TRANSMITTAL

ENGINEERING-SCIENCE, INC.
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Date: 3 May 1991
ES Project No. NC222.13

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How Mailed:

To: Alameda County Environmental Service Agency
80 Swan Way, Suite 200
Oakland, CA 94621

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Attn: Dennis Byrne
Re: 1650-65th Street Site, Oakland CA

WE ARE SENDING YOU

☒ ATTACHED ☐ UNDER SEPARATE COVER VIA

☐ SHOP DRAWINGS ☐ TRACINGS
☐ PRINTS ☐ CATALOGS
☐ DOCUMENTS ☐ COPY OF LETTER
☐ SPECIFICATIONS ☐

COPIES	DATE	ITEM
1	4/15/91	March 1991 (Sixth Quarterly) Groundwater Monitoring Report, 1650 65th Street, Emeryville, CA

Remarks

COPY TO
☒ File
☒ Author
☒ Reading File
☐

Signed: Clyde R. Wong, Project Manager

ES.01 (10/89)

ES
ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 548-7970 Fax: (415) 548-7635

15 April 1991
Ref: NC222.13

Alameda County Environmental Health Services
Hazardous Materials Division
80 Swan Way, Suite 200
Oakland, CA 94621

Attention: Mr. Dennis Byrne

Subject: March 1991 (Sixth Consecutive Quarterly) Groundwater Monitoring Report, 1650 65th Street Site, Emeryville, California

Dear Mr. Byrne:

INTRODUCTION

This letter report presents the hydrologic and hydrochemical results of the March 1991 groundwater sampling event and a summary of the groundwater remediation conducted at the 1650 65th Street Site in Emeryville, California. The purpose of groundwater sampling is to collect data to evaluate seasonal variations and/or offsite source inputs on the groundwater quality and quantity. ES has been monitoring groundwater conditions at the site since November 1989. The November 1990 event marked the completion of one year of quarterly sampling. The present sampling event is the sixth consecutive event with the others occurring in November 1989, February 1990, May 1990, August 1990, and November 1990.

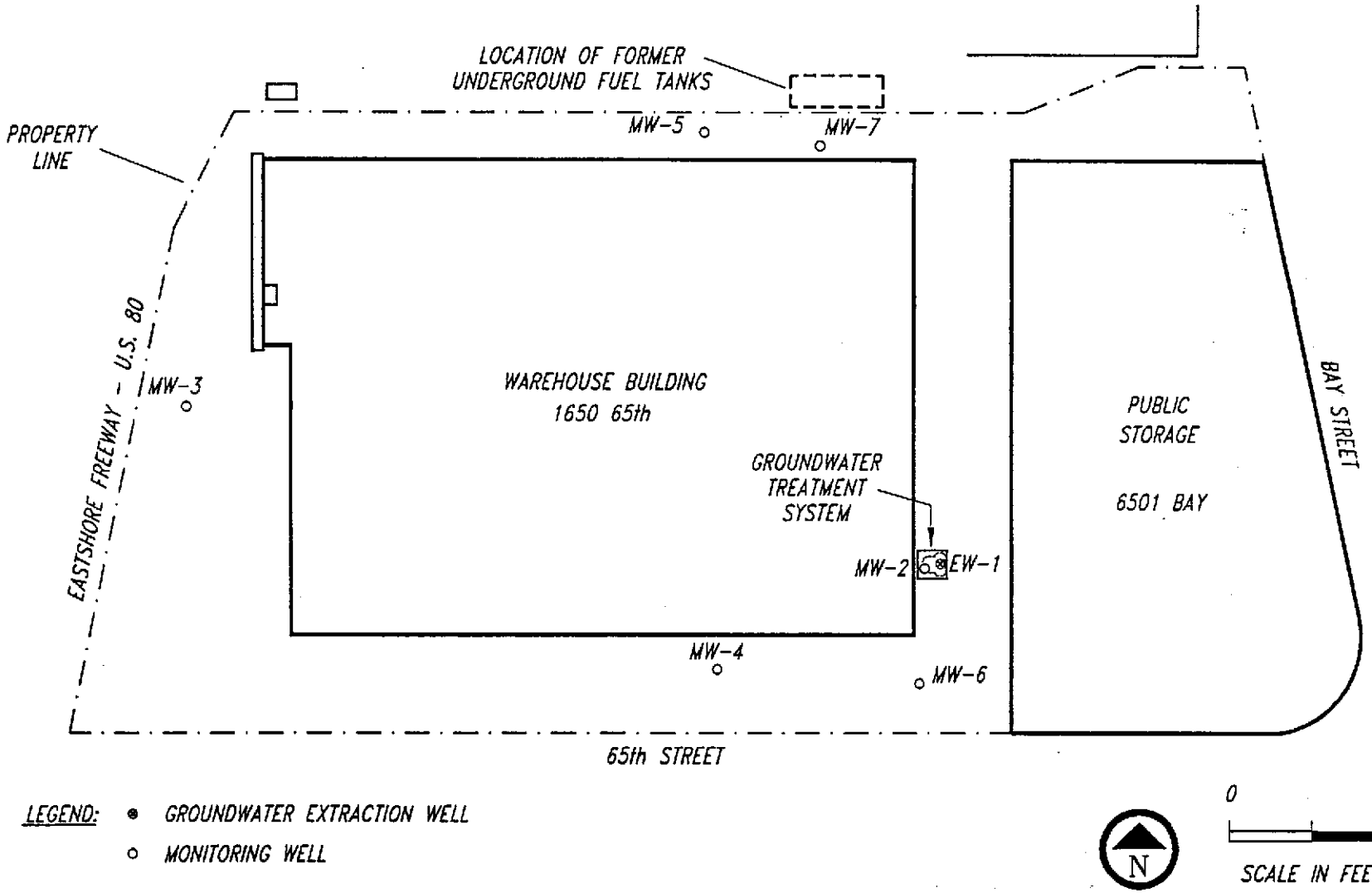
Groundwater extraction and treatment operation at the site began on 17 December 1990. The groundwater extraction and treatment system consists of pumping water from extraction well EW-1 and routing it through of three activated carbon canisters in a series to treat it. The treated water is discharged to a sanitary sewer in accordance with East Bay Municipal Utility District (EBMUD) effluent discharge Permit No. 502-02911 conditions. The system initially operated at a flow rate of 5 gpm; however, the pumping rate later equilibrated at approximately 2 gpm. The initial pumping rate was initially higher because the water was released mainly from the storage within the backfilled excavation. The natural recharge rate of the formation is estimated to be less than 2 gpm.

The monitoring wellfield at the site consists of six (6) monitoring wells (MW-2, MW-3, MW-4, MW-5, MW-6, MW-7) and one (1) extraction well (EW-1). Figure 1 shows the locations of all seven wells at the site. Extraction Well EW-1 and monitoring Well MW-2 are located in the excavation backfill of the former on-site underground fuel storage tank. Well MW-3 is located near the western property line; Wells MW-4 and MW-6 are located near the southern property line, and Wells MW-5 and MW-7 are

SITE PLAN

1650 65th Street Property

Emeryville, California



ENGINEERING—SCIENCE

FIGURE 1

C107-06.R3 1/3/91

located along the northern property line. Three underground fuel storage tanks were removed from the neighboring property to the north in 1989.

SAMPLING PROTOCOLS

Groundwater samples were collected from the monitoring wells on 01 March 1991 following the Regional Water Quality Control Board (RWQCB) groundwater sampling guidelines. Before sampling, the static groundwater levels in all the wells were recorded using an electronic water level indicator to a precision of 0.01 feet.

The next step entailed the collection of groundwater samples. Each well was initially checked for the presence of free floating product. This was accomplished by collecting water from the top 6 inches using a quartz/Teflon bailer and inspecting it for free floating product, any odor, and/or oily sheen. An oily sheen and a strong hydrocarbon odor was observed in Well MW-2.

In order to sample for dissolved product, a minimum of three submerged well casing volumes were purged from each well prior to sampling. Field measurements of temperature, hydrogen ion index (pH) and electrical conductivity (EC) were recorded three times: prior to purging, after two well volumes had been removed from each well, and after three well volumes had been removed from each well. Each time, the parameters were compared with previously recorded values to document stabilization. The purpose of recording temperature, pH, and EC readings was to ensure that a water sample representative of formation water was collected. Temperature, EC, and pH values in each of the wells, except MW-2, stabilized within the first three readings (initial, two casing volumes, and three casing volumes) thus water samples were subsequently collected. Four casing volumes were purged from Well MW-2 before collection of groundwater samples.

Groundwater purging and sampling was done using a clean quartz/Teflon bailer. Samples for total volatile hydrocarbons (gasoline and BTXE) were collected in 40 ml glass containers specifically designed to prevent the loss of volatile components. Containers were preserved with hydrochloric acid per standard protocol for the method. Samples for total extractable hydrocarbons (diesel) were collected in 1000 ml glass amber bottles. All samples were labelled and chain-of-custody records were completed prior to placement of these containers in an iced cooler. After collection of water samples from individual wells, the sampling equipment was decontaminated by washing with a mild detergent/water solution followed by rinsing with deionized water. Appendix A contains the groundwater sampling notes, water levels recorded in each well and chain-of-custody records.

GROUNDWATER ELEVATIONS

Table 1 lists the historical groundwater levels for the last five quarterly monitoring events for each surveyed well. Water levels measured in the field were calculated with reference to USGS datum. Wells MW-6 and MW-7 were surveyed for the first time on 1 April 1991. All the other wells were also resurveyed on the same date to validate elevations originally surveyed. Therefore for the first time, water elevations in Wells MW-6 and MW-7 were used to construct the water table isopleth map presented as Figure 2.

Water levels in each of the four surveyed wells except for MW-2 increased since the last monitoring event in November 1990. Water level in Well MW-2 decreased by 0.84 feet. The decrease in water level in MW-2 may be due to drawdown created by extraction Well EW-1. Although extraction Well EW-1 was down for maintenance at the time of sampling, the drawdown may be due to slow groundwater recovery in MW-2. Based on the water levels measured on 01 March 1991, the groundwater flow direction at the site was determined to be toward the southwest, which is consistent with historical groundwater flow direction. All the wells except Well MW-7 recharged quickly enough to be purged non-stop manually by 2-inch diameter bailer. Groundwater recharge in Well MW-7 was relatively slower.

TABLE 1

HISTORICAL GROUNDWATER LEVELS
(Feet Above Mean Sea Level)

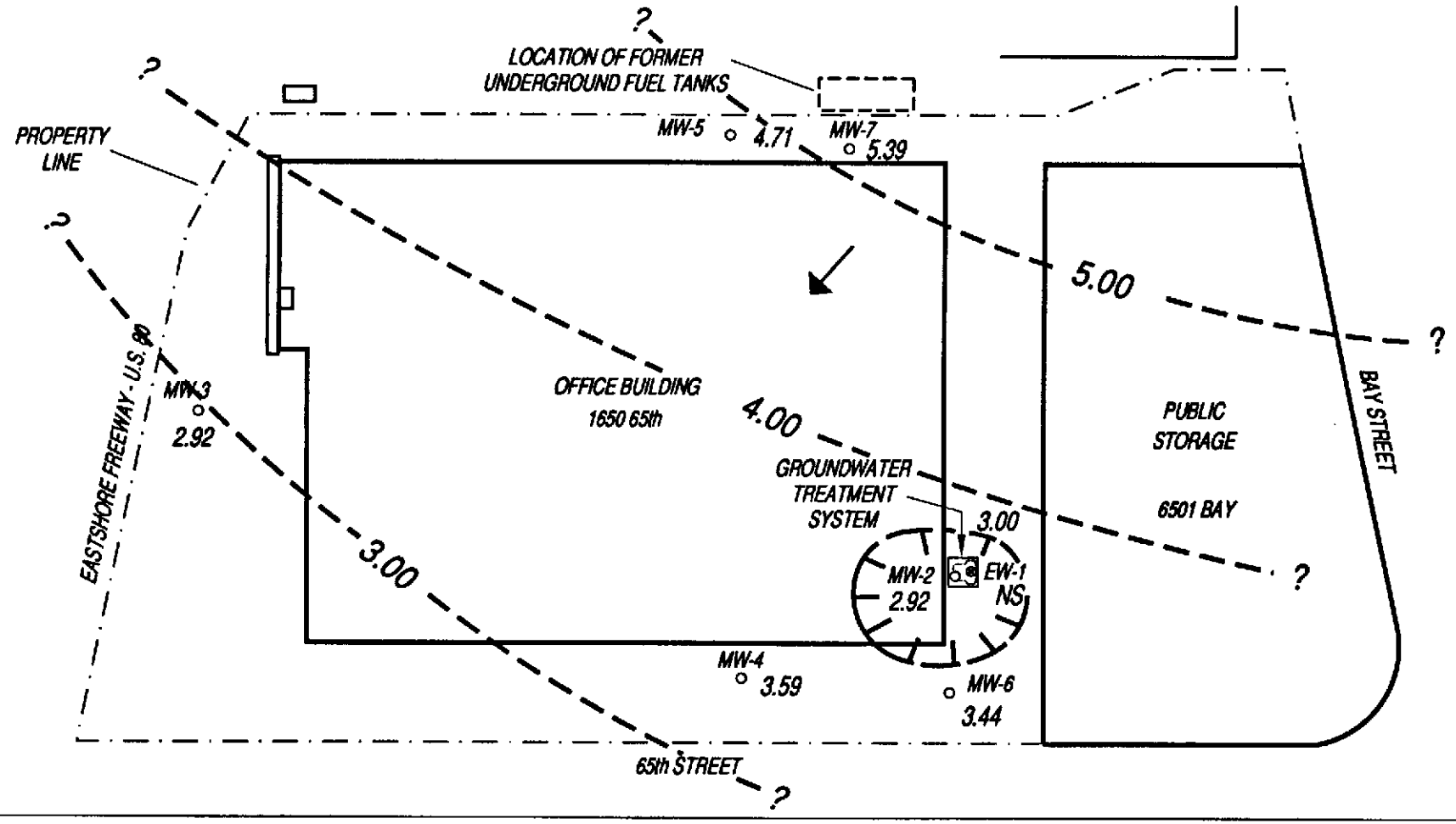
	Quarterly Sampling Events				
Well ID	21 February 90	25 May 90	29 August 90	29 November 90	01 March 91
MW-2	4.03	3.92	4.03	3.76	2.92
MW-3	3.27	3.20	2.95	2.65	2.92
MW-4	3.61	3.66	3.74	3.50	3.59
MW-5	5.90	5.23	5.06	4.64	4.71
MW-6	NI	NS	NS	NS	3.44
MW-7	NI	NS	NS	NS	5.39
EW-1	NI	NS	NS	NS	NS

