THIRD QUARTER
REPORT OF FINDINGS
FEBRUARY 1991

ALAMEDA COUNTY ALCOPARK FACILITY
165 13TH STREET
OAKLAND, CALIFORNIA

Prepared For:

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Project No. 6-90-5042

February 14, 1991

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This report, including all related activities, was prepared and conducted by personnel of the Concord, California office of Environmental Science & Engineering, Inc., (ESE) under the direct supervision of Susan S. Wickham, Staff Hydrogeologist and Director of Geosciences (California Registered Geologist No. 3851) and Oliver Christen, Geologist. We have performed the contracted professional services using that degree of care and skill ordinarily exercised under similar circumstances by other hydrogeologists and engineers practicing in this field. No other warranty, expressed or implied, is made as to the professional advice in this report.

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Geologist

Date 2-14-91

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Date 2-14-91

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1.0 EXECUTIVE SUMMARY

Environmental Science & Engineering, Inc. (ESE) conducted the third quarter ground-water monitoring activities at the Alameda County ALCOPARK facility on January 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 21.30 feet for the January 1991 sampling event (Table 1). ESE contoured relative ground-water elevations, calculated from depth to water readings, to reveal a ground-water gradient oriented to the east at about 0.0016 feet per foot (Figure 3). This ground-water gradient was nearly the same as that calculated for the November 1990 sampling event (ESE, 1990c).

Concentrations of Total Petroleum Hydrocarbons (TPH) in ground water were 270 micrograms per liter (ug/L, or parts per billion) in MW-1, non detectable (ND) in MW-4, and 120 ug/L in MW-5. Concentrations for Benzene in ground water were 23 ug/L in MW-1, 230 ug/L in MW-4 and 3.2 ug/L in MW-5. Concentrations for Toluene, Total Xylenes, and Ethyl Benzene were 1.5 ug/L, 3.1 ug/L and ND, respectively, in MW-1; 2.8 ug/L, 2.0 ug/L and 1.2 ug/L, respectively, in MW-4; and all ND for MW-5 (Table 2).

Fuel constituent concentrations (TPH) in MW-4 and MW-5 were the same as those for the October 1990 sampling event (ESE, 1990c). Fuel constituent concentrations decreased in MW-1 from 1,200 ug/L to 270 ug/L. Results for Benzene concentrations nearly doubled in MW-4 (230ug/L), and rose from ND to 23 ug/L in MW-1. Benzene concentrations in MW-5 fell from 14 ug/L to 3.2 ug/L. Results for Ethylbenzene, Toluene and Total Xylenes in MW-4 show the same relatively low results as the October 1990 sampling event.

Concentrations of these constituents decreased in MW-1, while concentrations in MW-5 remained at ND. Contours of Benzene concentration in ground water (Figure 4) are inferred to show a new plume centered on MW-4.

ESE collected a duplicate sample (MW-4-33) and maintained a trip blank (Trip Blank) for the project quality assurance program. Analytical result for the duplicate sample shows good agreement with results for the original sample, and results for the trip blank were ND. An equipment rinsate sample was not collected during this monitoring period because precleaned disposable bailers were used for sampling.

Comparison of ground-water elevations and fuel constituent concentrations shows no consistent trends connecting these two parameters. Ground water dropped by approximately 0.2 feet site since the October 1990 sampling event. This slight drop in water level was accompanied by no significant change in fuel (TPH) concentration in MW-4 and MW-5 and a decrease in concentration in MW-1. Results showed increases in Benzene concentration in MW-4 and MW-1, and a slight decrease in MW-5. The results for all other purgeable aromatic gasoline constituents (Ethylbenzene, Toluene and Total Zylenes) showed slight increases for MW-4, slight decreases for MW-1 and MW-5.

2.0 INTRODUCTION

This report is the second of four quarterly reports by Environmental Science & Engineering, Inc. (ESE) 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 facilities layout, illustrated in Figure 2, consists a single pump island for dispensing leaded and unleaded gasoline, and two 10,000 gallon underground storage tanks.

This quarterly ground-water monitoring report contains a discussion of ESE's field activities and analytical results for ground-water samples collected on January 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

Hunter/Gregg, Inc. (Hunter), now ESE, performed a Phase I Site Characterization for the site in March, 1989. Hunter assessed the lateral and vertical extent of petroleum hydrocarbon contamination in the on-site soil and ground water adjacent to the pump island. Hunter presented the results of Phase I Site Characterization in a report dated May 1989.

Alameda County General Services Agency (Alameda County GSA) authorized Hunter's Phase I site characterization to investigate the impact of a fuel leak on the site soil and ground water. The leak was discovered during a fuel line integrity test by Scott Company, January 1989. Soil samples analyzed for the initial investigation contained elevated levels of Total Petroleum Hydrocarbons (TPH), and of Benzene, Ethylbenzene, Toluene and Total Xylenes (BETX).

For the Phase I Site Characterization, Hunter drilled and sampled two soil borings, and drilled, sampled, and installed three ground-water monitoring wells and two vapor monitoring wells. Soil and ground-water samples analyzed for that phase of investigation contained similarly elevated levels of hydrocarbon constituents. Soil and ground-water analysis results for the initial and subsequent site investigations are presented in Hunter's Phase I Site Characterization report (Hunter, 1989).

The current investigation consists of on-site ground-water monitoring activities, as required by the San Francisco Bay Area Regional Water Quality Control Board (Regional Board). For this phase, the site ground-water is monitored and ground-water samples 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.

