FOURTH QUARTER
REPORT OF FINDINGS
MAY 1991

ALAMEDA COUNTY ALCOPARK FACILITY
165 13TH STREET
OAKLAND, CALIFORNIA

Prepared For:

Mr. Jim De Vos
Alameda County General Services Agency
4400 MacArthur Boulevard
Oakland, California 94619

Prepared By:

Environmental Science & Engineering, Inc.
4090 Nelson Avenue, Suite J
Concord, California 94520

Project No. 6-90-5042

May 22, 1991

This report has been prepared by Environmental Science & Engineering, Inc. for the exclusive use of Alameda County General Health Services as it pertains to their site located at 165 13th Street, Oakland, Alameda County, California. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other geologists and engineers practicing in this field. No other warranty, expressed or implied, is made as to professional advice in this report.

REPORT PREPARED BY:

Shannon T. O'Hare
Scientist

UNDER THE PRIMARY REVIEW OF:

Susan S. Wickham, RG 3851
Staff Hydrogeologist
Director of Geosciences

Project No. 6-90-5042

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 EXECUTIVE SUMMARY

Environmental Science & Engineering, Inc. (ESE) conducted the fourth quarter ground-water monitoring activities at the Alameda County ALCOPARK facility on April 25, 1991. The ALCOPARK facility (site) is located at 165 13th Street in Oakland, Alameda County, California (Figures 1, 2). ESE calculated ground-water elevations in the three monitoring wells at the site based on depth to ground water measured at each well. ESE observed no free product in any of the wells. ESE collected ground-water samples and submitted them for analyses of gasoline constituents.

Depth to ground water at the site averaged 20.84 feet for the April 1991 sampling event (Table 1). Average ground-water elevations increased by approximately 0.4 feet since January 1991. ESE contoured relative ground-water elevations, calculated from depth to water readings, to reveal a ground-water flow direction to the east/ northeast at about 0.026 feet per foot. This ground-water gradient was slightly higher than that calculated for the January 1991 sampling event (ESE, 1991a).

Fuel constituent concentrations (TPH) were detected in MW-4 for the first time. Fuel constituent concentrations decreased in MW-1 and MW-5, from 270 to 230 ug/L, and 120 ug/L to ND, respectively. Benzene concentrations in all wells decreased for this sampling period, with a significant decrease for MW-4 (230 ug/L to 12 ug/L). The results for all other purgeable aromatic gasoline constituents (Ethylbenzene, Toluene, and Total Xylenes) showed slight decreases in all wells to nondetectable concentrations, with the exception of a slight increase in Total Xylenes from 2.0 ug/L to 2.3 ug/L in MW-4. Comparison of ground-water elevations and fuel constituent concentrations shows no consistent trends connecting these two parameters.

2.0 INTRODUCTION

This report is the fourth of four quarterly reports for 1990 and 1991 presenting the results of ground-water monitoring activities at the Alameda County ALCOPARK facility. The ALCOPARK facility (site) is located at 165 13th Street, Oakland, California (Figure 1). The site is an Alameda County fueling station located northwest of the ALCOPARK parking and vehicle maintenance structure operated by Alameda County at the corner of 13th and Jackson Streets, Oakland, California. The fueling station facility's layout, illustrated in Figure 2, consists of a single pump island for dispensing leaded and unleaded gasoline, and two 10,000 gallon underground storage tanks.

All work was performed by Environmental Science & Engineering, Inc. (ESE). This quarterly ground-water monitoring report contains a discussion of ESE's field activities and analytical results for ground-water samples collected on April 25, 1991. The results are illustrated as contour maps of relative ground-water elevations (Figure 3) and concentration of Benzene in ground water (Figure 4). The report also includes a discussion of trends in ground-water elevations versus concentrations of selected fuel constituents in ground water at the site (Table 3).

2.1 Background

During a fuel line integrity test performed by Scott Company of Oakland on January 24, 1989, a leak was found in the vapor recovery line below the unleaded gasoline dispenser. Hunter/ Gregg, Inc. (Hunter), now ESE, completed a hand auger boring directly below where the piping leak was found. Soil samples obtained from the boring showed elevated levels of Total Petroleum Hydrocarbons (TPH), Benzene, Ethlybenzene, Toluene and Total

Xylenes (BETX). Alameda County General Services Agency (Alameda County GSA) authorized Hunter (now ESE) to perform a Phase I site characterization to assess the lateral and vertical extent of petroleum hydrocarbon contamination in the on-site soil and ground water adjacent to the pump island. The site characterization was performed for the site in March 1989, and the results were presented in a report dated May 1989.

For the Phase I Site Characterization, Hunter drilled and sampled two borings, and drilled, sampled, and installed three ground-water monitoring wells and two vapor monitoring wells. Analysis of soil and ground-water samples from that phase of the investigation showed nondetectable concentrations of TPH, and elevated concentrations of Benzene, Ethylbenzene, Toluene, and Total Xylenes (BETX) in soil and ground water. Only Benzene was above the State of California drinking water action levels, with concentrations of 21 ug/L (micrograms per liter or parts per billion) in MW-1, 13 ug/L in MW-4, and nondetectable in MW-5. Soil and ground-water analysis results for the initial hand auger sampling, and site characterization investigation are presented in Hunter's Phase I Site Characterization report (Hunter, 1989). In the conclusion of that report, ESE recommended quarterly monitoring of ground water, and no further action concerning the soil at the site.

The current investigation consists of ground-water monitoring, as required by the San Francisco Bay Area Regional Water Quality Control Board (Regional Board). The site ground water is monitored and ground-water samples are analyzed for TPH , distinguished as Total Extractable Hydrocarbons (TEH, or diesel) and Total Volatile Hydrocarbons (TVH, or gasoline), and BETX for four consecutive quarters, in compliance with the Regional Board's (1989) recommendations for obtaining site closure. This report is the fourth of the quarterly monitoring reports.

2.2 Current Investigation

For each sampling event, the instructions contained in the project Work Plan (ESE, 1990a), which includes ESE Standard Operations Procedures, are followed. Site activities consist of these tasks:

- Secure work site.

- Measure depth to ground water in each on-site well. Measure thickness of product, if present. Calculate well volume, calculate ground-water elevation. Record ground-water level survey elevation in field logs and forms.

- Purge each well by pumping or bailing. Temporarily store purged ground water in 55-gallon drums on site. The purged ground water will be properly disposed of by Alameda County GSA. While purging, measure ground-water temperature, pH and specific conductance, and observe ground-water color, odor, turbidity and the presence/absence of hydrocarbon product. Record ground-water quality measurements and observations in field logs and forms (Appendix A).

- Sample each well by bailing. Collect ground-water samples in containers provided by the analytical laboratory. Keep filled sample containers chilled in a cooler for transport to the analytical laboratory.

- Record final ground-water quality parameters and depth to ground water. Prepare Chain of Custody documents to accompany the samples to the analytical laboratory.

