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REPORT OF FINDINGS  
EXCAVATION OF PETROLEUM HYDROCARBON CONTAMINATED SOILS

EDEN HOSPITAL  
20103 LAKE CHABOT ROAD  
CASTRO VALLEY, CALIFORNIA

PREPARED FOR:  
Mr. Robert Costanzo  
Eden Hospital  
20103 Lake Chabot Road  
Castro Valley, CA 94546

PREPARED BY:  
APPLIED ENVIRONMENTAL SOLUTIONS, INC.  
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Milpitas, CA 95035

February 1992

## TABLE OF CONTENTS

<u>Topic</u>	<u>Page</u>
Introduction	1
Executive Summary	2
Risk	3
Site Background	3-4
Excavation of Soils	4
Soil Sampling Protocol	5
Analytical Results	6-8
Disposal of Contaminated Soils	8
Back-filling and Compaction	8
Findings and Recommendations	9-10
Limitations	11

### Figures

- Figure 1 - Site Location Map
- Figure 2 - Site Characterization Map
- Figure 3 - Soil Sampling Location Map

### Appendices

- Appendix A - Laboratory Report/Chain of Custody

Mr. Robert Costanzo  
Eden Hospital  
20103 Lake Chabot Road  
Castro Valley, CA 94546

Project No. 344  
February 12, 1992

**Subject: Eden Hospital**  
20103 Lake Chabot Road  
Castro Valley, CA 94546  
**Excavation of Petroleum Hydrocarbon Contaminated Soils**

Dear Mr. Costanzo,

On December 18, 1991, Applied Environmental Solutions (AES) excavated petroleum hydrocarbon contaminated soils from the subject property. The site clean-up was instigated by the discovery of elevated concentrations of petroleum hydrocarbons during AES's October 17, 1991 removal of a 3000-gallon underground storage tank. The scope of our work included: The excavation of petroleum hydrocarbon contaminated soils from the vicinity of the former location of the underground storage tank; the collection and analyses of soil samples from the walls of the excavation; the proper treatment and/or disposal of the contaminated soils; and the back-filling and compaction of the excavation with clean material.

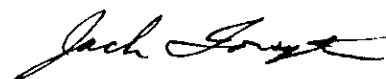
This Report of Findings summarizes the history of the site, excavation procedures, subsurface sampling methods, analytical results of the soil samples, and our findings and recommendations.

Copies of this report should be sent to:

- Alameda County Health Agency, Division of Hazardous Materials, Department of Environmental Health, 80 Swan Way, Room 200, Oakland, CA 94621
- Regional Water Quality Control Board, 2101 Webster Street, Suite 500, Oakland, CA 94612

Should you have any questions regarding this project or need additional information, please feel free to contact us at (408) 957-7700 at your convenience. Applied Environmental Solutions is pleased to be of service to you on this project.

Respectfully,



Jack Forsythe  
Staff Geologist

## **EXECUTIVE SUMMARY**

On December 18, 1991, AES excavated petroleum hydrocarbon contaminated soils from the subject property. The site clean-up was instigated by the discovery of elevated concentrations of petroleum hydrocarbons during AES's October 17, 1991 removal of one 3000-gallon, diesel fuel underground storage tank (UST).

Prior to the excavation described in this report, the initial size of the pit that formerly contained the UST was approximately 22 feet long, 12 feet wide, and 14 feet deep. The pit subsequently was enlarged to approximately 29 feet long, 14 feet wide, and 16 feet deep. The extent of the excavation was partially restricted by man-made obstructions located nearby: The west wing of the hospital to the north; underground storage tanks to the south; and a portable office and access road to the east and west, respectively. Excavation depth was limited by the presence of a concrete slab at 16 feet below surface grade (bsg), which apparently was designed to underlie the previously-removed UST.

Native soils encountered during the excavation process were comprised of a layered sequence of native sediments. From surface grade to approximately six feet bsg a moderately-plastic, yellowish-brown silty clay with minor gravel was encountered. From six feet bsg to 16 feet bsg yellowish-brown to dark-brown gravelly clays and silty clays were encountered. A slight to moderately-strong product odor emanated from portions of the excavated soils, especially soils removed from the eastern wall and northeastern corner of the excavation pit. Groundwater was not encountered during the excavation process.