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 602)
MW-4*	TEH (GC FID 3510), BETX (EPA Method 8020)
MW-5	TVH, BETX (EPA Method 8020)

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* 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 sample for TEH (diesel) to establish background concentration and to test for the presence of that constituent in MW-4. ESE assumes that the analysis for BETX may be considered an adequate surrogate for the presence of gasoline in ground water.

ESE analyzed ground water from MW-1 and MW-5 for TVH (gasoline) and groundwater from MW-4 for TEH (diesel). TVH and TEH are discussed as TPH within the text. ESE analyzed all ground-water samples for purgeable aromatic constituents of gasoline (BETX).

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 last (October 1990) sampling event, ESE has prepared trend analysis of ground-water analytical results versus ground-water elevation over time.

3.0 JANUARY 1991 SAMPLING EVENT

On January 25, 1991, ESE performed the third 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 21.65 feet below ground surface (bgs) in MW-4 to 21.10 feet bgs in MW-1. Relative ground-water elevation contours reveal an overall ground-water gradient to the east, at about 0.0016 ft/ft. The easterly ground-water gradient is the same as calculated for the October 1990 sampling event. Both gradients and flow directions are similar to those calculated for the Phase I Site Characterization (Hunter, 1989).

3.2 Ground-Water Sampling and Analysis

ESE collected ground-water samples from the three on-site wells. ESE submitted the four samples and additional validation samples (duplicate and trip blank) for analysis to Curtis & Tompkins on January 25, 1991. Analytical results are summarized in Table 2. The table lists results for TPH 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 January 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 a high (230 ug/L) in well MW-4 to very low concentrations in MW-5 and MW-1 (3.2 ug/L and 23 ug/L, respectively). This distribution may be modified by the easterly ground-water gradient.

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 January 1991 sampling event, these validation samples were labeled as MW-4-33, 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 nondetectable.

The purpose of the duplicate sample is to demonstrate the samplers' ability to collect a homogeneous sample. ESE collected the duplicate ground-water sample by pouring water collected in the sampling bailer into two sets of sample containers. The resulting aliquots

are not truly "duplicates", but rather sequential replicates of one sampling episode (one bailer of water from one well). ESE assumes that the water collected contains a uniform distribution of constituents that may be present in the sampler in order to compare the results as true duplicates.

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, and January 1991).

In general, relative ground-water elevations for the three on-site wells have fluctuated only slightly (less than 0.2 feet) from March 1989 to January 1991. 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 ug/L). TPH concentrations in MW-4 have remained ND for the observation period. TPH concentration

in MW-5 has shown a pattern similar to that of MW-1, with values stabilizing since the October 1990 sampling event (ND to 670 to 120 to 120 ug/L).

Benzene. Benzene concentrations in MW-1 increased from the March 1989 result of 21 ug/L to 200 ug/L in July 1990. The concentration for the October 1990 sampling event was ND, but rose to 23 ug/L in January 1991. Benzene in MW-4 shows a general trend of increasing concentration, except for the results of the July 1990 sampling event. In well MW-4, concentrations of Benzene were 13 ug/L in March 1989, 0.8 ug/L in July 1990, 120 ug/L in October 1990 and 230 ug/L in January 1991. Benzene concentrations in MW-5 show no consistent trend relative to ground-water elevation. Benzene concentrations for MW-5 were ND in March 1989, 0.8 ug/L in July 1990, 13 ug/L in October 1990 and 3.2 ug/L in January 1991.

Ethylbenzene. Ethylbenzene concentrations in MW-1 have fluctuated over the past four quarters. The analytical results are the following: 0.4 ug/L in March 1989, ND in July 1990, 2.2 ug/L in October 1990 and ND in January 1991. Fluctuations have also occurred in MW-4, while MW-5 has been ND the last three quarters.

Toluene, Total Xylenes. Concentrations for these two constituents in MW-1 are similar. Relatively low initial concentrations in March 1989 (3.9 and 4.5 ug/L, respectively) were followed by increases in July 1990 (45, 53 ug/L, respectively). Results of the October sampling showed a reduction in concentration of toluene and a relatively stable concentration of Total Xylenes (7.3 and 46, respectively). In January 1991, concentrations were 1.6 and 3.1 ug/L, respectively, showing continued decline. Concentration trends for these two constituents in MW-4 are relatively steady (1.4, ND, 1.2 and 2.8 ug/L for Toluene; ND, ND, 0.9 and 2.0 ug/L for Total Xylenes). These two constituents have not been detected in MW-5 for the observation period.

4.0 DISCUSSION

4.1 Ground-Water Elevations

ESE used the depth to ground water data obtained for the January 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, and a gradient of about 0.0016 ft/ft. This relatively flat gradient indicates ground-water flow toward the topographic low occupied by Lake Merritt (Figure 1). These results are similar to results obtained for the Phase I Site Characterization (Hunter, 1989) and for the October 1990 sampling event (ESE, 1990c).

4.2 Analytical Results

Benzene concentrations in on-site ground water (Table 2) are above the State of California action level for drinking water (5 ug/L) for wells MW-1 and MW-4. Benzene concentration for ground water in MW-5 is 3.2 ug/L. 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.

An increase in Benzene concentration in MW-1 was reported since October 1990. The concentration of Benzene in ground water for MW-4 also increased during the monitoring period, from 120 ug/L in October 1990 to 230 ug/L in January 1991.