- Clean work site. Secure and label temporary ground-water storage drums.

- Submit ground-water samples through proper Chain of Custody protocol to the analytical laboratory.

ESE submitted ground-water samples to Curtis & Tompkins, Ltd., a California State-certified analytical laboratory. Curtis & Tompkins analyzed the ground-water samples as listed below.

Analytical Laboratory Schedule

Well Number	Analyses
MW-1	TVH (GC FID 5030), BETX (EPA Method 8020)
MW-4	TVH (GC FID 5030), TEH (GC FID 3510), BETX (EPA Method 8020)
MW-5	TVH, BETX (EPA Method 8020)

ESE analyzed ground water from MW-1 and MW-5 for TVH-gasoline (TVH-g) and BETX, and ground water from MW-4 for TVH-g, TEH-diesel (TEH-d), and BETX. MW-4 is the on-site upgradient well. According to information made available by Alameda County GSA, an underground diesel tank existed in a location upgradient from the site, most likely across Jackson Street. That tank was closed by cementing in place on March 1989 (Hunter, 1989). ESE analyzed the MW-4 ground-water samples for TEH-d to establish background concentration and to test for the presence of that constituent in MW-4. Prior to this sampling event, ESE assumed the analysis for BETX an adequate surrogate for the presence of gasoline in ground water samples obtained from MW-4. Due to the high levels of benzene concentrations detected in MW-4 in the January sampling event, however,

ground water from MW-4 was analyzed for TVH-g for this sampling event. TVH-g and TEH-d are discussed as TPH within the text.

ESE used the data obtained each sampling event to construct contour maps of Benzene constituent concentrations. The Benzene results are amenable to contouring. Benzene is also a widely used indicator for establishing clean-up levels for ground water. Starting with the second (October 1990) quarterly report, ESE has prepared a trend analysis of ground-water analytical results versus ground-water elevation over time (See Table 3).

3.0 APRIL 1991 SAMPLING EVENT

On April 25, 1991, ESE performed the fourth of four quarterly ground-water monitoring and sampling events. ESE obtained depth to water information, and purged and sampled three on-site monitoring wells. The objective of the ground-water level survey is to estimate the general direction of the ground-water flow at the site. An additional objective is to observe and record product thickness, if detected, for each well. The objective of the sampling program is to monitor the extent of hydrocarbon constituents in the on-site ground water, if present.

3.1 Ground-Water Elevations

Depth to ground water and relative ground-water elevations are presented in Table 1. ESE found no free product in ground water. In addition, no hydrocarbon odor was detected in ground water from any of the monitoring wells.

Relative ground-water elevations calculated from depth to water measurements are presented as contours in Figure 3. Depth to ground water on site ranges from 21.19 feet below ground surface (bgs) in MW-1 to 20.68 feet bgs in MW-5. Relative ground-water elevation contours reveal an overall ground-water flow direction to the east/ northeast, and a gradient of 0.026 feet/foot. The northeasterly ground-water flow direction deviates slightly from that calculated for the February 1991 sampling event and from previous reports for the site.

3.2 Ground-Water Sampling and Analysis

ESE collected ground-water samples from the three on-site wells. ESE submitted the three samples and additional validation samples (duplicate and trip blank) for analysis to Curtis & Tompkins on April 26, 1991. Analytical results are summarized in Table 2. The table lists results for TPH (TVH-g and TEH-d) and BETX concentrations in micrograms per liter (ug/L). Results of sample analyses are presented in Appendix B: Analytical Results and Chain of Custody Documents.

Concentrations of Benzene in ground water for the April 1991 sampling event are contoured in Figure 4. The interpretation presented in Figure 4 is based on the assumption that Benzene concentrations in ground water are uniformly distributed. Values range from 12 ug/L in well MW-4 to nondetectable concentrations in MW-5 and MW-1.

3.3 Quality Assurance and Control

For field quality assurance and control, ESE collected and submitted a duplicate ground-water sample, and a trip blank. For the April 1991 sampling event, these validation samples were labeled as MW-5-42, and Trip Blank, respectively. The duplicate sample and the Trip Blank were preserved, handled, and analyzed in a manner identical to the other ground-water samples. The duplicate sample showed good comparison with the original sample, and results for the Trip Blank were non-detectable.

3.4 Trend Analysis of Ground-Water Elevation and Analytical Data

Comparing trends in ground-water elevations versus hydrocarbon fuel constituent concentrations over time assesses the rate at which such concentrations decline or increase in ground water. Declines or increases in constituent concentration are part of a constituent plume fate and transport. This process includes migration, mixing, degradation and/or

attenuation of constituents. Another aspect is the change in the ratio of constituent concentrations. Although all constituent concentrations may ideally decrease over time, the more volatile constituents (Benzene, Ethylbenzene) escape more quickly. The composition of a constituent plume thus becomes relatively enriched in the heavier, less volatile constituents (Toluene, Xylenes) when compared to the originally established ratio. This change in constituent plume concentration ratios is generally an indication of plume age.

Ground-water elevations are compared to constituent concentrations on Table 3. The table includes initial (March 1989) data taken from the Site Characterization Report (Hunter, 1989) and from the current investigation (July 1990, October 1990, January 1991, and April 1991).

In general, relative ground-water elevations for the three on-site wells have fluctuated from March 1989 to April 1991. Average ground-water elevations for the three wells increased in July 1990, decreased in October 1990 and January 1991, and increased in April 1991. The only deviation from these trends was in MW-1, where ground-water elevation showed a decrease for the April 1991 sampling event. Trends in constituent concentrations are discussed below.

Total Petroleum Hydrocarbons (TPH). TPH concentrations in MW-1, nondetectable (ND) for March 1989, have declined since monitoring began (1500 to 1200 to 270 to 230 ug/L). TPH concentrations in MW-4 were ND for the initial investigation and the first three monitoring periods, but were detected in the fourth period (170 ug/L TVH-g and 130 ug/L TEH-d). TPH concentration in MW-5 has shown a pattern similar to that of MW-1, with values generally decreasing since the October 1990 sampling event (ND to 670 ug/L to 120 ug/L to 120 ug/L to ND). No trend between TPH concentration and ground-water elevation is apparent.

Benzene. Benzene concentrations in MW-1 have fluctuated over the monitoring period. In MW-1, Benzene concentrations were 21 ug/L in March, 200 ug/L in July 1990, ND in October 1990, 23 ug/L in January 1991, and ND in April 1991. Benzene concentrations in MW-4 have also fluctuated over the period. Concentrations of Benzene were 13 ug/L in March 1989, 0.8 ug/L in July 1990, 120 ug/L in October 1990, 230 ug/L in January 1991, and 12 ug/L in April 1991. Benzene concentrations for MW-5 were ND in March 1989, 0.8 ug/L in July 1990, 13 ug/L in October 1990, 3.2 ug/L in January 1991, and ND in April 1991. Overall, Benzene concentrations show no consistent trend relative to ground-water elevation for any of the monitoring wells.