A total of ten soil samples from the excavation were analyzed at a State-certified analytical laboratory. Eight samples were collected from native soils forming the northern, eastern, and western walls of the excavation pit; four samples were collected from the excavated soils stockpile and subsequently composited into two samples at the analytical laboratory.

The soil samples were analyzed for Total Petroleum Hydrocarbons as diesel (TPHd) and Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX). TPHd was detected in six samples, at concentrations ranging from 22 ppm to 1500 ppm. Benzene was detected in one sample, at a concentration of 6.8 ppb. Toluene was detected in four samples, at concentrations ranging from 5.9 ppb to 450 ppb. Ethylbenzene was detected in four samples, at concentrations ranging from 12 ppb to 390 ppb. Total Xylenes were detected in seven samples, at concentrations ranging from 9.7 ppb to 4400 ppb.

AES recommends removal of the two remaining USTs, followed by soil and groundwater investigations to determine the extent of possible contamination. Information derived from these investigations will aid the development of a feasible remediation plan.

## RISK

The site presents a moderate risk to the environment based on the following site conditions:

- TPHd was detected in six of the ten soil samples, at concentrations ranging from 22 ppm to 1500 ppm.

Soils with concentrations of TPH in excess of 1000 ppm are classified as "hazardous waste" by the California Department of Health Services (DOHS) and generally are required by regulatory agencies to undergo remediation and/or disposal. Soils containing TPH at concentrations above 100 ppm are classified as "designated waste" by the DOHS and may or may not require remediation, as determined by regulatory agencies.

- Benzene was detected in one sample, at a concentration of 6.8 ppb.
- Toluene was detected in four samples, at concentrations ranging from 5.9 ppb to 450 ppb.
- Ethylbenzene was detected in four samples, at concentrations ranging from 12 ppb to 390 ppb.
- Total Xylenes were detected in seven samples, at concentrations ranging from 9.7 ppb to 4400 ppb.

Concentration threshold values for Benzene, Toluene, Ethylbenzene, or Total Xylenes in soils have not been established.

## SITE BACKGROUND

The subject site currently is a hospital located at 20103 Lake Chabot Road, Castro Valley, California. The location of the site is shown in Figure 1, Site Location Map. The excavation occurred immediately south of the hospital's west wing, near the western end. A general layout of the area is shown in Figure 2, Site Characterization Map.

On October 17, 1991, AES removed one 3000-gallon diesel fuel tank. The results of the tank removal are included in the December, 1991 AES report: "Report of Findings, Underground Storage Tank Removal, Eden Hospital." Analytical results from the two sidewall soil samples and one composited stockpile sample indicated the presence of the following parameters:

<u>Parameter</u>	<u>Range of Concentrations</u>
TPHd	ND - 220 ppm
Ethylbenzene	ND - 11 ppb
Total Xylenes	ND - 180 ppb

The tank pit, as it existed after the removal of the underground storage tank, was approximately 22 feet long by 12 feet wide, with the base of the pit occurring at a depth of 14 feet bsg. After removal of the tank, the excavated soils (approximately 123 cubic yards) were returned to the tank pit to reduce the possibility of pit wall collapse.

#### **EXCAVATION OF SOILS**

On December 18, 1991, AES personnel excavated petroleum hydrocarbon contaminated soils located in and adjacent to the previously-excavated tank pit. The objective of the soil excavation was to remove the contaminated soils, to the greatest extent practical and feasible, in order to prevent the further migration of contaminants into areas of clean soil and/or groundwater.

The excavation was begun by first removing the soils which had been returned to the tank pit after the UST was removed. The excavation continued, primarily to the east and west, until the final approximate pit dimensions were 29 feet long by 14 feet wide and 16 feet deep. Groundwater was not encountered during the excavation process.

The extent of the excavation was restricted by man-made obstructions. To the north, the west wing of the hospital limited the excavation to approximately four feet away from the hospital wall. To the south, the excavation was limited by the presence of underground storage tanks. A portable office and access road were located to the east and west, respectively. The depth of the excavation was limited by the presence of a concrete slab at 16 feet bsg, which apparently was designed to underlie the underground storage tank that was removed on October 17, 1991.

The soils encountered in the excavated pit were comprised of a layered sequence of native sediments. From surface grade to approximately six feet bsg a moderately plastic, light to medium yellowish-brown silty clay with minor gravel was encountered. From six feet bsg to 16 feet bsg medium yellowish-brown to dark-brown gravelly clays and silty clays were encountered. A slight to moderately-strong product odor emanated from portions of the excavated soils, especially soils removed from the eastern wall and northeastern corner of the excavation pit.