Notes: All elevations w.r.t. USGS datum
NI = Well Not Installed
NS = Well Elevations Not Surveyed

GROUNDWATER ELEVATION MAP

1650 65th Street Site, Emeryville, California

1 March 1991



LEGEND:

- ● GROUNDWATER EXTRACTION WELL
- ○ MONITORING WELL
- NS NOT SURVEYED
- 5.00 — GROUNDWATER ELEVATION CONTOUR
- ○ 3.50 WATER LEVEL ELEVATION IN FEET ABOVE SEA LEVEL
- ↙ GROUNDWATER FLOW DIRECTION

N

0 100

SCALE IN FEET

FIGURE 2

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C155-12.R2 4/9/91

ANALYTICAL RESULTS

Groundwater samples collected from all wells except MW-4 were analyzed using EPA Method 8020 for BTXE and DHS-LUFT Method (Modified 8015) for both gasoline and diesel. The water sample from MW-4 was analyzed only for diesel and BTXE but not gasoline. This sample was not analyzed for gasoline because in four consecutive monitoring events (since February 1990) samples collected from this well did not contain gasoline. The analytical procedures followed are referenced along with the analytical results in Appendix B.

Table 2 summarizes the historical analytical results of groundwater samples collected from the site wells for the last six events. The relevant state and federal drinking water standards are also listed for comparison.

Only one well (MW-2) contained gasoline at concentrations above the detection limit. Well MW-2 contained 72,000 µg/L of gasoline. Wells MW-3, MW-5, and MW-6 which had detected 900 µg/L, 600 µg/L, and 1200 µg/L of gasoline in November 1990, did not contain gasoline above the 0.5 mg/L detection limit. Only two wells (MW-2, MW-5) contained diesel above detection limits. Well MW-2 contained 1800 µg/L and Well MW-5 contained 1100 µg/L. Wells which had detected diesel during the previous sampling event were: MW-2 (3,500 µg/L), MW-3 (800 µg/L), MW-4 (700 µg/L), MW-6 (1,400 µg/L), and MW-7 (54 µg/L), and EW-1 (3,100 µg/L). Groundwater analytical results from the future sampling events will be used to evaluate the statistical significance of the hydrochemical data collected.

None of the sample were analyzed for purgeable halocarbons or lead. Benzene was detected in wells MW-2 (5500 µg/L), MW-3 (25 µg/L), MW-4 (3 µg/L), MW-5 (66 µg/L), MW-7 (100 µg/L), and EW-1 (1200 µg/L). Toluene was detected in wells MW-2 (6600 µg/L), MW-3 (25 µg/L), MW-5 (2.3 µg/L), MW-7 (3.6 µg/L), and EW-1 (280 µg/L). Xylenes were detected in only two wells: MW-2 and MW-3. Only MW-2 showed 7,700 µg/L of xylene which was above the drinking water standards (California Maximum Contaminant Level). Ethylbenzene was detected in MW-2 (1000 µg/L), MW-3 (5.3 µg/L), and EW-1 (360 µg/L). Only MW-2 had ethylbenzene concentrations above the California MCL (680 µg/L).

Total BTXE concentrations in Well EW-1 were significantly lower than the November 1990 (pre-groundwater extraction and treatment period) concentration. The decrease in groundwater concentrations may be attributed to the groundwater remediation system. The drop in BTEX concentrations in MW-2 is not very significant. However, the benzene concentrations in MW-2 dropped below 6,000 ug/L for the first time in its

TABLE 2
HISTORICAL GROUNDWATER SAMPLING ANALYTICAL RESULTS
1650 – 65TH STREET PROPERTY, EMERYVILLE

Well ID	Sample Date	Total Petroleum Hydrocarbons (ug/L)		Aromatic Hydrocarbons (ug/L)					Purgeable Halocarbons (ug/L)	Lead (mg/L)
		Gasoline	Diesel	Benzene	Toluene	Xylenes (total)	Ethyl-Benzene	Total BTXE		
MW-2	Nov 89	100,000	NA	8,400	7,400	13,000	2,400	31,200	15*	0.05
	Feb 90	54,000	NA	7,800	5,600	8,400	1,600	23,400	32*	0.021
	May 90	40,000	NA	7,800	7,500	7,600	1,600	24,500	76*	0.025
	Aug 90	49,000	4,600	9,000	8,000	8,900	ND	25,900	40*	0.0059
	Nov 90	73,000	3,500	6,900	5,900	7,400	1,400	21,600	NA	NA
	Mar 91	72,000	1,800	5,300	6,600	7,700	1,000	20,800	NA	NA
MW-3	Nov 89	130	NA	2.2	ND	3	ND	5.2	ND	ND
	Feb 90	ND	NA	2.5	ND	ND	ND	2.5	NA	0.011
	May 90	ND	ND	2	ND	ND	ND	2	ND	NA
	Aug 90	ND	800	4.4	2.9	5.4	ND	12.7	NA	NA
	Nov 90	900	800	3.4	ND	ND	ND	3.4	NA	NA
	Mar 91	ND	ND	25	25	32	5.3	87.3	NA	NA
MW-4	Nov 89	200	NA	2.3	ND	ND	ND	2.3	ND	ND
	Feb 90	ND	NA	ND	ND	ND	ND	ND	NA	0.006
	May 90	ND	ND	1	ND	ND	ND	1	ND	NA
	Aug 90	ND	800	8.9	7.1	9.4	ND	25.4	NA	NA
	Nov 90	ND	700	2.7	ND	ND	ND	2.7	NA	NA
	Mar 91	NA	ND	3	ND	ND	ND	3	NA	NA
MW-5	Nov 89	ND	NA	74	ND	4.2	ND	78.2	ND	ND
	Feb 90	ND	NA	200	ND	ND	ND	200	NA	0.012
	May 90	ND	ND	110	ND	ND	ND	110	ND	NA
	Aug 90	ND	700	66	2.2	3.8	ND	72	NA	NA
	Nov 90	600	900	69	ND	ND	ND	69	NA	NA
	Mar 91	ND	1,100	66	2.3	ND	ND	68.3	NA	NA
MW-6	Nov 89	NI	NI	NI	NI	NI	NI	NI	NI	NI
	Feb 90	NI	NI	NI	NI	NI	NI	NI	NI	NI
	May 90	NA	ND	ND	ND	ND	ND	ND	ND	ND**
	Aug 90	NA	ND	NA	NA	NA	NA	NA	NA	ND**
	Nov 90	1,200	1,400	1.2	ND	ND	ND	1.2	NA	NA
	Mar 91	ND	ND	ND	ND	ND	ND	ND	NA	NA
MW-7	Nov 89	NI	NI	NI	NI	NI	NI	NI	NI	NI
	Feb 90	NI	NI	NI	NI	NI	NI	NI	NI	NI
	May 90	NA	600	240	ND	ND	ND	240	ND	ND**
	Aug 90	ND	ND	81	1.8	1.6	ND	84.4	ND	ND**
	Nov 90	ND	800	54	ND	ND	ND	54	NA	NA
	Mar 91	ND	ND	100	3.6	ND	ND	103.6	NA	NA

TABLE 2 (continued)
HISTORICAL GROUNDWATER SAMPLING ANALYTICAL RESULTS
1650 – 65TH STREET PROPERTY, EMERYVILLE

Well ID	*Sample Date*	*Total Petroleum Hydrocarbons (ug/L)*		*Aromatic Hydrocarbons (ug/L)*					*Purgeable Halocarbons (ug/L)*	*Lead (mg/L)*
		Gasoline	*Diesel*	*Benzene*	*Toluene*	*Xylenes (total)*	*Ethyl-Benzene*	*Total BTXE*		
EW-1	Nov 89	NI	NI	NI	NI	NI	NI	NI	NI	NI
	Feb 90	NI	NI	NI	NI	NI	NI	NI	NI	NI
	May 90	20,000	ND	7,500	4,500	6,300	1,000	19,300	68	ND**
	Aug 90	NA	3,500	6,000	4,200	4,600	ND	14,800	16*	ND**
	Nov 90	47,000	3,100	6,000	3,400	4,700	1,000	15,100	NA	NA
EW-1(grab)	Feb 91	NA	NA	1,200	280	ND	360	1,840	NA	NA
Drinking Water Standards				1^	2,000~	1,750^	680^		0.5^	5.0^

Notes:

* = 1,2 - 1,2-Dichloroethane concentration (only 1,2-Dichloroethane detected)

^ = California Maximum Contaminant Level (MCL) California Code of Regulations, Title 22, Section 64435, Current as of 03/31/90

~ = Proposed Maximum Contaminant level, Region 9 Environmental Protection Agency Drinking Water Standards and Health Advisory Tables Drinking Water Branch, June 1989.

ND = Not Detected; NA = Not Analyzed; NI = Not Installed.

** = Organic Lead

EW-1(grab) was collected from extraction pump.

sampling history. Larger BTXE concentration drops are expected in these wells in future. Monitoring wells MW-3 showed a statistically significant increase in total BTEX concentration although it decreased in gasoline TPH concentration.

Appendix B contains the analytical results, detection limits, and methods used for analyses.

GROUNDWATER EXTRACTION AND TREATMENT

The recently installed activated carbon treatment system has effectively remediated over 43,000 gallons of contaminated groundwater extracted from EW-1. In compliance with the EBMUD discharge permit, performance of the groundwater extraction and treatment system is monitored by periodically collecting and analyzing samples from three sampling ports on the system. These three sampling ports are located as follows: 1) directly after the extraction well EW-1 (pre-treatment samples), 2) after the first activated carbon canister, 3) after the third activated carbon canister (effluent). Analytical results of the pre-treatment sample are used to monitor changes in groundwater contaminant concentrations.

Analytical results of grab samples collected from extraction piping indicate that the total BTXE concentrations of groundwater from EW-1 decreased from 31,100 µg/L on 17 December 1990 to 1840 µg/L on 13 February 1991. A more complete description of the groundwater extraction and treatment program is provided in Appendix C, which includes the first Quarterly Groundwater Treatment System Self-monitoring Report. The analytical results of samples collected from the effluent port during the first quarter showed that the discharged water met EBMUD wastewater discharge permit conditions.

SUMMARY

The groundwater elevations have fluctuated slightly since the November 1990 monitoring event. The groundwater flow direction is essentially the same, to the southwest.

Total BTXE and TPH concentrations in both MW-2 and EW-1 (wells closest to the former UFST) were lower than the historical averages. Well MW-6, which had detected gasoline, diesel and BTXE for the first time in November 1990, did not detect TPH or BTXE during the current event. Overall TPH concentration dropped below the detection limit of 500 µg/L in Well MW-3 although the total BTEX increased from 3.4 µg/L in the last monitoring event to 87.3 µg/L in this monitoring event. The overall TPH and BTXE concentrations in wells away from the extraction system did not change significantly.

Data from future sampling events will be used to further evaluate the effectiveness of groundwater extraction and treatment system.

Very truly yours,

Clyde R. Wong, P.E.
Project Manager

Richard S. Makdisi, R.G.
Project Director

RSM/AS/dk/172-27.R5
Attachments

cc: Mr. Thomas Gram, P.O. Partners

REFERENCES

Engineering-Science, Inc., 1987a, Underground Fuel Storage Tank Site Investigation near the Southeast Corner of the Warehouse Building, 1650 65th Street Property, Emeryville, California.

Engineering-Science, Inc., 1987b, Soil Remediation Plan for the Southeastern Corner of the 1650 65th Street Property, Emeryville, California.

Engineering-Science, Inc., 1988, Implementation of Soil Remedial Action Plan Report for United States Postal Service at 1650 65th Street, Emeryville, California.

Engineering-Science, Inc., 1989a, October 1989 Quarterly Groundwater Monitoring Results for the 1650 65th Street Property in Emeryville, California.

Engineering-Science, Inc., 1989b, November 1989 Groundwater Contamination Investigation, 1650 65th Street, Emeryville, California.

Engineering-Science, Inc., 1990a, February 1990 Second Quarterly Groundwater Monitoring Report 1650 65th Street, Emeryville, California.