Ethylbenzene. Ethylbenzene concentrations in MW-1 and MW-4 have fluctuated at low levels over the past four quarters, while concentrations on MW-5 have been non detectable throughout. Concentrations of this constituent are low and show no trend relative to ground-water elevation.

Toluene, Total Xylenes. Concentrations for these two constituents in MW-1 and MW-4 fluctuated over the monitoring period. The concentration of Toluene in MW-1 ranged between 45 ug/L (July 1990) and ND (April 1991); and in MW-4 between 2.8 ug/L (October 1990) and ND (July 1990, April 1991). Concentrations of Total Xylenes in MW-1 ranged between 53 ug/L (July 1990) and ND (April 1991), and in MW-4 between 2.3 ug/L (April 1991) and ND (March 1989, July 1990). Fluctuations in concentrations of both constituents were greater in MW-1. These two constituents have not been detected in MW-5 for the observations period. Overall, no trend in concentrations of these constituents relative to ground-water elevation has been observed.

4.0 DISCUSSION

4.1 Ground-Water Elevations

ESE used the depth to ground water data obtained for the April 1991 sampling event to produce a contour map of relative ground-water elevation (Figure 2). The contour map shows ground-water flow to the east/ northeast, toward the topographic low occupied by Lake Merritt (Figure 1), at a gradient of about 0.026 feet/foot. These results deviate slightly from results obtained for the Phase I Site Characterization (Hunter, 1989) and for the previous sampling events (ESE, 1990b, 1990c, 1991a), which showed ground-water flow directed east.

4.2 Analytical Results

Concentrations of Total Petroleum Hydrocarbons, Ethylbenzene, Toluene, and Total Xylenes in all monitoring wells were below that which require remedial action.

Benzene concentrations are above the State of California action level for drinking water (5 ug/L) for monitoring well MW-4 (See Table 2), which is the upgradient well at the site. The drinking water action level is presented for reference only. Site ground water has not been characterized for beneficial use, and drinking water standards may not apply. Benzene concentrations in MW-1 and MW-5 were nondetectable. Well MW-5 is located down-gradient of the gasoline pump and dispenser piping (Figure 2).

Benzene concentrations have fluctuated significantly over the monitoring period. Concentrations have been greater than 100 ug/L in MW-1 (200 ug/L in July 1990) and MW-4 (120 ug/L in October 1990 and 230 ug/L in January 1991). Concentrations in MW-5 have peaked at 13 ug/L (October 1990).

5.0 RECOMMENDATIONS

Based on the fluctuating TVH-g and BETX concentrations in the ground-water monitoring wells over the past year, ESE recommends two more quarters of monitoring at the site. Concentrations of gasoline constituents in ground water appear to be migrating onto the site. Increasing concentrations of Benzene have been noted in MW-4, upgradient to the site with respect to ground-water flow direction. Concentrations of TVH-g in downgradient wells MW-1 and MW-5 appear to be decreasing. Additional monitoring is needed to illustrate that Benzene concentrations in the groundwater below the site continue to decline, or to confirm the migration of a plume from offsite.

6.0 REFERENCES

California Regional Water Quality Control Board, 1989, Regional Board Staff Recommendations for Initial Evaluation and Investigation of Underground Tanks: Tri-Regional Recommendations. Prepared by Staff of San Francisco Bay Regional Water Quality Control Board; 2 June 1988 (Revised 9 November 1989).

Environmental Science & Engineering, Inc., 1990a, Work Plan, Quarterly Ground-Water Monitoring, Alameda County ALCOPARK Facility, 165 13th Street, Oakland, Alameda County, California. Prepared for Alameda County General Services Agency, Oakland, California; August 10, 1990.

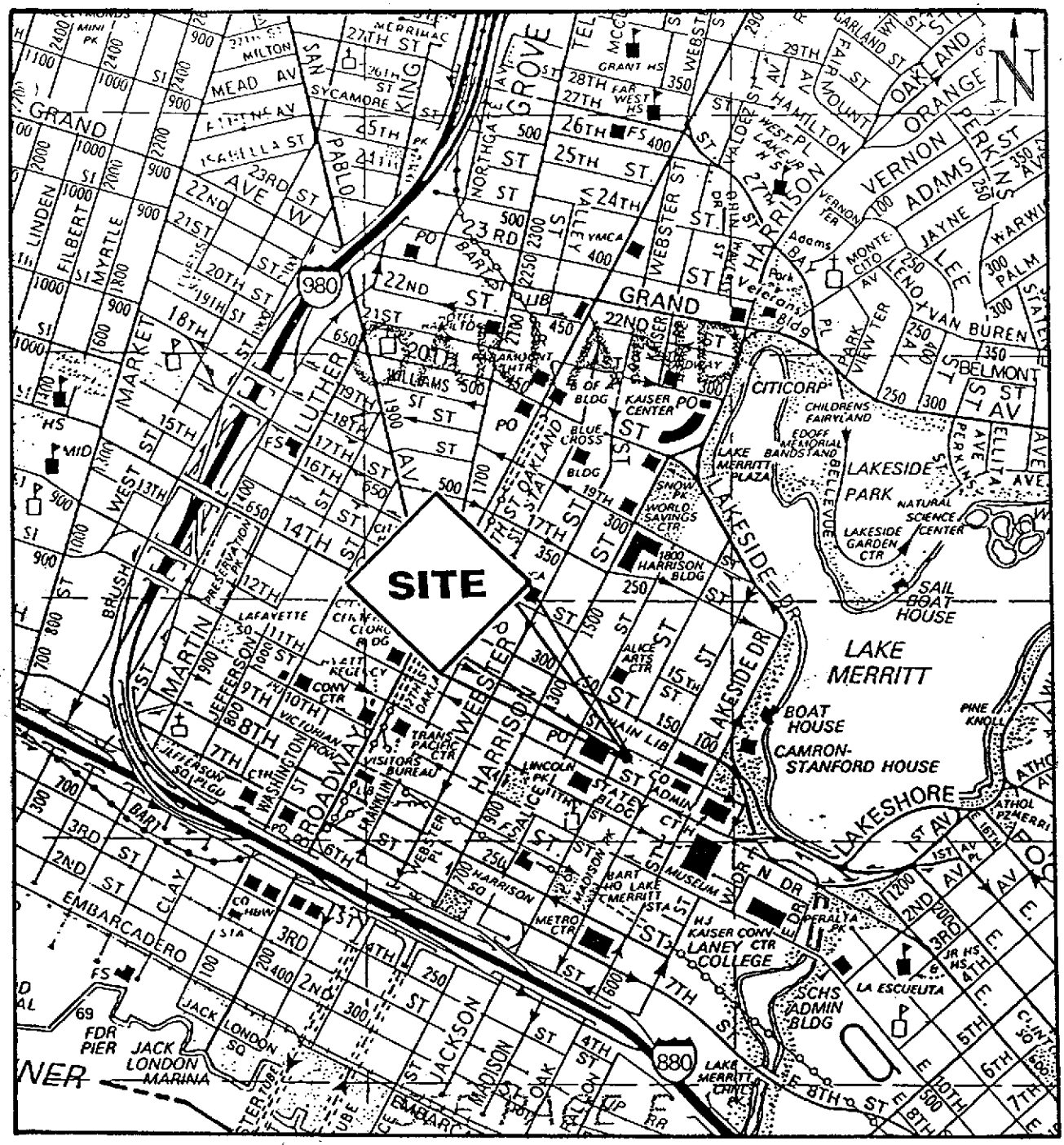
Environmental Science & Engineering, Inc. 1990b, First Quarter Report of Findings, August 1990, Alameda County ALCOPARK Facility, 165 13th Street, Oakland, California. Prepared for Alameda County General Services Agency, Oakland, California; August 27, 1990.