After the soil was excavated and removed from the pit, it was stockpiled south of the excavated pit on the adjacent dirt area. After the excavation was completed, the soil stockpile was covered with plastic sheeting in order to prevent extensive vapor discharge and/or contaminant leaching in the event of precipitation. The area then was fenced-off and properly marked with yellow caution tape.

## SOIL SAMPLING PROTOCOL

On December 18, 1991, AES personnel collected a total of eight soil samples from the walls of the excavation. The north, east, and west walls were sampled at two different depths according to a sampling grid constructed in the field. The upper samples were collected from locations on the walls seven feet bsg and the lower samples were collected from locations on the walls 15 feet bsg.

Four samples were collected from the north wall; samples SE-2 and SE-4 were collected from the seven-foot sampling interval, and samples SE-1 and SE-3 were collected from the 15-foot sampling interval. Two samples were collected from the east wall; samples SW-2 and SW-1 were collected from the seven-foot and 15-foot sampling intervals, respectively. Two samples were collected from the west wall; samples NE-2 and NE-1 were collected from the seven-foot and 15-foot sampling intervals, respectively. The locations from where the samples were collected are shown in Figure 3, Sampling Location Map. Additionally, four stockpile soil samples (SP-1, SP-2, SP-3, SP-4) were collected from the excavated soil stockpile, at random locations and depths sufficient to ensure accurate representation. The four stockpile samples were composited at the laboratory into two composite samples (SP-1,2 and SP-3,4).

The "grab sample" method was used to collect each soil sample. With this technique, a clean 2-inch outside diameter, 6-inch long brass sampling tube was hand-driven into the excavated soils in the bucket of the excavator. Care was taken in recovering the sample at locations away from the walls of the bucket in order to reduce the possibility of contamination from the bucket. Upon recovery of the sample, the ends of the brass tube were sealed with aluminum foil, capped with plastic end caps, secured with aluminized tape, and properly labeled. The label information included the date, identification number of the sample, and the project name and number. Under proper Chain of Custody procedures, the samples were placed on ice inside a thermally-insulated cooler for subsequent transport to a State-certified analytical laboratory. A copy of the Chain of Custody form, indicating the analyses requested and the time and date of sampling, is included in Appendix C.

All soil samples were submitted to Chromalab, Inc., of San Ramon, California (State-certification # E694). Each sample was analyzed for the presence of Total Petroleum Hydrocarbons as diesel (TPHd) using EPA Method 3550/8015, and Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX) using EPA Method 8020.

## **ANALYTICAL RESULTS**

The results of the laboratory analyses of each soil sample are presented in Table 1. The detection limit for each parameter is included in the table. Copies of the laboratory reports are included in Appendix A.

### North Wall

#### Eastern Section:

Soil sample SE-1 (15-foot sampling interval) contained TPHd at a concentration of 1500 ppm (parts per million), Benzene at a concentration of 6.8 ppb (parts per billion), Toluene at a concentration of 450 ppb, Ethylbenzene at a concentration of 390 ppb, and Total Xylenes at a concentration of 4400 ppb.

Soil sample SE-2 (seven-foot sampling interval) contained TPHd, Ethylbenzene, and Total Xylenes at concentrations of 630 ppm, 12 ppb, and 280 ppb, respectively.

#### Western Section:

Samples SE-3 and SE-4 did not contain detectable concentrations of TPHd or BTEX constituents.

### East Wall

Soil sample SW-1 (15-foot sampling interval) contained TPHd and Total Xylenes at concentrations of 200 ppm and 11 ppb, respectively.

Soil sample SW-2 (seven-foot sampling interval) contained TPHd, Toluene, and Total Xylenes at concentrations of 22 ppm, 5.9 ppb, and 50 ppb, respectively.

### West Wall

Soil sample NE-1 (fifteen-foot sampling interval) contained Total Xylenes at a concentration of 9.7 ppb.

Sample NE-2 did not contain detectable concentrations of TPHd or BTEX constituents.

### Stockpile

Stockpile sample SP-1,2 contained TPHd at a concentration of 820 ppm, Toluene at a concentration of 32 ppb, Ethylbenzene at a concentration of 38 ppb, and Total Xylenes at a concentration of 320 ppb.