Benzene concentration in MW-5 decreased during the monitoring period, from 13 ug/L in October 1990 to 3.2 ug/L in January 1991. Well MW-5 is located downgradient of the gasoline pump and dispenser piping (Figure 2). The MW-5 well box lies adjacent to and down slope of the fuel pump islands. For the January 1991 sampling event, the well

protective box was found dry. The pavement nearby is stained from gasoline spills at the pumps, but none of the stained area reached the sealed well protective cover.

One interpretation of the Benzene concentration distribution is that a new constituent "plume" exists in the upgradient portion of the site, near MW-4 (Figure 4). An inferred new Benzene plume is indicated from the general increase in Benzene concentrations at MW-4 over the past 2 monitoring periods. These results suggest an off-site source to the west, across Jackson Street, in addition to a plume located near the documented former leak.

In our opinion, an off-site or unexpected on-site source is possible. An underground diesel tank, upgradient from the site, was closed by cementing in place in 1989 (Hunter, 1989). ESE has no documentation of a leak or suspected leak from the tank. No sample points exist either up- or downgradient of the site to test either hypothesis, or to more accurately characterize the ground-water.

ESE recommends one more quarter of monitoring at the site. Alameda County GSA may want to begin an investigation through County and State agencies of recent hazardous material releases in the area to determine potential sources of offsite contamination.

5.0 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).

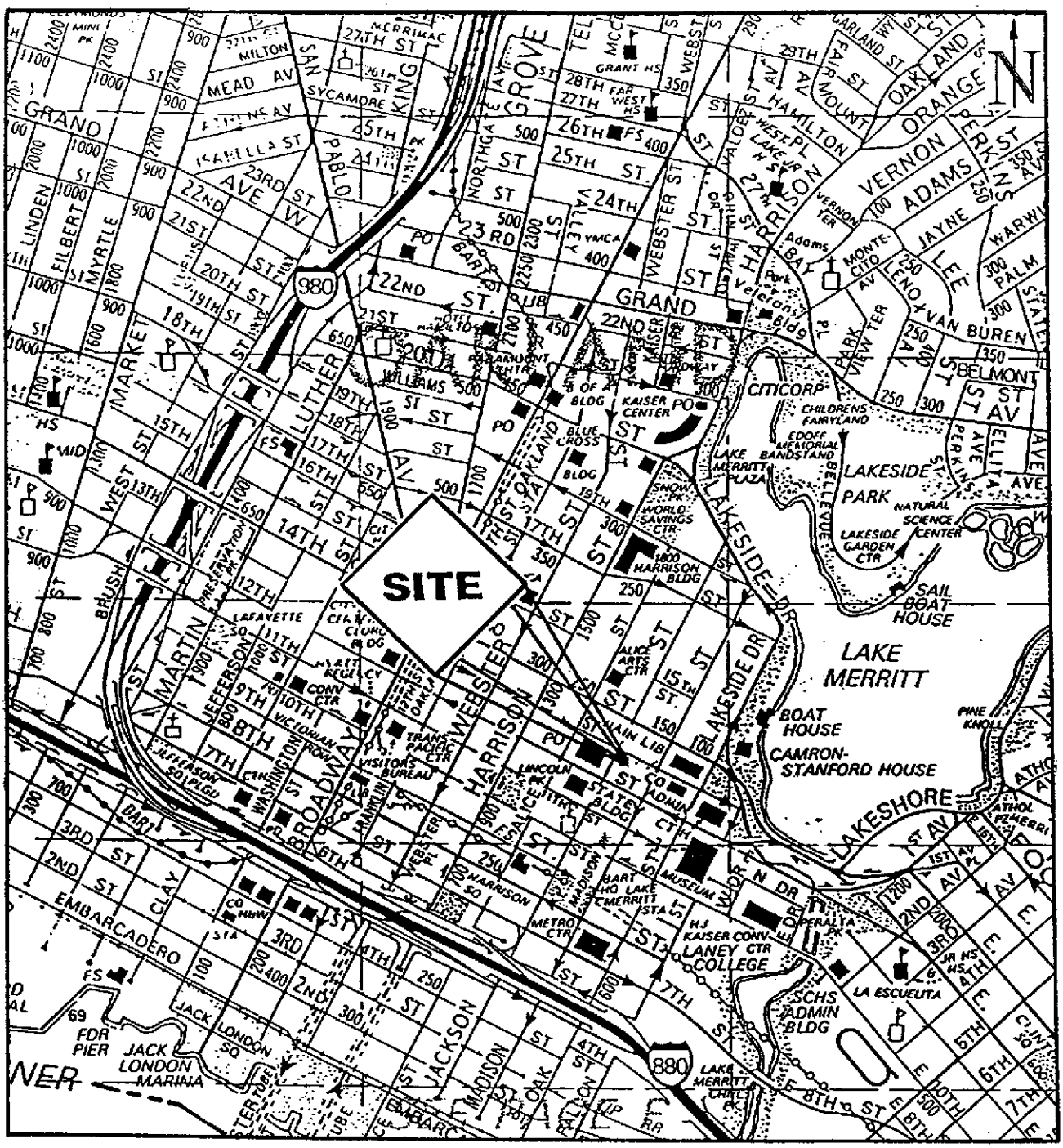
Environmental Science & Engineering, Inc., 1990a, Work Plan, Quarterly Ground-Water Monitoring, Alameda County ALCOPARK Facility, 165 13th Street, Oakland, Alameda County, California. Prepared for Alameda County General Services Agency, Oakland, California; August 10, 1990.

Environmental Science & Engineering, Inc, 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; August 27, 1990.

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.