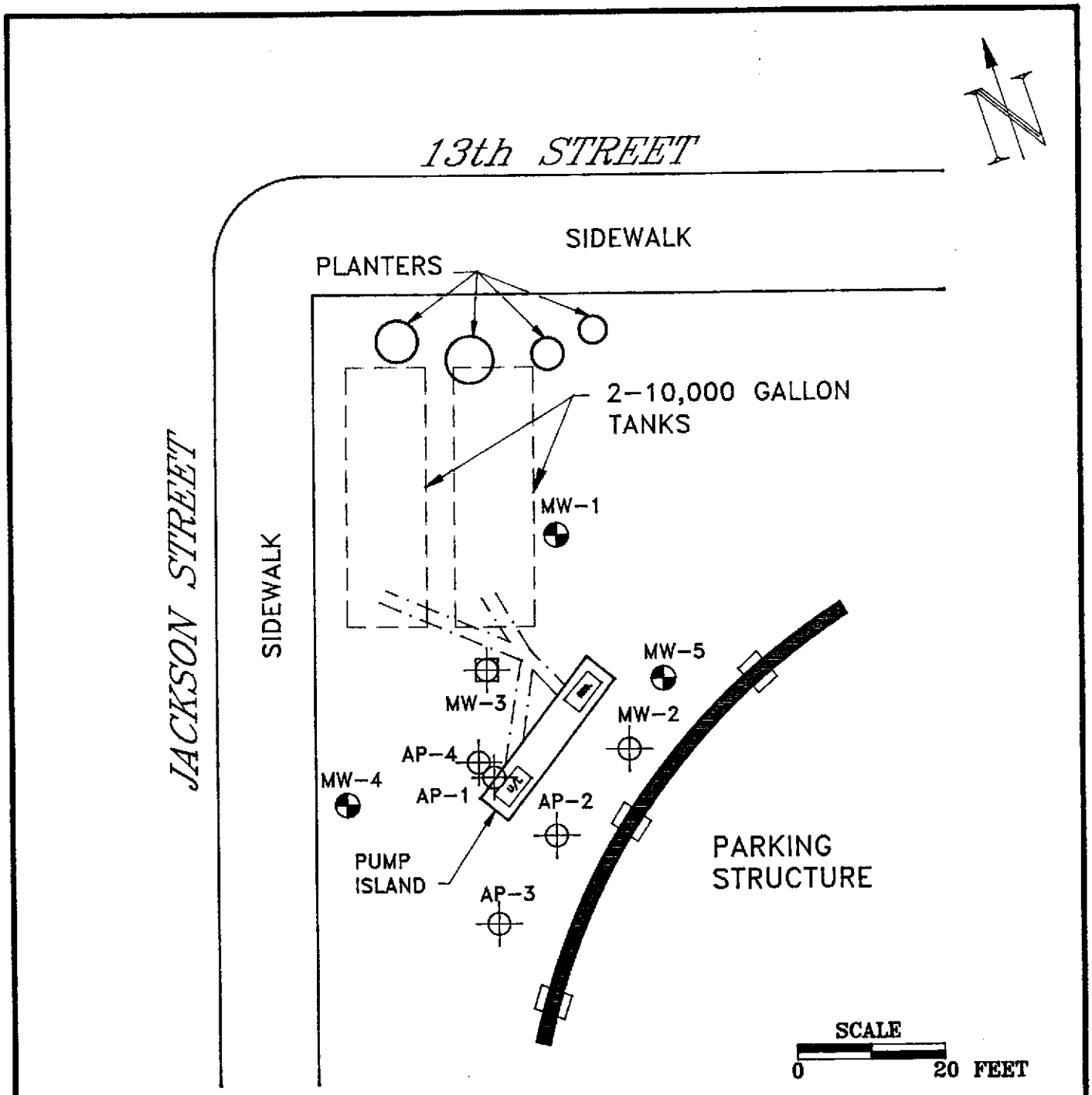
Environmental Science & Engineering, Inc. 1990c, Second Quarter Report of Findings, November 1990, Alameda County ALCOPARK Facility, 165 13th Street, Oakland, California. Prepared for Alameda County General Services Agency, Oakland, California; November 19, 1990.

Environmental Science & Engineering, Inc. 1991a, Third Quarter Report of Findings, February 1990, Alameda County ALCOPARK Facility, 165 13th Street, Oakland, California. Prepared for Alameda County General Services Agency, Oakland, California; February 14, 1991.

Hunter/Gregg, Inc., 1989, Phase I Site Characterization Report for Alameda County Alcopark Facility. Performed for Alameda County General Services Agency - Building Maintenance Department, Oakland, California; May 1989.

FIGURES


SITE
N
SCALE
0
1250 FEET
Environmental Science & Engineering, Inc.
A CH2M COMPANY
ALAMEDA COUNTY
ALCOPARK
OAKLAND, CA
FIGURE 1
LOCATION MAP
DRAWN BY
CVS
APPROVED BY
REVISED
5/91 CVS
DATE
11/90
FILE NAME
F1LM10
PROJ. NO.
6-90-5042



