C.

During the current monitoring period, dissolved-phase petroleum hydrocarbons were detected only in groundwater samples collected from monitoring well MW-4. The groundwater sample collected from well MW-4 was found to contain TPH-g at a concentration of 95,000 milligrams per liter (μg/L), benzene at 16,000 μg/L, toluene at 13,000 μg/L, ethylbenzene at 2,500 μg/L, and total xylenes at 12,000 μg/L. MTBE was tentatively identified using EPA Test Method 8020 at 44,000 μg/L. The analytical laboratory inadvertently did not reanalyze the sample from MW-4 to confirm the concentration of MTBE.

Future confirmation of the presence of MTBE will be performed using EPA Test Method 8260.

Historically, petroleum hydrocarbons have been detected intermittently in samples collected from well MW-1. At wells MW-2 and MW-3, low concentrations of petroleum hydrocarbons had previously been detected only during the January and April 1999 sampling events. Dissolved-phase petroleum hydrocarbons were not detected in groundwater samples collected from monitoring wells MW-1, MW-2 and MW-3 during this reporting period.

6.0 SUMMARY OF FINDINGS

Results of the First Quarter 2000 groundwater monitoring indicate a southerly groundwater flow direction, consistent with historical groundwater flow determination.

Elevated concentrations of dissolved petroleum hydrocarbons were detected only in groundwater samples collected from well MW-4 during the First Quarter 2000 monitoring event. Petroleum hydrocarbons were not detected in the samples collected from wells MW-1, MW-2 and MW-3. Current data from the downgradient monitoring wells MW-2 and MW-3, remain consistent with results of the November 1999 sampling suggesting that the petroleum hydrocarbon plume associated with the former UST remains stable and localized.

In accordance with directives from ACEHS, quarterly groundwater sampling will continue. As requested by ACEHS, Appendix A presents the findings of an evaluation of groundwater remedial techniques to address the presence of dissolved petroleum hydrocarbons detected at monitoring well MW-4. Also, on behalf of PEM and as required by ACEHS, PES will prepare a site conceptual model and corrective action plan.

7.0 REFERENCES

Alameda County Environmental Health Services (ACEHS), 1997. *Soil and Groundwater Investigation for Pacific Electric Motor Co., 1009-66th Ave., Oakland, CA 94601.* August 19.

______, 1998a. *Evaluation of Residual Health Risks at Pacific Electric Motor Company, 1009 66th Avenue, Oakland, CA 94601.* May 13.

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______, 1999. Re: *Corrective Action Plan for Pacific Electric Motor Company, 1009 66th Avenue, Oakland, CA 94621.* December 28.

______, 2000. Re: *Pacific Electric Motor, 1009 66th Avenue, Oakland, CA 94621.* January 24.

ENVIRON Corporation, 1997. *Soil and Groundwater Investigation, Summary Report, Pacific Electric Motor Co., 1009-66th Avenue, Oakland, California.* July 17.

PES Environmental, Inc. (PES), 1998a. *Results of Additional Soil and Groundwater Investigation, 1009 66th Avenue, Oakland, California.* November 11.

______, 1998b. *Proposal, Quarterly Groundwater Sampling, Pacific Electric Motor Company, Oakland, California.* December 11.

______, 1999. *Corrective Action Plan, Pacific Electric Motor Company, 1099 66th Avenue, Oakland, California.* December 20.

W. A. Craig, Inc. (*WAC*), 1997. *Excavation and Sampling Report, Pacific Electric Motor Co., 1009 66th Avenue, Oakland, California.* May 12. (Partial)

Table 1. Monitoring Well Completion Details
Quarterly Monitoring Report
First Quarter 2000
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

Well Number	Date Installed	Installed By	TOC Elevation (feet*)	Boring Diameter (inches)	Casing Diameter (inches)	Total Depth Boring (feet bgs)	Total Depth of Casing (feet bgs)	Screened Interval Depth (feet bgs)	
								Top	Bottom
MW-1	6/10/97	ENVIRON	101.04	8	2	26.5	25.5	5	25
MW-2	6/10/97	ENVIRON	100.12	8	2	25.5	25.5	5	25
MW-3	6/10/97	ENVIRON	100.23	8	2	25.5	25.5	5	25
MW-4	9/14/98	PES	100.32	8	2	25.0	25.0	15	25

Notes:
* = Referenced to site datum established by ENVIRON (1997).
bgs = Below ground surface.

Table 2. Water-Level Elevation Data
Quarterly Monitoring Report
First Quarter 2000
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

Well Number	Date	Measured By	Top of Casing Elevation (feet*)	Depth to Water (feet BTOC)	Water-level Elevation (feet*)
MW-1	6/19/97	ENVIRON	100.67	5.87	94.80
	7/1/97	ENVIRON	100.67	5.88	94.79
	9/29/97	PES	100.67	6.45	94.22
	12/16/97	PES	100.67	3.42	97.25
	3/10/98	PES	100.67	3.06	97.61
	10/1/98	PES	100.67	6.36	94.31
	1/19/99	PES	100.67	5.33	95.34
	4/15/99	PES	100.67	3.23	97.44
	5/6/99	PES	100.67	4.36	96.31
	7/30/99	PES	100.67	5.49	95.18
	11/15/99	PES	100.67	6.30	94.37
	3/24/00	**PES**	**100.67**	**3.47**	**97.20**
MW-2	6/19/97	ENVIRON	99.85	5.30	94.55
	7/1/97	ENVIRON	99.85	5.37	94.48
	9/29/97	PES	99.85	6.05	93.80
	12/16/97	PES	99.85	3.81	96.04
	3/10/98	PES	99.85	2.89	96.96
	10/1/98	PES	99.85	5.83	94.02
	1/19/99	PES	99.85	5.26	94.59
	4/15/99	PES	99.85	3.19	96.66
	5/6/99	PES	99.85	3.91	95.94
	7/30/99	PES	99.85	4.79	95.06
	11/15/99	PES	99.85	5.92	93.93
	3/24/00	**PES**	**99.85**	**3.55**	**96.30**
MW-3	6/19/97	ENVIRON	99.93	5.50	94.43
	7/1/97	ENVIRON	99.93	5.52	94.41
	9/29/97	PES	99.93	6.16	93.77
	12/16/97	PES	99.93	5.52	94.41
	3/10/98	PES	99.93	3.11	96.82
	10/1/98	PES	99.93	5.96	93.97
	1/19/99	PES	99.93	5.45	94.48
	4/15/99	PES	99.93	3.85	96.08
	5/6/99	PES	99.93	4.12	95.81
	7/30/99	PES	99.93	5.14	94.79
	11/15/99	PES	99.93	6.35	93.58
	3/24/00	**PES**	**99.93**	**3.29**	**96.64**

Table 2. Water-Level Elevation Data
Quarterly Monitoring Report
First Quarter 2000
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

Well Number	Date	Measured By	Top of Casing Elevation (feet*)	Depth to Water (feet BTOC)	Water-level Elevation (feet*)
MW-4	10/1/98	PES	100.32	6.32	94.00
	1/19/99	PES	100.32	5.59	94.73
	4/15/99	PES	100.32	7.71 #	92.61 #
	5/6/99	PES	100.32	4.50	95.82
	7/30/99	PES	100.32	5.18	95.14
	11/15/99	PES	100.32	6.27	94.05
	3/24/00	**PES**	**100.32**	**3.59**	**96.73**

Notes:
* = Referenced to site datum established by ENVIRON (1997).
BTOC = Below top of casing.
# = Anomalous data, not used for water-level elevation contouring.

