FIRST QUARTER
REPORT OF FINDINGS
AUGUST 1990

ALAMEDA COUNTY ALCOPARK FACILITY
165 13TH STREET
OAKLAND, CALIFORNIA

Prepared For:

Mr. Terry Hunt
Alameda County General Services Agency
4400 MacArthur Boulevard
Oakland, California 94619

Prepared By:

Environmental Science & Engineering, Inc.
597 Center Avenue, Suite 350
Martinez, California 94553

Project No. 02-276-015

August 27, 1990

This report, including all related activities, was prepared and conducted by personnel of the Martinez, California office of Environmental Science & Engineering, Inc., (ESE) under the direct supervision of Barney p. Popkin, Associate Vice President and Emilio Gonzales, Jr., California Registered Geologist No. 4154. our professional services have been performed 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.

Date 8-27-90

Emilio Gonzalez, Jr.
Staff Geologist
California Certified Engineering Geologist No. E978

Date 8-27-90

Barney P. Popkin
Associate Vice President

TABLE OF CONTENTS

Figures, Tables, and Appendicies following text.

TABLE OF CONTENTS
(continued)

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 EXECUTIVE SUMMARY

Environmental Science & Engineering, Inc. (ESE) conducted the first quarterly ground-water monitoring activities at the Alameda County ALCOPARK facility on July 26, 1990 (August 1990 sampling event). The ALCOPARK facility (site) is located at 165 13th Street in Oakland, Alameda County, California (Figures 1, 2). ESE calculated ground-water levels 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 20.78 feet for the August 1990 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 northeast at about 0.0024 feet per feet, or about a 0.1 foot drop in ground-water elevation across the site. (Figure 3).

Concentrations of Total Petroleum Hydrocarbons (TPH) in ground water were 1.4 milligrams per liter (mg/L, or parts per million) in MW-1, and non-detectable (ND) in MW-4 and MW-5. Results for Benzene concentration in ground water for all wells monitored exceed the State of California's action level for Benzene in drinking water (0.5 ug/L). Concentrations for Benzene in ground water were 220 micrograms per liter (ug/L, or parts per billion) in MW-1, 1.8 ug/L in MW-5 and 0.8 ug/L in MW-4. Concentrations for Toluene and Total Xylenes were 51 and 61 ug/L, respectively in MW-1. All other results for purgeable aromatics gasoline constituents (Benzene, Ethylbenzene, Toluene and Total Xylenes, or BETX) were ND (Table 2).

ESE contoured concentration of Benzene in ground water (Figure 4). MW-1, exhibiting highest concentrations of monitored contaminants, is located directly downgradient of the on-site fuel leak discovered in 1989.

ESE collected a duplicate sample (MW-1-2) and an equipment rinsate sample (MW-5-1) in the field for the project quality assurance program. Analytical result for the duplicate sample shows good agreement with results for the original sample. The equipment rinsate sample showed a concentration of benzene that was slightly above method detection limit. ESE interprets this result as indicating that the bailer decontamination procedure used was not effective in removing extremely low levels of some gasoline constituents. This finding may call into question the detection of constituents at low levels noted in MW-5, crossgradient to the inferred hydrocarbon constituent "plume" centered on MW-1. The finding should not influence the validity of analytical results indicating high constituent levels detected downgradient of the underground tank complex. The need for an improved equipment decontamination procedure is indicated.

2.0 INTRODUCTION

This report is the first 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 July 27, 1990 (August 1990 monitoring event). The results are illustrated as contour maps of relative ground-water elevations (Figure 3) and concentration of Benzene in ground water (Figure 4). ESE will discuss trends in ground-water elevations and concentrations of selected hydrocarbon constituents in ground water at the site in future quarterly monitoring reports.

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 consist 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 will be monitored, and ground-water samples analyzed

for TPH and BETX for four consecutive quarters, in compliance with the Regional Board's (1989) recommendations for obtaining site closure.

2.2 Current Investigation

ESE's current on-site investigation consists of monitoring ground-water elevations and sampling ground water. For each sampling event, ESE will follow the instructions contained in the project Work Plan (ESE, 1990), which includes ESE Standard Operations Procedures. 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 will submit ground-water samples NET Pacific, Inc. (NET), a California State-certified analytical laboratory. NET will analyze the ground-water samples as listed below.

Analytical Laboratory Schedule

Well Number	Analyses
MW-1	TPH-gas (Method GC FID/5030), BETX (EPA Method 8020)
MW-4*	TPH-diesel (Method GC FID/3510), BETX
MW-5	TPH-gas, BETX.

* MW-4 is the on-site upgradient well. According to information made available by Alameda County GSA, a source of diesel exists upgradient from the site. ESE will analyze the MW-4 ground-water sample for TPH-diesel for the August sampling event to establish background concentration and to test for the presence of that constituent in MW-4. ESE assumes that the analysis for BETX for the August 1990 sampling event may be considered an adequate surrogate for the presence of gasoline in ground-water. ESE will analyze ground-water samples from MW-4 for TPH-gas and BETX beginning with the November 1990 sampling event if the result of TPH-diesel analysis for the August 1990 sampling event is ND.

ESE will analyze ground water from MW-1 and MW-5 for TPH-gas. ESE will analyze all ground-water samples for purgeable aromatics constituents of gasoline (BETX).

ESE will use the data obtained each sampling event to construct contour maps of petroleum hydrocarbons or other constituent concentrations (November 1990) and to prepare trend analysis of ground-water results over time. ESE will prepare trend analyses of ground-water results over time, as appropriate, after the second quarterly sampling event.

3.0 AUGUST 1990 SAMPLING EVENT

On July 26, 1990, ESE performed the first 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, nor evidence of hydrocarbon odors in ground water during purging of the 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 21.13 feet below ground surface (bgs) in MW-4 to 20.60 bgs (MW-1, MW-5). Relative ground-water elevation contours reveal an overall ground-water gradient to the northeast, at about 0.0024 ft/ft. This gradient corresponds to a drop of about 0.1 foot in ground-water elevation across the site. The northeasterly ground-water gradient is similar to the gradient 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 three samples and additional validation samples (duplicate, equipment rinsate) for analysis to NET on July 27, 1990. Analytical results are summarized in Table 2. The table lists results for TPH concentrations in milligrams per liter (mg/L) 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 August 1990 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, from a high (220 ug/L) in well MW-1 to very low concentrations in MW-4 and MW-5 (0.8 and 1.8 ug/L, respectively). This distribution may be modified by the northeasterly ground-water gradient.