Stockpile sample SP-3,4 contained TPHd at a concentration of 330 ppm, Toluene at a concentration of 7.4 ppb, Ethylbenzene at a concentration of 28 ppb, and Total Xylenes at a concentration of 210 ppb.

Sample Number	TPHd (ppm)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (ppb)
<u>West Wall</u>					
NE-1	ND	ND	ND	ND	9.7
NE-2	ND	ND	ND	ND	ND
<u>East Wall</u>					
SW-1	200	ND	ND	ND	11
SW-2	22	ND	5.9	ND	50
<u>North Wall</u>					
SE-1	1500	6.8	450	390	4400
SE-2	630	ND	ND	12	280
SE-3	ND	ND	ND	ND	ND
SE-4	ND	ND	ND	ND	ND
<u>Stockpile</u>					
SP-1,2	620	ND	32	38	320
SP-3,4	330	ND	7.4	28	210
DETECTION LIMIT	1.0	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	3550/ 8015	8020	8020	8020	8020
ppm = parts per million (mg/kg) ppb = parts per billion (ug/kg) ND = Not Detected					

Table 1: Analytical Results (TPHd & BTEX)

- Soils with concentrations of TPH in excess of 1000 ppm are classified as "hazardous waste" by the California Department of Health Services (DOHS) and generally are required by regulatory agencies to undergo remediation and/or disposal. Soils containing TPH at concentrations above 100 ppm are classified as "designated waste" by the DOHS and may or may not require remediation, as determined by regulatory agencies. At the present time, threshold concentrations for BTEX constituents in soils have not been established by the DOHS.

#### **DISPOSAL OF CONTAMINATED SOILS**

On December 27, 1991, the stockpiled contaminated soil was transported from the site by AES personnel, and disposed of at Dixon Landing disposal site. Approximately 241 cubic yards of soil was excavated, removed, and transported from the site.

The contaminated soil was characterized for disposal by using soil stockpile analytical results from the original tank removal sampling and from the two stockpile composite samples collected during the subsequent excavation. Analytical results from the soil stockpile sample collected during the tank removal indicated concentrations of TPHd at 220 ppm and Total Xylenes at 11 ppb.

#### **BACK-FILLING AND COMPACTION**

Upon completion of the excavation and sampling, the pit was lined with 0.010-inch plastic sheeting, then imported back-fill material was deposited into the pit and progressively compacted. Base rock (3/4 inch) was back-filled into the excavated pit from approximately 16 feet bsg to approximately 13 feet bsg. Base rock was used because it is moderately self-compacting and non-expansive. As the base rock was back-filled into the excavation, it was spread, leveled, and compacted. From approximately 13 feet bsg to surface grade, quarry fines (1/4 inch) were back-filled into the excavated pit, spread, leveled, and compacted. Back-filling of the excavation was completed on December 19, 1991.

## FINDINGS AND RECOMMENDATIONS

### Findings

The following is a summary of the findings resultant from our excavation and removal of petroleum hydrocarbon contaminated soils from the site.

The soils encountered in the excavated pit were comprised of a layered sequence of native sediments:

- From surface grade to approximately six feet bsg a moderately-plastic, light to medium yellowish-brown silty clay with minor gravel was encountered. These soils typically have low to moderate permeabilities.
- From six feet bsg to 16 feet bsg medium yellowish-brown to dark-brown gravelly clays and silty clays were encountered. These soils typically have moderate permeabilities.

A slight to moderately-strong product odor emanated from portions of the excavated soils, especially soils removed from the eastern wall and northeastern corner of the excavation pit.

Groundwater was not encountered during the excavation process.

Analytical results of the ten soil samples indicated the presence of the following parameters:

- TPHd was detected in six of the samples, at concentrations ranging from 22 ppm to 1500 ppm.
- Benzene was detected in one sample, at a concentration of 6.8 ppb.
- Toluene was detected in two samples, at concentrations of 5.9 ppb and 450 ppb, respectively.
- Ethylbenzene was detected in four samples, at concentrations ranging from 12 ppb to 390 ppb.
- Total Xylenes were detected in seven of the samples, at concentrations ranging from 11 ppb to 4400 ppb.