Table 3. Analytical Results for Groundwater Samples
Quarterly Monitoring Report
First Quarter 2000
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

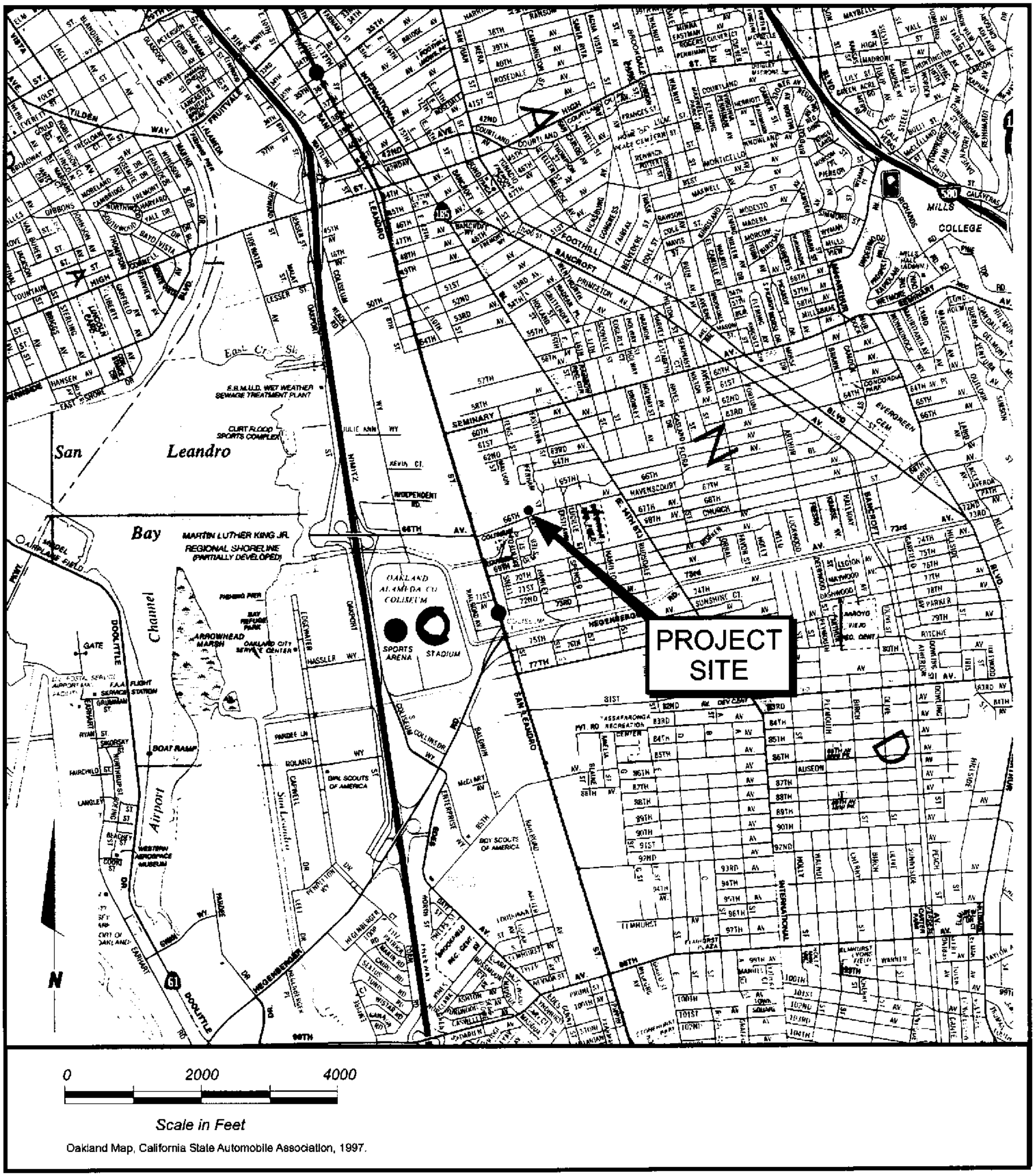
Sample Location	Date Sampled	Sampled By	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)	MTBE EPA 8020 (µg/L)	MTBE EPA 8260 (µg/L)
MW-1	6/19/97	ENVIRON	**18,000**	**3,300**	**200**	**1,100**	**4,900**	<250	--
	9/29/97	PES	**29,000**	**4,800**	<25	**2,000**	**3,500**	<250	--
	12/16/97	PES	<50	**1.3**	<0.5	**0.6**	**0.7**	<5	--
	3/10/98	PES	**190**	**2.0**	<0.5	**5.7**	**1.7**	<5	--
	1/19/99	PES	**1,000**	**40**	<0.5	**18**	**68**	**8.3**	**6.9**
	4/15/99	PES	<50	**0.92**	**0.9**	**0.7**	**0.87**	<5.0	--
	7/30/99	PES	**1,400**	**60**	<0.5	**63**	**120**	**13**	<5.0
	11/15/99	PES	**3,600**	**120**	<0.5	**150**	**620**	<5.0	--
	3/24/00	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
MW-2	6/19/97	ENVIRON	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	9/29/97	PES	<50	<0.5	<0.5	<0.5	<0.5	<5	--
	12/16/97	PES	<50	<0.5	<0.5	<0.5	<0.5	<5	--
	3/10/98	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	1/19/99	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	<5.0
	4/15/99	PES	<50	**0.75**	**0.64**	<0.5	**0.74**	<5.0	--
	7/30/99	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	11/15/99	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	3/24/00	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
MW-3	6/19/97	ENVIRON	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	9/29/97	PES	<50	<0.5	<0.5	<0.5	<0.5	<5	--
	12/16/97	PES	<50	<0.5	<0.5	<0.5	<0.5	<5	--
	3/10/98	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	1/19/99	PES	<50	**0.78**	<0.5	<0.5	<0.5	**8.7**	<5.0
	4/15/99	PES	<50	**5.4**	**3.9**	**1.7**	**5.6**	**23**	**25**
	7/30/99	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	11/15/99	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--
	3/24/00	PES	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--

Table 3. Analytical Results for Groundwater Samples
Quarterly Monitoring Report
First Quarter 2000
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

Sample Location	Date Sampled	Sampled By	TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)	MTBE EPA 8020 (µg/L)	MTBE EPA 8260 (µg/L)
MW-4	9/15/98	PES	170,000	26,000	32,000	2,900	18,000	26,000	--
	1/19/99	PES	2,600	1,700	3.8	25	29	13,000	16,000
	4/15/99	PES	210,000	28,000	15,000	3,700	19,000	52,000	67,000
	7/30/99	PES	91,000	16,000	7,500	2,300	8,500	68,000	67,000
	11/15/99	PES	63,000	8,500	2,400	1,400	4,000	57,000	58,000
	3/24/00	PES	95,000	16,000	13,000	2,500	12,000	44,000	--*

DTW @ 3.6' BTOC.