3.3 Quality Assurance and Control

For the purpose of field quality assurance and control, ESE collected and submitted a duplicate ground-water sample and an equipment rinsate sample. For the August 1990 sampling event, these validation samples were labeled as MW-1-2 and MW-5-1, respectively. Both the equipment blank and duplicate sample were preserved, handled, and analyzed in an identical manner as the other ground-water samples.

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.

The analytical results obtained for the ground-water and duplicate validation samples are:

Sample Number	TPH (mg/L)	Benzene (ug/L)	Ethylbenzene (ug/L)	Toluene (ug/L)	Total Xylenes (ug/L)
MW-1-1	1.4	220	ND	51	61
MW-1-2 (Duplicate)	1.5	200	ND	45	53

The results of analysis of the ground-water and duplicate validation samples may be compared by using Relative Percent Difference (RPD) (Wolff and others, 1986). RPD is a measure of the similarity between two samples, defined as:

$$RPD = \frac{| D_1 - D_2 |}{(D_1 + D_2) / 2} \times 100, \text{ where}$$

D_1 = First sample result, and

D_2 = Second sample result.

RPD values of 10 percent or less typically indicate good agreement for ground-water samples. Larger RPD values indicate poorer agreement between duplicate results. RPDs are most useful for comparing large numbers of results, which may yield statistically significant trends. They are not as useful for limited sampling results, such as those presented here. RPDs for the samples submitted in the August 1990 sampling event are included in the NET report of analytical results (Appendix B). For samples MW-1-1 and MW-1-2, RPDs for the five parameters analyzed are:

Constituent	Relative Percent Difference
TPH-gas	7
Benzene	10
Ethylbenzene	N/A
Toluene	24
Total Xylenes	30

The equipment rinsate sample is intended to serve as a check on ESE's sampling equipment decontamination procedures. ESE obtained this validation sample by pouring distilled deionized water from the decontaminated bailer into the appropriate sample containers. ESE collected the equipment rinsate validation sample after decontaminating the sampling bailer prior to sampling well MW-5 (Sample No. MW-5-1). Analytical results for the equipment rinsate validation sample are:

Constituent	Result
TPH-gas	ND
Benzene	0.8 (ug/L)
Ethylbenzene	ND
Toluene	ND
Total Xylenes	ND

The detected levels of Benzene are low and near the method detection limit (0.5 ug/L). The results may be due to Benzene concentrations in the distilled water, to reaction of the bailer material with the alcohol used for decontamination, to inefficient bailer decontamination procedures or to limitations of the analytical laboratory to measure constituents at or near the detection level. However, low levels of Benzene detected in the ground-water sample MW-5-2 may be considered as much a function of contamination within the bailer as actual concentrations of Benzene in ground water.

3.4 Trend Analysis of Ground-Water Elevation and Analytical Data

ESE will present historical data comparing ground-water elevations and concentrations of constituents, as appropriate, for the three on-site monitoring wells. The data available for the August sampling event are insufficient to present such an analysis.

4.0 DISCUSSION

4.1 Ground-Water Elevations

ESE used the depth to ground water data obtained for the August 1990 sampling event to produce a contour map of relative ground-water elevation (Figure 2). The contour map shows a flow of ground water to the northeast, and a gradient of about 0.0024 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).

4.2 Analytical Results

Constituent concentrations in on-site ground water, as indicated by results of Benzene analyses (Table 2), are above State of California action levels in drinking water. In particular, Benzene concentration for ground water in MW-1 is elevated by about three orders of magnitude (1,000 times) over those action levels. ESE's interpretation of the Benzene constituent ground-water "plume" near MW-1 is presented on Figure 4. No results are available to establish a trend in constituent concentration related to ground-water elevation, nor do sampling points exist which may help define actual extent of the "plume" postulated at MW-1.

The elevated concentrations of Benzene in MW-1 were anticipated, given the concentrations of Benzene in ground water obtained for the Phase I Site Characterization (Hunter, 1989). However, the magnitude of Benzene contamination in ground water at MW-1 is about one order of magnitude (10 times) greater than results obtained for the previous analysis.

The concentration of Benzene in ground water for MW-5 was not anticipated. Benzene was not detected in the earlier sampling event (Hunter, 1989). Assuming that some contaminant was introduced into the sample by improperly decontaminated bailer, the resulting concentration (1.8 ug/L detected minus 0.8 ug/L introduced, or 1.0 ug/L) is about 3 times the concentration detected in the earlier sampling round. Well MW-5 lies adjacent to and down slope of the fuel pump islands. The well protective box was found to contain some water for the August sampling event. Therefore, it is possible that some hydrocarbon constituents may be introduced into this well by surface water.

4.3 Quality Assurance and Control

Samples MW-1-2 and MW-5-1 were the duplicate sample and equipment rinsate sample, respectively. Duplicate sample analysis results showed good agreement with results for the ground-water sample (Section 3.4) for TPH and Benzene; fair agreement for results of

Toluene and Total Xylenes analyses. This result indicates that ESE's sampling procedure resulted in a generally homogeneous sample. However, the results are not statistically significant, since they are based on only one sample.

The equipment rinsate sample showed very low, but detectable levels of Benzene. The equipment rinsate and ground-water sample analytical results for Benzene were 0.8 and 1.8 ug/L, respectively. Analytical results for the remaining parameters were non-detect. The observed result may impact the validity of result for Benzene concentration on the periphery of the constituent "plume" postulated to be centered on well MW-1.

There are four possible interpretations for this result:

- The sample bailer material reacted with the alcohol used for decontamination.
- The laboratory is unable to measure constituents near the detection level.
- The deionized water or alcohol used for the equipment rinsate contained trace levels of Benzene.
- ESE's decontamination procedures were ineffective in removing hydrocarbon constituents at very low levels.

The sampling bailer is made of clear polyethylene plastic with teflon top and bottom. These material do not normally react with alcohol. ESE assumes that NET's laboratory analyses and procedures are valid. Since ESE can control procedures and materials used for decontamination, we will modify sampling and decontamination protocol for subsequent sampling events as described below.