LEGEND

- SOIL BORING
- GROUND–WATER MONITORING WELL
- VADOSE MONITORING WELL
- UNDERGROUND PIPING

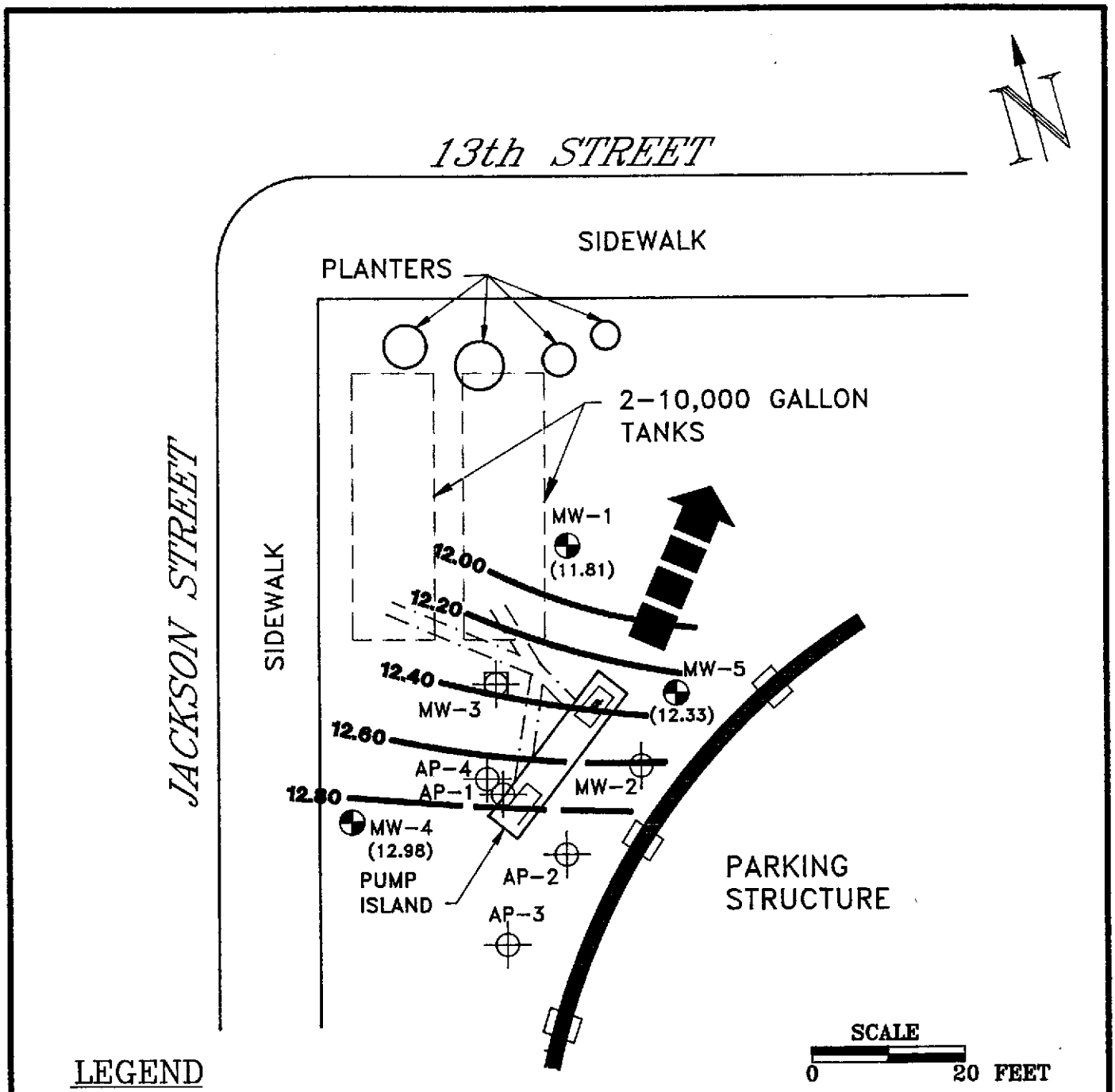
ESE A CALCORP COMPANY
Environmental Science & Engineering, Inc.

ALAMEDA COUNTY
ALCOPARK
OAKLAND, CA

FIGURE 2
SITE PLAN

DRAWN BY	APPROVED BY	REVISED
DWR		CVS 5/91

DATE	FILE NAME	PROJ. NO.
11/90	F2SP10	6–90–5042



LEGEND

- SOIL BORING
- GROUND–WATER MONITORING WELL
- VADOSE MONITORING WELL
- UNDERGROUND PIPING
- (11.81) DEPTH TO GROUND WATER (ft)
- 12.40 GROUND–WATER CONTOUR (ft)
- APPROXIMATE GROUND–WATER FLOW DIRECTION

WATER MEASUREMENTS TAKEN ON 4/25/91

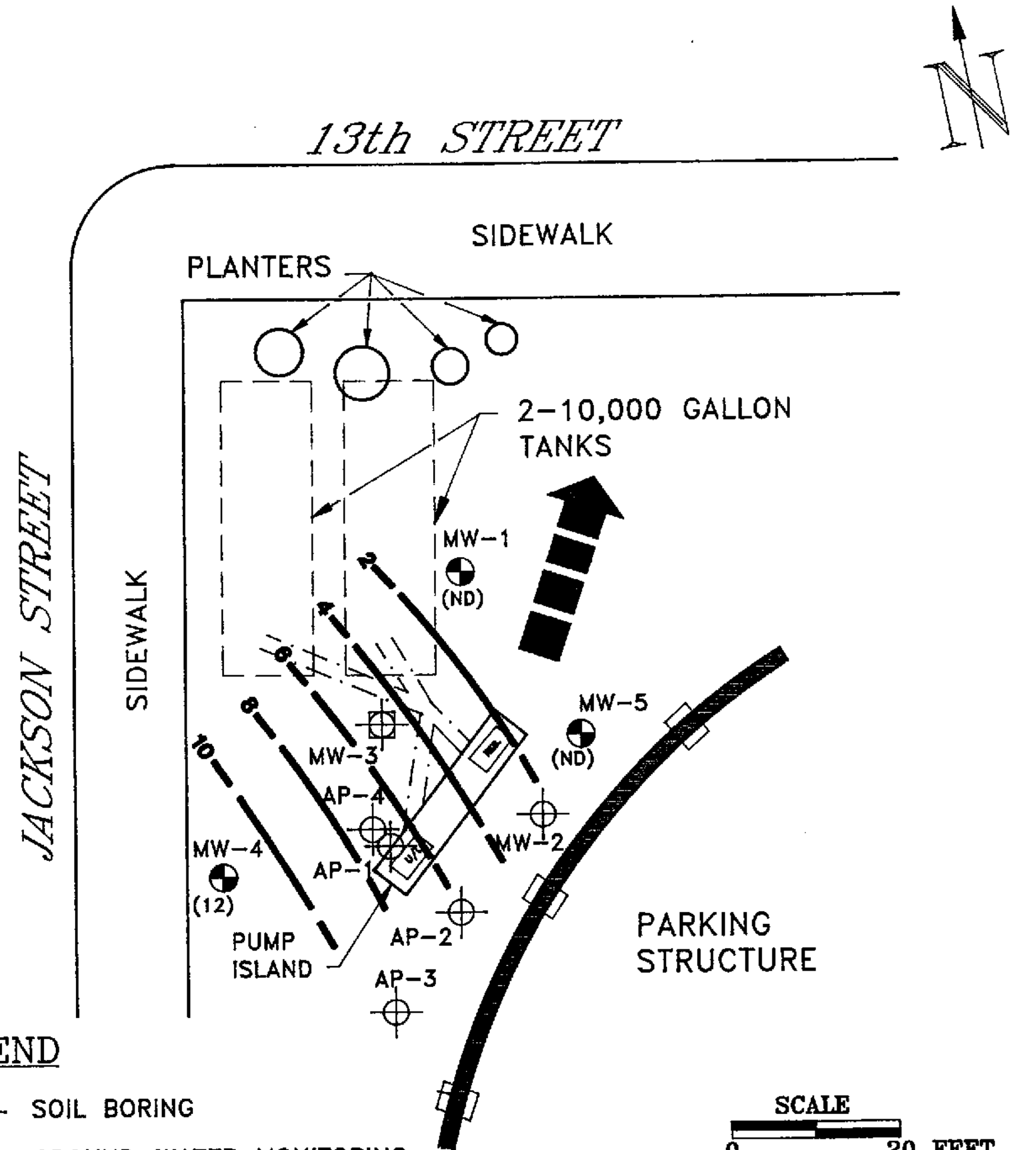
ESE A CH2MHILL COMPANY — Environmental Science & Engineering, Inc.