Notes:
TPH-g = Total petroleum hydrocarbons quantified as gasoline (EPA 8015M).
MTBE = Methyl tert-butyl ether (EPA 8020; detected concentrations were confirmed by EPA 8260.)
µg/L = Micrograms per liter.
<50 = Not detected at or above the indicated laboratory reporting limit.
-- = Not analyzed
* = Laboratory did not perform reanalysis of the sample by EPA Method 8260
to confirm the presence of MTBE.



Oakland Map, California State Automobile Association, 1997.

PES Environmental, Inc.
Engineering & Environmental Services

Site Location Map
First Quarter 2000 Groundwater Monitoring Report
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

PLATE
1

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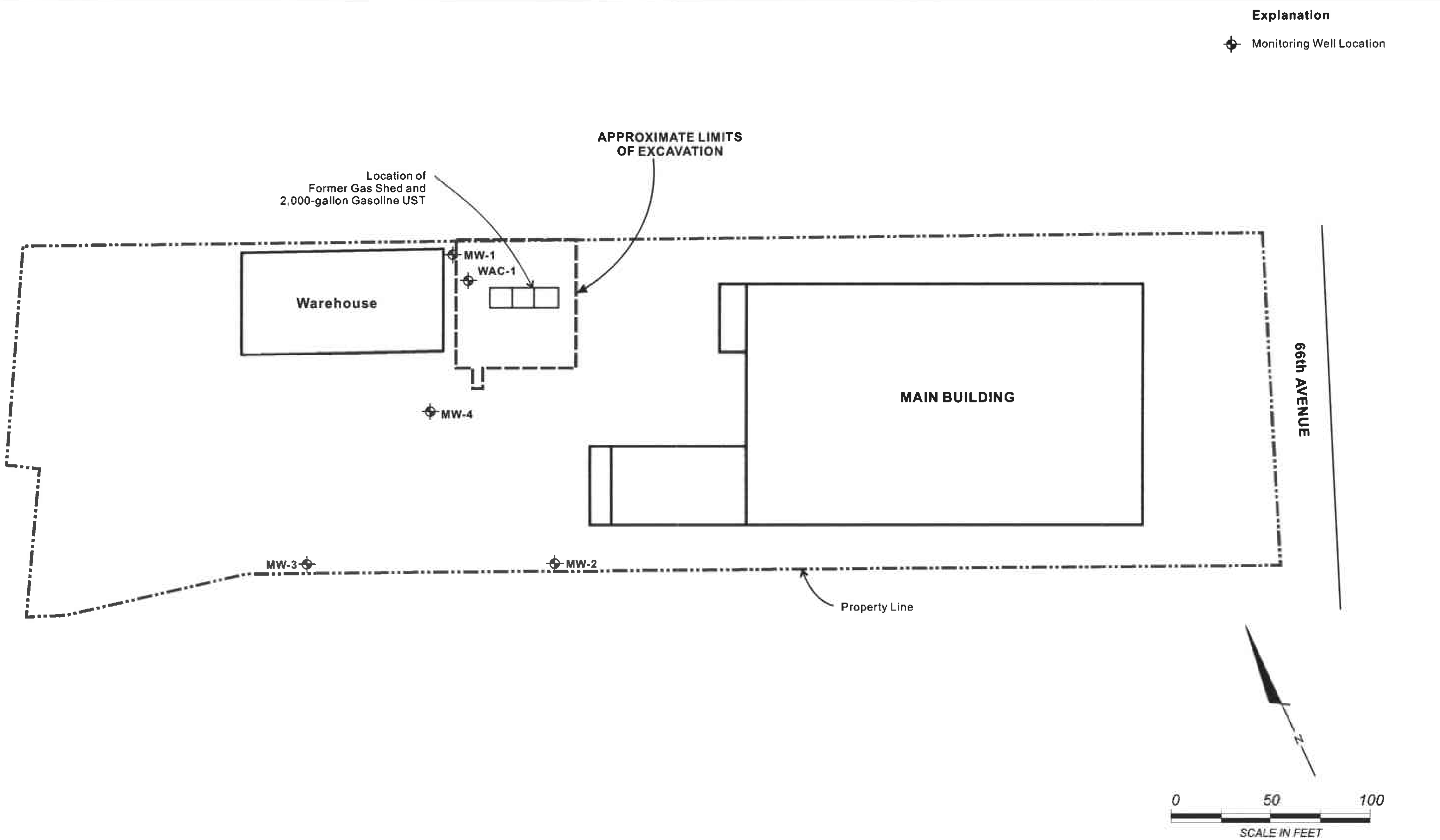

Drawing modified from ENVIRON, 1997

PES Environmental, Inc.
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Site Plan and Sampling Location Map
First Quarter 2000 Groundwater Monitoring Report
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