## **Recommendations**

The high concentrations of TPHd detected in soil samples from the eastern section of the north wall (630 ppm and 1500 ppm), and the low to moderate concentrations detected in samples from the east wall (22 ppm and 200 ppm), indicate that TPHd contamination at the site is significant. AES therefore recommends implementation of the following steps in order to reduce the possibility of contaminant migration into areas of clean soil and/or groundwater.

### **Recommendation 1 - Removal of Underground Storage Tanks**

Two single-walled underground storage tanks are located immediately south of the excavation described in this report; the sidewall of the nearest tank was revealed during the excavation process. The structural condition of these tanks is unknown, and it is possible that some soil contamination could be the result of leakage from one or both of these tanks. Removal of these tanks is recommended.

### **Recommendation 2 - Define the Extent and Magnitude of Soil Contamination**

The objective of this action is to define the lateral and vertical extent of soil contamination. We therefore recommend the installation of exploratory soil borings in accessible areas near the former and current locations of underground storage tanks. Soil samples collected from each boring should be analyzed at a State-certified analytical laboratory for the presence of TPHd and BTEX.

The soil borings should be extended laterally from the source area in five- to ten-foot increments until contamination is not detected. Soil samples from the borings should be collected at five-foot vertical increments, from directly above the water table, and wherever a change in lithology occurs.

### **Recommendation 3 - Determine Possible Groundwater Impact**

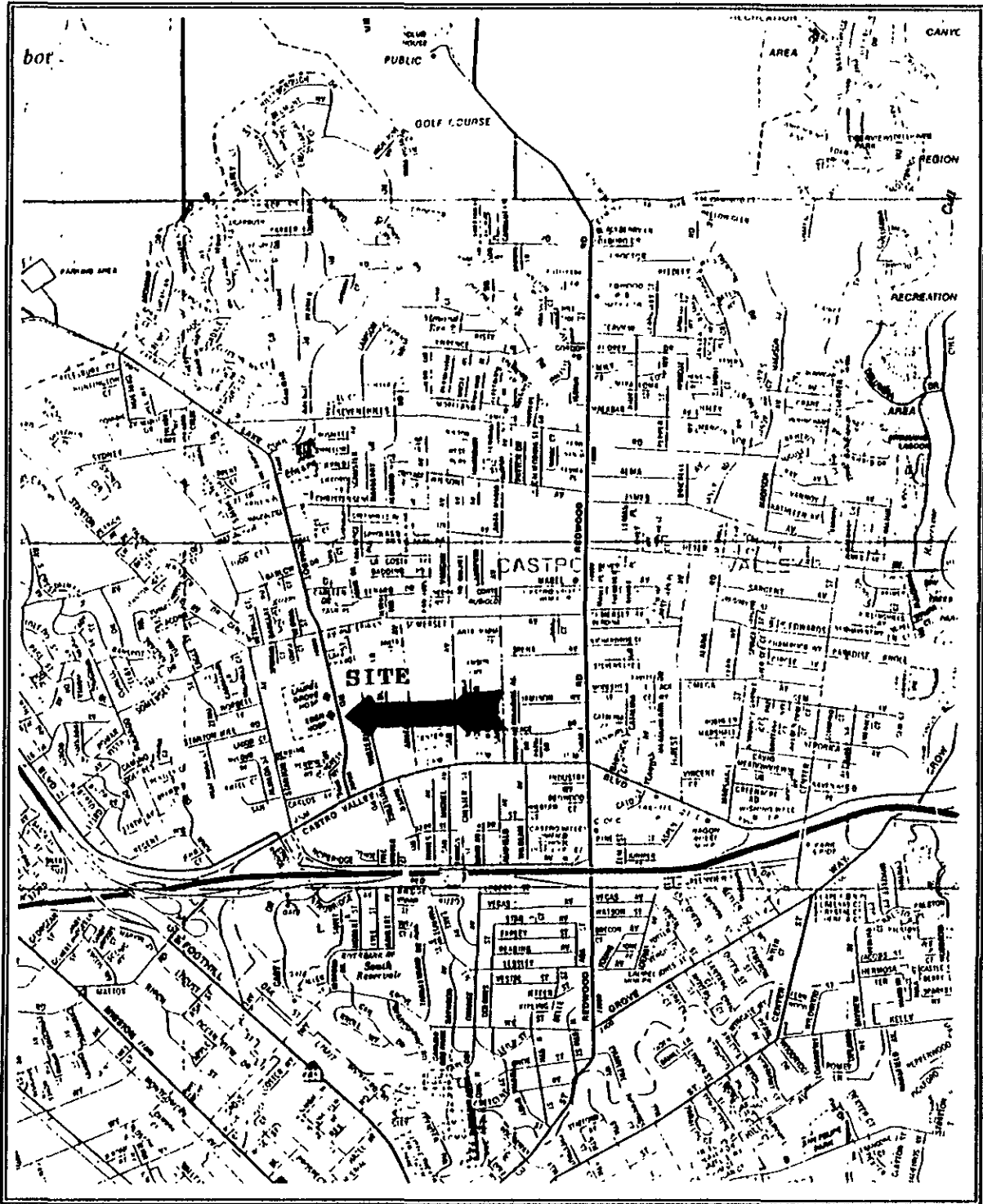
To determine the possible impact of groundwater, AES recommends installation of one to three groundwater monitoring wells. Groundwater samples collected from each well should be analyzed at a State-certified analytical laboratory for the presence of TPHd and BTEX.