Wolff, J.S., M.T. Homsher, R.D. Flotard and J.G. Pearson, 1986, "Semi-Volatile Organic Analytical Methods Performance and Quality Control Considerations," in Perkert, C.L., editor, Quality Control in Remedial Site Investigation: Hazardous and Industrial Solid Waste Testing, Fifth Volume, ASTM STP 925; American Society for Testing and Materials; Philadelphia, PA.

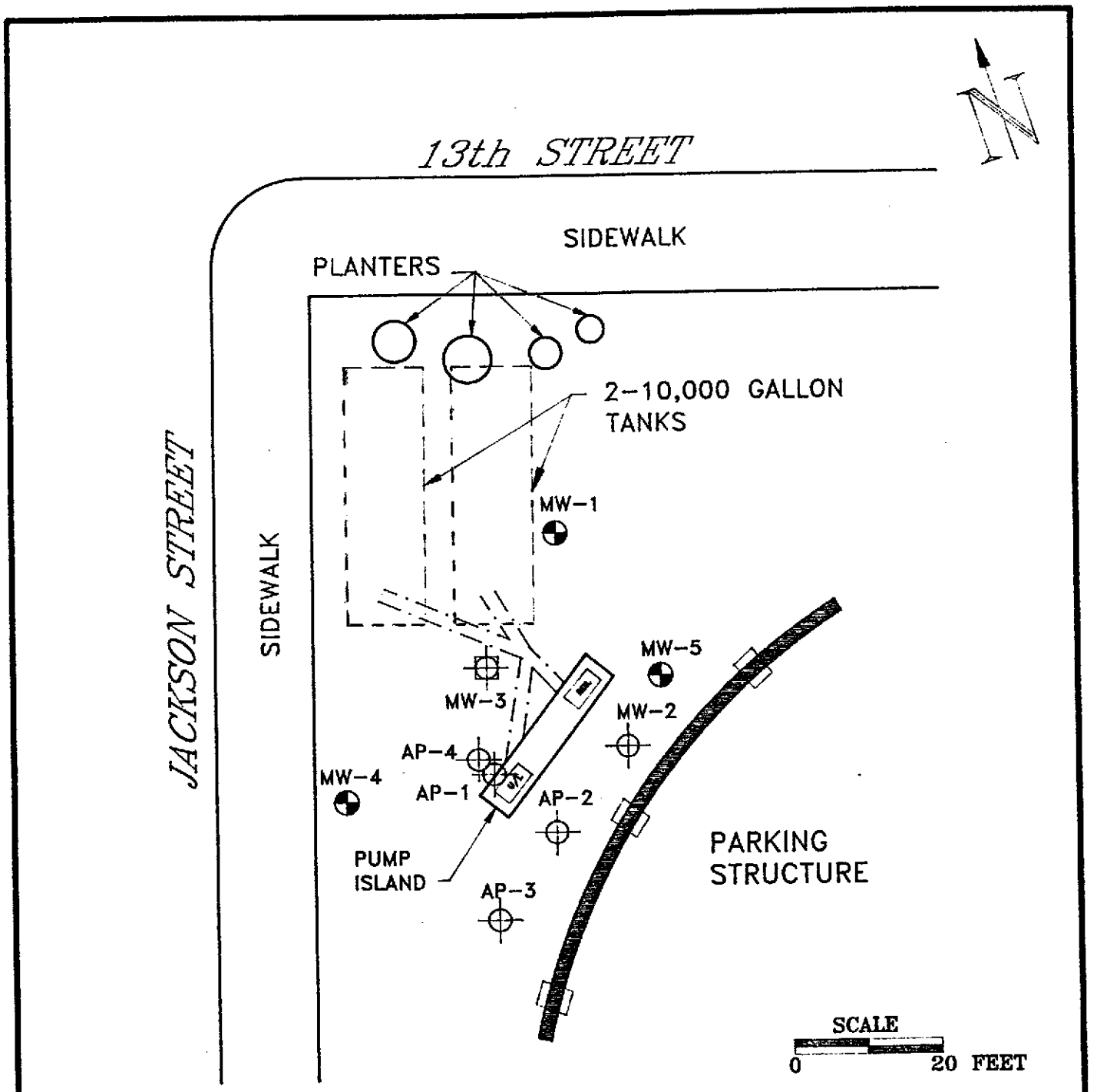
FIGURES



	Environmental Science & Engineering, Inc.
	ALAMEDA COUNTY ALCOPARK OAKLAND, CA
	FIGURE 1 LOCATION MAP