PLATE
2

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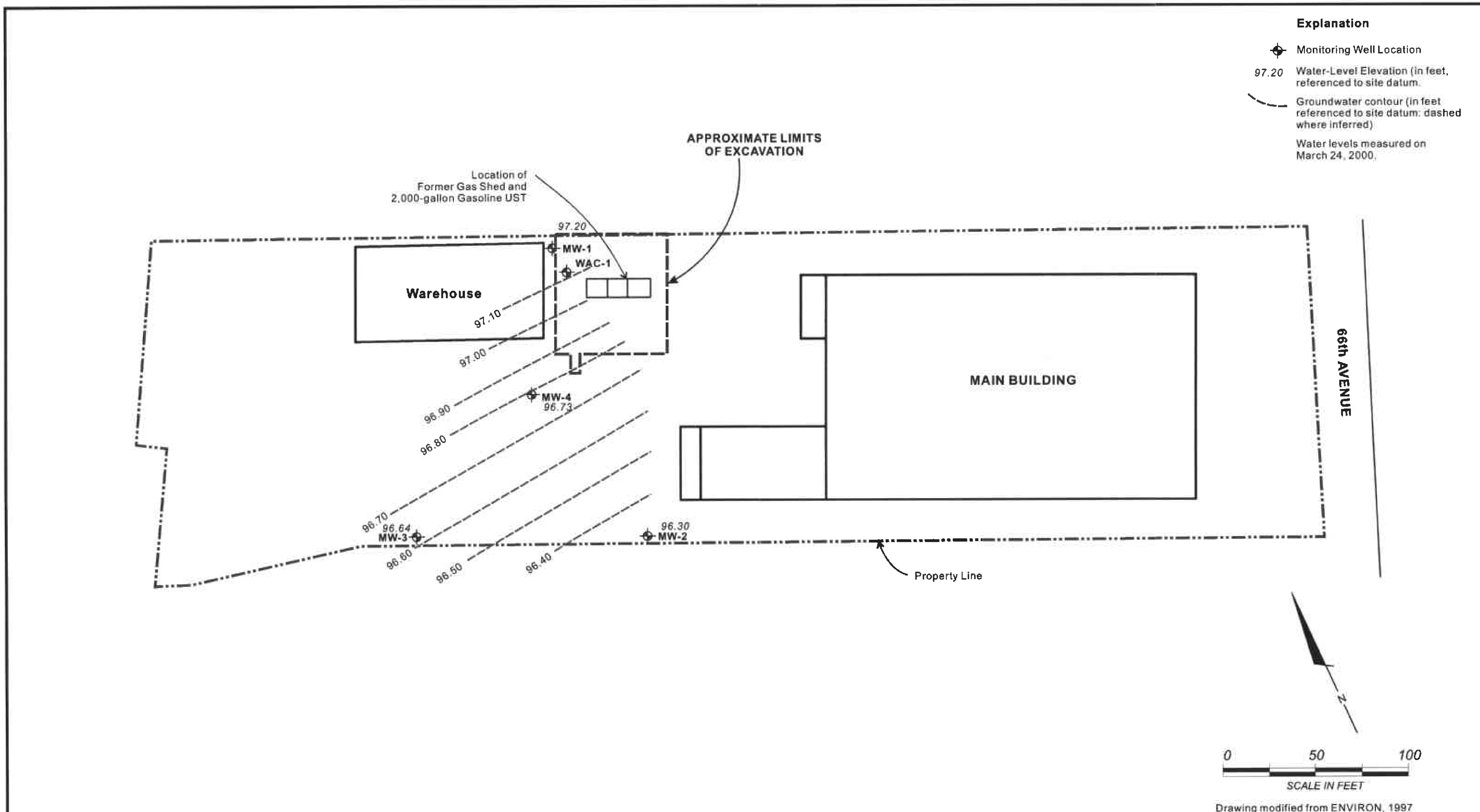

PES Environmental, Inc.
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Water-Level Elevation Map
First Quarter 2000 Groundwater Monitoring Report
Pacific Electric Motor Company
1009 66th Avenue, Oakland, California

PLATE 3

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APPENDIX A

EVALUATION OF GROUNDWATER REMEDIATION OPTIONS

EVALUATION OF REMEDIAL OPTIONS FOR GROUNDWATER
PACIFIC ELECTRIC MOTOR COMPANY
1009 66TH AVENUE
OAKLAND, CALIFORNIA

PES Environmental, Inc. (PES) has prepared this brief evaluation of potentially appliable remedial technologies to address the presence of petroleum hydrocarbons in shallow groundwater at the PEM facility located at 1009 66th Avenue, Oakland, California (Plate 1). Preparation of this evaluation was requested by Alameda County Environmental Health Services (ACEHS) in their January 24, 2000 letter to Mr. Perry of Pacific Electric Motor Company.

PES has previously investigated site soil and groundwater conditions and has prepared a Corrective Action Plan (CAP) that presented the results of a Risk-Based Corrective Action (RBCA) evaluation of risks to human health (PES, 1999). The RBCA evaluation compared the maximum concentrations of benzene, toluene, ethylbenzene, xylenes, and MTBE detected in soil and groundwater to calculated concentrations that would be protective of human health under various exposure scenarios. The exposure scenarios included volatilization of chemicals from the subsurface into outdoor and indoor air. The RBCA evaluation suggested that concentrations of benzene in groundwater exceed human health-based cleanup levels for both outdoor and indoor air exposures, and toluene concentrations exceed health-based cleanup levels in an indoor air exposure scenario. Though no structures overly the area of groundwater contamination and therefore no indoor air exposure scenation currently exists, PES recommended that conservative cleanup levels of 150 μg/L and 25,000 μg/L be established for benzene and toluene, respectively, under an indoor air exposure scenario. A cleanup level of 25,000 μg/L for benzene in groundwater would appear to be appropriate based on the RBCA evaluation for an outdoor air exposure setting. No

The RBCA evaluation suggested that MTBE concentrations in groundwater did not exceed health risk-based cleanup levels and that remediation of groundwater for MTBE did not appear warranted at this time. needed by SWRCB recommendation

Summary of Chemical Concentrations and Site Hydrogeology

The presence of dissolved-phase petroleum hydrocarbons at the site has been verified by collection and analysis of grab groundwater samples and periodic sampling of 4 groundwater monitoring wells. The current concentrations (well samples collected within the past year) of dissolved-phase petroleum hydrocarbons include TPHg at concentrations ranging from below the detection limit up to 210 milligrams per liter (mg/L), benzene from below the detection limit up to 16 mg/L, toluene from below the detection limit up to 13 mg/L, ethylbenzene from below the detection limit up to 2.5 mg/L, xylenes from below the detection limit up to 12 mg/L, and MTBE from below the detection limit up to 77 mg/L. The highest

(F.P.)

concentrations of these analytes were all detected in the samples collected from well MW-4, located immediately downgradient of the former UST.

Results of several years of groundwater monitoring indicate that groundwater flows at a nearly flat gradient to the south, and suggest that the dissolved hydrocarbon plume is very limited in area, is stable and is not migrating from the site. Further, the low conductivity and high organic carbon content of the Bay Mud water bearing zone limits the potential for the plume to migrate. Petroleum hydrocarbons have generally not been detected in groundwater monitoring wells located near the downgradient edge of the property.

Concentrations of benzene, toluene, ethylbenzene, xylenes, and MTBE exceed drinking water maximum contaminant levels* (MCLs) established by the State of California. Though no water production wells or other receptors are located in this area, the ACEHS is requesting that remedial options be evaluated to reduce these concentrations in shallow groundwater.

Groundwater Remedial Techniques

Groundwater that has been affected by petroleum hydrocarbons, including BTEX and MTBE, can be addressed by a variety of remedial techniques including:

- Groundwater Extraction and Treatment;
- Funnel and Gate Controls;
- Air Sparging;
- Monitored Natural Attenuation;
- Enhanced In-situ Bioremediation; and
- In-situ Oxidation.

Based on the site hydrogeological conditions, the low permeability of the water-bearing zone would likely preclude the effectiveness of groundwater extraction, funnel and gate, and air sparging remedial technologies. Principally, these techniques would be technically impracticable in a Bay Mud water-bearing zone and therefore these technologies were not evaluated further.