### **Recommendation 4 - Preparation and Implementation of a Remedial Action Plan**

Following completion of Recommendations 1, 2, and 3, the results of soil sample and water sample laboratory analyses should be utilized to establish a feasible remediation plan.

## **LIMITATIONS**

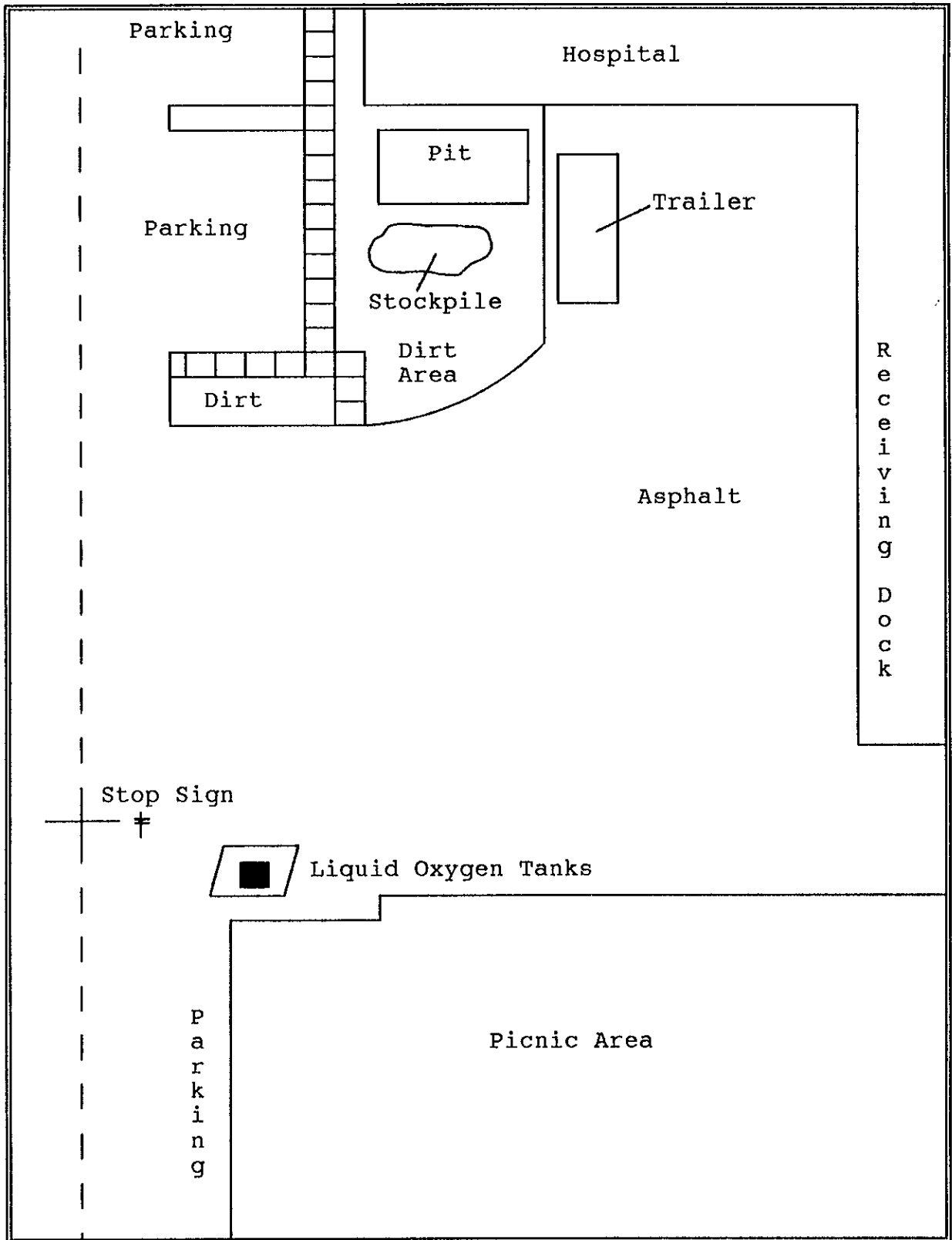
The conclusions and professional guidelines presented herein were developed in accordance with generally accepted practice for addressing fuel leaks from underground storage tanks as outlined in the guidelines from the Santa Clara Valley Water District and the California Water Quality Control Board. Because the analytical results are based on data collected from the sampling locations only, **AES** cannot have full knowledge of the underlying conditions at the site. Conditions at the project site may change with time due to the works of man and/or acts of nature. Accordingly, the findings of this report may be subject to change in light of new information.