- Purge and sample on-site wells from anticipated least to most concentrated with hydrocarbon constituents. Based on results of the August 1990 sampling event, ESE will purge and sample the on-site wells in this order: MW-4, MW-5, MW-1.
- Dispose of decontamination water for purging equipment (hand pump, purging bailer) before decontaminating the sampling bailer. Double rinse the decontamination containers with potable water, followed by a deionized water rinse, before using them for decontaminating the sampling bailer.
- Use reagent grade deionized water and reagent grade methanol for decontaminating the sampling bailer. Reagent grade materials are labeled with results of chemical analysis for impurities. This labeling should provide a check on potential constituents that may be introduced into validation samples.

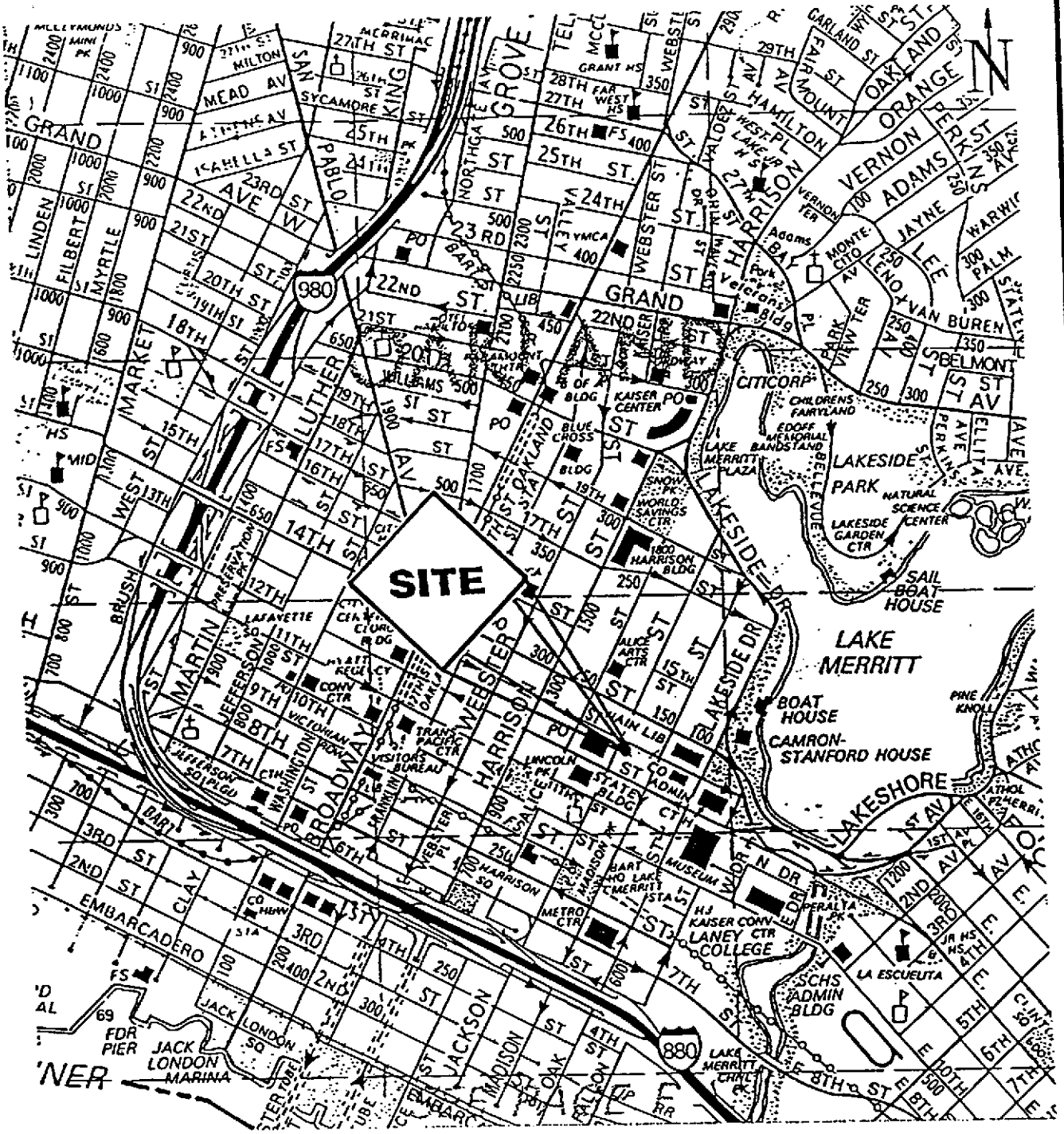
5.0 REFERENCES

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., 1990, 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.