Petroleum hydrocarbons, including BTEX and MTBE, biodegrade in a variety of conditions. BTEX compounds are generally readily degraded by indigenous microorganisms. Biodegradation of MTBE is not usually as rapid, though it has been demonstrated to occur under controlled conditions in both aerobic and anaerobic (methanogenic) environments. There is limited evidence that aerobic degradation of MTBE will occur following

* California Code of Regulations, Title 22.

biodegradation of BTEX compounds. Other evidence has demonstrated that biodegradation of MTBE will occur rapidly in methanogenic conditions if BTEX compounds are also present. The rate of biodegradation of BTEX and MTBE, therefore, is quite variable and difficult to predict, and depends on a variety of factors including presence of adequate microbial populations, oxygen, organic carbon content, pH, concentrations of salts, and oxidation reduction potential (ORP). An understanding of how these factors affect the rate of biodegradation is necessary to predict the rate of in-situ metabolism of petroleum hydrocarbons. Two remedial techniques that rely on biological degradation of hydrocarbons, namely monitored natural attenuation and in-situ bioremediation, are discussed further below. Additionally, in-situ oxidation of petroleum hydrocarbons is also discussed as a potential remediation technique.

Monitored Natural Attenuation

Typically, initiation of a monitored natural attenuation (MNA) program will incorporate a groundwater sampling program that tests for a variety of constituents including starting concentrations of contaminants, dissolved oxygen content, oxygen reduction potential, iron, sulfide and sulfate. As natural degradation progresses, groundwater samples are collected periodically and chemical concentrations are reevaluated. The success of MNA depends on the ability of the naturally-occurring bio-organisms to continue to degrade the contaminants. Regulatory agencies have been reluctant to promote MNA as a remedial approach at many sites due to unknown rates of contaminant degradation by indigenous microorganisms.

The applicability of MNA at the subject property is somewhat problematic due to the high concentrations of MTBE and BTEX compounds and the likely slow rate of natural biological degradation. For these reasons, MNA is not promoted as the most appropriate remedial technique at this site at this time. Initiation of an MNA program in the future following a more aggressive remedial technique that will address the localized area of significant contamination may be appropriate to verify plume reduction.

In-situ Bioremediation

Remedial techniques that utilize naturally-occurring microorganisms to degrade chemicals in-situ can be allowed to proceed at a natural, "background" rate (i.e., MNA) or be accelerated with the addition of compounds such as nutrients. These "enhanced" bioremediation techniques are commonly utilized to increase the rate of bioremediation of petroleum hydrocarbons. Compounds that are commonly added to the environment to accelerate the remediation of petroleum hydrocarbons include Oxygen Release Compound (ORC) and dilute hydrogen peroxide.

The rate of metabolism of petroleum hydrocarbons by indigenous organisms is highly variable, and is dependent on a variety of environmental factors such as the initial number of organisms present, whether oxygen is present, and concentrations of nutrients and salts. Knowledge of initial baseline conditions is necessary to predict rates of biodegradation and, as biodegradation occurs, conditions within the environment change. Adjustments are often necessary, such as additional introduction of oxygen or trace minerals to maintain an optimal rate of chemical removal.

Because of the relatively high concentrations of dissolved petroleum hydrocarbons at the site, enhanced in-situ bioremediation is not recommended to be implemented at this time. The initiation of an enhanced bioremediation program may be appropriate in the future once concentrations of petroleum hydrocarbons diminish.

In-situ Oxidation

Remedial techniques involving the addition of oxidants to the subsurface have successfully destroyed petroleum hydrocarbons including MTBE. These oxidants include hydrogen peroxide, Fenton's Reagent (hydrogen peroxide with iron added as a catalyst), potassium permanganate and ozone. Additional research is ongoing to identify new compounds to destroy various contaminants including MTBE. These oxidants typically destroy the compound and produce water and carbon dioxide as a by-product of the reaction.

The feasibility of using hydrogen peroxide or Fenton's Reagent to oxidize chemicals in the subsurface requires a detailed evaluation and caution. Because the reaction produces carbon dioxide and heat, there may be a resulting pressure buildup within the chemical delivery system or subsurface. Degradation of hydrogen peroxide can also occur within the chemical delivery system. The volume of hydrogen peroxide necessary to be injected may be large, and safety concerns may exist for the storage of this hazardous substance. The optimal site setting for use of hydrogen peroxide includes a pH range between 2 and 4 in saturated soils, though the reaction will occur in settings up to a neutral pH. The presence of large amounts of organic carbon in the environment (as is believed to exist at the subject site) would necessitate the use of greater volumes of hydrogen peroxide since the organic material is also oxidized during the process. Changes to the pH of soil and groundwater at the site can also occur following treatment. The reaction however is very effective in oxidizing contaminants and with proper controls and monitoring, has been successfully implemented at several sites. Further evaluation of the applicability of oxidation of the site contaminants using hydrogen peroxide or Fenton's Reagent is appropriate.

The use of ozone as an oxidant may have certain advantages over hydrogen peroxide, particularly with respect to safety, however, delivery of ozone to the subsurface at the subject site is complicated by the low permeability of the site soils. Successful application of ozone would likely require a dense grid of delivery wells. Further evaluation of the applicability of oxidation of the site contaminants using ozone is appropriate.

Introduction of potassium permanganate to the environment is in some respects simpler than introduction of hydrogen peroxide (little potential for pressure build-up, and it is not as hazardous as hydrogen peroxide). Potassium permanganate, like hydrogen peroxide and ozone, is a strong oxidant. Drawbacks to use of potassium permanganate include conversion of background concentrations of chromium in soil to hexavalent chromium, a pollutant, and precipitation of magnesium thereby reducing permeability even further. Primarily due to these two factors, use of potassium permanganate is not recommended.

Recommended Remediation Alternative

The hydrogeologic conditions at the site preclude the use of several groundwater remedial technologies, such as groundwater extraction or air sparging, and the unknowns associated with bioremediation techniques suggest that a more active remedial approach in the immediate vicinity of well MW-4 may be beneficial to more rapidly reduce contaminant concentrations. Remedial techniques such as MNA, enhanced in-situ bioremediation and oxidation technologies appear to be appropriate. Use of an oxidant such as hydrogen peroxide, Fenton's Reagent or ozone appears amenable to site conditions. Further evaluation including possible performance of pilot tests would be beneficial in selecting the most effective and appropriate oxidant for use at the site.

The duration of just an MNA or in-situ bioremediation program may be too lengthy (5 years or more) to receive regulatory approval. Incorporation of an MNA program following oxidation of chemicals in the vicinity of well MW-4 to rapidly reduce the high concentrations of petroleum hydrocarbons could be performed under a project schedule amenable to ACEHS.

APPENDIX B

BLAINE TECH GROUNDWATER SAMPLING REPORT

BLAINE
TECH SERVICES INC.

1680 ROGERS AVENUE
SAN JOSE, CALIFORNIA 95112-1105
(408) 573-7771 FAX
(408) 573-0555 PHONE

RECEIVED APR 10 2000

April 7, 2000

PES Environmental, Inc.
1682 Novato Blvd., Suite 100
Novato, CA 94947

ATTN: Will Mast

Site:
Pacific Electric Motor Company
1099 66th Ave.
Oakland, California

Date:
March 24, 2000

GROUNDWATER SAMPLING REPORT 000324-N-1

Blaine Tech Services, Inc. performs specialized environmental sampling and documentation as an independent third party. In order to avoid compromising the objectivity necessary for the proper and disinterested performance of this work, Blaine Tech Services, Inc. does not participate in the interpretation of analytical results, or become involved with the marketing or installation of remedial systems.