Engineering-Science, Inc., 1990b, June 1990 Evaluation of Remedial Alternatives and Remedial Action Plan for the 1650 65th Street Property, Emeryville, California.

Engineering-Science, Inc., 1990c, June 1990 Third Quarterly Groundwater Monitoring Report 1650 65th Street, Emeryville, California.

Engineering-Science, Inc., 1990d, October 1990 Fourth Quarterly Groundwater Monitoring Report 1650 65th Street, Emeryville, California

Engineering-Science, Inc., 1991a, March 1991 First Quarterly Groundwater Treatment System Self Monitoring Report, 1650 65th Street Site, Emeryville, California

WATER LEVEL DATA

P.O. PARTNERS, EMERYVILLE, CALIFORNIA

PERSONNEL: PLY, AS DATE: 01 MARCH 1991

WELL ID	MEASURED WELL DEPTH FROM T.O.C. (feet)	WATER LEVEL FROM T.O.C (feet)	WELL CASING DIAMETER (Inches)	SUBMERGED WELL CASING VOLUME (gallons)	GROUND SURFACE HEIGHT FROM T.O.C (feet)	T.O.C. ELEVATION (USGS) (Feet Above MSL)	WATER LEVEL ELEVATION (USGS) (Feet Above MSL)
EW-1	28.17	NR	4.00		0.40	NS	NS
MW-2	27.00	12.87	2.00	2.26	0.63	15.79	2.92
MW-3	18.25	9.51	4.00	5.68	0.29	12.43	2.92
MW-4	15.88	8.65	4.00	4.70	0.36	12.24	3.59
MW-5	17.96	8.11	4.00	6.40	0.25	12.82	4.71
MW-6	18.50	8.59	4.00	6.44	0.10	12.03	3.44
MW-7	18.70	7.51	4.00	7.27	0.20	12.90	5.39

NOTES:

1. T.O.C. = TOP OF CASING. ALL MEASUREMENTS RELATIVE TO TOP OF CASING
2. 2" ID CASING = 0.16 GALLONS PER LINEAR CASING FOOT.
3. 4" ID CASING = 0.65 GALLONS PER LINEAR CASING FOOT.
4. NS = NOT SURVEYED
5. NR = NOT RECORDED

GROUNDWATER SAMPLING FIELD NOTES

ENGINEERING-SCIENCE, INCORPORATED

PROJECT/LOCATION: P.O. PARTNERS, EMERYVILLE
PROJECT NUMBER: NC222.13

PERSONNEL: P. Young & A. Singh
DATE: 03/01/91

WELL ID	SAMPLE DATE, TIME AND SAMPLER	WATER LEVEL BEFORE*, WELL DIAMETER AND DEPTH (FEET)	WATER LEVEL AFTER* (FEET)	GALLONS PER CASING VOLUME	WELL PURGING METHOD**	PUMP ON/OFF	TEMP. oC	SPECIFIC CONDUCT. (UMHOS/CM)	pH	TOTAL WATER PURGED (GALS.)	SAMPLE COLL. METHOD	ANALYSIS & PRESERVATIVE NO.& TYPE OF CONTAINERS	COMMENTS
MW-4	03/01/91 1025 PLY	8.65 4" 15.88	9.10	4.7	B	NA	18.5 18.4 18.6	9000 8500 9000	8.53 8.93 8.96	14.5	B	(b),(c)	Strong H2S odor, Moderate recharge Clear, no odor
MW-6	03/01/91 1015 AS	8.59 4" 18.50	15.40	6.05	B	NA	17.5 18.3 18.4	5000 8000 8500	7.03 6.95 6.98	19.5	B	(a),(b)	Moderate recharge, Turbid, no odor
MW-2	03/01/91 1400 AS/PLY	12.87 2" 27.00	13.25	2.30	B	NA	17.3 16.9 17.2 17.0	8250 8000 4000 4000	7.86 7.90 7.95 7.95	9.0	B	(a),(b)	Hydrocarbon odor, Oily sheen, Semi-turbid
MW-3	03/01/91 1530 PLY/AS	9.51 4" 18.25	14.71	5.7	B	NA	17.0 17.2 17.6	4850 5000 4500	8.59 8.38 8.41	17.1	B	(a),(b)	Semi-clear no odor
MW-5	03/01/91 1115 PLY/AS	8.11 4" 17.96	8.25	6.4	B	NA	14.2 14.4 14.0	2300 2900 2600	7.62 7.54 7.69	12.8 6.4	B	(a),(b)	Semi-clear no odor

NOTES:

POP03/01

* Water level from top of casing in feet

** WW - Well Wizard; G - Grundfos Pump; B - Bailer

(a) EPA Method Modified 8015 TPH-D - Total Petroleum Hydrocarbons-Diesel (1-L amber glass)

(b) EPA Method 8015 - BTEX (3-40 mL glass VOA's with HCl preservatative)

(c) EPA Method 8015 BTEX and Gasoline (3-40 mL glass VOA's with HCl preservatative)

NA Not Applicable

NR Not Recorded

GROUNDWATER SAMPLING FIELD NOTES

ENGINEERING–SCIENCE, INCORPORATED

PROJECT/LOCATION: P.O. PARTNERS, EMERYVILLE
PROJECT NUMBER: NC222.13

PERSONNEL: C. Young & A. Sing
DATE: 03/01/91

WELL ID	SAMPLE DATE, TIME AND SAMPLER	WATER LEVEL BEFORE*, WELL DIAMETER AND DEPTH (FEET)	WATER LEVEL AFTER* (FEET)	GALLONS PER CASING VOLUME	WELL PURGING METHOD**	PUMP ON/OFF	TEMP. oC	SPECIFIC CONDUCT. (UMHOS/CM)	pH	TOTAL WATER PURGED (GALS.)	SAMPLE COLL. METHOD	ANALYSIS & PRESERVATIVE NO.& TYPE OF CONTAINERS	COMMENTS
MW-7	03/01/91 1125 AS	7.51 4" 18.70	15.81	7.30	B	NA	14.6 15.2 15.2	1750 2000 1950	8.23 8.45 8.38	NR	B	(a),(b)	Turbid, no odor
TRIP BLANK	02/28/91 1400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	(a)	Provided by ES lab.
RINSATE BLANK	03/01/91 1345 PLY	NA	NA	NA	NA	NA	NA	NA	NA	NA	B	(a)	Equipment rinse blank.

NOTES:

* Water level from top of casing in feet
** WW – Well Wizard; G – Grundfos Pump; B – Bailer
(a) EPA Method Modified 8015 TPH-D – Total Petroleum Hydrocarbons–Diesel (1-L amber glass)
(b) EPA Method 8015 – BTEX (3-40 mL glass VOA's with HCl preservatative)
(c) EPA Method 8015 BTEX and Gasoline (3-40 mL glass VOA's with HCl preservatative)
NA Not Applicable
NR Not Recorded

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 3/12/91

Work Order No.:2693

Client: Clyde Wong
ES Berkeley/P.O.Partners
600 Bancroft Way
Berkeley, CA. 94610

Date of Sample Receipt: 3/01/91

Your water sample identified as:

WELL MW-4

was analyzed for BTEX by EPA Method 8020 and TPH diesel.

In addition your water samples identified as:

RINSATE BLANK
TRIP BLANK

were analyzed for BTEX by EPA Method 8020.

Finally, your water samples identified as:

WELL MW-6
WELL MW-5
WELL MW-7
WELL MW-3
WELL MW-2

were analyzed for TPH gasoline plus BTEX and TPH diesel.

The analytical reports for the samples listed above are attached.

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

INVOICE NUMBER: 3063
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.13
INVOICE DATE : 3/12/91
WORK ORDER : 2693
ES CLIENT NO. :

BILL TO: CLYDE WONG
ES BERKELEY/P.O.PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
WATER BTEX BY 8020	3	110.00	$330.00
WATER GAS PLUS BTEX	5	160.00	800.00
WATER TPH DIESEL	6	100.00	600.00
		TOTAL DUE	$ 1730.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 3063

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
WELL MW-4	2693-01
WELL MW-6	2693-02
WELL MW-5	2693-03
WELL MW-7	2693-04
WELL MW-3	2693-05
WELL MW-2	2693-06
RINSATE BLANK	2693-07
TRIP BLANK	2693-08

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:WELL MW-4 Matrix:WATER
Level:NA

Laboratory ID:2693-1 Units:ug/L

Date Collected:03-01-91

Dilution Factor: 1.0 Date Analyzed: 03-06-91
Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	3.0	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JJ GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:WELL MW-6 Matrix:WATER
Level:NA

Laboratory ID:2693-2 Units:ug/L

Date Collected:03-01-91 Date Analyzed: 03-05-91

Dilution Factor: 1.0 Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: AJ

GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:WELL MW-5 Matrix:WATER
Level:NA

Laboratory ID:2693-3

Units:ug/L

Date Collected:03-01-91

Date Analyzed: 03-05-91
Dilution Factor: 1.0 Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	66.0	1.0
Ethyl Benzene	ND	2.0
Toluene	2.3	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JJ

GROUP LEADER: SP

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:WELL MW-7 Matrix:WATER
Level:NA

Laboratory ID:2693-4 Units:ug/L

Date Collected:03-01-91

Dilution Factor: 1.0 Date Analyzed: 03-05-91
Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	100.0	1.0
Ethyl Benzene	ND	2.0
Toluene	3.6	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:WELL MW-3 Matrix:WATER
Level:NA

Laboratory ID:2693-5 Units:ug/L

Date Collected:03-01-91 Date Analyzed: 03-05-91

Dilution Factor: 1.0 Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	25.0	1.0
Ethyl Benzene	5.3	2.0
Toluene	25.0	2.0
Xylenes (total)	32.0	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JJ GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:WELL MW-2 Matrix:WATER
Level:NA

Laboratory ID:2693-6

Units:ug/L

Date Collected:03-01-91

Dilution Factor: 100.0 Date Analyzed: 03-06-91
Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	5500.0	100.0
Ethyl Benzene	1000.0	200.0
Toluene	6600.0	200.0
Xylenes (total)	7700.0	400.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JJ

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:RINSATE BLANK Matrix:WATER
Level:NA

Laboratory ID:2693-7

Units:ug/L

Date Collected:NA

Dilution Factor: 1.0 Date Analyzed: 03-05-91
Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: LJ

GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2693 % Moisture:NA

Client ID:TRIP BLANK Matrix:WATER
Level:NA

Laboratory ID:2693-8 Units:ug/L

Date Collected:NA

Dilution Factor: 1.0 Date Analyzed: 03-05-91
Inst. Ser. #: VGC5-910301
QC Batch #: SWPB5910305A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693 % Moisture:NA
Laboratory ID:2693-1 Matrix:WATER
Client ID:WELL MW-4 Level:NA
Date Collected:03-01-91 Units:mg/L

DIESEL:
Date Extracted:03-06-91
Dilution Factor: 1.0
Date Analyzed:03-07-91
Inst. Ser. #:EGC2-910219
QC Batch #:W91QCB002-DES

Compound	Result	Reporting Limit
DIESEL	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: JT

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693 % Moisture:NA
Laboratory ID:2693-2 Matrix:WATER
Client ID:WELL MW-6 Level:NA
Date Collected:03-01-91 Units:mg/L

DIESEL:
Date Extracted:03-06-91
Dilution Factor: 1.0
Date Analyzed:03-07-91
Inst. Ser. #:EGC2-910219
QC Batch #:W91QCB002-DES

==========

Compound	Result	Reporting Limit
DIESEL	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: JJ

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693
Laboratory ID:2693-3
Client ID:WELL MW-5
Date Collected:03-01-91

% Moisture:NA
Matrix:WATER
Level:NA
Units:mg/L

DIESEL:
Date Extracted:03-06-91
Dilution Factor: 1.0
Date Analyzed:03-07-91
Inst. Ser. #:EGC2-910219
QC Batch #:W91QCB002-DES

Compound	Result	Reporting Limit
DIESEL	1.1	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: [signature]

GROUP LEADER: [signature]

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693
Laboratory ID:2693-4
Client ID:WELL MW-7
Date Collected:03-01-91

% Moisture:NA
Matrix:WATER
Level:NA
Units:mg/L

DIESEL:
Date Extracted:03-06-91
Dilution Factor: 1.0
Date Analyzed:03-07-91
Inst. Ser. #:EGC2-910219
QC Batch #:W91QCB002-DES

Compound	Result	Reporting Limit
DIESEL	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: [signature]

GROUP LEADER: [signature]

ES-ENGINEERING SCIENCE, INC.
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Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693 | % Moisture:NA
Laboratory ID:2693-5 | Matrix:WATER
Client ID:WELL MW-3 | Level:NA
Date Collected:03-01-91 | Units:mg/L

DIESEL:
Date Extracted:03-06-91
Dilution Factor: 1.0
Date Analyzed:03-07-91
Inst. Ser. #:EGC2-910219
QC Batch #:W91QCB002-DES

Compound	Result	Reporting Limit
DIESEL	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: JJ

GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

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Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693
Laboratory ID:2693-6
Client ID:WELL MW-2
Date Collected:03-01-91

% Moisture:NA
Matrix:WATER
Level:NA
Units:mg/L

DIESEL:
Date Extracted:03-06-91
Dilution Factor: 1.0
Date Analyzed:03-07-91
Inst. Ser. #:EGC2-910219
QC Batch #:W91QCB002-DES

Compound	Result	Reporting Limit
DIESEL	1.8	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: AJ