Scale: 1 inch = 1/2 mile

SITE LOCATION MAP

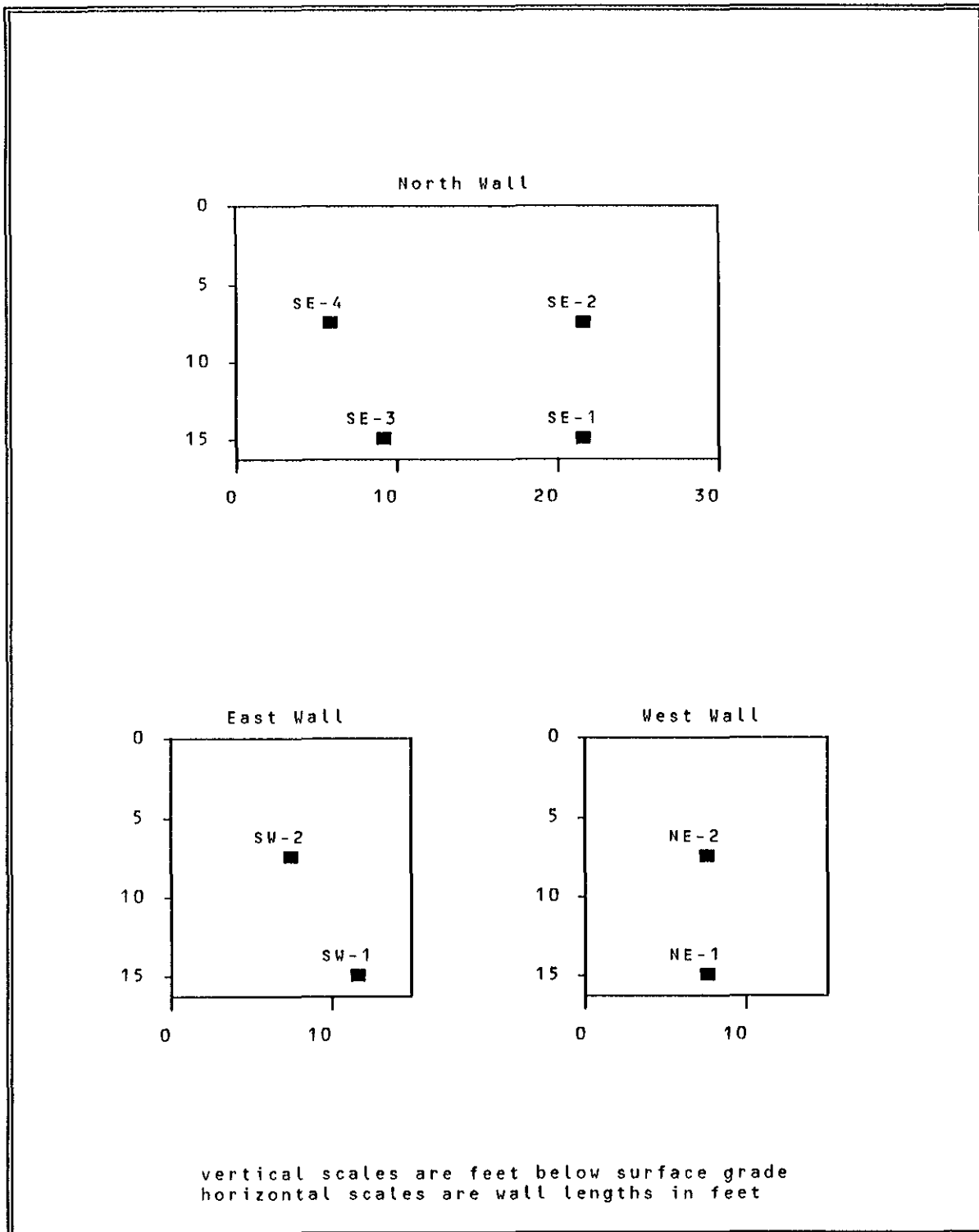
FIGURE 1



Scale: 1 inch = approximately 30 feet

SITE CHARACTERIZATION MAP

FIGURE 2



Scale: 1 inch = 10 feet

Figure 3: SAMPLING LOCATION MAP

All Locations and Dimensions are Approximate



**APPENDIX A**  
**LABORATORY REPORT/CHAIN OF CUSTODY**

# CHROMALAB, INC.

5 DAYS TURNAROUND

Analytical Laboratory (E694)

December 26, 1991

ChromaLab File No.: 1291145

APPLIED ENVIRONMENTAL SOLUTIONS

Attn: Ron LeGue

RE: Eight soil samples for Diesel/BTEX analysis

Project Name: EDEN HOSPITAL

Project Number: 344

Date Sampled: Dec. 18, 1991

Date Submitted: Dec. 18, 1991

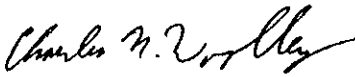
Date Extracted: Dec. 23, 1991

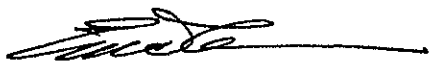
Date Analyzed: Dec. 24, 1991

## RESULTS:

Sample I.D.	Diesel (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
NE-1	N.D.	N.D.	N.D.	N.D.	9.7
NE-2	N.D.	N.D.	N.D.	N.D.	N.D.
SW-1	200	N.D.	N.D.	N.D.	11
SW-2	22	N.D.	5.9	N.D.	50
SE-1	1500	6.8	450	390	4400
SE-2	630	N.D.	N.D.	12	280
SE-3	N.D.	N.D.	N.D.	N.D.	N.D.
SE-4	N.D.	N.D.	N.D.	N.D.	N.D.
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKE REC.	101.4%	106.6%	108.6%	95.4%	97.9%