ALAMEDA COUNTY
ALCOPARK
OAKLAND, CA

FIGURE 3
RELATIVE GROUND–WATER ELEVATIONS
APRIL 1991

DRAWN BY	APPROVED BY	REVISED
DWR		CVS 5/91

DATE	FILE NAME	PROJ. NO.
5/91	F3GWE10	6–90–5042



LEGEND

- SOIL BORING
- GROUND-WATER MONITORING WELL
- VADOSE MONITORING WELL
- UNDERGROUND PIPING
- (12) BENZENE CONCENTRATION IN GROUND WATER (ug/L)
- INFERRED BENZENE CONCENTRATION CONTOUR (ug/L)
- APPROXIMATE GROUND-WATER FLOW DIRECTION

ND = NOT DETECTED (0.5 ug/L DETECTION LIMIT)

ESE A CILCORP COMPANY
Environmental Science & Engineering, Inc.

ALAMEDA COUNTY
ALCOPARK
OAKLAND, CA

FIGURE 4
BENZENE CONCENTRATIONS IN GROUND WATER
APRIL 1991

DRAWN BY	APPROVED BY	REVISED
DWR		CVS 5/91

DATE	FILE NAME	PROJ. NO.
11/90	F4BC10	6-90-5042

TABLES

TABLE 1

GROUND-WATER ELEVATIONS
for
ALAMEDA COUNTY, ALCOPARK - PROJECT NO. 6-90-5042

APRIL 1991

Well Number [a]	Reference Elevation [b] (Feet)	Depth to Ground Water (Feet)	Ground-Water Elevation (Feet)
MW-1	33.00	21.19	11.81
MW-4	33.63	20.65	12.98
MW-5	33.01	20.68	12.33

Notes:

a. MW-2 and MW-3 are vadose zone wells, not monitored for ground water (see Figure 2).
b. Datum elevation: MW-1 Reference Point assigned elevation of 33.00 feet.

Depth to ground water measured by Environmental Science & Engineering, Inc., on April 25, 1991.

TABLE 2

ANALYTICAL RESULTS
for
ALAMEDA COUNTY, ALCOPARK - PROJECT NO. 6-90-5042

APRIL 1991

Sample Number	TPH (TVH/TEH) (ug/L)[a]	Benzene (ug/L)	Ethyl Benzene (ug/L)	Toluene (ug/L)	Total Xylenes (ug/L)
MW-1-41	230/--	ND	ND	ND	ND
MW-4-41	170/130	12	ND	ND	2.3
MW-5-41	ND/--	ND	ND	ND	ND
MW-5-42	ND/--	ND	ND	ND	ND
Trip Blank	--/--	ND	ND	ND	ND

Notes:

BETX Benzene, Ethyl Benzene, Toluene and Total Xylenes
TPH Total Petroleum Hydrocarbons
ug/L Micrograms per liter, or parts per billion
ND Below detection limit (TPH = 0.5 ug/L, BETX = 0.5 ug/L)
-- Not analyzed for the constituent shown

a. TPH analyzed as gasoline (GC FID/5030 or TVH) for MW-1, MW-4 and MW-5, and as diesel (GC FID/3510 or TEH) for MW-4.
b. Duplicate sample.

Samples collected by Environmental Science & Engineering, Inc., on April 25, 1991, and analyzed by Curtis & Tompkins, Ltd, Laboratories. Laboratory reports and chain of custody documents are included in Appendix B.

TABLE 3

GROUND-WATER TRENDS
for
ALAMEDA COUNTY, ALCOPARK - PROJECT NO. 6-90-5042

APRIL 1991

Well MW-1

	March 1989[a]	July 1990	October 1990	January 1991	April 1991
Relative Ground-water Elevation (ft)	12.2	12.3	12.1	11.9	11.8
TPH (ug/L) (TVH/TEH)	ND/--	1500/--	1200/--	270/--	230/--
Benzene (ug/L)	21	200	ND	23	ND
E-benzene [b] (ug/L)	0.4	ND	2.2	ND	ND
Toluene (ug/L)	3.9	45	7.3	1.5	ND
Xylenes [c] (ug/L)	4.5	53	46	3.1	ND

TABLE 3
(Continued)

Well MW-4

	March 1989[a]	July 1990	October 1990	January 1991	April 1991
Relative Ground-water Elevation (ft)	12.4	12.5	12.2	12.0	13.0
TPH (ug/L) (TVH/TEH)	--/ND	--/ND	--/ND	--/ND	170/130
Benzene (ug/L)	13	0.8	120	230	12
E-benzene [b] (ug/L)	1.0	ND	1.1	1.2	ND
Toluene (ug/L)	1.4	ND	1.2	2.8	ND
Xylenes [c] (ug/L)	ND	ND	0.9	2.0	2.3

Well MW-5

	March 1989[a]	July 1990	October 1990	January 1991	April 1991
Relative Ground-water Elevation (ft)	12.2	12.4	12.1	11.9	12.3
TPH (ug/L) (TVH/TEH)	ND/--	670/--	120/--	120/--	ND/--
Benzene (ug/L)	ND	0.8	13	3.2	ND
E-benzene [b] (ug/L)	ND	ND	ND	ND	ND
Toluene (ug/L)	ND	ND	ND	ND	ND
Xylenes [c] (ug/L)	ND	ND	ND	ND	ND

TABLE 3
(Concluded)

Notes and Abbreviations

a Data for March 1989 taken from Site Characterization Report (Hunter, 1989).

b E-benzene = ethylbenzene

c Xylenes = Total Xylenes

-- Not analyzed for constituent shown

ND Not detected at the laboratory reporting limit (TPH = 0.5 ug/L, BETX = 0.5 ug/L)

TPH TPH expressed as Total Volatile Hydrocarbons (TVH, or gasoline) for MW-1, MW-4 and MW-5; and as Total Extractable Hydrocarbons (TEH, or diesel) for MW-4.