DRAWN BY	APPROVED BY	REVISED
CVS	DWR	2/91 CVS

DATE	FILE NAME	PROJ. NO.
11/90	F1LM10	6-90-5042

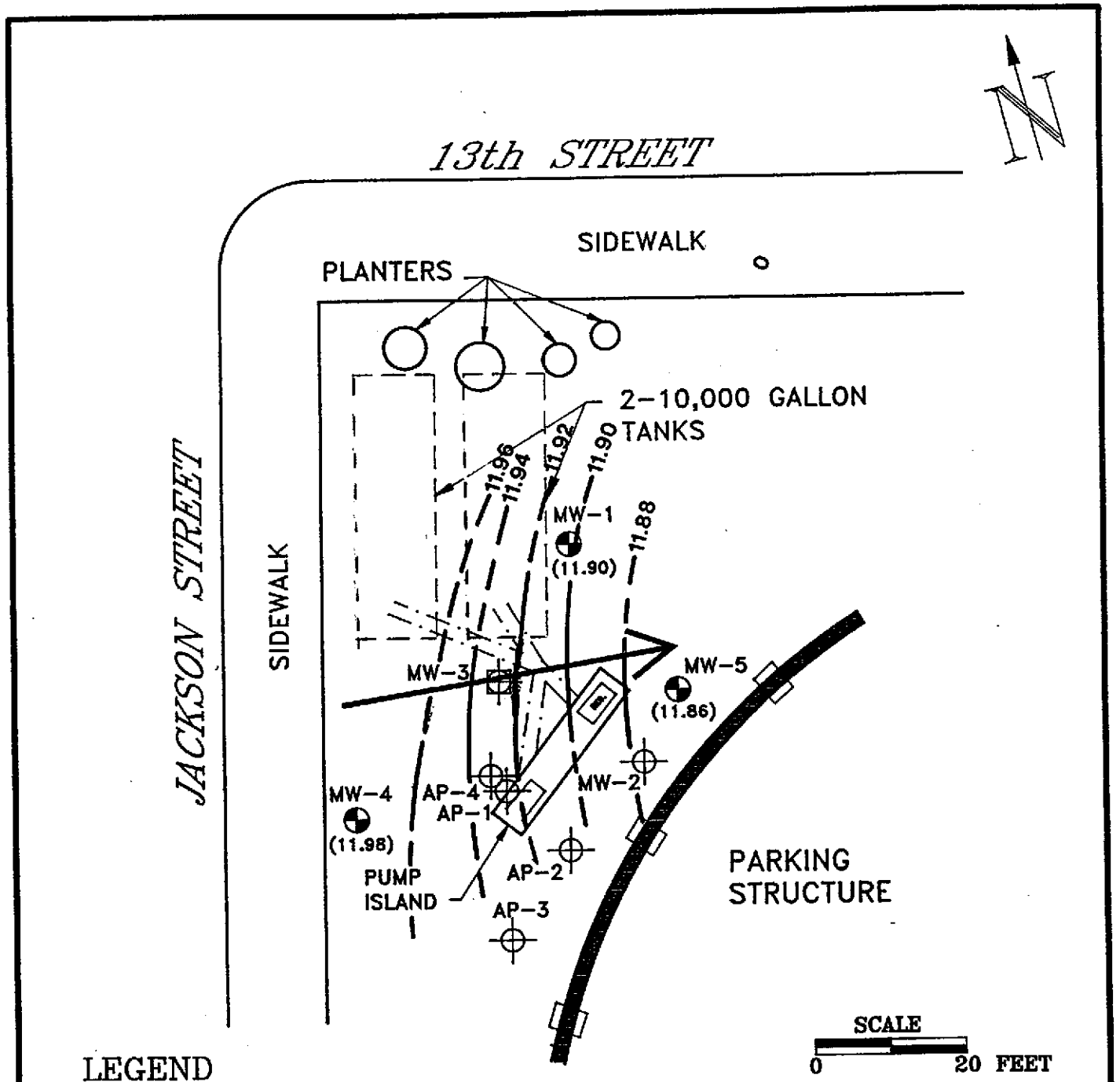


LEGEND

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

ESE A CILCORP COMPANY	Environmental Science & Engineering, Inc.
ALAMEDA COUNTY ALCOPARK OAKLAND, CA	
FIGURE 2 SITE PLAN	

DRAWN BY	APPROVED BY	REVISED
CVS		2/91 CVS
DATE	FILE NAME	PROJ. NO.
11/90	F2SP10	6-90-5042



LEGEND

- SOIL BORING
- GROUND-WATER MONITORING WELL
- VADOSE MONITORING WELL
- UNDERGROUND PIPING
- (11.9) DEPTH TO GROUND WATER (ft)
- 11.94 GROUND-WATER CONTOUR (ft)
- APPROXIMATE GROUND-WATER FLOW DIRECTION