GROUP LEADER: SF

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Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693
Laboratory ID:2693-2
Client ID:WELL MW-6
Date Collected:03-01-91

% Moisture:NA
Matrix:WATER
Level:NA
Units:mg/L

GASOLINE:

Dilution Factor: 1.0
Date Analyzed:03-05-91
Inst. Ser. #:VGC5-910301
QC Batch #:SWFG5910301A&B

Compound	Result	Reporting Limit
GASOLINE	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: JJ

GROUP LEADER: [signature]

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Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693
Laboratory ID:2693-3
Client ID:WELL MW-5
Date Collected:03-01-91

% Moisture:NA
Matrix:WATER
Level:NA
Units:mg/L

GASOLINE:

Dilution Factor: 1.0
Date Analyzed:03-05-91
Inst. Ser. #:VGC5-910301
QC Batch #:SWFG5910301A&B

Compound	Result	Reporting Limit
GASOLINE	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: AT

GROUP LEADER: SF

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Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693 % Moisture:NA
Laboratory ID:2693-4 Matrix:WATER
Client ID:WELL MW-7 Level:NA
Date Collected:03-01-91 Units:mg/L

GASOLINE:

Dilution Factor: 1.0
Date Analyzed:03-05-91
Inst. Ser. #:VGC5-910301
QC Batch #:SWFG5910301A&B

Compound	Result	Reporting Limit
GASOLINE	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: JT

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693
Laboratory ID:2693-5
Client ID:WELL MW-3
Date Collected:03-01-91

% Moisture:NA
Matrix:WATER
Level:NA
Units:mg/L

GASOLINE:

Dilution Factor: 1.0
Date Analyzed:03-05-91
Inst. Ser. #:VGC5-910301
QC Batch #:SWFG5910301A&B

Compound	Result	Reporting Limit
GASOLINE	ND	0.5

ND-Not Detected
NA-Not Applicable

ANALYST: JT

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
Modified EPA 8015

Work Order NO.: 2693
Laboratory ID:2693-6
Client ID:WELL MW-2
Date Collected:03-01-91

% Moisture:NA
Matrix:WATER
Level:NA
Units:mg/L

GASOLINE:

Dilution Factor: 10.0
Date Analyzed:03-06-91
Inst. Ser. #:VGC5-910301
QC Batch #:SWFG5910301A&B

Compound	Result	Reporting Limit
GASOLINE	72.0	5.0

ND-Not Detected
NA-Not Applicable

ANALYST: JT

GROUP LEADER:

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

W.O. 263

PAGE 1 OF 1

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Clyde Wong	NC222.13

PROJECT NAME / LOCATION: P.O. Partners

SAMPLER(S): (SIGNATURE) Ajay Singh

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH (gasoline)	TPH (diesel)	BTXE	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
MW-4	03/01	1025	Water	Well MW-4 -01A-D	4		✓	✓	Yes	No	2wks	
MW-6	03/01	1015	Water	Well MW-6 -02A-D	4	✓	✓	✓	"	No	"	
MW-5	03/01	1115	Water	Well MW-5 -03A-D	4	✓	✓	✓	"	No	"	
MW-7	03/01	1125	Water	Well MW-7 ~~04A-D~~	4	✓	✓	✓	"	"	"	
MW-3	03/01	1330	Water	Well MW-3 -05A-D	4	✓	✓	✓	"	"	"	
TRIP BLANK	03/01	1340	Water	TRIP BLANK ~~-06A-B~~	2			✓	"	"	"	-08A,B
RINSATE BLANK	03/1/91	1395	Water	Rinsate blank -07A-C	3			✓	"	"	"	
MW-2	03/1/91	1400	Water	Well MW-2 -06A-D	4	✓	✓	✓	"	"	"	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS
	3/1/91 1415		3/1/91 1415	

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ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 548-7970 Fax: (415) 548-7635

18 March 1991
NC 222.14

East Bay Municipal Utility District
Wastewater Treatment Plant
P.O. Box 24055
Oakland, CA 94623

Attention: William Meckel

Subject: March 1991 (First Quarterly) Groundwater Treatment System Self-monitoring Report, 1650-65th Street Site, Emeryville, California
Permit No. 502-02911

Dear Mr. Meckel:

INTRODUCTION

This letter report presents the self-monitoring and operating results of first quarter 1991 operation for the groundwater treatment system at 1650 65th Street in Emeryville, California. The groundwater treatment system employs activated carbon to remove hydrocarbon contaminants from contaminated groundwater and discharges the treated water to a EBMUD sewer under the subject discharge permit. Engineering-Science has been retained by P.O. Partners to perform the self-monitoring activity for the first year of operation. This letter report presents results for the operating period from December 1990 to March 1991. The purpose of this self-monitoring report is to provide a summary of influent/effluent sampling results and operation status, including maintenance data and progress of remediation, in accordance with subject permit conditions.

Figure 1 shows the locations of the treatment system and groundwater monitoring wells at the site. Figure 2 is the process flow diagram of the treatment system showing locations of sample taps.

OPERATION AND MAINTENANCE

The groundwater treatment system was placed into service on 17 December 1990. The Facility Inspection Log and Maintenance Log for this period are provided in Appendix A.

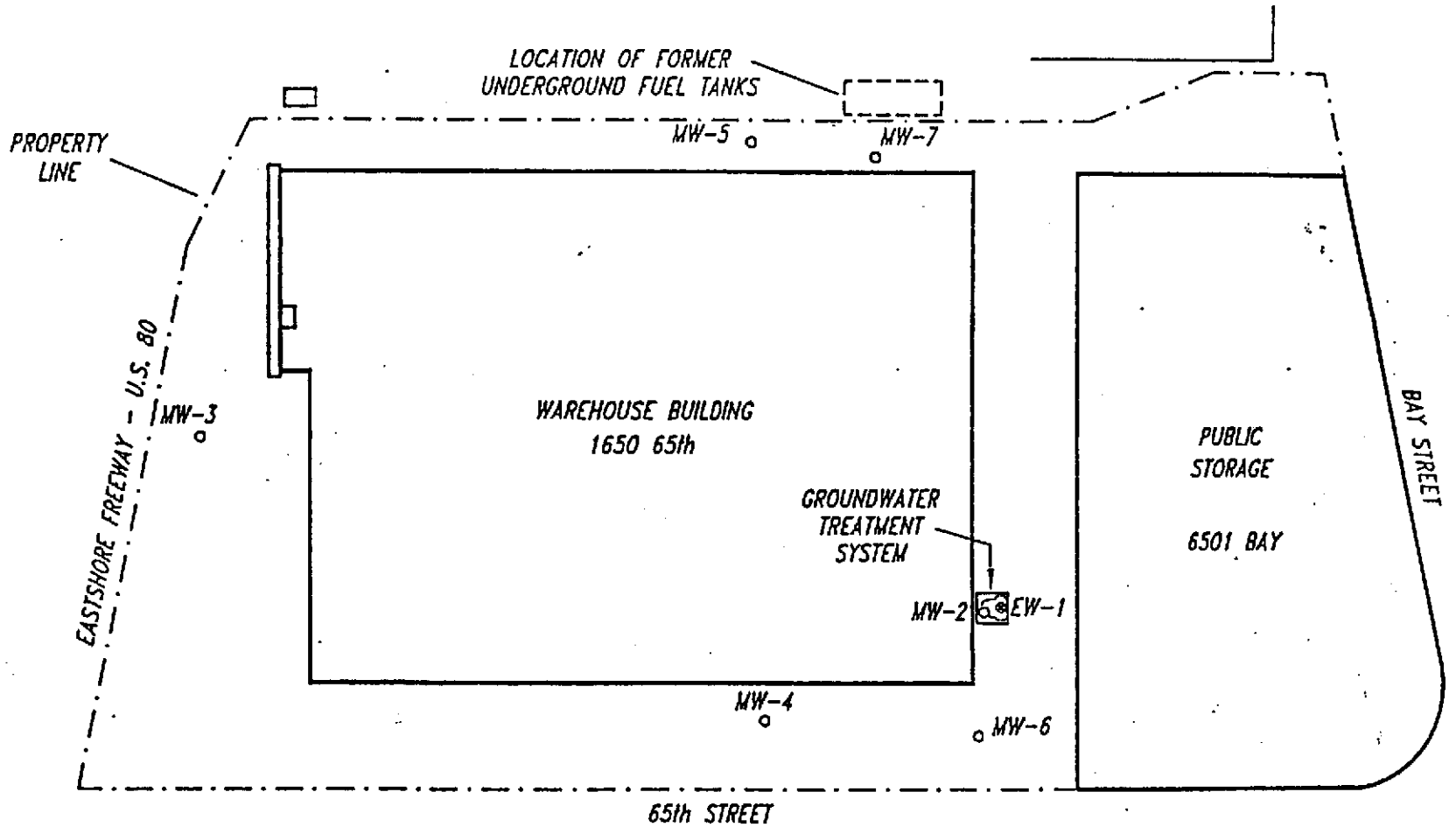
From initial startup to 13 March 1991, the system had pumped and treated 41,000 gallons of groundwater. The total volume of groundwater treated was significantly lower than anticipated because of two reasons: 1) the recharge rate was lower than that observed in the short-term pump test conducted on 4 April 1990 and, 2) the well pump was out of service for several weeks.

FIGURE 1

SITE PLAN

1650 65th Street Property

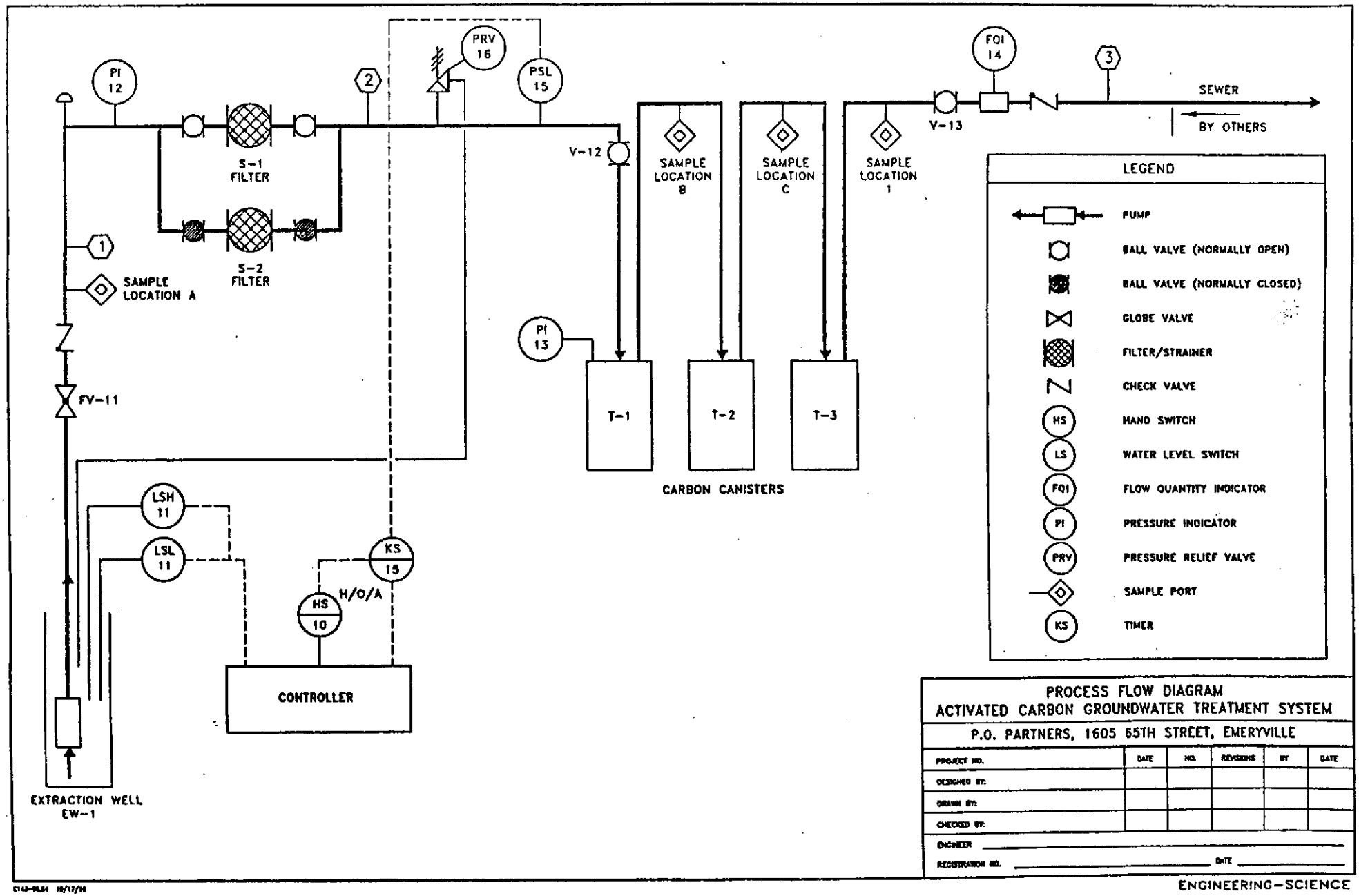
Emeryville, California



ENGINEERING—SCIENCE

FIGURE 1

FIGURE 2



PROCESS FLOW DIAGRAM
ACTIVATED CARBON GROUNDWATER TREATMENT SYSTEM
P.O. PARTNERS, 1605 65TH STREET, EMERYVILLE

PROJECT NO.	DATE	NO.	REVISIONS	BY	DATE
DESIGNED BY:					
DRAWN BY:					
CHECKED BY:					

ENGINEER _____
REGISTRATION NO. _____ DATE _____

ENGINEERING-SCIENCE

The pumping rate was initially set at the anticipated 5 gpm. After 2 days of operation, operating data indicated that the pump was frequently cycling off on low water level, resulting in a net average flowrate of approximately 2 gpm. Based on this, the actual recharge rate of the well is believed to be less than 2 gpm; hence, the pumping rate was adjusted to 2 gpm (2,880 gallons per day).