APPENDIX A

Water Sample Logs

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW-1-41 WELL NO. MW-1

PROJECT NAME Alameda County - Alco Park

PROJECT NO. 6-90-5042 DATE 4/25/91

Sample/Well Location: Adjacent to (2) 10,000 gallon UST's ; 13th Street

Weather Conditions: —

Field Personnel: P. Marsden

Prepared by: P. Marsden Reviewed by: S. O'Hare

Time	Cumm Dschg (gallons)	pH/O_2	Temp (°F)	Spec. Conduct. (umhos/cm)	Color	Odor	Turbidity (NTU)	Remarks
12:10	5	7	60.9	6.48	Brown	None		
12:20	15	6.32	61.3	6.52	"	"		
12:25	20	6.41	61.1	6.51	"	"		
12:30	30	6.75	60.6	5.77	"	"		
12:50	—	7.01	63	5.67	"	"		

Reference Point (RP): Description Top of well casing

RP Elevation (feet)/Datum 33.0

Total Depth (TD, feet) 33.9

Depth to Water (DTW, feet) START 21.19 END

Water Level (WL, feet) Start 11.81

Water Column (TD-DTW, feet) Δh = 12.71

Casing Volume (gallons)*: NA

Well Volume (gallons)*: 13.08

Total Discharge (gallons): 30+

Casing Volumes Removed: NA

Well Volumes Removed: 2.3

Flow Estimate (gallons per minute)**: 1.5

Method Used for Estimate**: Keck pump

QUALITY ASSURANCE

Method Used to Measure Water Level: Solinst well sounder

Sampling Method(s): disposable bailer

Sample Time: 12:50

Bailer or Pump Line: New ✓ Cleaned

Method of Cleaning Bailer/Pump: Alconox Wash + Rinse

pH Meter No.: — Conductivity Meter No.: — Other Instrument No.:

Calibration Date(s) and Results: —

Number, Size of Sample Containers: 3 VOAs

Method of Disposal of Discharged Water: 55 gallon steel drum on-site

DEVELOPMENT

Time Start: Time End:

Development Method(s) & Equipment:

Description of Surge Block or Pump:

Summary of Development Procedures***:

* See Notes and Calculations.
** Use Flow Estimate for Surface Water Samples only. Describe in Notes and Calculations.
*** Note Details of Well Development Procedures in Notes and Calculations.

ESE Environmental Science & Engineering, Inc.
A CH2M HILL Company

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW-1-41	WELL NO. MW-1
PROJECT NAME Alameda County - Alco Park	PROJECT NO. 6-90-5042
	DATE 4/25/91

NOTES AND CALCULATIONS

CASING VOLUME/WELL VOLUME CALCULATIONS

Borehole Diameter (inches):

Height of Water Column or Borehole Annulus within Aquifer (feet):

Borehole Volume (gallons):

Height of Water Column in Casing (feet):

Casing Volume (gallons):

Well Volume (Borehole Volume - Casing Volume, gallons):

Number of Well/Casing Volumes to Remove (gallons):

Total Volume to Remove (gallons):

Well Volume = Δh (3.43)(.3)

= Δh (1.029)

= 12.71 (1.029)

= 13.08

2 Well Volumes = 26.16 gallons

Samples

MW-1-41 - GW - TVH/BTEX

Prepared by: P Mausden Reviewed by: [signature] 5-3-91

ESE Environmental Science & Engineering, Inc.

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW-4-41 WELL NO. MW-4

PROJECT NO. 6-90-5042 DATE 4/25/91

PROJECT NAME Alameda County - Alco Park

Sample/Well Location: Adjacent to sidewalk + Jackson Street

Weather Conditions: —

Field Personnel: P. Marsden

Prepared by: P. Marsden Reviewed by: S. O'Hare

Time	Cumm Dschg (gallons)	pH/O_2	Temp (°F)	Spec. Conduct. (umhos/cm)	Color	Odor	Turbidity (NTU)	Remarks
11:25	5	6.88	62.6	6.02	Clear	No	None	
11:35	15	6.52	62.8	6.19	"	"		
11:40	23	6.4	63.7	6.38	"	"		
11:45	30	6.46	63.5	6.11	"	"		
12:45	—	7.05	62.5	5.44	"	"		

Reference Point (RP): Description Top of well casing

RP Elevation (feet)/Datum: 33.63

Total Depth (TD, feet): 35.35

Depth to Water (DTW, feet): START 20.65 END —

Water Level (WL, feet): Start 12.98

Water Column (TD-DTW, feet): Δh = 14.7

Casing Volume (gallons)*: NA

Well Volume (gallons)*: 10.8

Total Discharge (gallons): 30+

Casing Volumes Removed: NA

Well Volumes Removed: 2.8

Flow Estimate (gallons per minute)**: 1.5

Method Used for Estimate**: Kerk Pump

QUALITY ASSURANCE

Method Used to Measure Water Level: Solinst Sounder

Sampling Method(s): Disposable bailer

Sample Time: 12:45

Bailer or Pump Line: New ✓ Cleaned

Method of Cleaning Bailer/Pump: Alconox Wash + Rinse

pH Meter No.: —

Conductivity Meter No.: —

Other Instrument No.: —

Calibration Date(s) and Results:

Number, Size of Sample Containers: 3 voas - 1 liter amber

Method of Disposal of Discharged Water: 55 gallon steel drum on-site

DEVELOPMENT

Time Start: Time End:

Development Method(s) & Equipment:

Description of Surge Block or Pump:

Summary of Development Procedures***:

* See Notes and Calculations.
** Use Flow Estimate for Surface Water Samples only. Describe in Notes and Calculations.
*** Note Details of Well Development Procedures in Notes and Calculations.

Environmental Science & Engineering, Inc.

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW-4-41

WELL NO. MW-4

PROJECT NAME: Alameda County - Alco Park

PROJECT NO. 4-90-5042

DATE 4/25/91

NOTES AND CALCULATIONS

CASING VOLUME/WELL VOLUME CALCULATIONS

Borehole Diameter (inches):

Height of Water Column or Borehole Annulus within Aquifer (feet):

Borehole Volume (gallons):

Height of Water Column in Casing (feet):

Casing Volume (gallons):

Well Volume (Borehole Volume - Casing Volume, gallons):

Number of Well/Casing Volumes to Remove (gallons):

Total Volume to Remove (gallons):

Well Volume = $\Delta h (2.45)(.3)$

$= \Delta h (.735)$

$= 14.7 (.735)$

$= 10.8$

2 Well Volumes = 21.6 gallons

Samples

MW-4-41 : TVH/BTEX + TEH(d)

Prepared by: P. Marsden Reviewed by: Shannon Date: 5/3/91

Environmental Science & Engineering, Inc.