DUP SPIKE REC	98.2%	90.7%	93.1%	82.8%	86.3%
DET. LIMIT	1.0	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	3550/ 8015	8020	8020	8020	8020

ChromaLab, Inc.

  
Charles Woolley  
Analytical Chemist

  
Eric Tam  
Laboratory Director

# CHROMALAB, INC.

5 DAYS TURNAROUND

Analytical Laboratory (E694)

December 23, 1991

ChromaLab File No.: 1291145

APPLIED ENVIRONMENTAL SOLUTIONS

Attn: Ron LeGue

RE: Two rush composite samples for Diesel/BTEX analysis

Project Name: EDEN HOSPITAL

Project Number: 344

Date Sampled: Dec. 18, 1991

Date Submitted: Dec. 18, 1991

Date Extracted: Dec. 19, 1991

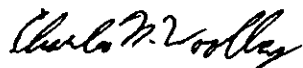
Date Analyzed: Dec. 20, 1991

## RESULTS:

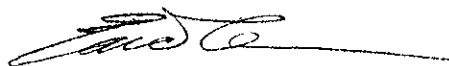
Sample I.D.	Diesel (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
SP-1,2	820	N.D.	32	38	320
SP-3,4	330	N.D.	7.4	28	210

BLANK	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKE REC.	88%	102%	105%	97%	101%
DUP SPIKE REC	91%	107%	106%	99%	101%
DET. LIMIT	1.0	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	3550/ 8015	8020	8020	8020	8020

ChromaLab, Inc.



Charles Woolley  
Analytical Chemist



Eric Tam  
Laboratory Director