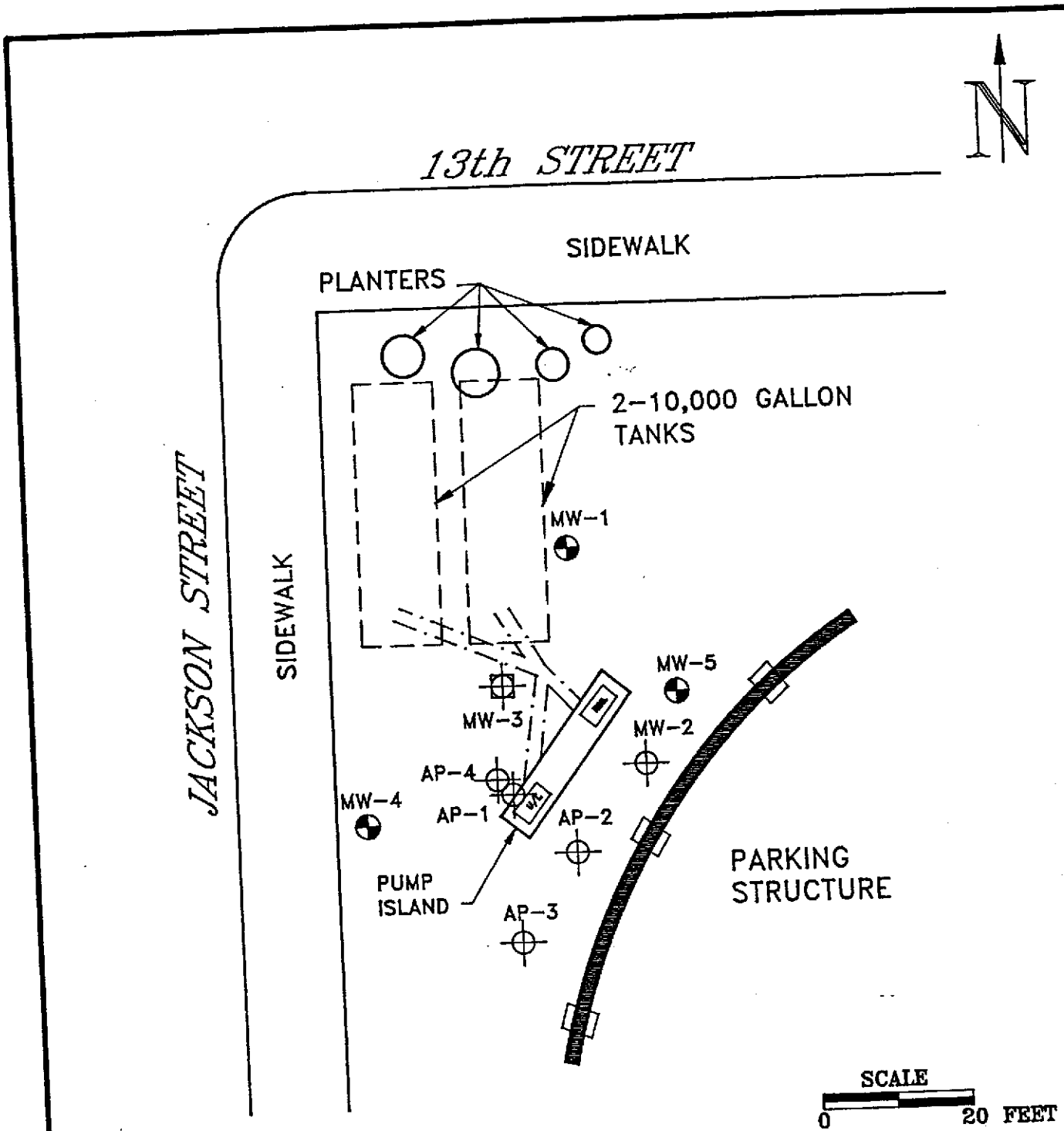
Hunter/Gregg, Inc., 1989, Phase I Site Characterization Report for Alameda County Alcopark Facility. Performed for Alameda County General Services Agency - Building Maintenance Department, Oakland, California; May 1989.

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.



ESE A CH2M HILL COMPANY	Environmental Science & Engineering, Inc.
ALAMEDA COUNTY ALCOPARK OAKLAND, CA	
FIGURE 1 LOCATION MAP	

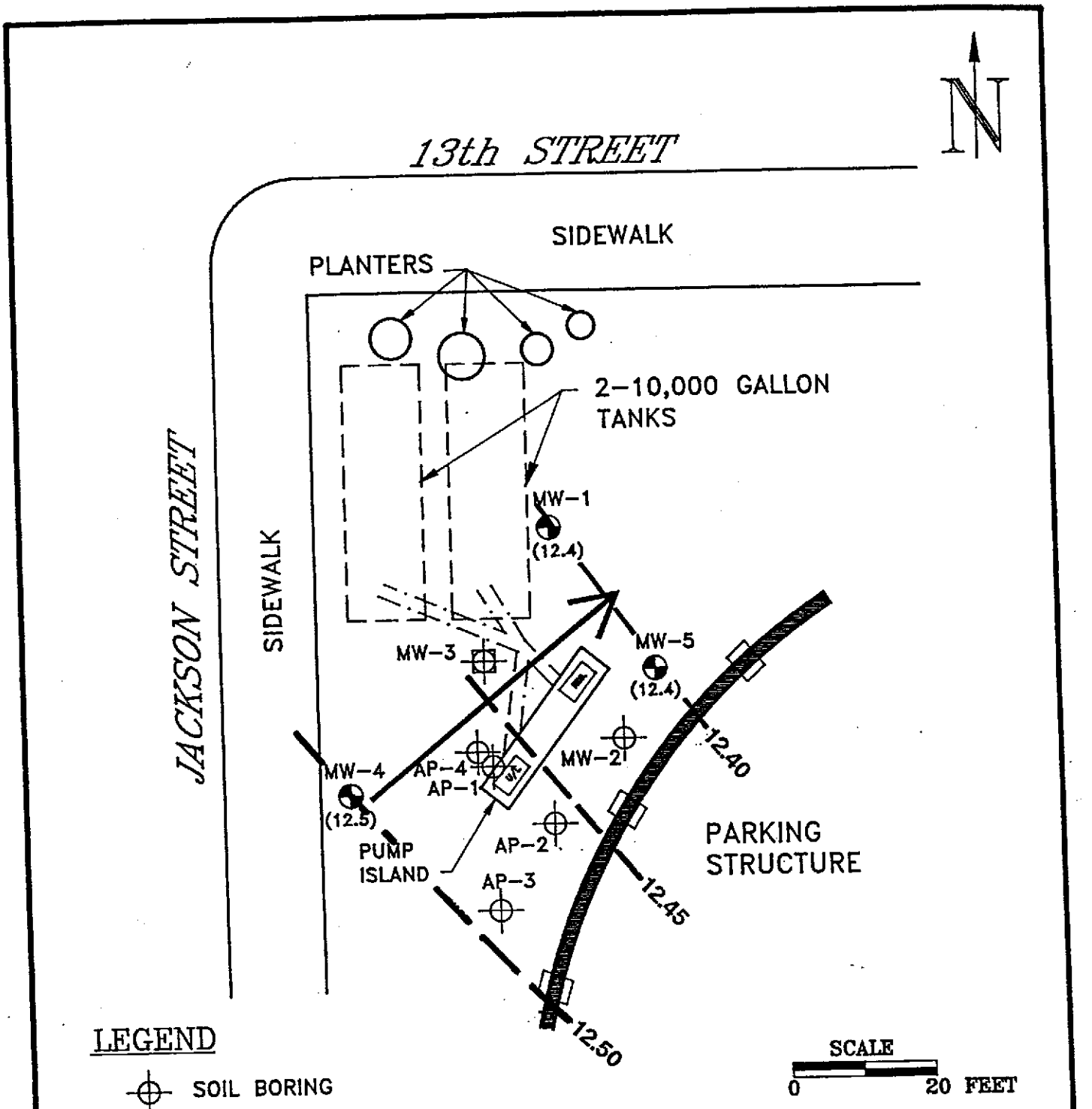
DATE	FILE NAME	PROJ. NO.
8/90	F1LM10	02-276-015