The flowrate continued to decline until the pump final failed to operate on 16 January 1991. The low flowrate was at the lower end of the pump's operating range and at the time believed to have contributed to the pump failure. On 30 January 1991, the system was placed back online with two low flow protective measures incorporated into the system. These measure included: 1) a load sensing device was installed to automatically shutoff the pump when an underload condition exists and; 2) a recirculation loop was installed in the pump discharge line so that the pump can operated at a higher flowrate, while a slip stream allow the desired flow to be routed to the treatment unit.

On 13 February 1991 the pump had stopped and the load sensing device was preventing it from running an extended time. The pump eventually failed to run. Further investigations founded the power supply to the system had dropped to a nominal 208 volts, which explained why the pumps (rated at 230 volts) kept failing. A new pump with the appropriate power factor was installed on 7 March 1991 and has been operating since.

The primary carbon canister (T-1) breakthrough occurred on 6 February 1991. The canister was removed from service on 13 February 1991. Canisters T-5 was placed into service at the third canister position. Detail evaluation of carbon canister loading is provided below.

SELF-MONITORING

Self-monitoring events were conducted in accordance with discharge permit requirements. Appendix B is the Sampling Schedule Log for the period, which provides a summary of self monitoring events conducted during this quarter. The sampling schedule was generally based on permit requirements, but obviously no samples were collected during periods when the treatment system was down for maintenance.

Sampling Locations

For each sampling event, water samples were collected from three sampling locations. As shown on Figure 2, these sampling locations are as follow:

- Location "1": effluent from the treatment system
- Location "B": sample tab between the first carbon canister and the second canister (Per conversation with William Meckel of EBMUD on 12 December 1990, this is the correct location for sample "B")
- Location "A": influent to the treatment system

Sampling Protocol

All grab samples were collected in 40 ml glass containers specifically designed to prevent the loss of volatile components. Sampling containers were preserved with hydrochloric acid per standard protocol for the method. All samples were labelled and chain-of-custody records were completed prior to placement of these containers in an iced cooler. Holding time for all samples were in accordance with EPA SW-846 requirements.

Samples were collected in the order of Location "1", Location "B" and Location "A" (i.e., lowest contaminant to highest contaminant concentration), so that chances of contaminating samples is reduced.

Analytical Results

All grab samples collected were analyzed using EPA 8020 to quantify benzene, toluene, ethylbenzene and xylenes (BTEX) contents. Analytical results and chain-of-custody forms are included in Appendix C. Table 1 summarizes historical grab sample analytical results for this operating period. No samples were collected during the two periods when the treatment system was down for maintenance from 16 January to 30 January, and from 13 February to 7 March.

Analytical results for sample location" 1" indicate that the effluent discharged to the sanitary sewer consistently contained non-detectable levels of BTEX. Total BTEX concentration in the influent samples (location "A") decreased from 31,100 ppb (ug/L) during initial startup on 17 December 1990 to 1,840 ppb on 13 February 1991. The decrease of total BTEX concentration versus total volume of groundwater extracted is depicted in Figure 3.

Breakthrough and Contaminant Removal

Table 1 also shows that breakthrough for the primary carbon canister (T-1) occurred on 6 February 1991. The concentration of benzene was first detected on 6 February at 4.9 ug/L at sample location "B". The next sampling event was conducted on 13 February just prior the removing T-1 from service. The concentration of benzene had only increased to 13 ug/L at sample location "B", while 4,750 gallons had been extracted between that period. No other compounds were detected at breakthrough. This confirms that there is still ample adsorption capacity remaining in the canister after initial breakthrough.

Appendix D is a calculation which estimates when the next canister breakthrough would occur using current loading rate data. The calculation tabulates the volume and BTEX concentration of groundwater extracted over time and estimates the quantity of BTEX removed at breakthrough. The average concentration between two sampling periods and the volume of water treated during the period were used to estimate quantity of BTEX removed in the period. Then, the total quantity of BTEX removed at breakthrough is estimated as the summation of BTEX removed for all periods between

TABLE 1

GROUNDWATER TREATMENT SYSTEM
Historical Grab Sample Analytical Results
1650 65th Street, Emeryville, California (P.O. Partners)

CONCENTRATIONS (ug/L)													
	Location 1				Location B				Location A				
Sample Date	Benzene	Toluene	Ethyl - Benzene	Xylene	Benzene	Toluene	Ethyl - Benzene	Xylene	Benzene	Toluene	Ethyl - Benzene	Xylene	Total BTEX at Pt. A
12/17/90	ND	ND	ND	ND	ND	ND	ND	ND	11,000	7,900	2,200	10,000	31,100
12/19/90	ND	ND	ND	ND	ND	ND	ND	ND	3,700	2,500	ND	2,300	8,500
12/21/90	ND	ND	ND	ND	ND	ND	ND	ND	3,200	2,200	ND	1,700	7,100
12/27/90	ND	ND	ND	ND	ND	ND	ND	ND	2,900	2,100	160	1,500	6,660
01/04/91	ND	ND	ND	ND	ND	ND	ND	ND	3,200	2,800	ND	ND	6,000
01/11/91	ND	ND	ND	ND	ND	ND	ND	ND	3,000	2,400	200	1,800	7,400
02/06/91	ND	ND	ND	ND	4.9	ND	ND	ND	470	230	11	390	1,101
02/13/91	ND	ND	ND	ND	13	ND	ND	ND	1200	280	ND	360	1,840

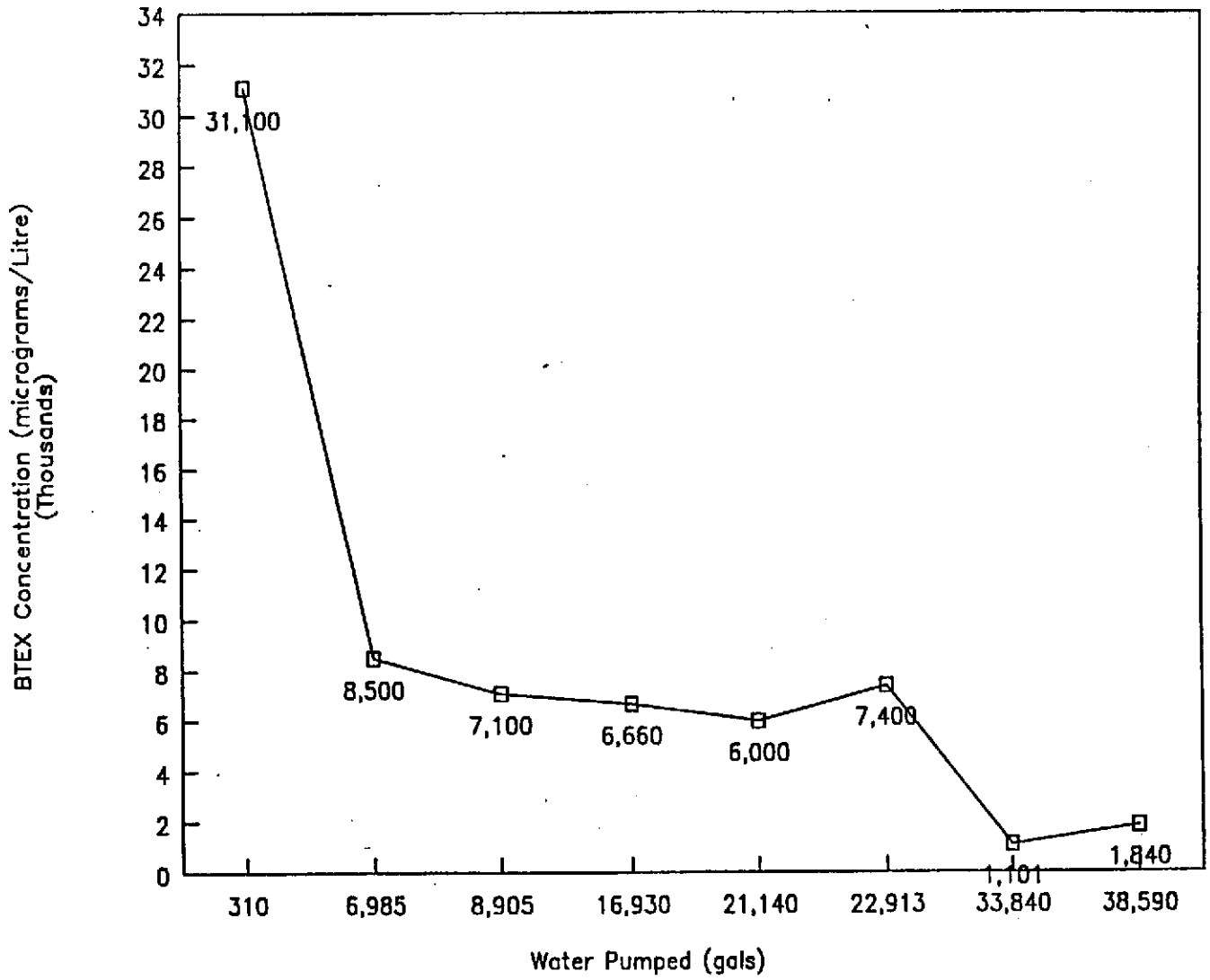
Notes:
ND = Not Detected
Location 1 = Effluent
Location B = After the first carbon canister
Location A = Influent

PO3.wk1

FIGURE 3

BTEX Concentrations Vs. Water Extracted

P.O. Partners, Emeryville.



sampling events. The total quantity of BTEX removed at breakthrough of 13 February 1991 is estimated at 1150 grams. Using the current loading rate of:

- Flowrate of 2 gpm
- Influent BTEX concentration of 1,840 ppb

the next breakthrough is expected to occur in 57 days or when an additional 165,200 gallons of groundwater is treated (when flow totalizer reading reaches approximately 203,000 gallons).

GROUNDWATER MONITORING

Engineering-Science had been conducting quarterly groundwater monitoring at the site since November 1989. Table 2 is the historical groundwater sampling analytical results for six quarterly groundwater monitoring events. The sixth quarterly groundwater monitoring event was conducted on 1 March 1991. Water level data from the monitoring event indicate that a cone of depression was present, even through the extraction pump has been down for several days. The analytical results indicate that the contaminant concentrations in the nearby monitoring well, MW-2, have decreased from 73,000 ppb to 72,000 ppb, and in the down-gradient wells MW-4 and MW-6, have decreased to non-detectable concentrations. This decrease can be attributed to the operation of the treatment system, although seasonal fluctuation may also partially influence this decrease. A complete report describing the 6th quarterly monitoring event will be submitted to the Alameda County Department of Environmental Health Services.

SUMMARY

During the first quarter of operation, the groundwater treatment system has effectively remediated over 42,000 gallons of contaminated groundwater at the site. Self monitoring results indicate that the effluent from the treatment system which discharges the sanitary sewer were below detectable concentrations, and met EBMUD wastewater discharge limits.

The extraction well recharge rate was able to sustain a pumping rate of 2 gpm, which is significantly lower then the flowrate of 5 gpm originally estimated by the short-term pump test. The nominal concentration of the influent dropped from 31,100 ppb of BTEX during system startup to 1,840 ppb. At the current flowrate of 2 gpm and a BTEX concentration of 1,840 ppb, the next canister breakthrough is anticipated at a flow totalizer reading of 203,000 gallons, which would occur around 5 May 1991, assuming continuous pumping at the current loading rate.