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO.: MW-5-41, MW-5-42 | WELL NO.: MW-5

PROJECT NAME: Alameda County - Alco Park | PROJECT NO.: 6-90-5042 | DATE: 4/25/91

Sample/Well Location: East of Pump Island - Adjacent to curb of parking garage

Weather Conditions: —

Field Personnel: P. Marsden

Prepared by: P. Marsden | Reviewed by: S. O'Hare

Time	Cumm Dschg (gallons)	pH/O_2	Temp (°C)	Spec. Conduct. (umhos/cm)	Color	Odor	Turbidity (NTU)	Remarks
10:45	5	7.98	63.5	11.9	Clear	No	None	
10:55	15	7.15	64.0	6.26	"	"		
11:00	22	7.15	63.4	6.49	"	"		
11:05	30	6.75	63.4	6.38	"	"		
12:40	—	7.45	63.4	5.97	"	"		

Reference Point (RP): Description: Top of well casing | RP Elevation (feet)/Datum: 33.01

Total Depth (TD, feet): 34.80 | Depth to Water (DTW, feet) START: 20.68 END: | Water Level (WL, feet) Start: 12.33

Water Column (TD-DTW, feet): Δh = 14.12 | Casing Volume (gallons)*: NA | Well Volume (gallons)*: 33.22

Total Discharge (gallons): 30+ gallons | Casing Volumes Removed: NA | Well Volumes Removed: 2

Flow Estimate (gallons per minute)**: 1.5 gpm | Method Used for Estimate**: Keck pump.

QUALITY ASSURANCE

Method Used to Measure Water Level: Solinst well sounder

Sampling Method(s): Disposable Bailer | Sample Time: 12:40pm

Bailer or Pump Line: New ✓ Cleaned | Method of Cleaning Bailer/Pump: Alconox Wash + Rinse

pH Meter No.: | Conductivity Meter No.: | Other Instrument No.:

Calibration Date(s) and Results:

Number, Size of Sample Containers: 3 voas - 3 voas gw duplicate

Method of Disposal of Discharged Water: 55 gallon drum - on-site

DEVELOPMENT

Time Start: | Time End:

Development Method(s) & Equipment: —

Description of Surge Block or Pump:

Summary of Development Procedures***:

* See Notes and Calculations.
** Use Flow Estimate for Surface Water Samples only. Describe in Notes and Calculations.
*** Note Details of Well Development Procedures in Notes and Calculations.

ESE Environmental Science & Engineering, Inc.
A CH2M HILL Company

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW-5-41, MW-5-42	WELL NO. MW-5
PROJECT NO. 6-90-5042	DATE 4/25/91

PROJECT NAME: Alameda County - Alco Park

NOTES AND CALCULATIONS

CASING VOLUME/WELL VOLUME CALCULATIONS

Borehole Diameter (inches):
Height of Water Column or Borehole Annulus within Aquifer (feet):
Borehole Volume (gallons):
Height of Water Column in Casing (feet):
Casing Volume (gallons):
Well Volume (Borehole Volume - Casing Volume, gallons):
Number of Well/Casing Volumes to Remove (gallons):
Total Volume to Remove(gallons):

Well Volume = Δh (3.92)(.3)
= Δh (1.176)
= 14.12 (1.176)
= 16.61

2 Well Volumes = 33.22 gallons

Samples:
MW-5-41: GW - TVH/BETX
MW-5-42: Duplicate - TVH/BETX

Prepared by: P. Marsden Reviewed by: [signature] Date: 5/3/91

Environmental Science & Engineering, Inc.
A CILCORP Company

APPENDIX B

Analytical Results

Chain of Custody Documents

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

DATE RECEIVED: 04/26/91
DATE REPORTED: 05/02/91

LAB NUMBER: 103648

CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING

PROJECT ID: 6-90-5042

LOCATION: ALAMEDA-ALCO PARK

RESULTS: SEE ATTACHED

QA/QC Approval

Final Approval

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 103648
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-90-5042
LOCATION: ALAMEDA-ALCO PARK

DATE RECEIVED: 04/26/91
DATE ANALYZED: 04/29/91
DATE REPORTED: 05/02/91

Total Volatile Hydrocarbons with BTXE in Aqueous Solutions
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL BENZENE (ug/L)	TOTAL XYLENES (ug/L)
103648-1	MW-1-41	230	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
103648-2	MW-5-41	ND(50)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
103648-3	MW-5-42	ND(50)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
103648-4	MW-4-41	170	12	ND(0.5)	ND(0.5)	2.3

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	1
RECOVERY, %	104

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 103648
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-90-5042
LOCATION: ALAMEDA-ALCO PARK

DATE RECEIVED: 04/26/91
DATE EXTRACTED: 04/29/91
DATE ANALYZED: 04/30/91
DATE REPORTED: 05/02/91

Extractable Petroleum Hydrocarbons in Aqueous Solutions
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	KEROSENE RANGE (ug/L)	DIESEL RANGE (ug/L)	MOTOR OIL RANGE (ug/L)	REPORTING LIMIT* (ug/L)
103648-4	MW-4-41	ND	ND	130	50

ND = Not detected at or above reporting limit.

*Reporting limit applies to all analytes.

QA/QC SUMMARY

RPD, %	4
RECOVERY, %	104

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 103648
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-90-5042
LOCATION: ALAMEDA-ALCO PARK

DATE RECEIVED: 04/26/91
DATE ANALYZED: 04/29/91
DATE REPORTED: 05/02/91

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL BENZENE (ug/L)	TOTAL XYLENES (ug/L)	REPORTING LIMIT * (ug/L)
103648-5	TRIP BLANK	ND	ND	ND	ND	0.5

ND = Not detected at or above reporting limit.

* Reporting Limit applies to all analytes.

QA/QC SUMMARY

RPD, %	<1
RECOVERY, %	104

103648

CHAIN OF CUSTODY RECORD

DATE 4/25/91 PAGE 1 OF 1

PROJECT NAME Alameda County-Alco Park

ADDRESS 4090 Nelson Avenue, Ste J
Concord, CA 94520

PROJECT NO. 6-90-5042

SAMPLED BY P. Marsden

LAB NAME Curtis + Tomplkins

ESE Environmental Science & Engineering, Inc.
A CALOGRP Company
4090 Nelson Avenue
Suite J
Concord, CA 94520
(415) 685-4053
Fax (415) 685-5323

SAMPLE #	DATE	TIME	LOCATION	TVH/BETX	BETX	TEH (diesel)	MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
-1 MW-1-41	4/25/91	12:50	Alco Park	X			water	3	Please call Shannon at
-2 MW-5-41		12:40		X			water	3	(415) 685-4053 with
-3 MW-5-42		12:40		X			water	3	questions.
-4 MW-4-41		12:45		X		X	water	4	
-5 Trip Blank					X		water	1	Standard 5 day TAT.
									Sample bottles kept cool.
									only received 1 Blank
								16	TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1.		4/26/91	1335
2.			
3.			
4.			
5.			

REPORT RESULTS TO: Shannon O'Hare

SPECIAL SHIPMENT REQUIREMENTS

SAMPLE RECEIPT

CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDTN/COLD	
CONFORMS TO RECORD	

INSTRUCTIONS TO LABORATORY (handling, analyses, storage, etc.):

Please include QA/QC report with results