WATER MEASUREMENTS TAKEN ON 1/25/91

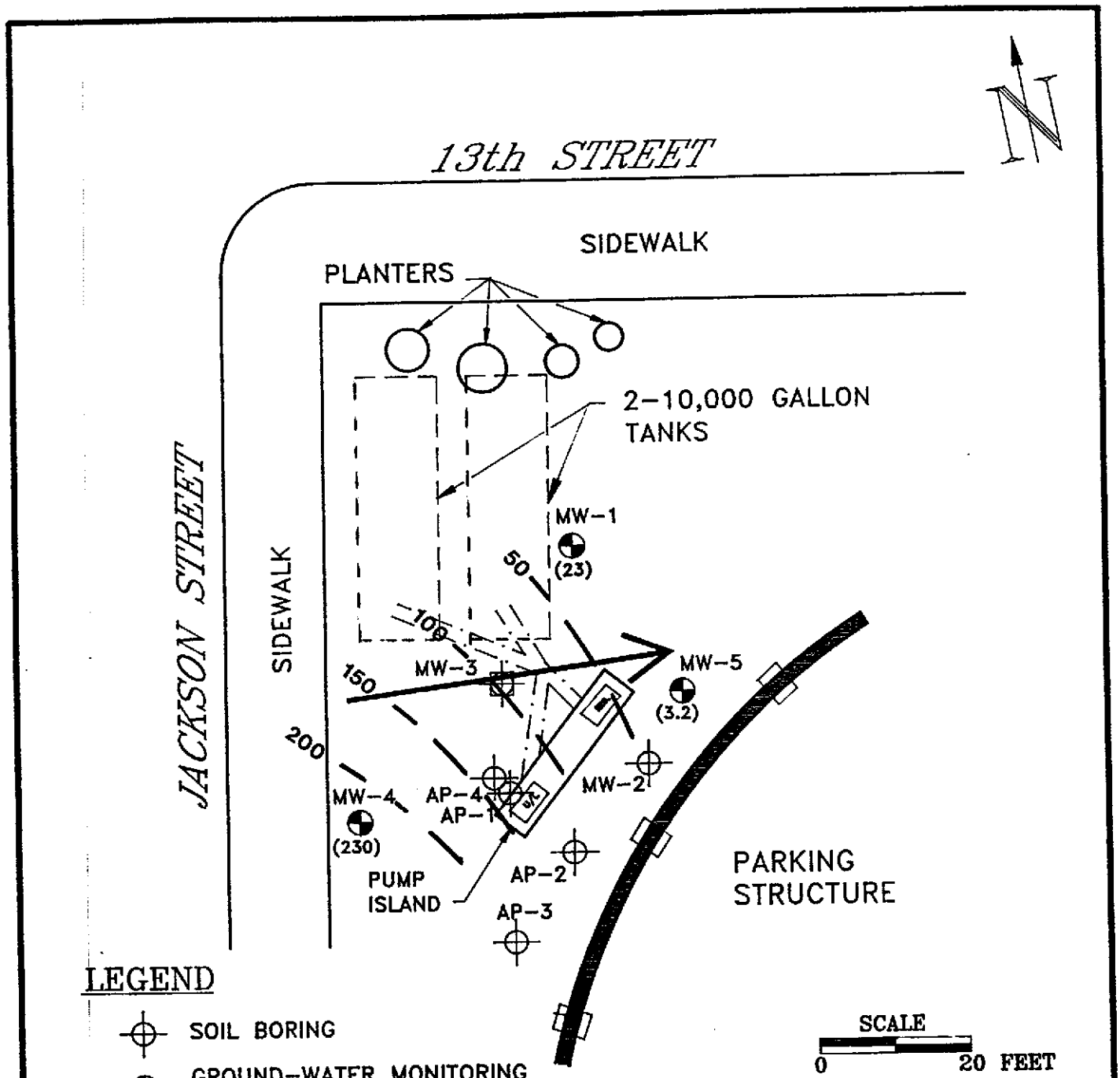
ESE A CH2M HILL COMPANY
Environmental Science & Engineering, Inc.

ALAMEDA COUNTY
ALCOPARK
OAKLAND, CA

FIGURE 3
RELATIVE GROUND-WATER ELEVATIONS
JANUARY 1991

DRAWN BY	APPROVED BY	REVISED
CVS	DWR	2/91 CVS

DATE	FILE NAME	PROJ. NO.
11/90	F3GWE10	6-90-5042



LEGEND

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

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

Environmental Science & Engineering, Inc.
A CHEVRON COMPANY

ALAMEDA COUNTY
ALCOPARK
OAKLAND, CA

FIGURE 4
BENZENE CONCENTRATIONS IN GROUND WATER
JANUARY 1991

DRAWN BY	APPROVED BY	REVISED
CVS	DWS	2/91 CVS
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

JANUARY 1991

Well Number [a]	Reference Elevation [b] (Feet)	Depth to Ground Water (Feet)	Ground-Water Elevation (Feet)
MW-1	33.00	21.10	11.90
MW-4	33.63	21.65	11.98
MW-5	33.01	21.15	11.86

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 January 25, 1991.

TABLE 2

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

JANUARY 1991

Sample Number	TPH (ug/L) [a]	Benzene (ug/L)	Ethyl Benzene (ug/L)	Toluene (ug/L)	Total Xylenes (ug/L)
MW-1-31	270	23	ND	1.5	3.1
MW-4-31	--	230	1.2	2.8	2.0
MW-4-32	ND	--	--	--	--
MW-4-33 [b]	ND	--	--	--	--
MW-5-31	120	3.2	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 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 January 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

JANUARY 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	11.90	
TPH (ug/L)	ND	1500	1200	270	
Benzene (ug/L)	21	200	ND	23	
E-benzene [b] (ug/L)	0.4	ND	2.2	ND	
Toluene (ug/L)	3.9	45	7.3	1.5	
Xylenes [c] (ug/L)	4.5	53	46	3.1	

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	
TPH (ug/L)	ND	ND	ND	ND	
Benzene (ug/L)	13	0.8	120	230	
E-benzene [b] (ug/L)	1.0	ND	1.1	1.2	
Toluene (ug/L)	1.4	ND	1.2	2.8	
Xylenes [c] (ug/L)	ND	ND	0.9	2.0	

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	
TPH (ug/L)	ND	670	120	120	
Benzene (ug/L)	ND	0.8	13	3.2	
E-benzene [b] (ug/L)	ND	ND	ND	ND	
Toluene (ug/L)	ND	ND	ND	ND	
Xylenes [c] (ug/L)	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

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 and MW-5, Total Extractable Hydrocarbons (TEH, or diesel) for MW-4.