This report deals with the groundwater well sampling performed by our firm in response to your request. Data collected in the course of our work at the site are presented in the TABLE OF WELL MONITORING DATA. This information was collected during our inspection, well evacuation and sample collection. Measurements include the total depth of the well and the depth to water. Water surfaces were further inspected for the presence of immiscibles. A series of electrical conductivity, pH, turbidity, and temperature readings were obtained during well evacuation and at the time of sample collection.

STANDARD PRACTICES

Evacuation and Sampling Equipment

As shown in the TABLE OF WELL MONITORING DATA, the wells at this site were evacuated according to a protocol requirement for the removal of three case volumes of water, before sampling. The wells were evacuated using disposable bailers.

Samples were collected using Disposable bailers.

Bailers: A bailer, in its simplest form, is a hollow tube which has been fitted with a check valve at the lower end. The device can be lowered into a well by means of a cord. When the bailer enters the water, the check valve opens and liquid flows into the interior of the bailer. The bottom check valve prevents water from escaping when the bailer is drawn up and out of the well.

Two types of bailers are used in groundwater wells at sites where fuel hydrocarbons are of concern. The first type of bailer is made of a clear material such as acrylic plastic and is used to obtain a sample of the surface and the near surface liquids, in order to detect the presence of visible or measurable fuel hydrocarbon floating on the surface. The second type of bailer is made of Teflon or stainless steel, and is used as an evacuation and/or sampling device.

Bailers are inexpensive and relatively easy to clean. Because they are manually operated, variations in operator technique may have a greater influence than would be found with more automated sampling equipment. Also, where fuel hydrocarbons are involved, the bailer may include near surface contaminants that are not representative of water deeper in the well.

Decontamination

All apparatus is brought to the site in clean and serviceable condition. The equipment is decontaminated after each use and before leaving the site.

Effluent Materials

The evacuation process creates a volume of effluent water which must be contained. Blaine Tech Services, Inc. will place this water in appropriate containers of the client's choice or bring new 55 gallon DOT 17 E drums to the site, which are appropriate for the containment of the effluent materials. The determination of how to properly dispose of the effluent water must usually await the results of laboratory analyses of the sample collected from the groundwater well. If that sample does not establish whether or not the effluent water is contaminated, or if effluent from more than one source has been combined in the same container, it may be necessary to conduct additional analyses on the effluent material.

Sampling Methodology

Samples were obtained by standardized sampling procedures that follow an evacuation and sample collection protocol. The sampling methodology conforms to both State and Regional Water Quality Control Board standards and specifically adheres to EPA requirements for apparatus, sample containers and sample handling as specified in publication SW 846 and T.E.G.D. which is published separately.

Sample Containers

Sample containers are supplied by the laboratory performing the analyses.

Sample Handling Procedures

Following collection, samples are promptly placed in an ice chest containing ice or an inert ice substitute such as Blue Ice or Super Ice. The samples are maintained in either an ice chest or a refrigerator until delivered into the custody of the laboratory.

Sample Designations

All sample containers are identified with both a sampling event number and a discrete sample identification number. Please note that the sampling event number is the number that appears on our chain of custody. It is roughly equivalent to a job number, but applies only to work done on a particular day of the year rather than spanning several days, as jobs and projects often do.

Chain of Custody

Samples are continuously maintained in an appropriate cooled container while in our custody and until delivered to the laboratory under our standard chain of custody. If the samples are taken charge of by a different party (such as another person from our office, a courier, etc.) prior to being delivered to the laboratory, appropriate release and acceptance records are made on the chain of custody (time, date and signature of person accepting custody of the samples).

Hazardous Materials Testing Laboratory

The samples obtained at this site were analyzed at Entech in Sunnyvale, California. Entech is certified by the California Department of Health Services under the Environmental Laboratory Accreditation Program (ELAP), and is listed as ELAP #I-2346.

Personnel

All Blaine Tech Services, Inc. personnel receive 29 CFR 1910.120(e)(2) training as soon after being hired as is practical. In addition, many of our personnel have additional certifications that include specialized training in level B supplied air apparatus and the supervision of employees working on hazardous materials sites. Employees are not sent to a site unless we are confident they can adhere to any site safety provisions in force at the site and unless we know that they can follow the written provisions of an SSP and the verbal directions of an SSO.

In general, employees sent to a site to perform groundwater well sampling will assume an OSHA level D (wet) environment exists unless otherwise informed. The use of gloves and double glove protocols protects both our employees and the integrity of the samples being collected. Additional protective gear and procedures for higher OSHA levels of protection are available.

Reportage

Submission to the Regional Water Quality Control Board and the local implementing agency should include copies of the sampling report, the chain of custody and the certified analytical report issued by the Hazardous Materials Testing Laboratory.

Please call if we can be of any further assistance.

William Jones

WRJ/pb

attachments: table of well monitoring data
chain of custody

TABLE OF WELL MONITORING DATA

Well I.D.	MW-1			MW-2			MW-3			MW-4		
Date Sampled	03/24/00			03/24/00			03/24/00			03/24/00		
Well Diameter (in.)	2			2			2			2		
Total Well Depth (ft.)	24.97			24.88			24.77			24.53		
Depth To Water (ft.)	3.47			3.55			3.29			3.59		
Free Product (in.)	NONE			NONE			NONE			NONE		
Reason If Not Sampled	--			--			--			--		
1 Case Volume (gal.)	3.4			3.4			3.4			3.4		
Did Well Dewater?	NO			NO			NO			NO		
Gallons Actually Evacuated	11.00			11.00			11.00			11.00		
Purging Device	DISPOSABLE BAILER			DISPOSABLE BAILER			DISPOSABLE BAILER			DISPOSABLE BAILER		
Sampling Device	DISPOSABLE BAILER			DISPOSABLE BAILER			DISPOSABLE BAILER			DISPOSABLE BAILER		
Time	9:16	9:22	9:28	7:30	7:37	7:42	8:01	8:13	8:14	8:43	8:49	8:54
Temperature (Fahrenheit)	61.6	61.2	61.3	61.3	62.2	62.2	62.6	64.3	63.3	69.6	71.7	70.4
pH	7.0	6.6	6.7	6.9	7.0	7.0	6.7	6.8	6.8	6.6	6.5	6.7
Conductivity (micromhos/cm)	416	400	403	1143	1077	1034	4964	5827	6387	6860	7071	7161
Nephelometric Turbidity Units	78	107	>200	>200	>200	>200	>200	>200	>200	138	91	74
Dissolved Oxygen (D.O) (mg/L)	--			--			--			--		
Oxidation Reduction Potential (mV)	--			--			--			--		
BTS Chain of Custody	000324-N-1			000324-N-1			000324-N-1			000324-N-1		
BTS Sample I.D.	MW-1			MW-2			MW-3			MW-4		
DOHS HMTL Laboratory	ENTECH			ENTECH			ENTECH			ENTECH		
Analysis	TPH-G, BTEX, MTBE			TPH-G, BTEX, MTBE			TPH-G, BTEX, MTBE			TPH-G, BTEX, MTBE		

BLAINE
TECH SERVICES, INC.