TABLE 2
HISTORICAL GROUNDWATER SAMPLING ANALYTICAL RESULTS
1650 – 65TH STREET PROPERTY, EMERYVILLE

Well ID	Sample Date	Total Petroleum Hydrocarbons (ug/L)		Aromatic Hydrocarbons (ug/L)					Purgeable Halocarbons (ug/L)	Lead (mg/L)
		Gasoline	Diesel	Benzene	Toluene	Xylenes (total)	Ethyl-Benzene	Total BTXE		
MW-2	Nov 89	100,000	NA	8,400	7,400	13,000	2,400	31,200	15*	0.05
	Feb 90	54,000	NA	7,800	5,600	8,400	1,600	23,400	32*	0.021
	May 90	40,000	NA	7,800	7,500	7,600	1,600	24,500	76*	0.025
	Aug 90	49,000	4,600	9,000	8,000	8,900	ND	25,900	40*	0.0059
	Nov 90	73,000	3,500	6,900	5,900	7,400	1,400	21,600	NA	NA
	Mar 91	72,000	1,800	5,500	6,600	7,700	1,000	20,800	NA	NA
MW-3	Nov 89	130	NA	2.2	ND	3	ND	5.2	ND	ND
	Feb 90	ND	NA	2.5	ND	ND	ND	2.5	NA	0.011
	May 90	ND	ND	2	ND	ND	ND	2	ND	NA
	Aug 90	ND	800	4.4	2.9	5.4	ND	12.7	NA	NA
	Nov 90	900	800	3.4	ND	ND	ND	3.4	NA	NA
	Mar 91	ND	ND	25	25	32	5.3	87.3	NA	NA
MW-4	Nov 89	200	NA	2.3	ND	ND	ND	2.3	ND	ND
	Feb 90	ND	NA	ND	ND	ND	ND	ND	NA	0.006
	May 90	ND	ND	1	ND	ND	ND	1	ND	NA
	Aug 90	ND	800	8.9	7.1	9.4	ND	25.4	NA	NA
	Nov 90	ND	700	2.7	ND	ND	ND	2.7	NA	NA
	Mar 91	NA	ND	3	ND	ND	ND	3	NA	NA
MW-5	Nov 89	ND	NA	74	ND	4.2	ND	78.2	ND	ND
	Feb 90	ND	NA	200	ND	ND	ND	200	NA	0.012
	May 90	ND	ND	110	ND	ND	ND	110	ND	NA
	Aug 90	ND	700	66	2.2	3.8	ND	72	NA	NA
	Nov 90	600	900	69	ND	ND	ND	69	NA	NA
	Mar 91	ND	1,100	66	2.3	ND	ND	68.3	NA	NA
MW-6	Nov 89	NI	NI	NI	NI	NI	NI	NI	NI	NI
	Feb 90	NI	NI	NI	NI	NI	NI	NI	NI	NI
	May 90	NA	ND	ND	ND	ND	ND	ND	ND	ND**
	Aug 90	NA	ND	NA	NA	NA	NA	NA	NA	ND**
	Nov 90	1,200	1,400	1.2	ND	ND	ND	1.2	NA	NA
	Mar 91	ND	ND	ND	ND	ND	ND	ND	NA	NA
MW-7	Nov 89	NI	NI	NI	NI	NI	NI	NI	NI	NI
	Feb 90	NI	NI	NI	NI	NI	NI	NI	NI	NI
	May 90	NA	600	240	ND	ND	ND	240	ND	ND**
	Aug 90	ND	ND	81	1.8	1.6	ND	84.4	ND	ND**
	Nov 90	ND	800	54	ND	ND	ND	54	NA	NA
	Mar 91	ND	ND	100	3.6	ND	ND	103.6	NA	NA

TABLE 2 (continued)
HISTORICAL GROUNDWATER SAMPLING ANALYTICAL RESULTS
1650 – 65TH STREET PROPERTY, EMERYVILLE

Well ID	Sample Date	Total Petroleum Hydrocarbons (ug/L)		Aromatic Hydrocarbons (ug/L)					Purgeable Halocarbons (ug/L)	Lead (mg/L)
		Gasoline	Diesel	Benzene	Toluene	Xylenes (total)	Ethyl-Benzene	Total BTXE		
EW-1	Nov 89	NI	NI	NI	NI	NI	NI	NI	NI	NI
	Feb 90	NI	NI	NI	NI	NI	NI	NI	NI	NI
	May 90	20,000	ND	7,500	4,500	6,300	1,000	19,300	68	ND**
	Aug 90	NA	3,500	6,000	4,200	4,600	ND	14,800	16*	ND**
	Nov 90	47,000	3,100	6,000	3,400	4,700	1,000	15,100	NA	NA
EW-1(grab)	Feb 91	NA	NA	1,200	280	ND	360	1,840	NA	NA
Drinking Water Standards				1^	2,000~	1,750^	680^		0.5^	5.0^

Notes:

* = 1,2 - 1,2-Dichloroethane concentration (only 1,2-Dichloroethane detected)

^ = California Maximum Contaminant Level (MCL) California Code of Regulations, Title 22, Section 64435, Current as of 03/31/90

~ = Proposed Maximum Contaminant level, Region 9 Environmental Protection Agency Drinking Water Standards and Health Advisory Tables Drinking Water Branch, June 1989.

ND = Not Detected; NA = Not Analyzed; NI = Not Installed.

** = Organic Lead

EW-1(grab) was collected from extraction pump.

The system experienced some functional problems which stopped operation from 16 January to 30 January, and again from 13 February to 7 March 1991. The problems were traced back to a low power supply voltage, hence the pumping system was modified to accommodate the lower voltage.

Very truly yours,

Clyde R. Wong, P.E.
Project Manager

CRW/dk/173-25.R0

cc: R.S. Makdisi

APPENDIX A

OPERATING LOGS
WEEKLY INSPECTION/MAINTENANCE

TABLE A
OPERATIONS LOG
WEEKLY INSPECTION
Groundwater Treatment System
1650 65th Street, Emeryville

Date	Time	FQI-14 Total Volume (Gallons)	FQI-14 Flowrate[1] (gpm)	Pressure (PSIG) PI-12 Pre-Filter	Pressure (PSIG) PI-13 Canister	Current Week (Calculated) Time Operated[2] (min)	Current Week (Calculated) Volume[3] (Gallons)	Current Week (Calculated) Average Flowrate[4] (gpm)	Comment	Inspector Name
2/6/91	1500	33840	1.2	14	11	8460	6270	0.74	Increased flow to 2gpm	CMW
2/13/91	1400	38590	~~0~~	9	9	10020	4750		Changed Carbon canister T-P	CMW
2/19/91	1400	38600	~~0~~	9	9	~~0~~			Pump Load protection unit cycling - called for maintenance (see maintenance log)	CMW
↓										↓
3/7/91	1500	38600	2.0	13	10	N/A			System Resumes operation	CMW
3/13/91	1100	41,900	1.6	12	9.5	8496	3300	0.39	Flowrate ~ 0.5gpm Readjusted to 1.6 gpm	CMW
3/15/91	1600	43029		22	12	3300	1129	0.34	Canisters being used are 2, 3, 5	AS

Notes:

1. Use a watch to time flow for half-minute (i.e. 2.5 gallons equals 5 gpm)
2. Time operated = Difference between previous time and current time
3. Current Week Volume = Total Volume - Total Volume (Previous reading)
4. Average Flowrate = Current Week Volume / Time Operated

1 day = 1,440 minutes 7 days = 10,080 minutes

TABLE A
OPERATIONS LOG
WEEKLY INSPECTION
Groundwater Treatment System
1650 65th Street, Emeryville

Date	Time	FQI-14 Total Volume (Gallons)	FQI-14 Flowrate[1] (gpm)	Pressure (PSIG) PI-12 Pre-Filter	Pressure (PSIG) PI-13 Canister	Current Week (Calculated) Time Operated[2] (min)	Current Week (Calculated) Volume[3] (Gallons)	Current Week (Calculated) Average Flowrate[4] (gpm)	Comment	Inspector Name
12/17/90	0950	310	5	5(?)	9.5	N/A			Drain rain water	CMW
12/19	1430	6985	5	11.5	9.5	3360	6675	1.99	Need to reset flowrate	CMW
12/21	1035	8905	1.3	10	7.5	2645	1920	0.72		
12/27	1338	16930		8	9	10,263	8025	0.78		AS
1/4/91	1020	21140	0.4	9	8	9882	4210	0.43		AS
1/11/91	1015	22913	0.12	9	8	10,075	1773		Flow rate too low & W.L too high increased F.R.	SB
1/11/91	10:22	—	0.12	9	8				opened valve V-11 1½ turn no change	SB
1/16/91	1230	23220	0	N/A		7335	307		PUMP NOT RUNNING WILL NOT RESTART - SEE MAINTENANCE LOG	CMW
1/30/91	1200	24600	2.1	13	10	20,130	1380		NEW PUMP RESTART	CMW
1/31/91	1200	27570	2.0	13	11	1440	2970			CMW

Notes:

1. Use a watch to time flow for half-minute (i.e. 2.5 gallons equals 5 gpm)
2. Time operated = Difference between previous time and current time
3. Current Week Volume = Total Volume - Total Volume (Previous reading)
4. Average Flowrate = $\frac{\text{Current Week Volume}}{\text{Time Operated}}$

1 day = 1,440 minutes 7 days = 10,080 minutes

TABLE C
MAINTENANCE LOG
Groundwater Treatment System
1650 65th Street Property
Emeryville, California

Date	Comments	Corrective Action	Name
12/12/90	Set pump & level switch	LSH 16'-TOC LSL 21'-TOC Top of pump 24'-TOC	CMW
	Set PRV-15 @ 12psig Set PSL @ 9psig		↓
12/17/90	Set pumping rate @	5gpm	CMW
12/20/90	Pump cycling due to LSL	Reset flowrate to 2.2gpm	CMW
	PSL needs reset due to reduce flowrate	set PSL @ 5psig	↓
1/16/91	PUMP WILL NOT RESTART	CALCON INSPECTED ON 1/17/91 PUMP SHORTED AT MOTOR	CMW
1/17/91		REMOVED PUMP & MOTOR — SUCTION BLOCKED WITH CLAY FINES	CMW
1/18/91		INSTALL NEW PUMP & MOTOR FLOWRATE REDUCED AFTER 5 MINUTES OF OPERATION	CMW
1/30/91	RESTART @ 2gpm Q=24600	INSTALL PUMP LOAD PROTECTION AND RECIRC	
2/6		Changed filter	CMW
2/13	Lab Report SHOWED 13ppb BENZ @ PORT "B"	CHANGED OUT CANISTER T-01	CMW

APPENDIX B
SAMPLING LOG

TABLE B-1
SAMPLING SCHEDULE/LOG
(WEEKS 1-8)
Groundwater Treatment System
1650 65th Street Property
Emeryville, California

Week	Date	Time	Sample Location 1	A	B	C	Comments	Sampled By
1.a.	12/17/90	0950	X°	X° Y	X°		water level = 14'11"	CRW
b.	12/19/90	1430	X°	X° Y	X°	X°	water level = 14'2"	JRB
c.	12/21/90	1035	X°	X° Y	X°		water level = 18'0"	JRB
2.	12/28/90	1340	X, Y	X	X			AS
3.	1/4/91	1015	X, Y,	X	X			AS
4.	1/11/91	1000	X	X	X		water level = 13'7"	JRB
5.	2/6/91	1500	X	X	X			CRW
6.	2/13/91	1410	X	X	X			AS
7.	3/15/91	1536	X	X	X			AS
8.								

Notes: Analysis X = EPA 8020, BTEX - grab sample
Y = EPA 410.4, Chemical Oxygen Demand (COD) - grab sample using VOA vial

° = 24 hour analytical results
5 days analytical results unless otherwise specified

APPENDIX C
ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date:

Work Order No.:2642

Client: Clyde Wong
ES Berkeley/P.O. Partners
600 Bancroft Way
Berekely, CA. 94710

Date of Sample Receipt: 2/13/91

Your samples identified as:

STATION #1
STATION B
STATION A

were analyzed for BTEX by EPA Method 8020.

The analytical reports for the samples listed above are attached.

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

INVOICE NUMBER:
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.14
INVOICE DATE :
WORK ORDER : 2642
ES CLIENT NO. :

BILL TO: CLYDE WONG
ES BERKELEY/P.O. PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
BTEX METHOD 8020	3	110.00	$330.00
SURCHARGE 1.5 X's	3	55.00	165.00
		TOTAL DUE	$ 495.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 3

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
STATION #1	2642-01
STATION B	2642-02
STATION A	2642-03

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2642 % Moisture:NA

Client ID:STATION # A Matrix:WATER
Level:NA

Laboratory ID:2642-3

Units:ug/L

Date Collected:02-13-91

Dilution Factor: 50.0 Date Analyzed: 02-14-91
Inst. Ser. #: VGC5-910109
QC Batch #: SWPB5910207A&B

Compound	Result	Reporting Limit
Benzene	1200.0	50.0
Ethyl Benzene	ND	100.0
Toluene	280.0	100.0
Xylenes (total)	360.0	200.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: LT

GROUP LEADER:

ENGINEERING SCIENCE, INC. W.O.# 3642

CHAIN OF CUSTODY RECORD

Proj. No.	Project Name
NC222-14	P. O. Partners

SAMPLERS (Signature) Ajay Singh

STA. NO.	DATE	TIME	STATION LOCATION	NO. OF CONTAINERS	BTEX	REMARKS
1	2/13/91	1410	Station # 1 -01A,B	2	✓	Preserved with HCL
B	2/13/91	1420	Station # B -02A,B	2	✓	
A	2/13/91	1430	Station # A. -03A,B	2	✓	

5 DAYS TAT
per Amy S.
2/13/91
GAR

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature) Ajay Singh	Date/Time 2/13/91 1510	Received for Laboratory by: (Signature)	2/13/91	Date/Time 1510	Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinators Field Files

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 2/14/91

Work Order No.:2627

Client: Clyde Wong
ES Berkeley/P.O. Partners
600 Bancroft Way
Berekely, CA. 94710

Date of Sample Receipt: 2/06/91

Your samples identified as:

STATION #1
STATION B
STATION A

were analyzed for BTEX by EPA Method 8020.

The analytical reports for the samples listed above are attached.