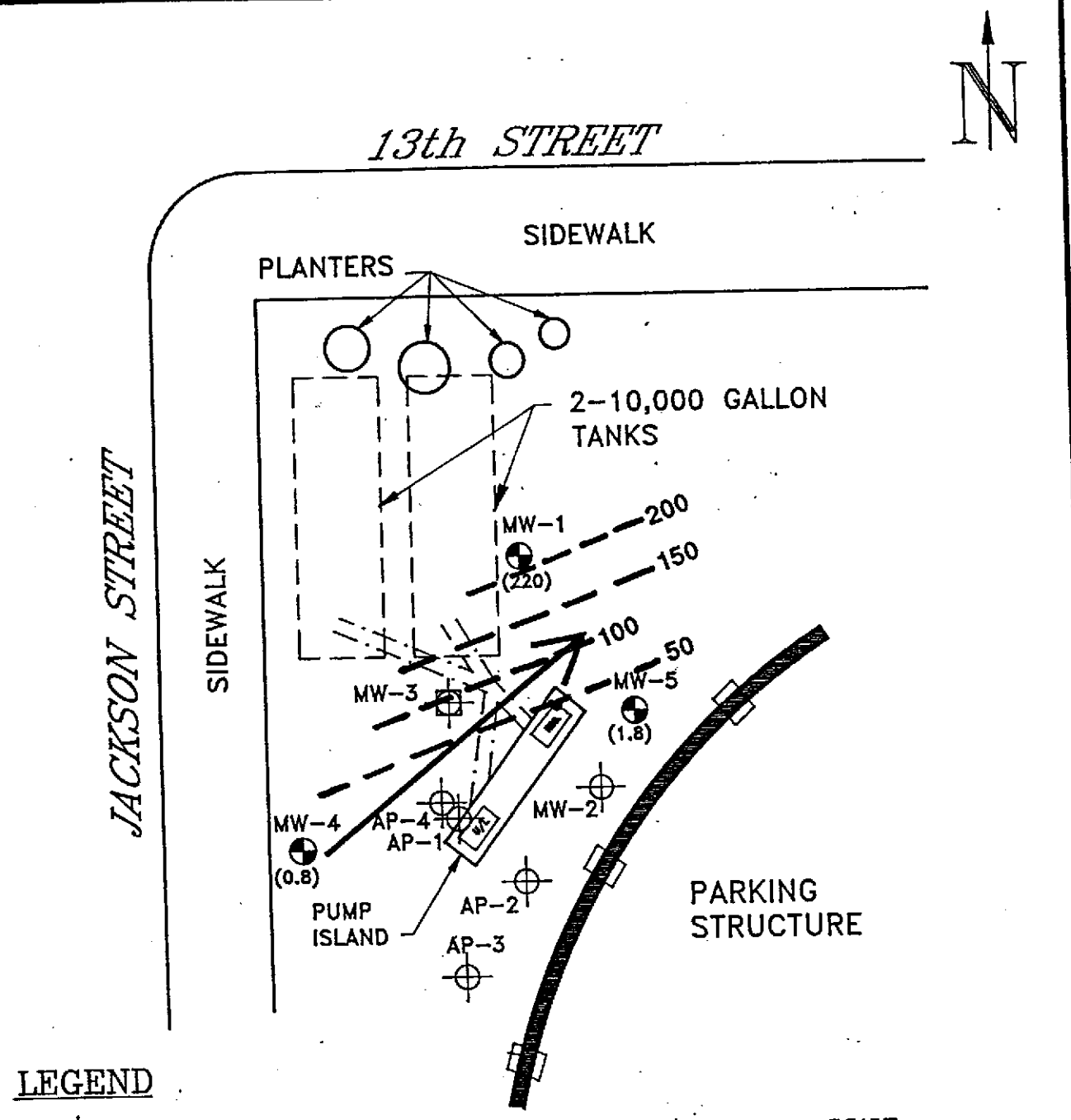
LEGEND

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

ESE	Environmental Science & Engineering, Inc.
ALAMEDA COUNTY ALCOPARK OAKLAND, CA	
FIGURE 2 SITE PLAN	
DATE 8/90	FILE NAME F2SP10
PROJ. NO. 02-276-015	



ESE	Environmental Science & Engineering, Inc.
ALAMEDA COUNTY ALCOPARK OAKLAND, CA	
FIGURE 3 RELATIVE GROUND–WATER ELEVATIONS AUGUST 1990	
DATE: 8/90	FILE NAME: F3GWE10
PROJ. NO.: 02–276–015	



LEGEND

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

SCALE
0 20 FEET

ESE Environmental Science & Engineering, Inc.

ALAMEDA COUNTY
ALCOPARK
OAKLAND, CA

FIGURE 4
BENZENE CONCENTRATIONS IN GROUND WATER, AUGUST 1990

DATE	FILE NAME	PROJ. NO.
8/90	F4BC10	02-276-015

TABLE 1

GROUND-WATER ELEVATIONS
for
ALAMEDA COUNTY, ALCOPARK - PROJECT NO. 02-276-015

AUGUST 1990

Well Number [a]	Reference Elevation [b] (Feet)	Depth to Ground Water (Feet)	Ground-Water Elevation (Feet)
MW-1	33.00	20.60	12.4
MW-4	33.63	21.13	12.5
MW-5	33.01	20.61	12.4

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 July 27, 1990.