1680 ROGERS AVENUE
SAN JOSE, CALIFORNIA 95112-1105
FAX (408) 573-7771
PHONE (408) 573-0555

CHAIN OF CUSTODY BTS # 000324 N-1

CLIENT: PES

SITE: Pacific Electric Motor
1099 66th Avenue
Oakland, CA

CONDUCT ANALYSIS TO DETECT

LAB: Entech | DHS #

ALL ANALYSES MUST MEET SPECIFICATIONS AND DETECTION LIMITS SET BY CALIFORNIA DHS AND

- ☐ EPA
- ☐ LIA
- ☐ OTHER
- ☐ RWQCB REGION

SPECIAL INSTRUCTIONS

Invoice and Report to : PES

Attn: Will Mast

* Confirm MTBE hits by EPA 8240/8260

SAMPLE I.D.	DATE	TIME	MATRIX (S= SOIL W=H₂O)	CONTAINERS TOTAL	C = COMPOSITE ALL CONTAINERS	TPH - Gas (8015)	BTEX (8020)	MTBE (8020) *	ADD'L INFORMATION	STATUS	CONDITION	LAB SAMPLE #
MW-1	3/24/00	9:35	W	3		X	X	X				
MW-2	3/24/00	7:50	W	3		X	X	X	Confirm MTBE			
MW-3	3/24/00	8:23	W	3		X	X	X	Hits by EPA			
MW-4	3/24/00	9:00	W	3		X	X	X	8240/8260			

SAMPLING COMPLETED: DATE 3/24/00 TIME 9:38

SAMPLING PERFORMED BY: Garrett Heckel

RESULTS NEEDED NO LATER THAN: Per Client

RELEASED BY	DATE	TIME	RECEIVED BY	DATE	TIME
Garrett H.	3-27-00	1200 pm	J. McGuire	3/27/00	12:00

SHIPPED VIA	DATE SENT	TIME SENT	COOLER #

APPENDIX C

LABORATORY ANALYTICAL DATA SHEETS
AND
CHAIN-OF-CUSTODY RECORDS

RECEIVED MAY - 4 2000

Entech Analytical Labs, Inc.

CA ELAP# 2346

525 Del Rey Avenue, Suite E • Sunnyvale, CA 94086 • (408) 735-1550 • Fax (408) 735-1554

April 03, 2000

Will Mast
PES Environmental, Inc.
1682 Novato Boulevard, Suite 100
Novato, CA 94947

Order:	19745	**Date Collected:**	3/24/00
Project Name:	000324 N-1	**Date Received:**	3/27/00
Project Number:		**P.O. Number:**	
Project Notes:			

On March 27, 2000, samples were received under documentented chain of custody. Results for the following analyses are attached:

Matrix	Test	Method
Liquid	BTEX+MTBE	EPA 8020
	TPH as Gasoline	EPA 8015 MOD. (Purgeable)

Chemical analysis of these samples has been completed. Summaries of the data are contained on the following pages. USEPA protocols for sample storage and preservation were followed.

Entech Analytical Labs, Inc. is certified by the State of California (#2346). If you have any questions regarding procedures or results, please call me at 408-735-1550.

Sincerely,

Michelle L. Anderson
Lab Director

Entech Analytical Labs, Inc.

CA ELAP# 2346

525 Del Rey Avenue, Suite E • Sunnyvale, CA 94086 • (408) 735-1550 • Fax (408) 735-1554

PES Environmental, Inc.
1682 Novato Boulevard, Suite 100
Novato, CA 94947
Attn: Will Mast

Date: 4/3/00
Date Received: 3/27/00
Project Name: 000324 N-1
Project Number:
P.O. Number:
Sampled By: Blaine Tech

Certified Analytical Report

Order ID: 19745 **Lab Sample ID:** 19745-001 **Client Sample ID:** MW-1

Sample Time: 9:35 AM **Sample Date:** 3/24/00 **Matrix:** Liquid

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
MTBE	ND		1	5	5	µg/L		3/28/00	WGC2000328	EPA 8020
Benzene	ND		1	0.5	0.5	µg/L		3/28/00	WGC2000328	EPA 8020
Toluene	ND		1	0.5	0.5	µg/L		3/28/00	WGC2000328	EPA 8020
Ethyl Benzene	ND		1	0.5	0.5	µg/L		3/28/00	WGC2000328	EPA 8020
Xylenes, Total	ND		1	0.5	0.5	µg/L		3/28/00	WGC2000328	EPA 8020

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	100	65 - 135

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
TPH as Gasoline	ND		1	50	50	µg/L		3/28/00	WGC2000328	EPA 8015 MOD. (Purgeable)

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	110	65 - 135

DF = Dilution Factor ND = Not Detected DLR = Detection Limit Reported PQL = Practical Quantitation Limit

Analysis performed by Entech Analytical Labs, Inc. (CA ELAP #2346)

Michelle L. Anderson, Laboratory Director

Environmental Analysis Since 1983

Entech Analytical Labs, Inc.

CA ELAP# 2346

525 Del Rey Avenue, Suite E • Sunnyvale, CA 94086 • (408) 735-1550 • Fax (408) 735-1554

PES Environmental, Inc.
1682 Novato Boulevard, Suite 100
Novato, CA 94947
Attn: Will Mast

Date: 4/3/00
Date Received: 3/27/00
Project Name: 000324 N-1
Project Number:
P.O. Number:
Sampled By: Blaine Tech

Certified Analytical Report

Order ID: 19745 **Lab Sample ID:** 19745-002 **Client Sample ID:** MW-2

Sample Time: 7:50 AM **Sample Date:** 3/24/00 **Matrix:** Liquid

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
MTBE	ND		1	5	5	µg/L		3/29/00	WGC2000328	EPA 8020
Benzene	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020
Toluene	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020
Ethyl Benzene	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020
Xylenes, Total	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	101	65 - 135

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
TPH as Gasoline	ND		1	50	50	µg/L		3/29/00	WGC2000328	EPA 8015 MOD. (Purgeable)

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	113	65 - 135

DF = Dilution Factor ND = Not Detected DLR = Detection Limit Reported PQL = Practical Quantitation Limit

Analysis performed by Entech Analytical Labs, Inc. (CA ELAP #2346)

Michelle L. Anderson, Laboratory Director

Environmental Analysis Since 1983

Entech Analytical Labs, Inc.