APPENDIX A

Water Sample Logs

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW1-31 WELL NO. MW-1

PROJECT NAME Alameda County, Alco Park PROJECT NO. 6-90-5042 DATE 1/25/91

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

Weather Conditions: Cool - hazy smog in Oakland

Personnel: S. O'Hare / P. Marsden

Prepared by: S. O'Hare Reviewed by:

Time	Cumm Dschg (gallons)	pH/O_2	Temp (°F)	Spec. Conduct. (umhos/cm)	Color	Odor	Turbidity (NTU)	Remarks
10:45	5	9.85	55.6	.91	Clear Tan	None	Slight	
10:49	10	9.74	60.0	.80	Clear Tan	"	"	
10:53	15	9.51	59.8	.79	Clear	"	"	
10:56	20	9.61	61.6	.83	Clear	"	"	
11:50	—	8.37	57.4	.71	—	—	—	

Reference Point (RP): Description Top of well casing

RP Elevation (feet)/Datum: 330

Total Depth (TD, feet): 33.9

Depth to Water (DTW, feet) START 21.1 END 21.1

Water Level (WL, feet) Start 11.9

Water Column (TD-DTW, feet): Δh = 12.8

Casing Volume (gallons)*: NA

Well Volume (gallons)*: 13.17

Total Discharge (gallons): 26

Casing Volumes Removed: NA

Well Volumes Removed: 2

Flow Estimate (gallons per minute)**: 1.8

Method Used for Estimate**: 5 gallon pail

QUALITY ASSURANCE

Method Used to Measure Water Level: Solinst

Sampling Method(s): Disposable Bailer

Sample Time: 11:50

Bailer or Pump Line: New ✓ Cleaned

Method of Cleaning Bailer/Pump: Alconox Wash

pH Meter No.: 90-10

Conductivity Meter No.: 90-10

Other Instrument No.: (Hydac 9 #12 was used)

Calibration Date(s) and Results: 1/25/91

Number, Size of Sample Containers: 2 voas - 40ml

Method of Disposal of Discharged Water: Into 55 gal drums on site - Future removal

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 GILCORP Company

WATER SAMPLE/WELL DEVELOPMENT LOG

PROJECT NAME: Alameda County- Alco Park	SAMPLE NO. MW1-31
	WELL NO. MW-1
	PROJECT NO. 6-90-5042
	DATE 1/25/91

NOTES AND CALCULATIONS

Samples MW1-31 was analyzed for TVH/BETX by Curtis + Tompkins

This well was sampled last.

CASING VOLUME/WELL VOLUME CALCULATIONS

Borehole Diameter (inches):
ht 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 = $\Delta h (3.43)(.3)$

$= 12.8(3.43)(.3)$

$= 13.17$ gallons

2 well volumes = 26 gallons

Began purging @ 10:44 am

Finished @ 10:57 am

Removed Hand pump + Decon

This well was purged last.

Prepared by: S. O'Hare Reviewed by: Date:

ESE Environmental Science & Engineering, Inc.

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW4-31, MW4-32, MW4-33 **WELL NO.** MW-4

PROJECT NAME Alameda County - Alco Park

PROJECT NO. 6-90-5042 **DATE** 1/25/91

Sample/Well Location: Adjacent to sidewalk and Jackson Street

Weather Conditions: Cool, hazy, smog

Personnel: S. O'Hare / P. Marsden

Prepared by: S. O'Hare Reviewed by:

Time	Cumm Dschg (gallons)	pH/O_2	Temp (F)	Spec. Conduct. (umhos/cm)	Color	Odor	Turbidity (NTU)	Remarks
9:46	5	12.2	58.4	1.2	Brown Muddy	None	High	
9:49	10	11.7	59.4	.93	"	"	"	
9:51	15	12.24	60.9	.92	"	"	"	
9:56	20	12.08	55.4	.86	"	"	"	
11:28	-	7.04	54	.86	-	-	-	

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 21.65 END 21.66

Water Level (WL, feet): Start 12.03

Water Column (TD-DTW, feet): Δh = 13.7

Casing Volume (gallons)*: NA

Well Volume (gallons)*: 9.98

Total Discharge (gallons): 20

Casing Volumes Removed: NA

Well Volumes Removed: 2

Flow Estimate (gallons per minute)**: 2

Method Used for Estimate**: 5 gallon pail

QUALITY ASSURANCE

Method Used to Measure Water Level: Solinist

Sampling Method(s): Disposable bailer

Sample Time: 11:28

Bailer or Pump Line: New ✓ Cleaned

Method of Cleaning Bailer/Pump: Alconox Wash

pH Meter No.: 90-10

Conductivity Meter No.: 90-10

Other Instrument No.: (Hydac 9 #12)

Calibration Date(s) and Results: 1/25/91

Number, Size of Sample Containers: 2 VOAs - 40 ml

2 liter amber glass jars

Method of Disposal of Discharged Water: 55 gallon drums on site - Future disposal

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 DRAGOR Company

WATER SAMPLE/WELL DEVELOPMENT LOG

PROJECT NAME: Alameda County - Alco Park	SAMPLE NO.: MW4-31, MW4-32, MW4-33
PROJECT NO.: 6-90-5042	WELL NO.: MW-4
	DATE: 1/25/91

NOTES AND CALCULATIONS

CASING VOLUME/WELL VOLUME CALCULATIONS

Borehole Diameter (inches):
ht 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 = Dh (2.45)(.3)
= 13.7 (2.45)(.3)
= 9.98 gallons
2 Well Volumes = 20 gallons

- Paul began purging @ 9:32
- Dissolved O_2 meter not warm; won't take reading. Use only Hydac 9 & take pH, temp, cond.
- Finished purging @ 9:56
- Decon Hand Pump
- 1st Well purged

Samples analyzed =
MW4-31 - BETX
MW4-32 - TEH(d)
MW4-33 - TEH(d) (DUPLICATE)

This well sampled 1st

Prepared by: S. O'Hare Reviewed by: Date:

ESE Environmental Science & Engineering, Inc.