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

INVOICE NUMBER: 3016
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.14
INVOICE DATE : 2/15/91
WORK ORDER : 2627
ES CLIENT NO. :

BILL TO: CLYDE WONG
ES BERKELEY/P.O. PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
BTEX METHOD 8020	3	110.00	$330.00
SURCHARGE 1.5 X's	3	55.00	165.00
		TOTAL DUE	$ 495.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 3016

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
STATION #1	2627-01
STATION B	2627-02
STATION A	2627-03

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2627 % Moisture:NA

Client ID:STATION # 1 Matrix:WATER
Level:NA

Laboratory ID:2627-1 Units:ug/L

Date Collected:02-06-91 Date Analyzed: 02-07-91

Dilution Factor: 1.0 Inst. Ser. #: VGC5-910109
QC Batch #: SWPB5910207A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER: SP

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2627

% Moisture:NA

Client ID:STATION B

Matrix:WATER
Level:NA

Laboratory ID:2627-2

Units:ug/L

Date Collected:02-06-91

Date Analyzed: 02-07-91
Inst. Ser. #: VGC5-910109
QC Batch #: SWPB5910207A&B

Compound	Result	Reporting Limit
Benzene	4.9	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER: SF

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

BILL TO: CLYDE WONG
ES BERKELEY/P.O. PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

INVOICE NUMBER: 2952
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.14
INVOICE DATE : 1/18/91
WORK ORDER : 2577
ES CLIENT NO. :

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
BTEX METHOD 8020	3	110.00	$330.00
SURCHARGE 1.5 X's	3	55.00	165.00
		TOTAL DUE	$ 495.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 2952

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
STATION #1	2577-01
STATION B	2577-02
STATION A	2577-03

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2577 % Moisture:NA

Client ID:NA Matrix:WATER
Level:NA

Laboratory ID:MWPB5910115 Units:ug/L

Date Collected:NA

Date Analyzed: 01-15-91
Dilution Factor: 1.0 Inst. Ser. #: VGC5-910109
QC Batch #: SWPB5910109A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: AT

GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2577 % Moisture:NA

Client ID:STATION #1 Matrix:WATER
Level:NA

Laboratory ID:2577-1 Units:ug/L

Date Collected:01-11-91

Dilution Factor: 1.0 Date Analyzed: 01-15-91
Inst. Ser. #: VGC5-910109
QC Batch #: SWPB5910109A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: [signature]

GROUP LEADER: [signature]

ES-ENGINEERING SCIENCE, INC.
600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2577 % Moisture:NA

Client ID:STATION B Matrix:WATER
Level:NA

Laboratory ID:2577-2 Units:ug/L

Date Collected:01-11-91 Date Analyzed: 01-15-91

Dilution Factor: 1.0 Inst. Ser. #: VGC5-910109
QC Batch #: SWPB5910109A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: [signature] GROUP LEADER: [signature]

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2577 % Moisture:NA

Client ID:STATION A Matrix:WATER
Level:NA

Laboratory ID:2577-3 Units:ug/L

Date Collected:01-11-91

Dilution Factor: 1.0 Date Analyzed: 01-15-91
Inst. Ser. #: VGC5-910109
QC Batch #: SWPB5910109A&B

Compound	Result	Reporting Limit
Benzene	3000.0	1.0
Ethyl Benzene	200.0	2.0
Toluene	2400.0	2.0
Xylenes (total)	1800.0	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: [signature]

GROUP LEADER: [signature]

CHAIN OF CUSTODY RECORD 2577

PAGE 1

CLIENT: ENGINEERING-SCIENCE, INC. BERKELEY

PROJECT MANAGER: Clyde Wong

PROJ. NO.: NC 222.14

PROJECT NAME / LOCATION: P.O. Partners / Emeryville, CA

SAMPLER(S): (SIGNATURE) John Budenbaugh

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: BTEX	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
1	1/11/90	10:00	Water	Station #1 -01A,B	2	✓	ICE		5 days	
B	"	10:02	"	Station B -02A,B	2	✓	"		"	
A	"	10:05	"	Station A -03A,B	2	✓	"		"	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
John Budenbaugh	1/11/91 1104				
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS Samples 5°C on Ice	
			1/11/90 1005		

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date:

Work Order No.:2563

Client: Clyde Wong
ES Berkeley/P.O. Partners
600 Bancroft Way
Berekely, CA. 94710

Date of Sample Receipt: 01/04/91

Your samples identified as:

A
B
1

were analyzed for BTEX by EPA Method 8020.

Finally your sample identified as:

1-2

was analyzed for COD.

Sample identified as 1 and 1-2 are the identical samples.

The analytical reports for the samples listed above are attached.

CL-FORM

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

INVOICE NUMBER: 2896
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.14
INVOICE DATE : 1/15/91
WORK ORDER : 2563
ES CLIENT NO. :

BILL TO: CLYDE WONG
ES BERKELEY/P.O. PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
BTEX METHOD 8020	3	110.00	$495.00
SURCHARGE 1.5 X's COD METHOD 410.4	1	30.00	45.00
		TOTAL DUE	$ 540.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 2896

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
A	2563-01
B	2563-02
1/1-2	2563-03

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2563 % Moisture:NA

Client ID:SAMPLE LOCATION A Matrix:WATER
Level:NA

Laboratory ID:2563-1 Units:ug/L

Date Collected:01-04-91

Dilution Factor: 500.0 Date Analyzed: 01-09-91
Inst. Ser. #: VGC5-910108
QC Batch #: SWPB5910109A&B

Compound	Result	Reporting Limit
Benzene	3200.0	500.0
Ethyl Benzene	ND	1000.0
Toluene	2800.0	1000.0
Xylenes (total)	ND	2000.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2563 % Moisture:NA

Client ID:SAMPLE LOCATION B Matrix:WATER
Level:NA

Laboratory ID:2563-2 Units:ug/L

Date Collected:01-04-91 Date Analyzed: 01-09-91

Dilution Factor: 1.0 Inst. Ser. #: VGC5-910108
QC Batch #: SWPB5910109A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2563 % Moisture:NA

Client ID:SAMPLELOCATION 1 Matrix:WATER
Level:NA

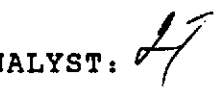
Laboratory ID:2563-3 Units:ug/L

Date Collected:01-04-91 Date Analyzed: 01-09-91

Dilution Factor: 1.0 Inst. Ser. #: VGC5-910108
QC Batch #: SWPB5910109A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: 

GROUP LEADER: 

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES-Berkeley
Project: P.O. Partners
Work Order: 2563
Matrix: Water

Client's ID:	1-2
	1018
Sample Date:	01/04/91
% Moisture:	
Lab ID:	2663.03
	D

Parameter	Results	Method	Normal Report Limit	Units	Date Analyzed
COD	210.	Color	50	mg/L	01/08/91

ND- Not Detected

ANALYST: _____ GROUP LEADER: _____

CHAIN OF CUSTODY RECORD

Proj. No.	Project Name
2222.14	P.O. Partners

SAMPLERS (Signature): Ajay Singh

LAB. NO.	DATE	TIME	STATION LOCATION	NO. OF CONTAINERS	BTEX	COD	REMARKS
A	01/04/91	1008	Sample Location A-010-C	3	✓		5 day turnaround time on all samples (OK'd with Rick Merrill).
B	"	1011	Sample Location B-020-C	3	✓		
1	"	1015	Sample Location 1-030-C	3	✓		
-2	"	1018	Sample Location 1 ~~-040-B~~ DUP -030-B			✓	
							According to Ajay Samples ID: 1 & 1-2 are identical DD 1/16/91

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	
Ajay Singh	01/04/91 1037		1/4/91 1040		

Distribution: Original Accompanies Shipment; Copy to Coordinators Field Files

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 1/03/90

Work Order No.:2553

Client: Clyde Wong
ES Berkeley/P.O. Partners
600 Bancroft Way
Berekely, CA. 94710

Date of Sample Receipt: 12/28/90

Your samples identified as:

S-L-A
S-L-B
S-L-1

were analyzed for BTEX by EPA Method 8020.

Finally your sample identified as:

S-L-1

was analyzed for COD. The analytical report for COD will soon follow.

The analytical reports for the samples listed above are attached.

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

BILL TO: CLYDE WONG
ES BERKELEY/P.O. PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

INVOICE NUMBER: 2882
JOB NUMBER : ZB547
CONTRACT/PO # : NC22.14
INVOICE DATE : 1/03/91
WORK ORDER : 2553
ES CLIENT NO. :

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
BTEX METHOD 8020	3	110.00	$495.00
SURCHARGE 1.5 X's COD METHOD 410.4	1	30.00	30.00
		TOTAL DUE	$ 525.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 2882

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
S-L-A	2553-01
S-L-B	2553-02
S-L-1	2553-03

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

INVOICE NUMBER: 2
JOB NUMBER : ZB547
CONTRACT/PO # : NC22.14
INVOICE DATE :
WORK ORDER : 2553
ES CLIENT NO. :

BILL TO: CLYDE WONG
ES BERKELEY/P.O. PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
BTEX METHOD 8020	3	110.00	$495.00
COD METHOD 410.4	1	30.00	30.00
		TOTAL DUE	$ 525.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 2

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
S-L-A	2553-01
S-L-B	2553-02
S-L-1	2553-03

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2553 % Moisture:NA

Client ID:S-L-A Matrix:WATER
Level:NA

Laboratory ID:2553-1 Units:ug/L

Date Collected:12-28-90 Date Analyzed: 12-31-90

Dilution Factor: 50.0 Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901220A&B

Compound	Result	Reporting Limit
Benzene	2900.0	50.0
Ethyl Benzene	160.0	100.0
Toluene	2100.0	100.0
Xylenes (total)	1500.0	200.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: [signature]

GROUP LEADER: [signature]

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2553 % Moisture:NA

Client ID:S-L-B Matrix:WATER
Level:NA

Laboratory ID:2553-2 Units:ug/L

Date Collected:12-28-90

Dilution Factor: 1.0 Date Analyzed: 12-31-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901220A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2553

% Moisture:NA

Client ID:S-L-1

Matrix:WATER
Level:NA

Laboratory ID:2553-3

Units:ug/L

Date Collected:12-28-90

Date Analyzed: 12-31-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901220A&B

Dilution Factor: 1.0

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: AT

GROUP LEADER: [illegible]

ENGINEERING SCIENCE, INC. WO# 250

CHAIN OF CUSTODY RECORD

Proj. No.	Project Name	NO. OF CON-TAINERS	BTXE	COD	REMARKS
NC222	P.O. Partners				

SAMPLERS (Signature) Ajay Singh

	STA. NO.	DATE	TIME	STATION LOCATION	NO. OF CONTAINERS	BTXE	COD	REMARKS
01A-C	S-L-A	12/28/90	1340	SAMPLING LOC. A	3	✓		5 day turnaround
02A-C	S-L-B	12/28/90	1345	SAMPLING LOC. B	3	✓		time
03A-C	S-L-1	12/28/90	1350	SAMPLING LOC 1	3	✓		
03D,E	S-L-1	12/28/90	1350	SAMPLING LOC. 1	2		✓	

ph - BTXE - NA
- COD - 2
Type - Memo
Location : BTXE (J-2)
: COD (WMK/A-3)
Temp. 6°C + Intact
RUSH - TAT 5DAYS

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
Ajay Singh	12/28/90 1402	[signature]	12/28/90 1402	Samples 6°C + Intact

Distribution: Original Accompanies Shipment; Copy to Coordinators Field Files

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 12/26/90

Work Order No.:2544

Client: Clyde Wong
ES Berkeley/P.O.Partners
600 Bancroft Way
Berkeley, CA. 94710

Date of Sample Receipt: 12/21/90

Your sample identified as:

A-2 SAMPLE A

was analyzed for COD.

Finally your samples identified as:

SAMPLE 1
SAMPLE B
A-1 SAMPLE A

were analyzed for BTEX by EPA Method 8020.
The analytical report for the sample listed above is attached.

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

BILL TO: CLYDE WONG
ES BERKELEY/P.O.PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

INVOICE NUMBER: 2875
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.13
INVOICE DATE : 12/26/90
WORK ORDER : 2544
ES CLIENT NO. :

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
COD METHOD 410.1	1	60.00	$60.00
BTEX METHOD 8020	3	220.00	660.00
		TOTAL DUE	$ 720.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 2875

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
SAMPLE 1	2544-01
SAMPLE B	2544-02
A-1 SAMPLE A	2544-03
A-2 SAMPLE A	2544-04

ES-ENGINEERING-SCIENCE, INC.

600 Bancroft Way
Berkeley, CA 94710

INORGANICS ANALYTICAL REPORT

Client: ES-Berkeley
Project: P.O. Partners

Work Order: 2544
Matrix: Water

Client's ID:	A-2
	1030
Sample Date:	12/21/90
% Moisture:	
Lab ID:	2544.04

Parameter	Results	Method	Normal Report Limit	Units	Date Analyzed
COD	400.	Color	50	mg/L	12/21/90

ND- Not Detected

ANALYST: D. Bauman

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2544 % Moisture:NA

Client ID:SAMPLE 1 Matrix:WATER
Level:NA

Laboratory ID:2544-1

Units:ug/L

Date Collected:12-21-90

Dilution Factor: 1.0 Date Analyzed: 12-21-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901221A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: AT

GROUP LEADER: RR

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2544 % Moisture:NA

Client ID:SAMPLE B Matrix:WATER
Level:NA

Laboratory ID:2544-2

Units:ug/L

Date Collected:12-21-90

Dilution Factor: 1.0 Date Analyzed: 12-21-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901221A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: [signature]

GROUP LEADER: [signature]

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2544 % Moisture:NA

Client ID:A-1 SAMPLE A Matrix:WATER
Level:NA

Laboratory ID:2544-3

Units:ug/L

Date Collected:12-21-90

Dilution Factor: 250.0 Date Analyzed: 12-21-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901221A&B

Compound	Result	Reporting Limit
Benzene	3200.0	250.0
Ethyl Benzene	(240) *	500.0
Toluene	2200.0	500.0
Xylenes (total)	1700.0	1000.0

* ESTIMATED VALUE
BELOW REPORTING LIMIT.