TABLE 2

ANALYTICAL RESULTS
for
ALAMEDA COUNTY, ALCOPARK - PROJECT NO. 02-276-015

AUGUST 1990

Sample Number	TPH (mg/L) [a]	Benzene (ug/L)	Ethyl Benzene (ug/L)	Toluene (mg/L)	Total Xylenes (ug/L)
MW-1-1	1.4	220	ND	51	61
MW-1-2 [b]	1.5	200	ND	45	53
MW-4-1	ND	-	-	-	-
MW-4-2	-	0.8	ND	ND	ND
MW-5-1 [c]	ND	0.8	ND	ND	ND
MW-5-2	0.67	1.8	ND	1.1	ND

Notes:

BETX Benzene, Ethyl Benzene, Toluene and Total Xylenes
TPH Total Petroleum Hydrocarbons
mg/L Milligrams per liter, or parts per million
ug/L Micrograms per liter, or parts per billion
ND Below detection limit

Detection Limits: TPH = 0.05 mg/L BETX = 0.05 ug/L

a. TPH analyzed as gasoline (Method GC FID/5030) for MW-1 and MW-5, and as diesel (Method GC FID/3510) for MW-4.
b. Duplicate sample.
c. Equipment rinsate sample.

Samples collected by Environmental Science & Engineering, Inc., on July 27, 1990, and analyzed by NET Pacific Laboratories. Laboratory reports and chain of custody documents are included in Appendix C.

F:\PROJ..\276-015\ANALYTCL

APPENDIX A

Water Sample Logs

WATER SAMPLE/WELL DEVELOPMENT LOG

PROJECT NO. 02-276-015 DATE 7/26/90

SAMPLE NO. MW-1-1, MW-1-2 WELL NO. MW-1

GENERAL

PROJECT NAME Alameda Co., ALCOPARK

SAMPLE/WELL LOCATION 13th & Jackson; north end of site

WEATHER CONDITIONS Sunny, warm, calm

FIELD PERSONNEL Shannon O'Hare, Emilio Gonzalez

SAMPLING

REFERENCE POINT (RP) DESCRIPTION Top of well casing

DEPTH TO WATER START 20.60 END 20.65

TOTAL DEPTH (feet) 33.9

WATER COLUMN (Dh) (TD-WL, feet) 13.3

WELL DIAMETER (2r, inches) 4

CASING VOLUME (gallons) 8.65

WELL VOLUME (gallons) —

TOTAL DISCHARGE (gallons) 28

CASING VOLUMES REMOVED 3.2

WELL VOLUMES REMOVED —

FLOW ESTIMATE (gallons per minute) N/A

METHOD USED FOR ESTIMATE N/A

QUALITY ASSURANCE

METHOD USED TO MEASURE WATER LEVEL Solinst well sounder

SAMPLING METHODS Clean plastic bailer

BAILER OR PUMP LINE (NEW) CLEANED

METHOD OF CLEANING BOILER/PUMP Alconox, tapriuse, alcohol, DI rinse

pH METER NO. HYDAC No. 3 S.N. 9001

CONDUCTIVITY METER NO.

OTHER INSTRUMENT NO. —

CALIBRATION DATES AND RESULTS Calibrated @ 1/6 — rental instrument

NUMBER, SIZE OF SAMPLE CONTAINERS 6 X 40 ml. (VOAS) (TPH-g + BETX)

SAMPLE TIME 1545, 1550

METHOD OF DISPOSAL OF DISCHARGED WATER 55-gallon drum on-site

WATER QUALITY MEASUREMENTS

TIME	CUMULATIVE DISCHARGE (gallons)	pH	TEMP °C/°F	SPEC. CONDUCT (umhos/cm)	COLOR	ODOR	TURBIDITY (NTU)	REMARKS
								No product or odor noted
1350	9	6.54	70.0	1080	Colorless	None	trans.	No odor
1400	17	6.59	70.6	1019	lt. yellow	None	"	"
1413	28	6.70	68.9	1027	lt. gray	"	"	"
1555	28	6.94	72.6	1033	Colorless	None	Trans	Final readings

DEVELOPMENT

TIME START N/A TIME END TIME SURGED OR PUMPED

METHOD & EQUIPMENT

DESCRIPTION OF SURGE BLOCK OR PUMP

DESCRIPTION OF DEVELOPMENT PROCEDURES

INITIAL CONDITIONS (T, pH, SC) FINAL WATER TURBIDITY (NTU)

NOTES AND CALCULATIONS

CASING VOLUME = $\pi \left(\frac{r}{12}\right)^2$ Dh x 7.48 gallons

CASING VOLUME FOR TYPICAL WELL DIAMETERS: 2-in. = 0.16 Dh 4-in. = 0.65 Dh 6-in. = 1.5 Dh

1350 Purge well; hand pump

1545 Sample well MW-1-1 & MW-1-2 (duplicate)

1555 Final WQ readings

ESE Environmental Science & Engineering, Inc.
A CALCORP Company

WATER SAMPLE/WELL DEVELOPMENT LOG

PROJECT NO. 02-276-015 DATE 7/26/90

GENERAL

PROJECT NAME Alameda Co. ALCOPARK

SAMPLE/WELL LOCATION 13th & Jackson, near Jackson St.

WEATHER CONDITIONS Sunny, warm, calm

FIELD PERSONNEL Shannon O'Hare, Emilio Gonzalez

SAMPLING

REFERENCE POINT (RP) DESCRIPTION top of well casing

DEPTH TO WATER

START	END	TOTAL DEPTH (feet)	WATER COLUMN (Dh) (TD-WL, feet)
21.13	21.20	35.35	14.22

WELL DIAMETER (2r, inches)	CASING VOLUME (gallons)	WELL VOLUME (gallons)
2	2.3	N/A

TOTAL DISCHARGE (gallons)	CASING VOLUMES REMOVED	WELL VOLUMES REMOVED
6.5	2.8	N/A

FLOW ESTIMATE (gallons per minute) N/A METHOD USED FOR ESTIMATE

QUALITY ASSURANCE

METHOD USED TO MEASURE WATER LEVEL Solinst well sounder

SAMPLING METHODS Plastic bailer

BAILER OR PUMP LINE (NEW) CLEANED METHOD OF CLEANING BOILER/~~PUMP~~ Alconox, tapwater rinse, alcohol, DI water

pH METER NO. HYDAC No.3 (pH, conduct.) CONDUCTIVITY METER NO. S.N. 9001 OTHER INSTRUMENT NO. —

CALIBRATION DATES AND RESULTS Rental - calibrated @ lab

NUMBER, SIZE OF SAMPLE CONTAINERS 6x 3x40ml VOAS, 3x1L amber SAMPLE TIME 1530, 1535

METHOD OF DISPOSAL OF DISCHARGED WATER 55-gallon drum, on-site

SAMPLE NO. MW-4-1, MW-4-2 WELL NO. MW-4

WATER QUALITY MEASUREMENTS

TIME	CUMULATIVE DISCHARGE (gallons)	pH	TEMP °C/°F	SPEC. CONDUCT (umhos/cm)	COLOR	ODOR	TURBIDITY (NTU)	REMARKS
								No product
1325	2	6.21	71.4	1067	Brown	None	Turbid	Sandy, muddy water
1330	4	6.22	70.2	1077	Yel/brn.	"	"	"
1340	6	6.42	70.5	1057	"	"	"	"
1540	6 1/2	6.67	73	1058	"	"	Trans.	No color