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW5-31

WELL NO. MW-5

PROJECT NAME Alameda County - Alco Park

PROJECT NO. 6-90-5042

DATE 1/25/91

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

Weather Conditions: Cool, hazy-smog

Personnel: S. O'Hare / P. Marsden

Prepared by: S. O'Hare

Reviewed by:

Time	Cumm Dschg (gallons)	pH/O_2	Temp (°F)	Spec. Conduct. (umhos/cm)	Color	Odor	Turbidity (NTU)	Remarks
10:22	5	11.60	54.8	.81	tan	none	slight	
10:24	10	11.09	58.4	.78	"	"	"	
10:29	20	11.02	58.6	.80	"	"	"	
10:34	30	11.02	59.2	.80	"	"	"	
11:44	—	8.52	56.3	.71	—	—	—	

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 21.15 END 21.15

Water Level (WL, feet): Start 11.86

Water Column (TD-DTW, feet): Δh = 13.65

Casing Volume (gallons)*: NA

Well Volume (gallons)*: 16.05

Total Discharge (gallons): 32

Casing Volumes Removed: NA

Well Volumes Removed: 2

Flow Estimate (gallons per minute)**: 2.7

Method Used for Estimate**: 5 gallon pail

QUALITY ASSURANCE

Method Used to Measure Water Level: Solinist

Sampling Method(s): Disposable Bailer

Sample Time: 11:44

Bailer or Pump Line: New ✓ Cleaned

Method of Cleaning Bailer/Pump: Alconox Wash

pH Meter No.: 90-10

Conductivity Meter No.: 90-10

Other Instrument No.: Hydac 9. #12

Calibration Date(s) and Results: 1/25/91

Number, Size of Sample Containers: 2 voas vials - 40 ml

Method of Disposal of Discharged Water: Into 55 gallon drums on site - Future disposal

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.

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A CELCORP Company

WATER SAMPLE/WELL DEVELOPMENT LOG

SAMPLE NO. MW5-31	WELL NO. MW-5
PROJECT NAME Alameda County - Alco Park	PROJECT NO. 6-90-5042
	DATE 1/25/91

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 = $\Delta h (3.92)(.3)$

$= (3.65)(3.92)(.3)$

$= 16.05$ gallons

2 Well Volumes = 32 gallons

Began purging well at 10:20

Finished purging well @ 10:35

Remove Hand Pump + Decon

Prepared by: S. O'Hare Reviewed by: Date:

ESE Environmental Science & Engineering, Inc.

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: 01/25/91
DATE REPORTED: 01/31/91

LAB NUMBER: 102836

CLIENT: ENVIRONMENTAL SCIENCE AND ENGINEERING

REPORT ON: SIX WATER SAMPLES

PROJECT #: 6-90-5042
LOCATION: ALAMEDA-ALCO PARK

RESULTS: SEE ATTACHED

QA/QC Approval

Final Approval

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 102836
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
JOB NUMBER: 6-90-5042
JOB LOCATION: ALAMEDA-ALCO PARK

DATE RECEIVED: 01/25/91
DATE ANALYZED: 01/28/91
DATE REPORTED: 01/31/91

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)
102836-2	MW4-31	230	2.8	1.2	2.0	0.5
102836-6	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, %	3
RECOVERY, %	83

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 102836
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-90-5042
JOB LOCATION: ALAMEDA-ALCO PARK

DATE RECEIVED: 01/25/91
DATE ANALYZED: 01/28/91
DATE REPORTED: 01/31/91

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)
102836-1	MW1-31	270	23	1.5	ND(0.5)	3.1
102836-5	MW5-31	120	3.2	ND(0.5)	ND(0.5)	ND(0.5)

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

QA/QC SUMMARY

RPD, %	3
RECOVERY, %	83

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 102836
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-90-5042
LOCATION: ALAMEDA-ALCO PARK

DATE RECEIVED: 01/25/91
DATE EXTRACTED: 01/28/91
DATE ANALYZED: 01/29/91
DATE REPORTED: 01/31/91

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)	REPORTING LIMIT* (ug/L)
102836-3	MW4-32	ND	ND	50
102836-4	MW4-33	ND	ND	50

ND = Not detected at or above reporting limit.

*Reporting limit applies to all analytes.

QA/QC SUMMARY

RPD, %	3
RECOVERY, %	95

CHAIN OF CUSTODY RECORD

DATE 1/25/91 PAGE 1 OF 1

PROJECT NAME Alameda County - Alco Park

ADDRESS 4090 Nelson Ave Suite J. Concord, CA 94520

PROJECT NO. 6-90-5042

SAMPLED BY S. O'Hare

LAB NAME Curtis + Tompkins

ESE Environmental Science & Engineering, Inc.
A CH CORP Company
4090 Nelson Avenue
Suite J
Concord, CA 94520
(415) 685-4053
Fax (415) 685-3321

SAMPLE #	DATE	TIME	LOCATION	TVH/BETX	BETX	TEH (diesel)	MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
MW1-31	1/25/91	11:50	-	X			water	2	Please call Shannon
MW4-31		11:28	-		X			2	at (415) 685-4053
MW4-32		11:28	-			X		1	for questions
MW4-33		11:28	-			X		1	
MW5-31		11:44	-	X				2	Standard 5 day
Trip Blank	↓	NA	-		X		↓	2	TAT
									Sample Bottles kept cool

ANALYSES TO BE PERFORMED

MATRIX

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1. Shannon O'Hare	Nancy Ruhr	1/25/91	12:30
2.			
3.			
4.			
5.			

10 TOTAL NUMBER OF CONTAINERS

REPORT RESULTS TO: Shannon

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