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: AT

GROUP LEADER: SR

CHAIN OF CUSTODY RECORD

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Clyde Wong	NC222.14

PROJECT NAME / LOCATION: P.O. Partners, Emeryville CA

SAMPLER(S): (SIGNATURE) John Bredenbaugh

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	BTEX	C.O.D				PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
						ANALYSES REQUIRED								
1	12/21/90	10:18	water	Sample Location 1	2	✓					ICE		24hr	-01AB
B	"	10:22	"	Sample Location B	2	✓					✓		"	-02AB
A-1	"	10:27	"	Sample Location A	2	✓					✓		"	-03AB
A-2	"	10:30	"	" " "	2		✓				✓		"	-04AB
														Loc: J-3-001
														A-1-COD

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
John Bredenbaugh	12/21/90 11:04				
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
			12/21/90 1105	6 °C INTACT	

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 12/27/90

Work Order No.:2537

Client: Clyde Wong
ES Berkeley/P.O.Partners Emeryville
600 Bancroft Way
Berkeley, CA. 94710

Date of Sample Receipt: 12/20/90

Your samples identified as:

SAMPLE B
SAMPLE C
SAMPLE 1
SAMPLE A-1

were analyzed for BTEX by EPA Method 8020.

The analytical reports for the samples listed above are attached.

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

INVOICE NUMBER: 2876
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.14
INVOICE DATE : 12/27/90
WORK ORDER : 2537
ES CLIENT NO. :

BILL TO: CLYDE WONG
ES BERKELEY/P.O.PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
METHOD 8020	4	110.00	$440.00
SURCHARGE FOR TAT			440.00
		TOTAL DUE	$ 880.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 2876

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
SAMPLE B	2537-01
SAMPLE C	2537-02
SAMPLE 1	2537-03
SAMPLE A-1	2537-04

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2537 % Moisture:NA

Client ID:SAMPLE C Matrix:WATER
Level:NA

Laboratory ID:2537-2

Units:ug/L

Date Collected:12-19-90

Dilution Factor: 1.0 Date Analyzed: 12-20-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901220A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2537 % Moisture:NA

Client ID:SAMPLE 1 Matrix:WATER
Level:NA

Laboratory ID:2537-3 Units:ug/L

Date Collected:12-19-90

Dilution Factor: 1.0 Date Analyzed: 12-20-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901220A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT

GROUP LEADER:

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2537 % Moisture:NA

Client ID:SAMPLE A-1 Matrix:WATER
Level:NA

Laboratory ID:2537-4

Units:ug/L

Date Collected:12-19-90

Dilution Factor: 250.0 Date Analyzed: 12-21-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901220A&B

Compound	Result	Reporting Limit
Benzene	3700.0	250.0
Ethyl Benzene	ND	500.0
Toluene	2500.0	500.0
Xylenes (total)	2300.0	1000.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: AJ

GROUP LEADER:

CHAIN OF CUSTODY RECORD

PAGE 1

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Clyde Wong	NC 222.14

PROJECT NAME / LOCATION: P.O. Partners

SAMPLER(S): (SIGNATURE) John Burdenbaugh

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	BTEX	C.O.D.	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
TB	12/19/90	14:43	water	Sample Location B	2	✓				24hr	701A,B
C	12/19/90	14:56	water	Sample Location C	2	✓				24hr	702A,B
1	12/19/90	14:59	water	Sample Location 1	2	✓				24hr	703A,B
A·1	12/19/90	13:05	water	Sample Location A	2	✓				24hr	704A,B
A·2	12/19/90	13:08	water	Sample Location A	2		✓			5 day	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
John Burdenbaugh	12/19/90 16:30				
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
			12/19/90 1630	Samples 5 & 4 Intact	

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

ENGINEERING-SCIENCE, INC.

BERKELEY LABORATORY
600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 841-7353

Report Date: 12/19/90

Work Order No.:2524

Client: Clyde Wong
ES Berkeley/P.O.Partners Emeryville
600 Bancroft Way
Berkeley, CA. 94710

Date of Sample Receipt: 12/17/90

Your samples identified as:

STATION A
STATION B
STATION #1

were analyzed for BTEX by EPA Method 8020.

The analytical reports for the samples listed above are attached.

ENGINEERING SCIENCE INC.

REMITTANCE ADDRESS:

ENGINEERING SCIENCE INC.
FILE 91849
LOS ANGELES, CA. 90074-1849
(415) 841-7353

INVOICE NUMBER: 2867
JOB NUMBER : ZB547
CONTRACT/PO # : NC222.13
INVOICE DATE : 12/19/90
WORK ORDER : 2524
ES CLIENT NO. :

BILL TO: CLYDE WONG
ES BERKELEY/P.O.PARTNERS
600 BANCROFT WAY
BERKELEY, CA. 94710

TEST CODE	NUMBER OF TESTS	PRICE	TOTAL
METHOD 8020	3	110.00	$330.00
SURCHARGE FOR 24HR TAT			330.00
		TOTAL DUE	$ 660.00

NOTE: Samples are discarded 30 days after results are reported unless other arrangments are made in writing. Hazardous samples will be returned to client or disposed of at client's expense.

REFERENCES FOR INVOICE NUMBER 2867

CLIENT SAMPLE IDENTIFIER	ESBL SAMPLE NUMBER
STATION A	2524-01
STATION B	2524-02
STATION #1	2524-03

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2524 % Moisture:NA

Client ID:STATION A Matrix:WATER
Level:NA

Laboratory ID:2524-1 Units:ug/L

Date Collected:12-17-90

Dilution Factor: 250.0 Date Analyzed: 12-18-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901203A&B

Compound	Result	Reporting Limit
Benzene	11000.0	250.0
Ethyl Benzene	2200.0	500.0
Toluene	7900.0	500.0
Xylenes (total)	10000.0	1000.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT GROUP LEADER: BF

ES-ENGINEERING SCIENCE, INC.

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GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2524 % Moisture:NA

Client ID:STATION A Matrix:WATER
Level:NA

Laboratory ID:2524-1 Units:ug/L

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Toluene	7900.0	500.0
Xylenes (total)	10000.0	1000.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT GROUP LEADER: BF

ES-ENGINEERING SCIENCE, INC.

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Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2524 % Moisture:NA

Client ID:STATION B Matrix:WATER
Level:NA

Laboratory ID:2524-2 Units:ug/L

Date Collected:12-17-90 Date Analyzed: 12-17-90

Dilution Factor: 1.0 Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901203A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

ANALYST: JT GROUP LEADER: SF

ES-ENGINEERING SCIENCE, INC.

600 Bancroft Way
Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2524 % Moisture:NA

Client ID:STATION # 1 Matrix:WATER
Level:NA

Laboratory ID:2524-3 Units:ug/L

Date Collected:12-17-90 Date Analyzed: 12-19-90

Dilution Factor: 1.0 Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901203A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

BENZENE

ISTD

SS %

TOLUENE

ETHYL BENZENE

M,P-XYLENES

O-XYLENE

"Sample ID:","2524-3 5ml "
"Analysis Date:","Wed Dec 19, 1990 2:22:28 pm "
"Dilution Factor:","100"
"Data File:","/DATA/LUFT_PID_474.RES "
"Method File:","/DATA/LUFTQP1129.MTH ","AreaUnits "
"* "
"* "

"Compound Name	Pk.Height	Pk.Area	Nanograms	RT"
"BENZENE "	297,	4660,	1.152,	5.773
"ISTD "	56607,	530744,	,	6.249
"SS % "	30532,	322544,	107.910,	7.547
"TOLUENE "	860,	12124,	2.992,	9.601
"ETHYL BENZENE "	61,	738,	.219,	13.206
"M,P-XYLENES "	212,	2003,	.526,	13.521
"O-XYLENE "	82,	853,	.255,	14.497

BENZENE

ISTD

SS %

TOLUENE

ETHYL BENZENE

M,P-XYLENES

O-XYLENE

"Sample ID:","mspb5901219"
"Analysis Date:","Wed Dec 19, 1990 12:06:03 pm"
"Dilution Factor:","100"
"Data File:","/DATA/LUFT_PID_471.RES"
"Method File:","/DATA/LUFTQP1129.MTH","AreaUnits"
"*"
"*"

"Compound Name	Pk.Height	Pk.Area	Nanograms	RT"
"BENZENE	244,	2639,	.662,	5.765
"ISTD	56206,	522620,	,	6.256
"SS %	30179,	320192,	108.789,	7.550
"TOLUENE	339,	6636,	1.663,	9.599
"ETHYL BENZENE	100,	1222,	.369,	13.199
"M,P-XYLENES	393,	3705,	.989,	13.515
"O-XYLENE	153,	1455,	.442,	14.483

ES-ENGINEERING SCIENCE, INC.

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Berkeley,CA 94710

GC ANALYTICAL REPORT
Analytical Method
BTEX Aromatic Compounds by 8020

Work Order NO.: 2524 % Moisture:NA

Client ID:NA Matrix:WATER
Level:NA

Laboratory ID:MWPB5901219 Units:ug/L

Date Collected:NA

Dilution Factor: 1.0 Date Analyzed: 12-19-90
Inst. Ser. #: VGC5-901129
QC Batch #: SWPB5901203A&B

Compound	Result	Reporting Limit
Benzene	ND	1.0
Ethyl Benzene	ND	2.0
Toluene	ND	2.0
Xylenes (total)	ND	4.0

ND-Not Detected
NA-Not Applicable
D-Additional Dilution Factor

RUSH

CHAIN OF CUSTODY RECORD w.o. 4254

PAGE

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Clyde Wong	NC 222.14

PROJECT NAME / LOCATION: P.O. Partners, Emeryville

SAMPLER(S): (SIGNATURE) Clyde Wong Clyde R Wong

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	BTEX	C.O.D.				PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
						ANALYSES REQUIRED								
-1, -2	12/17	12:00	water	Station A -01A,B	2	✓					ICE		24 hrs	
1, 2, B-3	"	12:09	"	Station B -02A-C	3	✓					"		24 hrs	
1, 2	"	12:20	"	Station #1 -03A,B	2	✓					"		24 hrs	
-3 -4	"	12:23	"	Station A	2		✓				"		5 days	C.O.D. in VOA bottles

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Clyde R Wong	12/17/90 1249				
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
			12/17/90 1049	Samples C. & C + Intact	

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

APPENDIX D
ESTIMATION OF CANISTER BREAKTHROUGH

ESTIMATION OF BTEX REMOVAL

BTEX CONCENTRATION TRENDS - EXTRACTION WELL EW-1
1650 - 65TH STREET (P.O. PARTNERS) PROPERTY, EMERYVILLE.

Date	*Time*	*Time Elapsed (min)*	*Cumulative time (min)*	*Flow Meter Reading*	*Water Pumped (gal)*	*Benzene*	*Toluene*	*Ethyl - - Benzene*	*Xylene*	*Total BTEX at Pt. A (ppb)*	*BTEX Removed (gms)*
12/17/90	950	0	0	310	310	11,000	7,900	2,200	10,000	31,100	36.49
12/19/90	1430	3,360	3,360	6,985	6,675	3,700	2,500	ND	2,300	8,500	500.24
12/21/90	1035	2,645	6,005	8,905	1,920	3,200	2,200	ND	1,700	7,100	56.68
12/27/90	1338	10,263	16,268	16,930	8,025	2,900	2,100	160	1,500	6,660	208.98
01/04/91	1020	9,882	26,150	21,140	4,210	3,200	2,800	ND	ND	6,000	100.87
01/11/91	1015	10,075	36,225	22,913	1,773	3,000	2,400	200	1,800	7,400	44.96
01/16/91	1230	7,335	43,560	23,220	307						
01/30/91	1200	20,130	63,690	24,600	1,380						
01/31/91	1200	1,440	65,130	27,570	2,970						
02/06/91	1500	10,260	75,390	33,840	6,270	470	230	11	390	1,101	175.80
02/13/91	1400	10,020	85,410	38,590	4,750	1200	280	ND	360	1,840	26.44

TOTAL BTEX REMOVED (gms)= *1150.46*

ES ENGINEERING-SCIENCE, INC.

Client P.O. Partners | Job No. NC222.14 | Sheet 2 of 2
Subject Carbon Canister Breakthrough | By CRW | Date 3/12/91
Checked | Rev.

PURPOSE: Calculate next canister breakthrough using current loading data

Estimation of BTEX Removal:

From the attached table — previous breakthrough for the 1st canister occurred at 1150 gm BTEX removed (this includes operating period between 2/6 and 2/13).

the table uses average BTEX concentration & volume from two sampling events to estimate BTEX removed during the period.

Total BTEX removed at breakthrough is sum of BTEX removed for all periods.

(Note: this is only a rough approximation)

Next canister breakthrough:

Assume current loading of 2gpm @ 1840 ppb BTEX

$$\text{Volume processed} = \frac{1150.\text{gm BTEX}}{(1.84 \times 10^{-3}\ \frac{\text{gm}}{\text{L}})(3.785\ \frac{\text{L}}{\text{gal}})} = 165,191 \text{ gallons}$$

$$t = \frac{165,190\ \text{gal}}{2880\ \text{gal/day}} = 57 \text{ days}$$