DEVELOPMENT

TIME START N/A TIME END TIME SURGED OR PUMPED

METHOD & EQUIPMENT

DESCRIPTION OF SURGE BLOCK OR PUMP

DESCRIPTION OF DEVELOPMENT PROCEDURES

INITIAL CONDITIONS (T, pH, SC) FINAL WATER TURBIDITY (NTU)

NOTES AND CALCULATIONS

CASING VOLUME = π $(\frac{r}{12})^2$ Dh x 7.48 gallons

CASING VOLUME FOR TYPICAL WELL DIAMETERS: 2-in. = 0.16 Dh 4-in. = 0.65 Dh 6-in. = 1.5 Dh

1325 Purge well; use bailer to purge well; no product

1540 Final readings; two samples prepared

MW-4-1 : TPH-diesel; MW-4-2 : BETX

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

WATER SAMPLE/WELL DEVELOPMENT LOG

PROJECT NO. 02-276-015 DATE 7/26/90

SAMPLE NO. MW-5-1, MW-5-2 WELL NO. MW-5

GENERAL

PROJECT NAME Alameda Co. ALCOPARK

SAMPLE/WELL LOCATION Bldg & Jackson; NE of pump Islands. Driveway.

WEATHER CONDITIONS Sunny, warm, calm

FIELD PERSONNEL Shannon O'Hare, Emilie Gonzalez

SAMPLING

REFERENCE POINT (RP) DESCRIPTION Top of well casing

DEPTH TO WATER

START	END	TOTAL DEPTH (feet)	WATER COLUMN (Dh) (TD-WL, feet)
20.61	20.66	34.8	14.19

WELL DIAMETER (2r, inches)	CASING VOLUME (gallons)	WELL VOLUME (gallons)
4	9.22	N/A

TOTAL DISCHARGE (gallons)	CASING VOLUMES REMOVED	WELL VOLUMES REMOVED
30	3.3	N/A

FLOW ESTIMATE (gallons per minute) N/A METHOD USED FOR ESTIMATE

QUALITY ASSURANCE

METHOD USED TO MEASURE WATER LEVEL Solinst well sounder

SAMPLING METHODS Plastic bailer

BAILER OR ~~PUMP~~ LINE (NEW) CLEANED METHOD OF CLEANING BOILER/~~PUMP~~ Alconox, water rinse, alcohol, DI rinse

pH METER NO. HYDAC No. 3 (pH, Spec. Cond.) CONDUCTIVITY METER NO. SN 9001 OTHER INSTRUMENT NO.

CALIBRATION DATES AND RESULTS Rental - calibrated @ lab

NUMBER, SIZE OF SAMPLE CONTAINERS 6 x 40 ml VOA's (TPH & BETX) SAMPLE TIME 1600, 1605

METHOD OF DISPOSAL OF DISCHARGED WATER 55 gallon drum, on-site

WATER QUALITY MEASUREMENTS

TIME	CUMULATIVE DISCHARGE (gallons)	pH	TEMP (°C) °F	SPEC. CONDUCT (umhos/cm)	COLOR	ODOR	TURBIDITY (NTU)	REMARKS
								No product
1458	9.	6.67	71.3	983	Lt. Yellow	None	Trans.	No odor
1510	18	6.73	67.9	1055	"	"	"	"
1512	30	6.67	67.2	1100	"	"	"	"
1610	30	6.85	72.6	1160	Yellowish	"	"	"

DEVELOPMENT

TIME START N/A TIME END TIME SURGED OR PUMPED

METHOD & EQUIPMENT

DESCRIPTION OF SURGE BLOCK OR PUMP

DESCRIPTION OF DEVELOPMENT PROCEDURES

INITIAL CONDITIONS (T, pH, SC) FINAL WATER TURBIDITY (NTU)

NOTES AND CALCULATIONS

CASING VOLUME = $\pi \left(\frac{r}{12}\right)^2$ Dh x 7.48 gallons

CASING VOLUME FOR TYPICAL WELL DIAMETERS: 2-in. = 0.16 Dh 4-in. = 0.65 Dh 6-in. = 1.5 Dh

1450 - Water in Clarity box; bailed out

1458 Start purging; use hand pump

1610 Final readings.

MW-5-1 - Equipment rinsate sample.

Environmental Science & Engineering, Inc.

A CH2M HILL Company

APPENDIX B

Analytical Results

Chain of Custody Documents

RECEIVED AUG 09 1990

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

Pancho Gonzalez
Env. Science & Engineering
597 Center Ave, Ste 350
Martinez, CA 94553

Date: 08-08-90
NET Client Acct. No: 691
NET Pacific Log No: 3080
Received: 07-27-90 2300

Client Reference Information

Alco Park, Project: 02-276-015

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

Enclosure(s)

Ref: Alco Park, Project: 02-276-015

SAMPLE DESCRIPTION: MW4-1 07-26-90 1530
LAB Job No: (-58737)

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS			--	
EXTRACTABLE (WATER)			--	
DILUTION FACTOR *			1	
DATE EXTRACTED			07-31-90	
DATE ANALYZED			08-01-90	
METHOD GC FID/3510			--	
as Diesel		0.05	ND	mg/L
as Motor Oil		0.5	ND	mg/L

Ref: Alco Park, Project: 02-276-015

SAMPLE DESCRIPTION: MW4-2 07-26-90 1535
LAB Job No: (-58738)