CA ELAP# 2346

525 Del Rey Avenue, Suite E • Sunnyvale, CA 94086 • (408) 735-1550 • Fax (408) 735-1554

PES Environmental, Inc.
1682 Novato Boulevard, Suite 100
Novato, CA 94947
Attn: Will Mast

Date: 4/3/00
Date Received: 3/27/00
Project Name: 000324 N-1
Project Number:
P.O. Number:
Sampled By: Blaine Tech

Certified Analytical Report

Order ID: 19745 **Lab Sample ID:** 19745-003 **Client Sample ID:** MW-3

Sample Time: 8:23 AM **Sample Date:** 3/24/00 **Matrix:** Liquid

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
MTBE	ND		1	5	5	µg/L		3/29/00	WGC2000328	EPA 8020
Benzene	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020
Toluene	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020
Ethyl Benzene	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020
Xylenes, Total	ND		1	0.5	0.5	µg/L		3/29/00	WGC2000328	EPA 8020

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	102	65 - 135

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
TPH as Gasoline	ND		1	50	50	µg/L		3/29/00	WGC2000328	EPA 8015 MOD. (Purgeable)

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	109	65 - 135

DF = Dilution Factor ND = Not Detected DLR = Detection Limit Reported PQL = Practical Quantitation Limit

Analysis performed by Entech Analytical Labs, Inc. (CA ELAP #2346)

Michelle L. Anderson, Laboratory Director

Environmental Analysis Since 1983

Entech Analytical Labs, Inc.

CA ELAP# 2346

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PES Environmental, Inc.
1682 Novato Boulevard, Suite 100
Novato, CA 94947
Attn: Will Mast

Date: 4/3/00
Date Received: 3/27/00
Project Name: 000324 N-1
Project Number:
P.O. Number:
Sampled By: Blaine Tech

Certified Analytical Report

Order ID: 19745 **Lab Sample ID:** 19745-004 **Client Sample ID:** MW-4

Sample Time: 9:00 AM **Sample Date:** 3/24/00 **Matrix:** Liquid

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
MTBE	44000		200	5	1000	µg/L		3/30/00	WGC2000328	EPA 8020
Benzene	16000		200	0.5	100	µg/L		3/30/00	WGC2000328	EPA 8020
Toluene	13000		200	0.5	100	µg/L		3/30/00	WGC2000328	EPA 8020
Ethyl Benzene	2500		200	0.5	100	µg/L		3/30/00	WGC2000328	EPA 8020
Xylenes, Total	12000		200	0.5	100	µg/L		3/30/00	WGC2000328	EPA 8020

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	101	65 - 135

Parameter	Result	Flag	DF	PQL	DLR	Units	Extraction Date	Analysis Date	QC Batch ID	Method
TPH as Gasoline	95000		200	50	10000	µg/L		3/30/00	WGC2000328	EPA 8015 MOD. (Purgeable)

Surrogate	Surrogate Recovery	Control Limits (%)
aaa-Trifluorotoluene	106	65 - 135

DF = Dilution Factor ND = Not Detected DLR = Detection Limit Reported PQL = Practical Quantitation Limit

Analysis performed by Entech Analytical Labs, Inc. (CA ELAP #2346)

Michelle L. Anderson, Laboratory Director

Environmental Analysis Since 1983

Entech Analytical Labs, Inc.

525 Del Rey Avenue, Suite E
Sunnyvale, CA 94086

QUALITY CONTROL RESULTS SUMMARY
METHOD: Gas Chromatography
Laboratory Control Sample

QC Batch #: WGBG2000328
Matrix: Water
Units: µg/Liter

Date Analyzed: 03/28/00
Quality Control Sample: Blank Spike

PARAMETER	Method #	MB µg/Liter	SA µg/Liter	SR µg/Liter	SP µg/Liter	**SP % R**	SPD µg/Liter	**SPD %R**	RPD	QC LIMITS RPD	QC LIMITS %R
Benzene	8020	<0.50	4.3	ND	3.8	**88**	3.8	**89**	1.0	25	67-115
Toluene	8020	<0.50	28.0	ND	29	**102**	30	**108**	5.6	25	82-122
Ethyl Benzene	8020	<0.50	5.6	ND	5.8	**103**	6.3	**112**	8.6	25	77-114
Xylenes	8020	<0.50	31.3	ND	33	**104**	35	**113**	8.0	25	85-125
Gasoline	8015	<50.0	484	ND	508	**105**	505	**104**	0.7	25	74-122
aaa-TFT(S.S.)-PID	8020			101%	98%		96%				65-135
aaa-TFT(S.S.)-FID	8015			111%	105%		103%				65-135

Definition of Terms:

na: Not Analyzed in QC batch
MB: Method Blank
SA: Spike Added
SR: Sample Result
RPD(%): Duplicate Analysis - Relative Percent Difference
SP: Spike Result
SP (%R): Spike % Recovery
SPD: Spike Duplicate Result
SPD (%R): Spike % Recovery
nc: Not Calculated

BLAINE
TECH SERVICES, INC.

1680 ROGERS AVENUE
SAN JOSE, CALIFORNIA 95112-1105
FAX (408) 573-7771
PHONE (408) 573-0555

CHAIN OF CUSTODY BTS # 000324 N-1

CLIENT: PES

SITE: Pacific Electric Motor
1099 66th Avenue
Oakland, CA

LAB: Entech | DHS #

ALL ANALYSES MUST MEET SPECIFICATIONS AND DETECTION LIMITS SET BY CALIFORNIA DHS AND
☐ EPA ☐ LIA ☐ OTHER ☐ RWQCB REGION ______

SPECIAL INSTRUCTIONS

Invoice and Report to : PES
Attn: Will Mast
* Confirm MTBE hits by EPA 8240/8260

CONDUCT ANALYSIS TO DETECT

SAMPLE I.D.	DATE	TIME	MATRIX (S= SOIL, W=H2O)	CONTAINERS TOTAL	19745	C = COMPOSITE ALL CONTAINERS	TPH - Gas (8015)	BTEX (8020)	MTBE (8020) *					ADD'L INFORMATION	STATUS	CONDITION	LAB SAMPLE #
MW-1	3/24/00	9:35	W	3	001		X	X	X								
MW-2	3/24/00	7:50	W	3	002		X	X	X					Confirm MTBE			
MW-3	3/24/00	8:23	W	3	003		X	X	X					Hits by EPA			
MW-4	3/24/00	9:00	W	3	004		X	X	X					8240/8260			

SAMPLING COMPLETED: DATE 3/24/00 TIME 9:38
SAMPLING PERFORMED BY: Garrett Heckel

RESULTS NEEDED NO LATER THAN: Per Client

RELEASED BY	DATE	TIME	RECEIVED BY	DATE	TIME
Garrett H	3-27-00	1200 pm	J. Mylini	3/27/00	12:00
Mylini	3/27/00	12:26	Leo Rodriguez	3/27/00	1300

SHIPPED VIA	DATE SENT	TIME SENT	COOLER #

00 MAR 27 12:2

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AUGUST 22, 2000

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QUALITY CONTROL REVIEWER

William F. Frizzell

William F. Frizzell, P.E.
Principal Engineer