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS			--	
VOLATILE (WATER)			--	
DILUTION FACTOR *			1	
DATE ANALYZED			08-01-90	
METHOD 602			--	
Benzene		0.5	0.8	ug/L
Ethylbenzene		0.5	ND	ug/L
Toluene		0.5	ND	ug/L
Xylenes, total		0.5	ND	ug/L

Ref: Alco Park, Project: 02-276-015

SAMPLE DESCRIPTION: MW1-1 07-26-90 1545
LAB Job No: (-58739)

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS			--	
VOLATILE (WATER)			--	
DILUTION FACTOR *			1	
DATE ANALYZED			08-01-90	
METHOD GC FID/5030			--	
as Gasoline		0.05	1.4	mg/L
METHOD 602			--	
DILUTION FACTOR *			10	
DATE ANALYZED			08-02-90	
Benzene		0.5	220	ug/L
Ethylbenzene		0.5	ND	ug/L
Toluene		0.5	51	ug/L
Xylenes, total		0.5	61	ug/L

Client Acct: 691
Client Name: Env. Science & Engineering
NET Log No: 3080

Date: 08-08-90
Page: 5

Ref: Alco Park, Project: 02-276-015

SAMPLE DESCRIPTION: MW1-2 07-26-90 1550
LAB Job No: (-58740)

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS			--	
VOLATILE (WATER)			--	
DILUTION FACTOR *			1	
DATE ANALYZED			08-01-90	
METHOD GC FID/5030			--	
as Gasoline		0.05	1.1	mg/L
METHOD 602			--	
DILUTION FACTOR *			10	
DATE ANALYZED			08-02-90	
Benzene		0.5	200	ug/L
Ethylbenzene		0.5	ND	ug/L
Toluene		0.5	45	ug/L
Xylenes, total		0.5	53	ug/L

Ref: Alco Park, Project: 02-276-015

SAMPLE DESCRIPTION: MW5-1 07-26-90 1600
LAB Job No: (-58741)

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS			--	
VOLATILE (WATER)			--	
DILUTION FACTOR *			1	
DATE ANALYZED			08-01-90	
METHOD GC FID/5030			--	
as Gasoline		0.05	ND	mg/L
METHOD 602			--	
DILUTION FACTOR *			1	
DATE ANALYZED			08-01-90	
Benzene		0.5	0.8	ug/L
Ethylbenzene		0.5	ND	ug/L
Toluene		0.5	ND	ug/L
Xylenes, total		0.5	ND	ug/L

Client Acct: 691
Client Name: Env. Science & Engineering
NET Log No: 3080

Date: 08-08-90
Page: 7

Ref: Alco Park, Project: 02-276-015

SAMPLE DESCRIPTION: MW5-2 07-26-90 1605
LAB Job No: (-58742)

Parameter	Method	Reporting Limit	Results	Units
PETROLEUM HYDROCARBONS			--	
VOLATILE (WATER)			--	
DILUTION FACTOR *			1	
DATE ANALYZED			08-02-90	
METHOD GC FID/5030			--	
as Gasoline		0.05	0.67	mg/L
METHOD 602			--	
DILUTION FACTOR *			1	
DATE ANALYZED			08-02-90	
Benzene		0.5	1.8	ug/L
Ethylbenzene		0.5	ND	ug/L
Toluene		0.5	1.1	ug/L
Xylenes, total		0.5	ND	ug/L

Ref: Alco Park, Project: 02-276-015

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Diesel	0.05	mg/L	114	ND	N/A	N/A	5.7
Motor Oil	0.5	mg/L	N/A	ND	N/A	N/A	N/A

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	0.05	mg/L	103	ND	87	106	19.1
Benzene	0.5	ug/L	100	ND	86	94	10.5
Toluene	0.5	ug/L	100	ND	88	95	8.2
Gasoline	0.05	mg/L	96	ND	94	103	8.9
Benzene	0.5	ug/L	100	ND	97	100	3.4
Toluene	0.5	ug/L	99	ND	96	97	1.4

COMMENT: Blank Results were ND on other analytes tested.

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results colum indicates analyte not detected at the value following, which supercedes the listed reporting limit.
mean	:	Average; sum of measurements divided by number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND	:	Not detected; the analyte concentration is less than applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 [Value 1 - Value 2]/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

* Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated reporting limits by the dilution factor.

Environmental Science & Engineering, Inc.

597 Center Avenue, Suite 350 Martinez, CA 94553 Phone (415) 372-3637 Fax (415) 372-3790

Formerly known as Hunter/Gregg, Inc.

CHAIN OF CUSTODY RECORD

DATE 7-27-90 PAGE 1 OF 1

NAME ESE
ADDRESS 597 Center Ave Suite 300
Martinez, CA 94553

PROJECT 02-276-015.

SAMPLER'S NAME (print) Shannon O'Hare

(signature) Shannon O'Hare

sample #	date	time	location	PARAMETERS 1 TPH-Diesel	2 BTEX	3 TPH-Gas/BTEX	4	5	6	7	8	9	10	OTHER						TOTALS
MW4-1	7-26-90	15:30	Alco Park	X																3
MW4-2	7-26-90	15:35	"		X															3
MW1-1	7-26-90	15:45	"			X														3
MW1-2	7-26-90	15:50	"			X														3
MW5-1	7-26-90	16:00	"			X														3
MW5-2	7-26-90	16:05	"			X														3

PARAMETER KEY:
1-CAM METALS (18)
2-PR. POLLUTANT METALS (13
3-GENERAL MINERALS
4-OIL & GREASE
5-PETROLEUM HYDROCARBONS
6-BASE/NEU/ACIDS (ORGANICS
7-PESTICIDES
8-VOLATILE ORGANICS (601/602)
9-VOLATILE ORGANICS (624)
10-TOC 0-

OBSERVATION/COMMENTS

Please call
Emilio (Pancho) Gonzalez
@ (415) 372-3637
for questions

10-day TAT

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1. Shannon O'Hare	1. Janice Green	7/27/90	1:20 p
2.	2.		
3.	3.		
4.	4.		

DISPATCHED BY: (signature)	date	time	RECEIVED FOR LAB BY: (sig)	date	time

TOTAL NUMBER OF CONTAINERS THIS SHEET: 18

METHOD OF SHIPMENT: NET Courier

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: