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December 15, 1994

Alameda County Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

Attn: Mr. Scott Seery

Subject: **Report on Soil and Groundwater Corrective Action at 2896 Castro Valley Blvd., Castro Valley, CA**

Dear Mr. Seery,

This document reports on the excavation of soil, soil sampling, groundwater treatment & sampling, and backfilling at the subject site performed in accordance with; GTE's September 29, 1993 *Work Plan for Initial Soil and Groundwater Remediation*, GTE's May 23, 1994 *Request for Modification to Remediation Workplan,* and the *Report on Preliminary Sampling and Request for Modification to Remediation Workplan* dated July 5, 1994.

All work reported herein was performed in accordance with the soil and groundwater sampling protocols presented in GTE's September 29, 1993 *Work Plan for Initial Soil and Groundwater Remediation* - which is now being considered as the site "Corrective Action Plan".

Scope of Work Performed

Soil Excavation:

Between October 23rd and 25th 1993, GTE excavated soil at the subject site in the approximate area shown on **Figure 9375-A** attached hereto. The area covered by the excavation was estimated based on soil and groundwater sampling that had previously been performed by Aqua Science and Sampling Specialists Company. The excavation was extended from the building towards Castro Valley Blvd. approximately 50 ft. to the southeast, about 20 ft. to 25 ft. in width, and to a depth of approximately 13.5 ft. below grade surface. GTE Field Test Kits for Volatile Organic Compounds (a colormetric soil and water test equivalent to the Nu-Hanby Test Kits) were used to test soil during the excavation in order to assist in determining the extent and direction of the excavation, and to separate the overburden clean soil from the affected soil. The depth of the excavation was extended to approximately 2-3 ft. below the current static level of groundwater. Total depth of the excavation was approximately 13.5 ft. below grade surface (BGS). Groundwater occurred at approximately 12 ft. BGS.

During the excavation, the clean soil was separated from the contaminated soil and each stockpiled on site. Soil from the area of the previous waste oil tank area which appeared to contain contamination was also separated from the gasoline/diesel contaminated soil.

The excavation was surrounded with temporary security fencing.

Initial Extremity Soil Sampling:

Note: All soil and groundwater sampling was performed in accordance with GTE's Sampling Protocols which are attached as ***Appendix 2****.*

On October 25 1993, six soil samples were collected from the extremities of the excavation in locations depicted on **Figure 9375-A** attached hereto. Each of the samples was taken at the depth of the soil/groundwater interface zone (about 12 ft. BGS). These samples were labeled S/W#1, S/W#2, S/W#3, S/W#4, S/W#5, and S/W#6, properly logged on a legal Chain of Custody, and transported to Geochem Environmental Laboratories - a state certified lab. - for analytical testing. Each of the six samples were tested for TPHg and BTEX by EPA Methods 8015 & 8020. S/W#5 and S/W#6 were also tested for Total Oil and Grease under EPA Method 5520. Samples #5, and #6 had been taken from the immediate areas in the vicinity of the previous waste oil storage tank. The laboratory analytical test results and legal Chain of Custody can be found in **Appendix 1**.

Secondary Extremity Soil Sampling:

In his response to GTE's September 29, 1993 *Work Plan for Initial Soil and Groundwater Remediation*, Mr. Scott Seery of the Alameda County Department of Environmental Health (ACDEH) had required that additional laboratory testing be performed to further identify the presence of previously discovered chemical constituents in the soil and groundwater on site. GTE had not perform laboratory testing for these additional constituents during the first sampling event. GTE submitted a *Request for Modification to Remediation Workplan* on May 23, 1994 to include the additional requirements - with some modifications approved in a phone conversation with Mr. Seery. The added testing required that; 1) GTE obtain additional extremity soil samples; 2) sample the waste oil soil stock pile, and; 3) take a grab sample of the groundwater within the existing pit. Each of the extremity samples was to be tested under EPA Method 8100 for SVOC's, and for six metals - in addition to TOG, and TPHd. The Groundwater Grab sample and Waste Oil Soil Stockpile were to be tested under EPA Method 8100 for SVOC's, six metals, TOG, TPHd, TPHg, and BTEX. In part, the additional sampling was conducted as a preliminary step in establishing the sampling and laboratory testing requirements that would be necessary for the remainder of the project.

1) The extremity sidewalls of the excavation were re-sampled at the depth of the soil water interface, at 20 ft. intervals. These samples are labeled on the Chain of Custody as EXT-S/W#1(A), EXT-S/W#2(A), EXT-S/W#3(A), and EXT-S/W#4(A). Each of these samples was analytically tested at AMER labs, a State Certified laboratory for the additional constituents requested including TPHd, SVOC's (EPA 8100), TOG, and the metals; Cr, Ni, Pb, Cd, Zn, and Se. The constituents which had already been run in the previous side wall sampling event (ie; gasoline and BTEX) were not analyzed in this batch of soil samples. The laboratory analytical test results and legal Chain of Custody can be found in **Appendix 1**.

2) A groundwater grab sample was collected from the existing pool of water within the excavation. This sample is labeled as EXC-GWS#1 on the attached Chain of Custody. The sample was analyzed at AMER labs - a State Certified lab for TPHg, TPHd, BTEX, TOG, and SVOC's (EPA Method 8100). Additional testing was performed for the metals; Cr, Ni, Pb, Cd, Zn, and Se. The laboratory analytical test results and legal Chain of Custody can be found in **Appendix 1.**

3) One soil sample was collected from the waste oil contaminated soil stockpile, and test at AMER labs - a State Certified lab for TPHg, TPHd, BTEX, TOG, and SVOC's (EPA Method 8100). Additional testing was performed for the metals; Cr, Ni, Pb, Cd, Zn, and Se. The laboratory analytical test results and legal Chain of Custody can be found in **Appendix 1**.

Analytical Results Tables

The following tables display the samples, and related chemical test results for both sampling events.

October 25, 1993 Sampling Event

	S/W#1	S/W#2	S/W#3	S/W#4	S/W#5	S/W#6
TPHg	64.11 PPM	29.49 PPM	1.28 PPM	4.35 PPM	1.25 PPM	5.09 PPM
Benzene	1.103 PPM	.0559 PPM	ND	ND	ND	.3064 PPM
Toluene	4.135 PPM	.5480 PPM	.0716 PPM	.1889 PPM	.2073 PPM	1.009 PPM
E-Benzene	4.866 PPM	1.187 PPM	.0124 PPM	.0133 PPM	.0274 PPM	.0150 PPM
Xylenes	25.05 PPM	6.636 PPM	,1213 PPM	.1018 PPM	.1653 PPM	.6112 PPM
TOG	NR	NR	NR	NR	3980 PPM	955 PPM

May 26, 1994 Sampling Event

	EXT - S/W # 1 (A)	EXT - S/W # 2 (A)	EXT - S/W # 3 (A)	EXT - S/W # 4 (A)	W/O - S/P #1	EXC-GWS #1
TPHg	*NR*	*NR*	*NR*	*NR*	*ND*	*ND*
BTEX (ALL)	*NR*	*NR*	*NR*	*NR*	*ND*	*ND*
TPHd	*93 PPM*	*12 PPM*	*16 PPM*	*55 PPM*	*24 PPM*	*92 PPB*
TOG	*NR*	*NR*	*NR*	*NR*	*21 PPM*	*ND*
EPA 8100 (ALL)	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*
Cr	*7.0 PPM*	*3.9 PPM*	*4.7 PPM*	*7.6 PPM*	*9.7 PPM*	*0.05 PPM*
Ni	*19 PPM*	*19 PPM*	*21 PPM*	*23 PPM*	*24 PPM*	*ND*
Pb	*2.6 PPM*	*2.0 PPM*	*2.6 PPM*	*6.6 PPM*	*7.3 PPM*	*ND*
Cd	*0.24 PPM*	*0.13 PPM*	*0.17 PPM*	*0.24 PPM*	*0.38 PPM*	*0.01 PPM*
Zn	*32 PPM*	*32 PPM*	*39 PPM*	*40 PPM*	*38 PPM*	*46 PPM*
Se	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*

Discussion of Analytical Results

TPHg/BTEX: TPHg in the six sidewall samples originally obtained in the October 1993 sampling event all contained less than 100 PPM of TPHg - the highest being S/W#1 @ 64.11 PPM. The highest benzene content for these samples was 1.28 PPM (also S/W#1). The soil sample taken from the waste oil stock pile during the May 26, 1994 sampling event (W/O-S/P#1) was non-detect for TPHg, and non-detect for BTEX constituents. The groundwater grab sample taken in May, 1994 contained no detectable TPHg, and was non-detect for all BTEX constituents.

TPHd: TPHd was detected in each of the sidewall samples during the May 1994 sampling event ranging from a high of 93 PPM in EXT-S/W#1 to 12 PPM in EXT-S/W#2.

TOG: Total Oil and Grease was detected at fairly high concentrations (3980 PPM in S/W#5 and 955 PPM in S/W#6) in the soil samples taken near the previous waste oil tank. GTE field personnel noted that this area still affected by waste oil was easily identified by observing discoloration of the soil.

Metals: Six metals were analyzed in each of the samples obtained during the May 26, 1994 sampling event (Cr,Ni,Pb,Cd,Zn,& Se). Analytical results indicated that each was below the Title 22 TTLC regulatory limits.

EPA 610/8100: None of the SVOC constituents were found in any of the soil samples. These constituents were also non-detect in the groundwater grab sample.

Soil Treatment:

The excavated soil had been separated into nine stockpiles during the excavation portion of the project. This separation was based on results of field testing (using Hanby Colormetric Test Kits) which had been performed on the soil in various areas throughout the excavation process. The location and sizes of these stockpiles are depicted on **Figure 9375-B** attached hereto.

All of the soil containing petroleum contamination was inoculated with Solmar® L-104 hydrocarbon degrading microbes. The application of the microbes was performed in accordance with GTE's work plan. The soil was turned, dampened, and aerated on several occasions, and the soil reinoculated two additional times after the initial application. Permits were secured through the AQMD for the treatment (attached in Appendix 3). Details on soil treatment methodology and practices can be found in **Appendix 3** attached hereto.

Based on the results of the soil and groundwater sampling that had been performed to date at the subject site, the following conditions were noted:

1. It appeared that the excavation had effectively removed soil containing greater than 100 PPM of gasoline and diesel constituents.

2. There appeared to be an area on the extremity of the excavation - near the previous waste oil tank - in which some waste oil contaminated soil still remained, and needed to be further excavated. The remaining contaminated soil in this area

(by visual observation) appeared to extend beneath the existing building - requiring that the building either be removed or its foundation undermined in order to access this affected remaining soil.

3. The groundwater within the excavation pit proved to be free of gasoline and Oil and Grease constituents, however, diesel remained in the water at 92 PPB - which was slightly greater than the 50 PPB drinking water standard which is necessary to achieve for non-restrictive discharge.

4. All soil and groundwater tested proved to be free of EPA 8100 SVOC constituents, and the six metals were all well within permissible limits.

Modifications to Initial Work Plan

Based on the preliminary data gathered to date, GTE requested in their July 5, 1994 *Report on Preliminary Sampling and Request for Modification to Remediation Workplan* to continue the project following the original work plan on file, with some modifications to the soil sampling, groundwater treatment, and backfilling requirements. Basically, GTE proposed to supplement the previous work with additional sampling that would provide the basis for determining the disposition of the excavated soil and treated groundwater. Using the sampling data, GTE would; a) separate the soil that was candidate for backfilling from soil that was not; b) backfill the excavation with acceptable soil; c) dig out the remaining area of soil contamination near the previous waste oil tank, and; d) off-haul and properly dispose of the soil that could not be used on site for backfilling. The groundwater remaining in the pit would be pumped into a tank on site and "polished" to acceptable standards. **The plan was discussed with Scott Seery by telephone on August 16, 1994, and a letter dated August 16, 1994 sent to GTE by Mr. Seery on that date confirming the conversation.** The following work was performed in accordance with the modified plan.

Stock Pile Soil Sampling:

On [redacted] Soil samples were collected from the separated [redacted]verburden soil pile [redacted] @ one discrete sample per 20 cu. yds. (8 samples total). Please refer to **Figure 9375-B** for the location of these samples. The samples are labeled O/B S/P #1 (A,B,C, & D) and O/B S/P #2 (A,B,C, & D) on the drawing. Each of these samples was composited into one sample unit, and the single sample composites O/B S/P #1 and O/B S/P #2 analyzed at a state certified lab for TPHg, TPHd, BTEX, and Oil & Grease.

On [redacted] soil samples were also collected from the [redacted]reatment stockpiles [redacted] @ one discrete sample per 20 cu. yds. Please refer to **Figure 9375-B** for the location of these samples. The samples are labeled Exc-S/P 1 through 10 on the drawing. Each of these 10 samples was analyzed at a state certified lab for TPHg, TPHd, BTEX, and Oil & Grease.

The[redacted]aste oil contaminated soil[redacted]stockpile [redacted]EXC. Stockpile A) - as shown on **Figure 9375-B** was not re-sampled as it had been previously tested in May, 1994 and found to contain [redacted] [redacted] N.D. for BTEX, and N.D. for VOC's. This soil had been inoculated with microbes at the time of excavation, and had been degrading for about 3 months.

The following table shows the results of the **stockpile soil samples** obtained during these sampling events. The Chains of Custody and analytical laboratory test results can be found in **Appendix 1** attached hereto.

August 17, 1994 Sampling Event Stockpile

	SAMPLE I.D.	*Gasoline*	*Diesel*	*Benzene*	*Toluene*	*Ethyl-Benzene*	*Total Xylenes*	*Oil & Grease*
		(PPM)	(PPM)	(PPB)	(PPB)	(PPB)	(PPB)	(PPM)
stockpile #1	EXC-S/P #1	ND	ND	ND	ND	ND	ND	ND
	EXC-S/P #2	ND	ND	ND	ND	ND	ND	ND
	EXC-S/P #3	ND	ND	ND	ND	ND	ND	ND
stockpile #2	EXC-S/P #4	ND	ND	ND	ND	ND	ND	[redacted]
	EXC-S/P #5	ND	ND	ND	ND	ND	ND	[redacted]
	EXC-S/P #6	ND	ND	ND	ND	ND	ND	[redacted]
stockpile #3	[redacted]	ND	ND	ND	ND	ND	ND	[redacted]
	[redacted]	ND	ND	ND	ND	ND	ND	[redacted]
	[redacted]	ND	ND	ND	ND	ND	ND	[redacted]
stockpile #4	EXC-S/P#10	ND	ND	ND	ND	ND	ND	[redacted]
over-burden	O/B-S/P#1-ABCD	ND	ND	ND	ND	ND	ND	[redacted]
	O/B-S/P#2-ABCD	ND	ND	ND	ND	ND	ND	[redacted]

Final Groundwater Treatment and Verification:

(Please refer to **Appendix 1** for the Chains of Custody and Analytical Lab test results for the following groundwater samples)

On [redacted]he existing groundwater remaining in the excavation pit was pumped into a 5,000 gallon treatment/holding tank which had been imported to the site. The water within the tank (totaling approximately 4,500 gallons) was inoculated with Solmar® L-104 hydrocarbon degrading microbes. The application of the microbes was performed in accordance with the manufacturers recommendations. An aeration pump was installed in the tank to circulate and aerate the water for a period of five days.

On [redacted] a sample of this treated water (labeled "Dewater-GWS" on the C.O.C.) was collected and sent to a State Certified lab for analytical testing. The sample was tested only for TPH Diesel, because previous sampling of the pond water had determined that no TPHg, BTEX, or Oil and Grease constituents were present. The results of the testing revealed N.D. at laboratory test limits.

Discussion of Sampling Results and Site Disposition:

At this point of the project, adequate laboratory testing had been performed to assert the following:

1. The initial excavation efforts had effectively removed soil containing greater than 100 PPM of gasoline and diesel constituents. Extremity soil sampling had identified one remaining area on the extremity of the excavation - near the previous waste oil tank - where waste oil contaminated soil still remained, and needed to be further excavated. The remaining contaminated soil in this area appeared to extend beneath the existing building.

2. The groundwater within the excavation pit which had been shown to be free of gasoline and oil and grease constituents had been pumped into the holding tank on site, "polished", retested for diesel, and found to contain less than 50 PPB of Diesel constituents. This water was, at this point - by drinking water standards - safe for discharge. A significant amount of water would be needed to moisten the backfill soils for optimum compaction. If the water could be used for this purpose, it would not be necessary to obtain a RWQCB Discharge Waiver or NPDES permit.

4. The soil and groundwater tested to date was demonstrated to be free of EPA 8100 SVOC constituents. Stockpile samples had demonstrated that one of the piles (EXC-Stockpile #3) contained greater than 100 PPM of residual Oil and Grease - but no VOC's. EXC-Stockpile #2 was found to contain residual oil and grease which was still above the 10 PPM limit for backfill, however none of the samples from this stockpile contained greater than 100 PPM of Oil and Grease - and no VOC's. The average concentration for stockpile EXC-#2 was 76 PPM TOG. The O/B Stockpile contained 20 to 32 PPM of TOG - but no VOC's. EXC. Stockpile

"A" had been demonstrated to contain only 21 PPM of TOG, and 24 PPM of Diesel - but no VOC's. The remaining soil on site had demonstrated to be N.D. for Oil and Grease contamination, VOC's. All soil samples tested for the six metals had been found to contain acceptable levels of each.

Based on the data at hand, a phone call was made to Mr. Scott Seery to discuss the possibility of using the soils which contained small residual amounts (less than 100 PPM) of Oil and Grease (Stockpiles ~~#0/B-#1-&-2,~~ #EXC-#2, EXC-#4, and EXC-#A) as part of the backfill for the project. *The average concentrations of remaining Oil and Grease for these stockpiles containing residual TOG was 63.5 PPM.* Scott did not object, but suggested that the final decision regarding this sort of variance would need to come from the Regional Water Quality Control Board. On August 29, 1994, Stuart Solomon (GTE President), spoke with Mr. Dennis Mishek of the Bay Area Regional Water Quality Control Board, and relayed the data concerning the site, the soil test results, etc.. Based on the data presented, Mr. Mishek had no objection to using the soil provided that no volatile compounds were present. Dennis suggested that GTE install clean imported fill at the bottom of the excavation - and the affected soil in a lift near the surface of the excavation - separated from the clean soil by a plastic barrier. Based on this conversation, GTE proceeded with the backfilling project as follows.

Partial Backfilling and Remaining Soil Excavation:

In order to provide room for further excavation and stockpiling of the remaining waste oil affected soil near the building, GTE chose to partially backfill the clean portion of the excavation pit.

1. Approximately 10 yards of "de-muck" material (clay mud) from the bottom of the pit was excavated and stockpiled as EXC-Stockpile # 5.

2. Approximately 92 tons of clean 3/4 inch drainrock was imported and installed to form a compaction "bridge" in the aquifer zone. This rock was brought up to a depth of approximately 9 ft. BGS.

3. **Excavation of Remaining Affected Soil**

   a) A ramp was built to permit access of the excavator into the partially filled excavation. The area of remaining oil contaminated soil (as shown on Figure 9375-B) was excavated from beneath the building at the northeastern corner of the excavation to the maximum capabilities of the excavating equipment. The building was undermined by approximately 6 to 7 ft. in this area, and all observable discolored soil removed. A total of approximately 10 to 15 yards of soil was excavated. This material was stockpiled along with the soil pile of "de-mucked" material [redacted] Stockpile #5).

b) On [redacted] a soil sample was collected from the sidewall at the extremity of this excavation from the depth of the soil/water interface (approx. 8.5 ft. below grade). This sample is labeled EXT.-S/W#5-A and is shown on **Figure 9375-B**. This sample was tested at a State Certified Lab for Total Oil and Grease. Additional tests were not run on this sample because previous testing of soil samples from this area had indicated that no other TPH or solvent constituents existed in the soil at this location. The Chain of Custody and analytical laboratory test results can be found in **Appendix 1**. Results of the testing revealed N.D. at lab limits for Oil and Grease.

4. The drain-rock base was then covered with a 10 mill visquine seal/barrier to prevent blending of fill materials and to isolate the groundwater aquifer from any native fill materials.

Note: Clean water from the treatment tank was used to provide the required moisture for compaction of the backfill material throughout the backfilling process.

5. The clean, non-detect native material fro[redacted] was installed in one foot lifts over the gravel base, and compacted using a sheepsfoot compaction wheel. A total lift of approximately 2 ft. was compacted over the rock using this material. The clean material filled the pit to approximately 7 ft. from the surface. ND

6. A second visquine barrier was installed over the clean compacted native fill material.

7. The remaining soil containing less than 100 PPM (as discussed above) of oil and grease was installed over the second visquine barrier, and compacted in one foot lifts to approximately 2 ft. below grade.

8. A third Visquine barrier was installed over the previous lift of material, and approximately 96 tons of class II structural base material was imported, installed, and compacted to grade.

Disposal Soil Characterization:

On [redacted] for the purposes of disposal characterization, 4 samples were collected from [redacted] (additionally excavated waste oil tank area soil and the "de-mucked" soil) and [redacted] (soil known to contain greater than 100 PPM of oil and grease). These samples are shown on **Figure 9375-B** and labeled as Exc-S/P # 7A, 8A, 9A, & 11A. The 4 samples were composited into one sample at the lab and tested for VOC's (EPA 8240), and RCI - in accordance with the characterization requirements of BFI Vasco Road Landfill. In addition, a discrete sample of Stockpile # 5 (de-muck material) was obtained (sample labeled Exc-S/P # 11). This sample was tested for TPHg, TPHd, BTEX, TOG, and Cam 17 Metals. **Results were forwarded to BFI Vasco Road for their approval.** The table of lab results follows. Analytical lab data and the C.O.C. can be found in **Appendix 1**.

November 8, 1994 Sampling Event

Sample #	***TPHg (PPM)***	***TPHd (PPM)***	***VOC's (PPB)***	***TOG (PPM)***	***R.C.I.***
Exc-S/W #5A	NR	NR	NR	ND	NR
Exc-S/P #11	ND	ND	NR	[illegible]	NR
Exc-S/P #'s 7A, 8A, 9A, & 11A Composite	NR	NR	ND (ALL)	NR	pH = 7.2 Ign. = NO

Sample EXC-S/P #11 - Cam 17 Metals

Metal	*PPM*	*Metal*	*PPM*
Silver	8.2	Arsenic	ND
Barium	99	Beryllium	ND
Cadmium	ND	Cobalt	8.0
Chromium	25	Copper	17
Mercury	12	Molybdenum	ND
Nickel	27	Lead	ND
Antimony	ND	Selenium	ND
Thallium	ND	Vanadium	34
Zinc	41		

Conclusions and Recommendations:

Remedial activities have been demonstrably successful at removing contaminates from the soil and groundwater at the subject site. Soil containing greater than 100 PPM of petroleum hydrocarbons was excavated, and the groundwater in the area of the excavation decontaminated. Backfill material from about 2 ft. BGS to 7 ft. BGS contains some residual Oil and Grease which averages 63.5 PPM, however, this material does not contain any volatile constituents, no excessive metals concentrations, and is considered non-hazardous by Title 22 standards.

Approximately 80-85 yards of soil containing greater than 100 PPM of Oil and Grease remains stockpiled on the site. This soil is currently covered with plastic sheeting. Laboratory testing has shown that this soil contains no volatile or excessive heavy metal constituents. A non-hazardous disposal profile has been submitted to BFI Vasco Road Landfill, and has been approved. This soil will be off-hauled and disposed of in the near future.

need proof!

There are three groundwater monitoring wells located at the property. It is GTE's opinion that these wells are properly positioned to provide reliable groundwater sampling data necessary for ultimate site closure. To GTE's knowledge, these wells have not been sampled during at least the past four quarters. It is GTE's recommendation that the quarterly sampling program be re-initiated immediately for the three wells. These wells will need to be monitored for at least four consecutive quarters prior to site closure.

It is GTE's opinion that contamination that existed as a result of previous operations at this site no longer poses a significant threat to the environment. With the exception of ongoing groundwater monitoring, no further corrective action is recommended.

If you have any questions concerning this report, please do not hesitate to call the undersigned.

Respectfully,

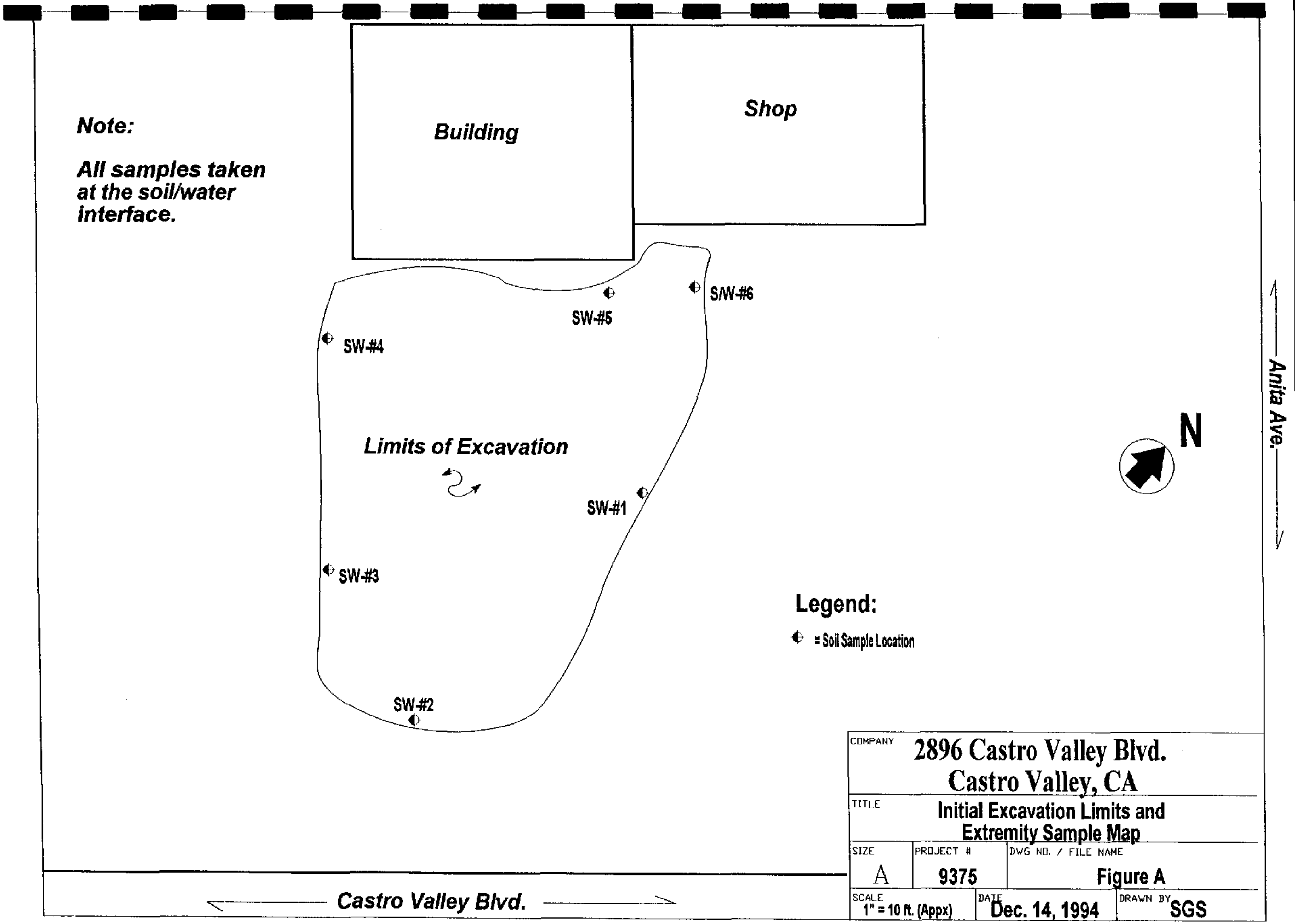
Stuart G. Solomon, Principal

Robert Croyle, R.P.E. No. 2039

ROBERT W. CROYLE
No. 20,397
EXP. 9/97
CIVIL

Attachments:

Figure 9375-A -	Initial Excavation Limits and Extremity Sample Map
Figure 9375-B -	Secondary Extremity Sampling, Additional Excavation Limits & Stockpile Sample Map
Appendix 1 -	Chains of Custody and Analytical Lab Test Results
Appendix 2 -	GTE Sampling Protocols
Appendix 3 -	Soil Treatment Methodology and AQMD Permit



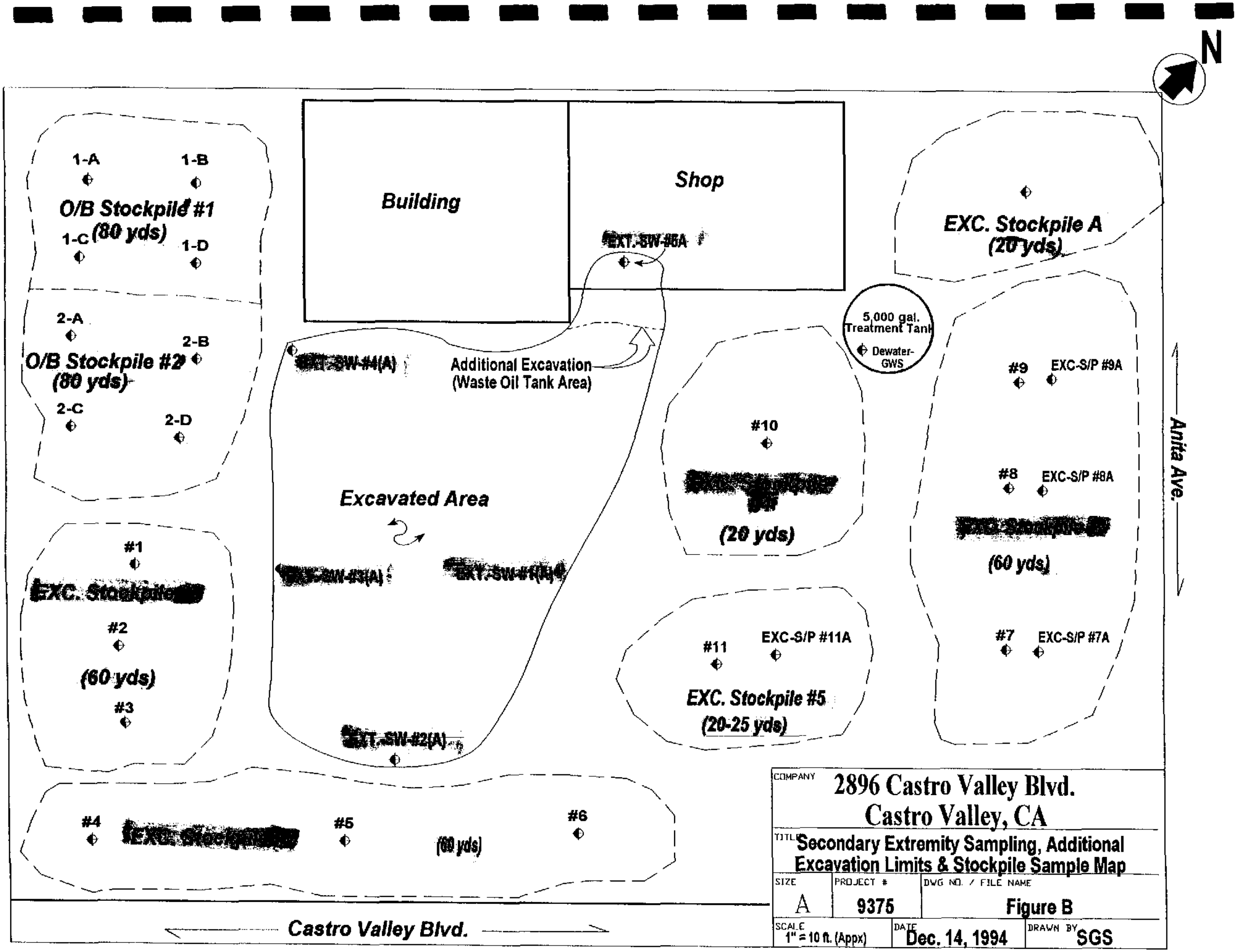
Note:

All samples taken at the soil/water interface.

Legend:

◐ = Soil Sample Location

COMPANY	2896 Castro Valley Blvd. Castro Valley, CA		
TITLE	Initial Excavation Limits and Extremity Sample Map		
SIZE A	PROJECT # 9375	DWG NO. / FILE NAME Figure A	
SCALE 1" = 10 ft. (Appx)	DATE Dec. 14, 1994	DRAWN BY SGS	



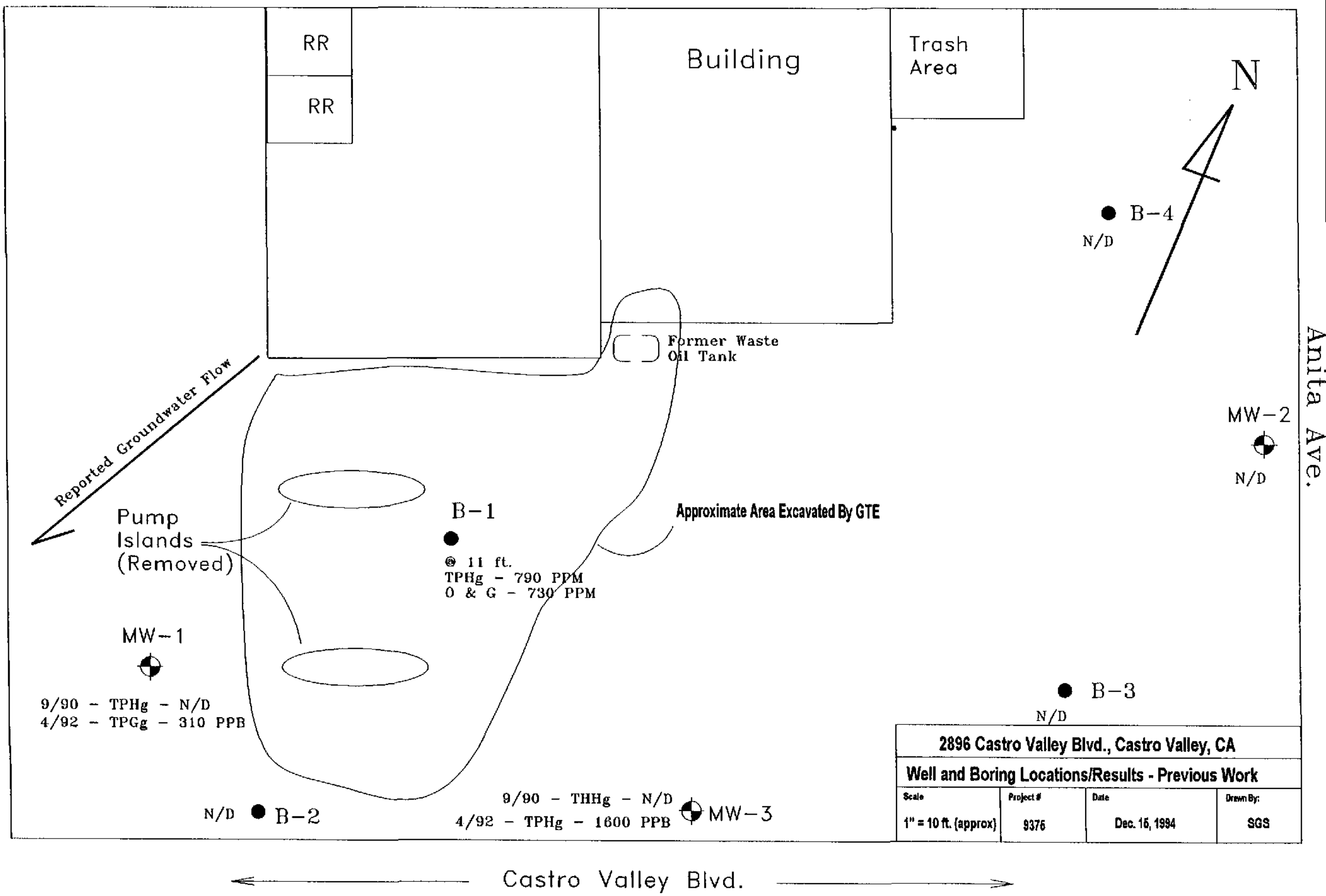
COMPANY **2896 Castro Valley Blvd.**
Castro Valley, CA

TITLE **Secondary Extremity Sampling, Additional Excavation Limits & Stockpile Sample Map**

SIZE	PROJECT #	DWG NO. / FILE NAME
A	9375	Figure B

SCALE	DATE	DRAWN BY
1" = 10 ft. (Appx)	Dec. 14, 1994	SGS

Gen-Tech Environmental, Inc.



2896 Castro Valley Blvd., Castro Valley, CA

Well and Boring Locations/Results - Previous Work

Scale	Project #	Date	Drawn By:
1" = 10 ft. (approx)	9376	Dec. 15, 1994	SGS

Gen-Tech Environmental, Inc.

APPENDIX 1

CHAINS OF CUSTODY AND ANALYTICAL LAB TEST RESULTS

EOCHEM Environmental Laboratories
780 Montague Expressway, Suite 404
San Jose, CA 95131
(408) 955-9988 • FAX (408) 955-9538

CHAIN OF CUSTODY REC RD

Date 10-25-93 Page 1 of 1

CLIENT CON-TECH ENVIRONMENTAL

ADDRESS
1436 CALVIEW AVE. #I
SAN JOSE CA. 95124

PROJECT NAME #4375-R DICKERSFIELD LOANS (CASTRO VALLEY)

PROJECT MANAGER BEN HALSTED

PHONE NUMBER (408) 559-1248 FAX (408) 559-1228

TESTS REQUIRED

SAMPLE I.D.	LOCATION DESCRIPTION	DATE	TIME	MATRIX			NO. OF CTNR	418.1/TRPH	8010 (601)	8015 E/TPH-diesel	8015 M/TPH-gasoline	8020 (602) BTEX	7420/Total Lead	Organic Lead	TOTAL OIL & GREASE		Archive
				AIR	WATER	SOIL											
S/W #1	EAST SIDEWALL @ 12' DTH.	10-25-93	12:45	*		✓	1				✓	✓					
S/W #2	SOUTH SIDEWALL @ 12' DTH.	"	12:50	*		✓	1				✓	✓					
S/W #3	WEST SIDEWALL @ 12' DTH.	"	12:52			✓	1				✓	✓					
S/W #4	WEST SIDEWALL @ 12' DTH.	"	12:55			✓	1				✓	✓					
S/W #5	NORTH SIDEWALL @ 12' DTH.	"	12:57			✓	1				✓	✓			✓	*	
S/W #6	EAST SIDEWALL @ 12' DTH.	"	1:00P	*		✓	1				✓	✓			✓	*	
	*TUESDAY ??? PLEASE																

		Date	Time
Sampled/Relinquished by: CLIC WISSEL	Received by: BEN HALSTED	10/27/93	8:05 a
Relinquished by: BEN HALSTED	Received by: Cheryl Trillo	10/27/93	10:30 AM
Relinquished by: Cheryl Trillo	Received by: [illegible]	[illegible]	[illegible]

Turnaround time: 24 hr. 48 hr. [✓ Normal (3-5 days)]

Special Instructions:

Geochem ENVIRONMENTAL LABORATORIES

Mobile & In-House Laboratories Certified by State of California
Phone: (408) 955-9988 / FAX: (408) 955-9538

ANALYTICAL REPORT

Page: 1 of 1

****

Client: Gen-Tech Environmental
1936 Camden Ave., Ste.1
San Jose, CA 95124
Attn: Ben Halsted

Date Sampled: 10/25/93
Date Received: 10/29/93
Date Analyzed: 11/02/93
Batch:SD-310 Matrix: Soil
Conc. Unit mg/kg (ppm)

Project: Diversified Loans (Proj.#9375-R)

****

"**ND**" means "not detected" at indicated detection limit.
B:benzene, **T**:toluene, **E**:ethylbenzene & **X**:total xylenes.
Samples recieved chilled with a chain of custody record.

SAMPLE I.D.	TOG 5520F	8015M/TPH Gasoline	8020 B / T / E / X
DETECTION LIMIT	1 ppm	0.05 ppm	0.0005 ppm
S/W #1		64.11	1.103/ 4.135/ 4.866/ 25.05
S/W #2		29.49	0.0559/0.5480/ 1.187/ 6.636
S/W #3		1.28	ND /0.0716/0.0124/0.1213
S/W #4		4.35	ND /0.1889/0.0133/0.1018
S/W #5	3980	1.25	ND /0.2073/0.0274/0.1653
S/W #6	955	5.09	0.3064/ 1.009/0.0150/0.6112

RECEIVED
NOV 8 1993
ANSWERED

Reviewed and approved by George Ts. Nov. 03, 1993
George Tsai, Laboratory Director

[redacted]

[redacted]

DOHS 1193

Chain of Custody

DATE 5-26-94 PAGE 1 OF 1.

PROJ. MGR Eric Lissol
COMPANY GEN-TECH ENVIRONMENTAL
ADDRESS 1936 CAMDEN AVE. #1
SAN JOSE CA. 95124
SAMPLERS (SIGNATURE) (PHONE NO.) (408) 559-1248

ANALYSIS REPORT

SAMPLE ID	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)	SVOC's (EPA 8100) PNA	METALS: Cd, Cr, Pb, Zn, Ni + Sn	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
EXT.-S|W#1(A)	5-26-94	2:05P	SOIL				X									X	X								1
EXT.-S|W#2(A)	"	2:12P	SOIL				X									X	X								1
EXT.-S|W#3(A)	"	2:20P	SOIL				X									X	X								1
EXT.-S|W#4(A)	"	2:30P	SOIL				X									X	X								1
EXC.-GWS.#1	"	3:00P	WATER			X	X					X				X	X								7
W|O-S|P#1	"	2:00P	SOIL			X	X					X				X	X								1

PROJECT INFORMATION

PROJECT NAME: CASTRO VALLEY S.S.
PROJECT NUMBER #9375
P.O. #

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS 12
HEAD SPACE —
REC'D GOOD CONDITION/COLD
CONFORMS TO RECORD

TAT [✓ STANDARD 5-DAY] 24 48 72 OTHER

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY 1
(SIGNATURE) 8:00 (TIME)
Eric Lissol (PRINTED NAME) 5-31-94 (DATE)
G.T.E. (COMPANY)

RECEIVED BY 1
Cheryl Trillo (SIGNATURE) 9:00 (TIME)
CHERYL TRILLO (PRINTED NAME) 5/31 (DATE)
GTE (COMPANY)

RELINQUISHED BY 2
Cheryl Trillo (SIGNATURE) 4:30 (TIME)
(PRINTED NAME) 5/31 (DATE)
GTE (COMPANY)

RECEIVED BY 2
Jennifer Binder (SIGNATURE) (TIME)
Jennifer Binder (PRINTED NAME) 5/3 (DATE)
AMER (COMPANY)

RELINQUISHED BY 3
(SIGNATURE) (TIM
(PRINTED NAME) (DATE
(COMPANY)

RECEIVED BY (LABORATORY)
(SIGNATURE) (TIM
(PRINTED NAME) (DAT
(LAB)

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 8015M

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	8015M/ TPH-GASOLINE	DF
EXC.-GWS.#1	E4053114	ND	1
Units		ug/l	
Detection Limits (DL)		50ug/l	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reviewed By

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 8020

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue. #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	Benzene	Toluene	Ethyl Benzene	Total Xylene	DF
EXC.-GWS.#1	E4053114	ND	ND	ND	ND	1
Units		ug/l	ug/l	ug/l	ug/l	
Detection Limits (DL)		0.5ug/l	0.5ug/l	0.5ug/l	1.0ug/l	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reviewed By

Lei Chen, Laboratory Manager

AMER

Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 8015M

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	8015M/ TPH-GASOLINE	DF
W/O-S/P#1	E4053115	ND	1
Units		mg/kg	
Detection Limits (DL)		1.0mg/kg	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reviewed By

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 8020

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	Benzene	Toluene	Ethyl Benzene	Total Xylene	DF
W/O-S/P#1	E4053115	ND	ND	ND	ND	1
Units		ug/kg	ug/kg	ug/kg	ug/kg	
Detection Limits (DL)		5.0ug/kg	5.0ug/kg	5.0ug/kg	10ug/kg	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reviewed By

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 8015M

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	8015M/ TPH-DIESEL	DF
EXT.-S/W#1(A)	E4053110	**93**	1
EXT.-S/W#2(A)	E4053111	**12**	1
EXT.-S/W#3(A)	E4053112	**16**	1
EXT.-S/W#4(A)	E4053113	**55**	1
W/O-S/P#1	E4053115	**24**	1
Units		mg/kg	
Detection Limits (DL)		1.0mg/kg	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reviewed By

Lei Chen

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 8015M

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	8015M/ TPH-DIESEL	DF
EXC.-GWS.#1	E4053114	**92**	1
Units		ug/l	
Detection Limits (DL)		50ug/l	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reviewed By

Lei Chen

Lei Chen, Laboratory Manager

AMER
lvanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHODS 5520F (TOG)

GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	5520F TOG	DF
EXC.-GWS.#1	E4053114	ND	1
Units		mg/kg	
Detection Limits (DL)		5.0mg/kg	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER

Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHODS 5520F (TOG)

GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Client I.D.	AMER I.D.	5520F TOG	DF
W/O-S/P#1	E4053115	21	1
Units		mg/kg	
Detection Limits (DL)		5.0mg/kg	

ND Not Detected. All analytes recorded as ND were found to be under the limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER

Advanced Materials Engineering Research, Inc.

EPA METHODS 610/8100 ANALYSIS REPORT
(ELAP CERTIFICATE NO. 1909)

Client: GEN-TECH ENVIRONMENTAL, INC.
1936 Camden Avenue, #1
San Jose, CA 95124
Project Manager: Eric Lissol
Project: Castro Valley S.S., #9375
Sample Name: EXT.-S/W #1(A) (E4053110)

Date Sampled: 05-26-94
Date Received: 05-31-94
Date Reported: 06-08-94
Sample Matrix: SOIL
AMER Report #: E234

COMPOUND	CAS #	CONC. (ug/kg)	DETECTION LIMIT (ug/kg)
acenaphthylene		ND	100
acenaphthene*		ND	100
anthracene		ND	100
benzo (a) anthrancene		ND	250
benzo(a)pyrene**		ND	250
benzo(b)fluoranthene		ND	250
benzo(g,h,i)perylene		ND	100
benzo(k) fluoranthene		ND	100
1-chloronaphthalene		ND	100
2-chloronaphthalene		ND	100
chrysene		ND	100
dibenzo(a,h)anthracene		ND	100
dibenzo(a,j)acridine		ND	100
fluoranthene*		ND	250
fluorene		ND	100
indeno(1,2,3-cd)pyrene		ND	100
3-methylcholanthrene		ND	100
naphthalene		ND	100
phenanthrene		ND	100
pyrene		ND	100

Reviewed By:

Lei Chen, Env. Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

EPA METHODS 610/8100 ANALYSIS REPORT
(ELAP CERTIFICATE NO. 1909)

Client: GEN-TECH ENVIRONMENTAL, INC.
1936 Camden Avenue, #1
San Jose, CA 95124
Project Manager: Eric Lissol
Project: Castro Valley S.S., #9375
Sample Name: EXT.-S/W #2(A) (E4053111)

Date Sampled: 05-26-94
Date Received: 05-31-94
Date Reported: 06-08-94
Sample Matrix: SOIL
AMER Report #: # E234

COMPOUND	CAS #	CONC. ug/kg	DETECTION LIMIT ug/kg
acenaphthylene		ND	100
acenaphthene*		ND	100
anthracene		ND	100
benzo (a) anthrancene		ND	250
benzo(a)pyrene**		ND	250
benzo(b)fluoranthene		ND	250
benzo(g,h,i)perylene		ND	100
benzo(k) fluoranthene		ND	100
1-chloronaphthalene		ND	100
2-chloronaphthalene		ND	100
chrysene		ND	100
dibenzo(a,h)anthracene		ND	100
dibenzo(a,j)acridine		ND	100
fluoranthene*		ND	250
fluorene		ND	100
indeno(1,2,3-cd)pyrene		ND	100
3-methylcholanthrene		ND	100
naphthalene		ND	100
phenanthrene		ND	100
pyrene		ND	100

Reviewed By:

Lei Chen, Env. Laboratory Manager

EPA METHODS 610/8100 ANALYSIS REPORT
(ELAP CERTIFICATE NO. 1909)

Client: GEN-TECH ENVIRONMENTAL, INC.
1936 Camden Avenue, #1
San Jose, CA 95124
Project Manager: Eric Lissol
Project: Castro Valley S.S., #9375
Sample Name: EXT.-S/W #3(A) (E4053112)

Date Sampled: 05-26-94
Date Received: 05-31-94
Date Reported: 06-08-94
Sample Matrix: SOIL
AMER Report #: # E234

COMPOUND	CAS #	CONC. ug/kg	DETECTION LIMIT ug/kg
acenaphthylene		ND	100
acenaphthene*		ND	100
anthracene		ND	100
benzo (a) anthrancene		ND	250
benzo(a)pyrene**		ND	250
benzo(b)fluoranthene		ND	250
benzo(g,h,i)perylene		ND	100
benzo(k) fluoranthene		ND	100
1-chloronaphthalene		ND	100
2-chloronaphthalene		ND	100
chrysene		ND	100
dibenzo(a,h)anthracene		ND	100
dibenzo(a,j)acridine		ND	100
fluoranthene*		ND	250
fluorene		ND	100
indeno(1,2,3-cd)pyrene		ND	100
3-methylcholanthrene		ND	100
naphthalene		ND	100
phenanthrene		ND	100
pyrene		ND	100

Reviewed By:

Lei Chen

Lei Chen, Env. Laboratory Manager

EPA METHODS 610/8100 ANALYSIS REPORT
(ELAP CERTIFICATE NO. 1909)

Client: GEN-TECH ENVIRONMENTAL, INC.
1936 Camden Avenue, #1
San Jose, CA 95124
Project Manager: Eric Lissol
Project: Castro Valley S.S., #9375
Sample Name: EXT.-S/W #4(A) (E4053113)

Date Sampled: 05-26-94
Date Received: 05-31-94
Date Reported: 06-08-94
Sample Matrix: SOIL
AMER Report #: # E234

COMPOUND	CAS #	CONC. ug/kg	DETECTION LIMIT ug/kg
acenaphthylene		ND	100
acenaphthene*		ND	100
anthracene		ND	100
benzo (a) anthrancene		ND	250
benzo(a)pyrene**		ND	250
benzo(b)fluoranthene		ND	250
benzo(g,h,i)perylene		ND	100
benzo(k) fluoranthene		ND	100
1-chloronaphthalene		ND	100
2-chloronaphthalene		ND	100
chrysene		ND	100
dibenzo(a,h)anthracene		ND	100
dibenzo(a,j)acridine		ND	100
fluoranthene*		ND	250
fluorene		ND	100
indeno(1,2,3-cd)pyrene		ND	100
3-methylcholanthrene		ND	100
naphthalene		ND	100
phenanthrene		ND	100
pyrene		ND	100

Reviewed By:

Lei Chen, Env. Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

EPA METHODS 610/8100 ANALYSIS REPORT
(ELAP CERTIFICATE NO. 1909)

Client: GEN-TECH ENVIRONMENTAL, INC.
1936 Camden Avenue, #1
San Jose, CA 95124
Project Manager: Eric Lissol
Project: Castro Valley S.S., #9375
Sample Name: EXC.-GWS.#1 (E4053114)

Date Sampled: 05-26-94
Date Received: 05-31-94
Date Reported: 06-08-94
Sample Matrix: WATER
AMER Report #: E234

COMPOUND	CAS #	CONC. ug/l	DETECTION LIMIT ug/l
acenaphthylene		ND	0.27
acenaphthene*		ND	0.28
anthracene		ND	0.28
benzo (a) anthrancene		ND	0.29
benzo(a)pyrene**		ND	0.17
benzo(b)fluoranthene		ND	0.20
benzo(g,h,i)perylene		ND	0.25
benzo(k) fluoranthene		ND	0.20
1-chloronaphthalene		ND	0.50
2-chloronaphthalene		ND	0.30
chrysene		ND	0.24
dibenzo(a,h)anthracene		ND	0.26
dibenzo(a,j)acridine		ND	0.50
fluoranthene*		ND	0.32
fluorene		ND	0.27
indeno(1,2,3-cd)pyrene		ND	0.23
3-methylcholanthrene		ND	0.50
naphthalene		ND	0.29
phenanthrene		ND	0.30
pyrene		ND	0.33

Reviewed By:

Lei Chen

Lei Chen, Env. Laboratory Manager

EPA METHODS 610/8100 ANALYSIS REPORT
(ELAP CERTIFICATE NO. 1909)

Client: GEN-TECH ENVIRONMENTAL, INC.
1936 Camden Avenue, #1
San Jose, CA 95124
Project Manager: Eric Lissol
Project: Castro Valley S.S., #9375
Sample Name: W/O - S/P #1 (E4053115)

Date Sampled: 05-26-94
Date Received: 05-31-94
Date Reported: 06-08-94
Sample Matrix: SOIL
AMER Report #: # E234

COMPOUND	CAS #	CONC. ug/kg	DETECTION LIMIT ug/kg
acenaphthylene		ND	100
acenaphthene*		ND	100
anthracene		ND	100
benzo (a) anthrancene		ND	250
benzo(a)pyrene**		ND	250
benzo(b)fluoranthene		ND	250
benzo(g,h,i)perylene		ND	100
benzo(k) fluoranthene		ND	100
1-chloronaphthalene		ND	100
2-chloronaphthalene		ND	100
chrysene		ND	100
dibenzo(a,h)anthracene		ND	100
dibenzo(a,j)acridine		ND	100
fluoranthene*		ND	250
fluorene		ND	100
indeno(1,2,3-cd)pyrene		ND	100
3-methylcholanthrene		ND	100
naphthalene		ND	100
phenanthrene		ND	100
pyrene		ND	100

Reviewed By:

Lei Chen

Lei Chen, Env. Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Cadmium (Cd)
Sample Matrix: SOIL
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXT.-S/W#1(A)	E4053110	**0.24**	0.02	mg/kg
EXT.-S/W#2(A)	E4053111	**0.13**	0.01	mg/kg
EXT.-S/W#3(A)	E4053112	**0.17**	0.01	mg/kg
EXT.-S/W#4(A)	E4053113	**0.24**	0.02	mg/kg
W/O-S/P#1	E4053115	**0.38**	0.03	mg/kg

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Cadmium (Cd)
Sample Matrix: WATER
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXC.-GWS.#1	E4053114	**0.01**	0.01	mg/l

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT: GEN-TECH ENVIRONMENTAL 1936 Camden Avenue, #1 San Jose, CA 95124	DATE SAMPLED: 05-26-94 DATE RECEIVED: 05-31-94 DATE REPORTED: 06-07-94 AMER ID: E234

MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

Metal Analysis: Chromium (Cr)
Sample Matrix: SOIL
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXT.-S/W#1(A)	E4053110	7.0	0.06	mg/kg
EXT.-S/W#2(A)	E4053111	3.9	0.03	mg/kg
EXT.-S/W#3(A)	E4053112	4.7	0.03	mg/kg
EXT.-S/W#4(A)	E4053113	7.6	0.06	mg/kg
W/O-S/P#1	E4053115	9.7	0.08	mg/kg

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Chromium (Cr)
Sample Matrix: WATER
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXC.-GWS.#1	E4053114	**0.05**	0.03	mg/l

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER

Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Lead (Pb)
Sample Matrix: SOIL
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXT.-S/W#1(A)	E4053110	**2.6**	0.2	mg/kg
EXT.-S/W#2(A)	E4053111	**2.0**	0.1	mg/kg
EXT.-S/W#3(A)	E4053112	**2.6**	0.1	mg/kg
EXT.-S/W#4(A)	E4053113	**6.6**	0.2	mg/kg
W/O-S/P#1	E4053115	7.3	0.3	mg/kg

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Lead (Pb)
Sample Matrix: WATER
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXC.-GWS.#1	E4053114	ND	0.4	mg/l

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:	
GEN-TECH ENVIRONMENTAL	DATE SAMPLED: 05-26-94
1936 Camden Avenue, #1	DATE RECEIVED: 05-31-94
San Jose, CA 95124	DATE REPORTED: 06-07-94
MATRIX: SOIL	AMER ID: E234
PROJECT MANAGER: Eric Lissol	
PROJECT: Castro Valley S.S., # 9375	

Metal Analysis: Zinc (Zn)
Sample Matrix: SOIL
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXT.-S/W#1(A)	E4053110	**32**	1.0	mg/kg
EXT.-S/W#2(A)	E4053111	**32**	1.0	mg/kg
EXT.-S/W#3(A)	E4053112	**39**	1.0	mg/kg
EXT.-S/W#4(A)	E4053113	**40**	1.0	mg/kg
W/O-S/P#1	E4053115	**38**	1.0	mg/kg

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Zinc (Zn)
Sample Matrix: WATER
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXC.-GWS.#1	E4053114	46	20	mg/l

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER

Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Nickel (Ni)
Sample Matrix: SOIL
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXT.-S/W#1(A)	E4053110	**19**	2.0	mg/kg
EXT.-S/W#2(A)	E4053111	**19**	2.0	mg/kg
EXT.-S/W#3(A)	E4053112	**21**	2.0	mg/kg
EXT.-S/W#4(A)	E4053113	**23**	2.0	mg/kg
W/O-S/P#1	E4053115	**24**	2.0	mg/kg

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Nickel (Ni)
Sample Matrix: WATER
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXC.-GWS.#1	E4053114	ND	0.04	mg/l

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH ENVIRONMENTAL
1936 Camden Avenue, #1
San Jose, CA 95124
MATRIX: SOIL
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Selenium (Se)
Sample Matrix: SOIL
Dilution Factor: 5

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXT.-S/W#1(A)	E4053110	ND	1.3	mg/kg
EXT.-S/W#2(A)	E4053111	ND	1.3	mg/kg
EXT.-S/W#3(A)	E4053112	ND	1.3	mg/kg
EXT.-S/W#4(A)	E4053113	ND	1.3	mg/kg
W/O-S/P#1	E4053115	ND	1.3	mg/kg

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

AMER
Advanced Materials Engineering Research, Inc.

ANALYSIS REPORT
(ELAP Certificate No. 1909)
EPA METHOD 6000/7000

CLIENT:
GEN-TECH. ENVIRONMENTAL
1936 Camden Avenue
SAN JOSE, CA 95124
MATRIX: WATER
PROJECT MANAGER: Eric Lissol
PROJECT: Castro Valley S.S., # 9375

DATE SAMPLED: 05-26-94
DATE RECEIVED: 05-31-94
DATE REPORTED: 06-07-94
AMER ID: E234

Metal Analysis: Selenium (Se)
Sample Matrix: WATER
Dilution Factor: 1

Client I.D.	AMER I.D.	Metal Concentration	Detection Limit	Units
EXC.-GWS.#1	E4053114	ND	0.005	mg/l

ND = Not Detected. Analyte reported as ND was not present above the stated limit of detection.

Reported by:

Lei Chen, Laboratory Manager

Gen-Tech Environment

PEL # 9408074 (1 of 2)

INV # 25120

1936 Camden Ave., Suite 1
San Jose, CA 95124
Contractor's Lic. #615869

Chain of Custody

Tel. (408) 559-1220 • Fax (408) 559-1228 • 1-800-499-1220 DATE 8/17/94 PAGE 1 OF 2

PROJ. MGR ERIC LISSOL w/E.L.S.

COMPANY G.T.E.

ADDRESS 1936 CAMDEN AVE. #1
SAN JOSE CA. 95124

SAMPLERS (SIGNATURE) (PHONE NO.) (408) 559-1220

ANALYSIS REPORT

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)		METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
EXC.-S|P #1	8/17/94	10:50	SOIL			X	X					X													1
EXC.-S|P #2	"	10:53	"			X	X					X													1
EXC.-S|P#3	"	10:56	"			X	X					X													1
EXC.-S|P#4	"	11:00	"			X	X					X													1
EXC.-S|P#5	"	11:04	"			X	X					X													1
EXC.-S|P#6	"	11:10	"			X	X					X													1
EXC.-S|P#7	"	11:13	"			X	X					X													1
EXC.-S|P#8	"	11:17	"			X	X					X													1
EXC.-S|P#9	"	11:20	"			X	X					X													1
EXC.-S|P#10	"	11:25	"			X	X					X													1

PROJECT INFORMATION

PROJECT NAME: CASTRO VALLEY S.S.

PROJECT NUMBER: #9315-

P.O. #

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	10
HEAD SPACE	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	

TAT	STANDARD 5-DAY			24	48	72	OTHER

SPECIAL INSTRUCTIONS/COMMENTS:
TOTAL OF (10) TEN INDIV. SAMPLES

RELINQUISHED BY 1.
(SIGNATURE) 12:30P (TIME)
ERIC LISSOL (PRINTED NAME) 8/17/94 (DATE)
G.T.E. (COMPANY)

RELINQUISHED BY 2.
(SIGNATURE) (TIME)
STUART SOLOMON (PRINTED NAME) 8:20 8/18/94 (DATE)
GTE (COMPANY)

RELINQUISHED BY 3
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RECEIVED BY 1.
(SIGNATURE) 12:30P (TIME)
STUART SOLOMON (PRINTED NAME) 8/17/94 (DATE)
GEN-TECH (COMPANY)

RECEIVED BY 2.
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RECEIVED BY (LABORATORY) 3.
(SIGNATURE) 8:20 AM (TIME)
DAVID DUONG (PRINTED NAME) 08/18/94 (DATE)
PEL (LAB)

Gen-Tech Environmental

PEL # 9508074 (2 o)

INV # 25120

936 Camden Ave., Suite 1
San Jose, CA 95124
Contractor's Lic. #615869

Chain of Custody

Tel. (408) 559-1220 • Fax (408) 559-1228 • 1-800-499-1220 DATE 8/17/94 PAGE 2 OF 2

PROJ. MGR ERIC LISSOL W/ E.C.S.

COMPANY G.T.E.

ADDRESS 1936 CAMDEN AVE. #1
SAN JOSE CA. 95124

SAMPLERS (SIGNATURE) (PHONE NO.) (408) 559-1220

ANALYSIS REPORT

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)		METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
O/B-S/P#1-A	8/17/94	10:15	SOIL			X	X					X													1
O/B-S/P#1-B	"	10:18	"			X	X																		1
O/B-S/P#1-C	"	10:22	"			X	X		COMPOSITE AS (ONE) SAMPLE																1
O/B-S/P#1-D	"	10:25	"			X	X																		1
O/B-S/P#2-A	8/17/94	10:30	SOIL			X	X					X													
O/B-S/P#2-B	"	10:33	"			X	X		COMPOSITE AS (ONE) SAMPLE																
O/B-S/P#2-C	"	10:37	"			X	X																		
O/B-S/P#2-D	"	10:40	"			X	X																		

PROJECT INFORMATION

PROJECT NAME CASTRO VALLEY S.S.

PROJECT NUMBER 9375

P.O. #

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	8
HEAD SPACE	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	

TAT	STANDARD 5-DAY			24	48	72	OTHER

SPECIAL INSTRUCTIONS/COMMENTS: NOTE:
PLEASE COMP. O/B-S/P #1-A THRU D AS ONE (1) SAMPLE
ALSO COMP. O/B-S/P#2-A THRU D AS ONE (1)
FOR A TOTAL OF (2) TWO SAMPLES

RELINQUISHED BY 1.
(SIGNATURE) 12:20P (TIME)
ERIC LISSOL (PRINTED NAME) 8/17/94 (DATE)
(COMPANY)

RELINQUISHED BY 2.
(SIGNATURE) (TIME)
STUART SOLOMON 8:30A (PRINTED NAME) (DATE)
GTE 8/18/94 (COMPANY)

RELINQUISHED BY 3
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RECEIVED BY 1.
8/17/94 (SIGNATURE) (TIME)
STUART SOLOMON 12:30P (PRINTED NAME) (DATE)
GEN-TECH (COMPANY)

RECEIVED BY 2.
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RECEIVED BY (LABORATORY) 3.
(SIGNATURE) (TIME)
DAVID DUONG 08/18/94 (PRINTED NAME) (DATE)
PEL (LAB)

PEL

PRIORITY ENVIRONMENTAL LABS

Precision Environmental Analytical Laboratory

August 19, 1994

PEL # 9408074

GEN-TECH ENVIRONMENTAL

Attn: Stuart Solomon
Re: Twelve soil sample for Gasoline/BTEX, Diesel and Oil & Grease analyses.

Project name: Castro Valley S.S.
Project number: 9375

Date sampled: Aug 17, 1994
Date extracted: Aug 18-19, 1994

Date submitted: Aug 18, 1994
Date analyzed: Aug 18-19,1994

RESULTS:

SAMPLE I.D.	Gasoline (mg/Kg)	Diesel (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)	Oil & Grease (mg/Kg)
EXC-S/P # 1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
EXC-S/P # 2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
EXC-S/P # 3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
EXC-S/P # 4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	43
EXC-S/P # 5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	97
EXC-S/P # 6	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	88
EXC-S/P # 7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	280
EXC-S/P # 8	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	270
EXC-S/P # 9	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	220
EXC-S/P # 10	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	71
O/B-S/P#1-ABCD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20
O/B-S/P#2-ABCD	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	32
Blank	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spiked Recovery	85.3%	91.6%	97.8%	92.6%	89.4%	103.7%	---
Detection limit	1.0	1.0	5.0	5.0	5.0	5.0	10
Method of Analysis	5030 / 8015	3550 / 8015	8020	8020	8020	8020	5520 D & F

*Composited soil samples.

David Duong
Laboratory Director

1764 Houret Court Milpitas, CA. 95035 Tel: 408-946-9636 Fax: 408-946-9663

Gen Tech Environmental

1936 Camden Ave., Suite 1
San Jose, CA 95124
Contractor's Lic. #615869

PEL # 94110

INV # 25418

Tel. (408) 559-1220 • Fax (408) 559-1228 • 1-800-499-1220 DATE

PROJ MGR Eric Lissoy
COMPANY G.T.E.
ADDRESS 1936 CAMDEN AVE. #1
SAN JOSE CA. 95124
SAMPLERS (SIGNATURE) (PHONE NO.)

ANALYSIS REPORT

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, [✓ 8240], 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)	R.C.I.	METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
EXC-S|P# 11	11/8	10:00A	SOIL			☒	☒			▨		☒						☒							1
EXC-S|P#11-A	11/8	10:05A	SOIL							☒						☒									1
EXC-S|P#7-A	11/8	8:59A	SOIL							☒						☒									1
EXC-S|P#8-A	11/8	9:00A	SOIL							☒						☒									1
EXC-S|P#9-A	11/8	9:02A	SOIL							☒						☒									1
[illegible]	~~11/~~		~~SOIL~~									☒													1

COMPOSIT AS ONE

PROJECT INFORMATION

PROJECT NAME: DIVERSIFIED LOANS/CASTRO V.
PROJECT NUMBER #9375
P.O. #

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	5
HEAD SPACE	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	

TAT STANDARD 5-DAY [✓ 24] 48 72 OTHER

SPECIAL INSTRUCTIONS/COMMENTS: PLEASE COMP SAMPLES #S EXC-S|P#11-A, #7-A, #8-A, #9-A AS ONE SAMPLE FOR TEST INDICATED.

RUSH, RUSH

RELINQUISHED BY 1
(SIGNATURE) 10:30A (TIME)
ERIC LISSOY (PRINTED NAME) 11/8/94 (DATE)
G.T.E. (COMPANY)

RECEIVED BY 1.
(SIGNATURE) 10:30A (TIME)
Chris Solomon (PRINTED NAME) 11/8/94 (DATE)
G.T.E (COMPANY)

RELINQUISHED BY 2.
(SIGNATURE) 10:53A (TIME)
Chris Solomon (PRINTED NAME) 11/8/94 (DATE)
G.T.E. (COMPANY)

RECEIVED BY 2.
Cheryl Trillo (SIGNATURE) 10:53 (TIME)
CHERYL TRILLO (PRINTED NAME) (DATE)
GTE (COMPANY)

RELINQUISHED BY
Cheryl Trillo (SIGNATURE) 10:0 (TIM
CHERYL TRILLO (PRINTED NAME) 11/9/94 (DAT
GTE (COMPANY)

RECEIVED BY (LABORATORY)
(SIGNATURE) 10:00 A (TIM
DAVID DUONG (PRINTED NAME) 11/09/9 (DAT
PEL (LAB)

PRIORITY ENVIRONMENTAL LABS

Precision Environmental Analytical Laboratory

November 10, 1994

PEL # 9411026

GEN - TECH ENVIRONMENTAL

Attn: Eric Lissor
Re: One RUSH soil sample for Gasoline/BTEX, Diesel, and Oil & Grease analyses.

Project name: Diversifield Loans / Castro Valley
Project number: 9375

Date sampled: Nov 08, 1994
Date extracted: Nov 09-10, 1994

Date submitted: Nov 09, 1994
Date analyzed: Nov 09-10, 1994

RESULTS:

SAMPLE I.D.	Gasoline (mg/Kg)	Diesel (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)	Oil & Grease (mg/Kg)
EXC-S/P# 11	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	35
Blank	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spiked Recovery	99.7%	101.2%	89.3%	94.4%	89.1%	98.6%	---
Detection limit	1.0	1.0	5.0	5.0	5.0	5.0	1.0
Method of Analysis	5030 / 8015	3550 / 8015	8020	8020	8020	8020	5520 D & F

David Duong
Laboratory Director

P E L
PRIORITY ENVIRONMENTAL LABS
Precision Environmental Analytical Laboratory

November 10, 1994

PEL # 9411026

GEN - TECH ENVIRONMENTAL

Attn: Eric Lissor

Project name: Diversifield Loans / Castro Valley
Project number: 9375

Analysis : TTLC CAM 17 metals

Sample I.D.: EXC-S/P # 11

Date Sampled: Nov 08, 1994
Date Analyzed: Nov 09-10, 1994

Date Submitted: Nov 09, 1994

Method of Analysis: EPA 6010

CODE	METAL	CONCENTRATION (mg/Kg)	DETECTION LIMIT (mg/Kg)
Ag	Silver	8.2	0.05
As	Arsenic	N.D.	0.01
Ba	Barium	99	0.05
Be	Berryllium	N.D.	0.01
Cd	Cadmium	N.D.	0.01
Co	Cobalt	8.0	0.05
Cr	Chromium	25	0.05
Cu	Copper	17	0.05
Hg	Mercury	12	0.002
Mo	Molybdenum	N.D.	0.05
Ni	Nickel	27	0.05
Pb	Lead	N.D.	0.10
Sb	Antimony	N.D.	0.10
Se	Selenium	N.D.	0.01
Tl	Thallium	N.D.	0.20
V	Vanadium	34	0.05
Zn	Zinc	41	0.05

David Duong
Laboratory Director

PRIORITY ENVIRONMENTAL LABS

Precision Environmental Analytical Laboratory

November 10, 1994 PEL # 9411026

GEN - TECH ENVIRONMENTAL Attn: Eric Lissor
Project name:Diversifield Loans/Castro Valley Project number: 9375

Sample I.D.: EXC-S/P # 7,8,9,11-A

Date Sampled: Nov 08, 1994 Date Submitted: Nov 09, 1994
Date Analyzed: Nov 09, 1994
Method of Analysis: EPA 8240 Detection limit: 5.0 ug/Kg

COMPOUND NAME	CONCENTRATION (ug/Kg)	SPIKE RECOVERY (%)
Acetone	N.D.	-----
Chloromethane	N.D.	-----
Vinyl Chloride	N.D.	-----
Bromomethane	N.D.	-----
Chloroethane	N.D.	-----
Trichlorofluoromethane	N.D.	-----
1,1-Dichloroethene	N.D.	-----
Methylene Chloride	N.D.	-----
Trans-1,2-Dichloroethene	N.D.	-----
1,1-Dichloroethane	N.D.	-----
Chloroform	N.D.	-----
1,1,1-Trichloroethane	N.D.	-----
Carbon Tetrachloride	N.D.	-----
1,2-Dichloroethane	N.D.	-----
Trichloroethene	N.D.	-----
1,2-Dichloropropane	N.D.	-----
Bromodichloromethane	N.D.	-----
2-Chloroethylvinylether	N.D.	-----
Trans-1,3-Dichloropropene	N.D.	-----
Cis-1,3-Dichloropropene	N.D.	-----
1,1,2-Trichloroethane	N.D.	-----
Tetrachloroethene	N.D.	-----
Benzene	N.D.	-----
Dibromochloromethane	N.D.	-----
Toluene	N.D.	-----
Chlorobenzene	N.D.	-----
Ethylbenzene	N.D.	-----
Bromoform	N.D.	-----
1,1,2,2-Tetrachloroethane	N.D.	-----
Dichlorodifluoromethane	N.D.	-----
Freon 113	N.D.	-----
M & P-Xylenes	N.D.	-----
O-Xylene	N.D.	-----
1,3-Dichlorobenzene	N.D.	-----
1,4-Dichlorobenzene	N.D.	-----
1,2-Dichlorobenzene	N.D.	-----

David Duong
Laboratory Director

P E L
PRIORITY ENVIRONMENTAL LABS
Precision Environmental Analytical Laboratory

November 10, 1994

PEL # 9411026

GEN-TECH ENVIRONMENTAL

Attn: Eric Lissor
Re: One composited soil sample for RCI analysis.

Project name: Diversifield Loans / Castro Valley
Project number: 9375

Date sampled: Nov 08, 1994
Date extracted: Nov 09,1994

Date submitted: Nov 09, 1994
Date analyzed: Nov 09, 1994

RESULTS:

SAMPLE I.D.	REACTIVITY	CORROSIVITY	IGNITABILITY
EXC-S/P#7,8,9,11-A	NO	pH 7.2	NO
Blank	NO	pH 7.0	NO
Method of Analysis	Title 22, CCR 66261.23	Title 22, CCR 66261.22	Title 22, CCR 66261.21

David Duong
Laboratory Director

1764 Houret Court Milpitas, CA. 95035 Tel: 408-946-9636 Fax: 408-946-9663

Gen Tech Environmental

1936 Camden Ave., Suite 1
San Jose, CA 95124
Contractor's Lic. #615869

Chain of Custody

Tel. (408) 559-1220 • Fax (408) 559-1228 • 1-800-499-1220 DATE 11/8/94 PAGE 1 OF 1

PROJ. MGR Eric Hesson
COMPANY G.T.E.
ADDRESS 1936 CAMDEN AVE. #1
SAN JOSE CA. 95124
SAMPLERS (SIGNATURE) (PHONE NO.)

ANALYSIS REPORT

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)	R.C.I.	METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		☒	☒			▨		☒						☒							1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]						☒						☒									1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]						☒						☒									1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]						☒						☒									1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]						☒						☒									1
EXT-S/W# 5-A	11/8	10:20A	SOIL									☒						A6889							1

~~COMPOSITE ONE~~

PROJECT INFORMATION

PROJECT NAME: DIVERSIFIED LOANS/CASTRO V.
PROJECT NUMBER #9375
P.O. #

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS 5
HEAD SPACE
REC'D GOOD CONDITION/COLD
CONFORMS TO RECORD

TAT [✓ STANDARD 5 DAY] ~~24~~ 48 72 OTHER

SPECIAL INSTRUCTIONS/COMMENTS: PLEASE COMP SAMPLES #'s EXC-S|W#11-A, #7-A, #8-A, #9-A AS ONE SAMPLE FOR TEST INDICATED.

RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
(SIGNATURE) (TIME) 10:20A	(SIGNATURE) (TIME) 10:53A	Cheryl Trillo (SIGNATURE) (TIME) 9:10
Eric Hesson (PRINTED NAME) (DATE) 11/8/94	Chris Soloman (PRINTED NAME) (DATE) 11/8/94	CHERYL TRILLO (PRINTED NAME) (DATE) 11/9/94
G.T.E. (COMPANY)	G.T.E (COMPANY)	GTE (COMPANY)
RECEIVED BY 1.	**RECEIVED BY 2.**	**RECEIVED BY (LABORATORY) 3.**
(SIGNATURE) (TIME) 10:20A	Cheryl Trillo (SIGNATURE) (TIME) 10:53	Gil Ruiz (SIGNATURE) (TIME)
Chris Soloman (PRINTED NAME) (DATE) 11/8/94	CHERYL TRILLO (PRINTED NAME) (DATE)	(PRINTED NAME) (DATE)
G.T.E (COMPANY)	GTE (COMPANY)	(LAB)

Hull Development Labs, Inc.

Gen-Tech Environmental
1936 Camden Ave., Suite 1
Campbell, CA 95124
Attn: Stuart Solomon

Date:	11/15/94
Date Received:	11/9/94
Date Analyzed:	11/11/94
Lab #:	See Table
Project #:	9375
Sampled By:	Client

Certified Analytical Report

Soil Sample Analysis:

Test	*EXT.S/W#5-A*	*Units*	*Detection Limit*	*EPA Method #*
Sample Matrix	Soil			
Sample Date	11/8/94			
Sample Time	10:20am			
Lab #	A6889			
Total Oil & Grease	ND	mg/kg	50.0 mg/kg	EPA 5520

1. ND: None detected at specified detection limit
2. Analysis performed by Hull Development Labs, Inc. (CAELAP #1369)

Michael N. Golden, Lab Director

APPENDIX 2

GTE SAMPLING PROTOCOLS

Gen-Tech Environmental

1936 Camden Ave., Suite 1
San Jose, CA 95124
Contractor's Lic. #615869

Tel. (408) 559-1220 • Fax (408) 559-1228 • 1-800-499-1220

GEN TECH ENVIRONMENTAL, INC.
DRILLING, SEALING WELL CONSTRUCTION AND SAMPLING PROTOCOL

Last Rev. 4/5/93

Exploratory Boring Drilling and Sealing

Exploratory boring and well construction, and borehole sealing procedures follow guidelines recommended by the USEPA, California Regional Water Quality Control Board, and modified as required by City, local or water district agencies. Drilling is performed only under approved permits and boreholes are sealed upon completion.

Soil Sampling Procedures

1. Drive (or hydraulically push) soil sampling will commence at a depth of 5 feet below surface grade. The samples will be taken at 5 foot increments and at intervals of geologic interest or obvious contamination. Additional sampling and/or continuous coring may be done at the discretion of the supervising geologist. All logging will be done using the Unified Soil Classification System, together with pertinent geologic observations.

2. Soil sampling tools (split spoons, cores, etc.) will be disassembled, steam-cleaned or cleaned in soapy (TSP) water, rinsed with clean tap water and finally rinsed with or distilled water, and air-dried prior to taking each sample. The cleaned tools will then be reassembled with similarly cleaned, dry brass sample liners and carefully lowered into the hollow stem augers for the collection of the next sample. The drill rig will be decontaminated as needed and at the discretion of the logging geologist.

3. When sampling stockpile soils or during excavations, the soil sample will be collected by the following procedure; a clean brass liner will be pushed into the stockpile or soil in the excavator bucket. About two inches of soil will be brushed away and the liner pushed into the soil. The liner is then removed, sealed, labeled and logged onto chain-of-custody forms and packed in a chilled ice chest.

4. The soil samples in the lowermost of brass liners in the sampling tool (if in good condition) will be retained for chemical testing. The samples will be labeled and sealed in the field in their original liners. Sample liners ends will be sealed with aluminum foil, capped with clean cap plugs, and taped.

5. The remaining soil sample will be extruded from the other rings in the field and lithologically logged. Sampler shoe cuttings, drill rig response and bit penetration rate will also be logged. The cuttings and the soils samples not retained for chemical analysis will be placed in 55-gallon drums pending chemical analysis and off-site disposal.

6. All samples retained for chemical analysis will be stored on ice in a clean, covered cooler-box for transport to the Laboratory.

Reconnaissance Groundwater Sampling Procedures

1. Reconnaissance groundwater sample, handling, and storage will follow guidance documents of the Environmental Protection Agency and Regional Water Quality Control Board and local agency guidelines for the investigation.

2. Reconnaissance groundwater samples will be collected in the field in temporarily cased exploratory boreholes using clean Teflon or disposal bailers. The samples will be collected from temporarily cased exploratory boreholes. All sample containers will be properly prepared, sealed, labeled, and identified. Label information will include the date, sampler name, sampling time, and identification number, and the project name and number.

3. The sample will be delivered to a State Certified Laboratory within two days of collection. Samples will be kept on ice and/or refrigerated continuously for shipment to the Laboratory.

4. The sealed sample will only be opened by Laboratory personnel who will perform the chemical analysis.

5. The samples will be analyzed according to the approved EPA Method and storage for the requested analysis.

6. Groundwater sampling will begin 24 hours following well development, following the procedures detailed below for monitoring well sampling. Depth to water measurements are made to the nearest 0.01 foot a surveyed datum (project or known) and wells are checked for separate phase product. Boreholes are sealed following water sampling.

Monitoring Well Construction

1. The proper permits will be obtained from the appropriate agency or Water District, using a Well Inspector as required to be present to witness the installation of the annular seal. The soils borings will be drilled with a continuous-flight hollow-stem auger of at least 3 inches Inside Diameter (ID) and 6 to 8 inches Outside Diameter (OD). All augers will be thoroughly steam-cleaned prior to visiting the site. The augers will be steamed cleaned between borings at a location well away from the proposed borings or adequate clean auger will be available to complete all of the wells without reusing auger sections.

2. A geologic drilling log will be made of the materials encountered and sample depth for each boring. The soils/sediment lithology will be logged using the Unified Soil Classification System. The log will include field descriptions of the soil lithologic variations, moisture conditions, geologic data, and any unusual characteristics which may indicate the presence of chemical contamination.

3. The borings will be advanced to a depth of 45 feet if a saturated zone is not encountered (in absence of other depth specifications). If a saturated zone is encountered, the boring will advance no further than 15 feet below first encountered groundwater or 5 feet into the underlying clay aquitard. A seal will be placed in the overdrilled portion of the aquitard.

4. During the drilling operations, 55-gallon drums will be on site to contain potentially contaminated soils and rinse water.

5. Where borings are completed as groundwater monitoring wells, 2-inch ID schedule 40 PVC blank pipe will be used. Usual well screen selection will be 2 inch ID Schedule 40 PVC pipe with 0.020 inch machine slot. Sections will be threaded and screwed together; glues will not be used. Screens will extend 3-5 feet above first encountered groundwater. The annulus of the perforated section will be packed with clean #3 or #4 Monterey Sand, or equivalent, to a point about 2-feet above the screen interval. Final well design will be adjusted in the field to site specific subsurface conditions, and will be placed so as not to interconnect two possible aquifers. Screens will extend a nominal length above first encountered groundwater for floating product detection. A 1-2 foot thick bentonite seal will be placed on top of the sandpack. A cement annular seal which extends to the surface will be placed by tremie line from the bottom to top of the remaining annular space above the bentonite.

6. The top of the well casing will be locked to prevent contamination and tampering. Above-grade or at-grade well completion will depend upon the final well location. Above-grade completion will require a 6 inch diameter locking, steel protective casing and a Christy, or equivalent, traffic box and concrete pad.

Monitoring Well Development

1. Wells will be developed until the water is free of fine-grained sediments and/or until field measurements of pH, and electrical conductivity have stabilized. Approximately 4 to 10 well volumes of water will be removed during development of the well. Duration of development will be specific for each well and continue until the water clears and sand content is minimal or ceases.

2. Equipment inserted into the well during development will be decontaminated by washing or steam cleaning prior to and after its use. Development water will be collected in drums.

Monitoring Well Sampling

1. Depth to groundwater will be measured to the nearest 0.01 foot, and the well checked for presence of separate phase product. If present, the apparent thickness of the product will be measured. The well will not be sampled if separate phase product is present.

2. The standing well volume calculated, and 4 to 10 well volumes will be purged from the well prior to sampling. Measurements of conductivity, temperature and the pH of the water will be taken until parameters have stabilized to indicate that aquifer water is entering the well.

3. The groundwater samples will be collected using a Teflon Bailer. A field log will record sampling measurements and observations. Aquifer parameters which will be measured are; pH, temperature and electrical conductivity. Aquifer water is assumed to be entering the well when these parameters are measured within a 10% range. The sample will be collected when the well recovers to within 80% of the original depth to water measurement.

4. The bailer will be thoroughly steam-cleaned or cleaned with soapy (TSP) water, rinsed with tap water, and finally rinsed with deionized or distilled water prior to the collection of each sample. A separate clean bailer will be used to sample each individual well.

5. All water retained for chemical analysis will be placed in clean, borosilicate, 40ml VOA vial with a teflon cap, or clean amber glass one-liter bottles and other sample containers as appropriate for water sampling purpose and test parameters. Each sample vial or bottle is topped-off to avoid air space, and will be inverted to check for air bubbles, and filled to minimum headspace. Samples will be placed on ice, blue ice, or refrigerated at 4 degrees Centigrade at all times.

6. Water samples blanks of distilled water will be poured through the sampling bailer and placed in clean sample collection bottles or vials. One water sample blank will be taken for each set of water samples collected from each boring or well.

7. All sampling equipment will be decontaminated following each sampling event, prior to use the next monitoring well.

Sample Records and Chain of Custody

1. Sample records for each sample will contain information on sample type and source; Gen-Tech Environmental project number, sampler name, sampling date, location, Laboratory name, sampling method, and any significant conditions that may affect the sampling.

2. A signature Chain-of-custody and transference documentation will be strictly maintained at all times.

3. A copy of the Laboratory sample results and the completed Chain of Custody will be provided with the technical report.

Quality Control and Quality Assurance Objectives

The sampling and analysis procedures employed by GTE for groundwater sampling and monitoring follow quality assurance and quality control (QA/QC) guidelines set out in Federal, State and local agencies guidance. Quality assurance objectives have been established to develop and implement procedures for obtaining and evaluating water quality and field data in an accurate, precise and complete manner. In this way, sampling procedures and field measurements provide information that is comparable and representative of actual field conditions. Quality control is maintained by site specific field protocols and requiring the analytical laboratory to preform internal and external QC checks. The goal is to provide data that are accurate, precise, complete comparable and representative.

The definitions as developed by overseeing federal, state, and local agency guidance documents for accuracy, precision, completeness, comparability and representativeness are:

- **Accuracy** - the degree of agreement of a measurement with an accepted reference or true value.

- **Precision** - a measure of agreement among individual measurements under similar conditions. Usually expressed in terms of standard deviation.

- **Completeness** - the amount of valid data obtained from a measurement system compared to the amount that was expected to meet the project data goals.

- **Comparability** - express the confidence with which one data set can be compared to another.

- **Representativeness** - a sample or group of samples that reflect the characteristics of the media at the sampling point. It also includes how well the sampling point represents the actual parameter variations which are under study.

Gen-Tech Environmental
3936 Camden Ave., Suite 8
San Jose, CA 95124
(408) 559-1248

STANDARD SYMBOLS

Legend

☐	Soil sample location
■	Soil sample collected for laboratory analysis
▨	No soil recovery
▽	First encountered groundwater level
▼	Potentiometric groundwater level
☒	Disturbed or bag soil sample
2.5 YR 6/2	Soil color according to Munsell Soil Color Charts (1975 Edition)

Penetration

Sample drive hammer weight - 140 pounds falling 30 inches.
Blows required to drive sampler 1 foot are indicated on the logs

Well Construction

▧	Annular seal
■	Bentonite seal
▒	Sand pack
☐	Well riser section
▤	Well screen section

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than half of material is larger than No. 200 sieve size	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size	Clean Gravels	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixture, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size	Clean Sands	SW	Well-graded sands, gravelly sand, little or no fines
			SP	Poorly graded sands, gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS More than half of material is smaller than No. 200 sieve size	SILTS AND CLAYS	Low Liquid Limit	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts, with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
		High Liquid Limit	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
			Pt	Peat and other highly organic soils

NOTES:

1. Boundary Classification: Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well-graded gravel-sand mixture with clay binder.
2. All sieve sizes on this chart are U.S. standard.
3. The terms "silt" and "clay" are used respectively to distinguish materials exhibiting lower plasticity from those with higher plasticity.
4. For a complete description of the Unified Soil Classification System, see "Technical Memorandum No. 3-357," prepared for Office, Chief of Engineers, by Waterways Equipment Station, Vicksburg, Mississippi, March 1953.

APPENDIX 3

SOIL TREATMENT METHODOLOGY AND AQMD PERMIT

i. Lew

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

REGULATION 8, RULE 40
Aeration of Contaminated Soil and Removal of Underground Storage Tanks

NOTIFICATION FORM

☐ Removal or Replacement of Tanks
☒ Excavation of Contaminated Soil

SITE INFORMATION

SITE ADDRESS 2896 Castro Valley Blvd

CITY, STATE Castro Valley, CA ZIP 94546

OWNER NAME Diversified Loan Services

SPECIFIC LOCATION OF PROJECT 2896 Castro Valley Blvd

TANK REMOVAL

SCHEDULED STARTUP DATE ______

VAPORS REMOVED BY:

☐ WATER WASH
☐ VAPOR FREEING (CO^2)
☐ VENTILATION

CONTAMINATED SOIL EXCAVATION

SCHEDULED STARTUP DATE 10-26-93

STOCKPILES WILL BE COVERED? [✓ YES] X NO ____

ALTERNATIVE METHOD OF AERATION (DESCRIBE BELOW):

______ (MAY REQUIRE PERMIT)

X, IF Rains.

CONTRACTOR INFORMATION

NAME Gentech Environmental CONTACT Ben Halsted

ADDRESS 1936 Camden Ave #1 PHONE (408) 559-1248

CITY, STATE, ZIP San Jose, Ca 95124

CONSULTANT INFORMATION
(IF APPLICABLE)

NAME Same as Contractor CONTACT ______

ADDRESS ______ PHONE ( ) ______

CITY, STATE, ZIP ______

RECEIVED
OCT 29 1993
ANSWERED

FOR OFFICE USE ONLY

DATE RECEIVED FAX 10/22/93 BY Bg (init.)

DATE POSTMARKED ______ BY ______ (init.)

CC: INSPECTOR NO. ______ DATE 10/26/93 BY Bg (init.)

UPDATE: CONTACT NAME ______ DATE ______ BY ______ (init.)

BAAQMD N # ______ DATA ENTRY 10/27/93

• See reverse for instructions

1/91

BIOREMEDIATION OF PETROLEUM CONTAMINATED SOILS USING A MICROBIAL CONSORTIA AS INOCULUM

B.A. MOLNAA and R.B. GRUBBS, SOLMAR CORP.

ABSTRACT

Bioremediation is becoming an attractive alternative for cleaning up soil systems contaminated with petroleum and other hydrocarbons. Due to time constraints and unknown quality of results, certain projects have not had bioremediation as an option. A process has been developed in which a consortia of microorganisms is introduced into the soil system to facilitate the bioremediation process and ensure consistency of results.

Techniques to enhance the activity of the organisms and thus ensure the success of such programs are described.

Several successful projects are described along with potential roadblocks to bioremediation and how one can work around such roadblocks. Degradation parameters for these projects are discussed.

INTRODUCTION

In the past few years, as landfills have become more and more scarce and concomitantly more and more cost prohibitive, interest in biological methods to treat organic wastes has increased. One area, in particular, that has received increased attention is the biological treatment of petroleum contaminated soils.

The term bioremediation has been given to describe the process by which the use of living organisms (in conjunction with or independent from other technologies) is employed to effectively decontaminate a polluted system. In most cases the organisms employed are bacteria, however, work is being conducted using fungi and plants. Water hyacinths have been utilized in water systems to effectively remove trace organics and trace metals.

There are two techniques for utilizing bacteria to degrade petroleum in the soil. One method uses the bacteria that can already be found in the soil. These bacteria are stimulated to grow by introducing nutrients into the soil and thereby enhancing the biodegradation process. This process is known as biostimulation. The other method involves culturing the bacteria independently and adding them to the site. This process is known as bioaugmentation(8).

One advantage of bioremediation is that the process can be done on site with a minimum amount of space and equipment. By treating on site, costs and liability are greatly reduced while extending the life of our current landfills by reducing the amount of waste they would normally receive.

On site treatment may involve excavation of the contaminated soil and construction of a lined treatment cell. If excavation is impractical the treatment may be conducted without disturbing the contaminated site by using a recirculating injection well system. This process is considered in situ treatment(5,8).

Both on site and in situ treatment have their advantages and disadvantages and the decision to use one method of treatment or the other is often dictated by various factors at the site.

ON SITE VERSUS IN SITU TREATMENT

On site treatment, whereby the contaminated soil is excavated and placed into a lined treatment cell, has some distinct advantages. It allows for better control of the system by enabling the engineering firm to dictate the depth of soil as well as the exposed surface area. By controlling the depth and exposed surface area of the soil one is able to better control the temperature, nutrient concentration, moisture content and oxygen availability(8). The presence of the liner is an added benefit, since the liner prevents the migration of the contaminants there is no possibility of contaminating the groundwater. After treatment the liner is picked up and properly disposed of generally by incineration.

On site treatment has an added benefit in that it is much easier to demonstrate the site is clean than in an in situ clean up. By isolating the contaminated soil in the treatment cell it is possible to sample the site in a more thorough and therefore representative manner. This may prove a necessity if the regulating agency or the customer desire to optimize the reliability of sampling and analysis.

The excavation of the contaminated soil adds to the cost of a bioremediation project as does the liner and the landfarming equipment. In addition to these costs it is necessary to find enough space to treat the excavated soil on site. In some states areas are now being set aside to provide the needed space to treat these soils.

In situ treatment is advantageous in instances where the excavation of the contaminated soil is cost prohibitive or impossible. The method of in situ treatment generally involves establishing a hydrostatic gradient through the area of contamination. Water is placed on the site so that it will flow through the area of contamination, carrying nutrients and possibly organisms to the contaminants. Once the water has passed through the site, it is pumped up through wells and returned to the beginning of the system. This continuous recirculation is carried on until the site has been determined to be clean (Figure 1).

Recovery of the percolating water is the most difficult aspect of this treatment method. Sites may contain a natural clay or rock barrier which collects the percolating water, in which case extraction wells can be placed in this collection zone. Other sites may require the construction of collection trenches or numerous recovery wells at the bottom of the contaminated soil horizon. Given the various geologic/hydraulic is impractical the treatment may be conducted without disturbing the contaminated site by using a recirculating injection well system. This process is considered in situ treatment(5,8).

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Biostimulation assumes that every organism needed to accomplish the desired treatment results are, in fact, present. Therefore, all that is required to achieve effective biodegradation is to provide (or enhance) an ideal environment for these ubiquitous microorganisms to live and work(8).

There are numerous shortcomings with this hypothesis. For example, how can we be certain that those organisms present are the most suitable to degrade all materials present? Secondly, what if the only organisms stimulated are those that eliminate the primary substrate, but do not cometabolize the specifically targeted substrates? At any given site, many of the problem substrates may not be able to be biodegraded directly. If they are the only food source available, the microbes may not be able to degrade these targeted organics, since they do not serve as primary food sources on which the microbes feed.

To ensure that the necessary organisms are present it is generally necessary to conduct a feasibility study on the soil from the site before any biostimulation project is undertaken. The cost of such a study can range from $5000 to $40000 depending on the extent of contamination and the characteristics of the contaminants.

Bioaugmentation is the controlled addition of specially formulated biocultures to assist those found naturally in the soil. It is done in conjunction with the development and monitoring of an ideal growth environment in which these selected bacteria can live and work.

In most cases, the targeted organic contaminants either serve as the food source or are cometabolized. Essential elements are added to the "food source" to provide the required nutrient levels, and water provides the media in which the bacteria function.

The mere addition of bacteria will not, in itself, solve the problem. Studies conducted in 1979 by Dibble and Bartha clearly demonstrated that sewage sludge actually inhibited hydrocarbon biodegradation in soil, and the use of yeast extract had no effects whatsoever(2). The selected microorganisms must be carefully matched to the waste contamination present in the soil, as well as the metabolites formed. They must favorably compete with the ubiquitous organisms found in the expected environmental conditions.

Bioaugmentation allows one to control the nature of the biomass. It provides an element, heretofore not available, that of predictability. Bioaugmentation ensures that the proper team of microorganisms is present in the soil in sufficient type, number, and compatability to effectively and efficiently attack the waste constituents and break them down into their most basic compounds.

One objection to bioremediation has been that it takes an inordinate amount of time for the process to work. In the case of biostimulation this is true. However, the addition of specially selected microbial consortia allows one to control the biomass of the contaminated site. The additional control of the biomass enables one to increase the kinetic rates of removal from the contaminated site by selecting a more efficient consortia of microorganisms than might be present at the site.

By increasing the kinetic rates it has been possible to remediate sites in sixty to ninety days using the addition of a selected consortia of microorganisms.

By selecting the microbial consortia beforehand it is possible to select for organisms that will not produce nuisance odors such as hydrogen sulfide. Petroleum degradation can create anaerobic conditions within the soil. Once anaerobic conditions are present it becomes possible to generate phytotoxic compounds such as hydrogen sulfide(1). If one augments the soil with organisms that do not possess the ability to generate these phytotoxic compounds a potential hazard to on site petroleum degradation can be averted.

The cost of the selected microorganisms has been mentioned as a disadvantage in treating contaminated soils. However, if one considers the cost of a feasibility study to ensure that a biostimulation project will work, the cost is considerably less for the bioaugmentation products.

THE PROCESS

There is far more involved with bioremediation projects than simply adding microorganisms. Various factors need to be considered to ensure the success of these programs. The proper engineering to facilitate biological growth is a crucial step in the process of bioremediating a site.

An electron acceptor is required for breakdown of hydrocarbons. Oxygen, nitrate and sulfate are the most common. In a bioremediation project the presence of oxygen is one of the most crucial factors to the rate of reaction. This is especially true early on in a project before any oxygenated intermediates are formed. Sporadic reports of anaerobic degradation in vitro remain controversial, and convincing proof of significant anaerobic hydrocarbon biodegradation is still outstanding(1). Sulfates are a potential electron acceptor, but are not abundant in soils. Nitrate is not energetically favorable for this purpose in soils(6).

In soils aeration depends on the total amount of air filled pore space. Elimination of air filled pore space by waterlogging or compaction reduces oxygen transfer. Large amounts of biodegradable organics in the top layers will deplete oxygen reserves in the soil and slow down oxygen diffusion rates to the deeper layers.

Oxygen can become a limiting factor in all types of petroleum degradation, so aeration is required in most applications. In aqueous systems aeration and agitation also provide more surface area of hydrocarbons to the bacteria which live only in the aqueous phase of the system and work at the oil to water interface.

Another essential parameter in a bioremediation process is moisture. Bacteria rely on water to exchange everything through the cell. At 100% saturation of moisture in soils, however, all pore spaces are filled with water. At only 10% saturation of moisture level osmotic and matrix forces reduce metabolic activity to marginal levels. Moisture levels in the range of 20% to 80% of saturation generally allow suitable biodegradation in soils(1).

The addition of large quantities of hydrocarbons in a system usually creates a nutritional imbalance which needs to be corrected by the application of inorganic fertilizers containing nitrogen and phosphorous. Biosludges from refinery and petrochemical treatment facilities normally contain enough nitrogen and phosphorous.

For landfarming operations the American Petroleum Institute recommends a C:N ratio of 160:1. Laboratory experiments by Dibble and Bartha showed a C:N ratio 60:1 and a C:P ratio of 800:1 to be optimum(1). The expense of fertilizer and the potential for groundwater contamination encourage more conservative application rates. Most agricultural fertilizers contain excessive P and K for microbial use. Urea and ammonium compounds can be added to such fertilizer to bring up the nitrogen levels. Nitrates can pose leaching problems and encourage denitrification under anaerobic conditions. The ammonium ion being positively charged binds to the negatively charged soil particles. But in well aerated soils with neutral pH values, above 50° F the ammonium ion is nitrified to nitrates in one to two weeks after application(12).

In clean up situations one frequently cannot do a mass balance of pollutants. Sufficient nitrogen and phosphorous must be present to start off microbial activity and must be monitored continually to assure that they don't become too low due to assimilation into cell mass, leaching, nitrification, or volatilization. We recommend maintaining nitrogen levels in excess of 5 ppm at all times and phosphorous levels of 1 ppm or more. These levels will ensure that microbial activity is not lost.

Temperature affects the rates of microbial metabolism as well as the physical state of hydrocarbons. It also affects the solubility of the substrates. Some small alkanes are more soluble at 0° C than at 25° C(10). Elevated temperatures can influence nonbiological losses, mainly evaporation. In some cases the decreased evaporation of toxic components at lower temperatures has been reported to have inhibited degradation(3). In general most mesophilic bacteria perform best at about 35° C, but their performance can be affected by these other factors. Consequently researchers have reported different optimums and considerable variance in activity at different temperatures, little change in activity over given temperature ranges and other superficial contradictions. Huddleston and Cresswell (1976) reported petroleum degradation in soils as low as -1.1 ° C as long as the soil solution remained liquid(7). Degradation rates were quite slow. In natural habitats shifts in microbial populations due to temperature changes have been reported(14). As one might suspect from such shifts, as well as changes in solubilities, there are reports showing the types of hydrocarbons being degraded may vary with temperature.

While the pH of the marine environment is uniform, steady, and alkaline, the pH of various soils covers a wide range. The marine environment is well buffered. In soils and poorly buffered treatment situations, organic acids and mineral acids from the various metabolic processes can significantly lower the pH. The overall biodegradation rate of hydrocarbons generally is higher under slightly alkaline conditions. So appropriate monitoring and adjustments should be made to keep such systems in the 7.0 to 7.5 pH range. Variations or swings in pH in treatment systems can have a very deleterious effect on the performance of the biomass.

Since oils and most petroleum hydrocarbons are only sparingly soluble in water, the relatively small interfacial area of oil in contact with water can limit the microbial degradation of oil. Microbes colonize the surfaces of oil droplets and the undersides of slicks. Many hydrocarbon using microorganisms produce emulsifying agents which greatly enhances their effectiveness in handling the oil. It is widely held that emulsifiers can be involved in the entry of hydrocarbons into the cells, but degradation can occur without emulsification. Emulsifiers have proven useful in some clean up operations, but various sources indicate that not all dispersants enhance biodegradation(9,12).

Most of the parameters that need to be monitored in a bioremediation project are a function of good environmental application. Once the environment has been made conducive to bacterial growth, and a satisfactory monitoring system has been established, the programs are not very labor or capital intensive.

SUCCESSFUL BIOREMEDIATION PROGRAMS

Several innovative and successful bioremediation programs have been conducted by Solmar Corp. in conjunction with various environmental engineering firms and remediation contractors.

CASE #1: Bioremediation was selected as the method of choice to clean up an abandoned refinery site in southern California. The thirty-two acre site was located in a prime industrial area and the goal was to clean the site to a low enough level that commercial buildings could be built.

The initial contamination levels for the site ranged from a low of 1500 ppm to a high of 30,000 ppm. The site was sectioned off into several treatment zones, and a bioremediation program was begun using a consortia of microorganisms supplied by Solmar Corp. of Orange, CA. Since the site had been contaminated on and off for a period of forty years with little or no sign of decontamination by indigenous organisms it was concluded that a bioaugmentation program could accelerate the remediation process.

The treatment was conducted over a period of six months. While areas were being treated other areas were being taken out of service until the entire tank farm was dismantled. As areas were taken out of service treatment was begun to remediate those sections of the property.

The twenty nine acres of the area was certified as clean within a period of one year. The balance, which has been used as the dumping area, is still being remediated.

CASE #2: The city of Carson, California decided to exercise its redevelopment powers and condemned a site that had been used as a petrochemical tank storage site and salvage operation. The site had been an eyesore. Rather than seal the contaminants at the site under buildings and parking lot, the city decided to get rid of the contaminants. The site had been earmarked as a park, and the city officials were concerned that if the contaminants were left in place they may endanger the health of the children using the park(13).

The price for hauling away the contaminated soil for proper disposal was estimated to be $2 million. The estimated amount of contaminated soil was approximately 10,000 cubic yards. A bioaugmentation program was proposed and adopted at the site.

The cost of the clean up was less than $132,000, and the city began seeking bids for its most elaborate recreation facility.

CASE #3: When the Sacramento Utilities District purchased a small parcel of land to expand their existing parking lot, they were unaware that the land had been previously contaminated with diesel fuel. Once the contamination had been detected the Utilities District decided to take it upon themselves to clean up the site.

The District realized that merely excavating and hauling the contaminated soil to a dump site was just transferring the problem to another site. In keeping with the Districts policy of concern with the environment, other alternatives to land disposal were sought.

Upon examination of treatment options the District decided to implement a bioremediation program using bioaugmentation as the source of organisms. The bioremediation of the 2000 cubic yards of contaminated soil reduced the Total Petroleum Hydrocarbon levels from 2800 ppm to less than 38 ppm (Figure 2) in approximately 74 treatment days(11). The cost of treatment was $360,000 less than the total price of disposal without the inherent liability.

CASE #4: Bioremediation was the method of treatment opted for to treat 1500 cubic yards of diesel contaminated soil at the former Kings Truck Stop in Sacramento, CA. The project reduced the diesel contaminant levels from 3000 ppm to less than 30 ppm in approximately 62 treatment days.

CASE #5: In situ bioremediation was necessary to clean up contamination from a ruptured transfer line that passed under a railroad track. A jumbo tank car had been moving on the track as solvents were being pumped through the line. The resulting rupture led to a loss of 300 to 400 gallons of solvent at a depth of 38 inches beneath the surface along 120 feet of the track.

A continuously recirculating ground injection system was designed and installed to treat the contaminated soil (see Figure 1). Following a clean up program of nine months with the bioaugmented system, a 99.5% degradation of the contaminants was achieved (Table 1).

CASE #6: A bioremediation project involving 32,000 cubic yards of soil contaminated with various lubrication and form oils is currently ongoing. Preliminary results indicate that the contamination levels have been reduced from a high of 4800 ppm down to 125 ppm in the most contaminated cell (Figure 3). In a lesser contaminated cell the levels have been taken from 1400 ppm down to below the action level of 100 ppm (Figure 4).

COST OF TREATMENT

Cost effectiveness, it seems, plays only a small role in the agencies pursuit of the elusive Best Demonstrated Alternative Technology (BDAT). The facts are that economics do govern, and if cost effective ways of dealing with the problems can be found, then more sites will be cleaned up, and fewer generators will resort to legal delays in effecting clean ups.

Feasibility studies conducted on the previous projects discussed above found that bioremediation is a most cost effective means of dealing with contaminated soils. As with most technologies cost is directly related to the size of the site and extent of contamination. However, bioremedial approaches tend to have lower fixed costs and therefore are able to compete favorably with other technologies from a cost standpoint.

When looking at a bioaugmentation project, one must consider the cost of the cultures. Generally, the cost of the cultures is less than 2% of the total cost of the project. When one weighs the cost of the organisms versus the assurance of mind in knowing the correct organisms have been provided, this is a small price to pay.

Table 2 gives a breakdown of various technologies and their costs per ton.

FUTURE TRENDS

At the time of this writing California seems to be pushing for bioremediation of petroleum contaminated soils more than any other state. This is due in part to the stringent regulations within the state. Since California classifies all petroleum contaminated soil containing 1,000 ppm total petroleum hydrocarbons or more as hazardous, and requires it to be manifested and disposed of in a class one landfill, there are certain economic incentives in California that do not at this time exist in other states.

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TABLE 1

COMPONENT	09/24/84 (ppb)	10/31/84 (ppb)	04/04/84 (ppb)	% RED.
Benzene	N/A	96	31	67.7
Carbon Tet.	N/A	65	Nil	99.9
Chlorobenzene	9,050	227	37	99.6
1,1 DCE	N/A	508	341	32.9
Ethyl Benzene	154,000	1,119	382	99.8
Toluene	31,000	1,276	526	98.3
111 TCA	N/A	82	Nil	99.9
Xylene	1,249,000	16,825	1,979	99.8

N/A - not analyzed for

TABLE 2

TREATMENT PROCESS	COST PER TON
Landfill disposal fees:	$140 to $120/ton + Taxes + Transportation
Mobile Incineration:	$150 to $400/ton
Stabilization/fixation:	$100 to $200/ton
Bioremediation:	$15 to $70/ton

BIOTREATMENT SYSTEM SCHEMATIC

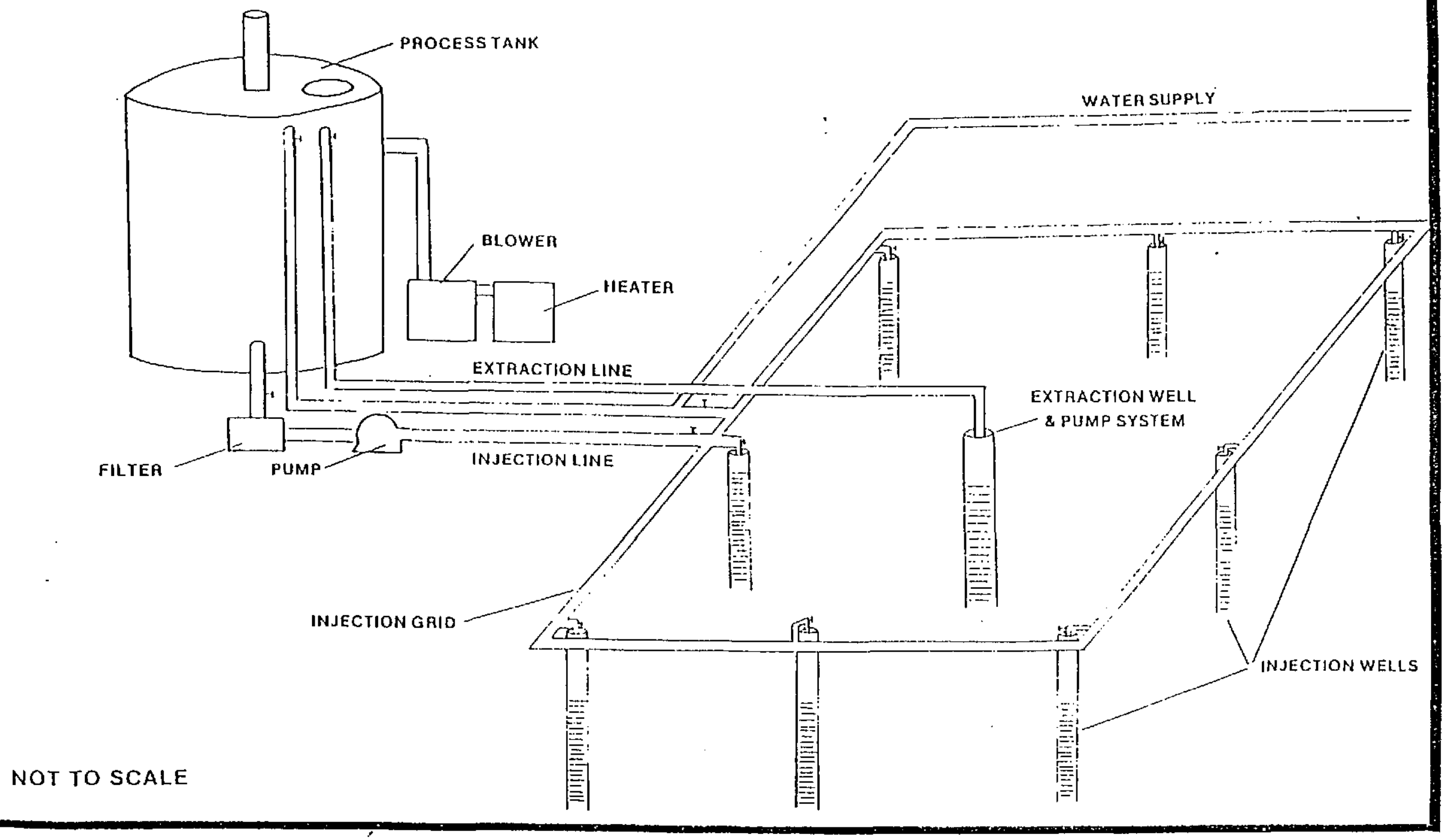


FIGURE 1

Compliments of California GEO

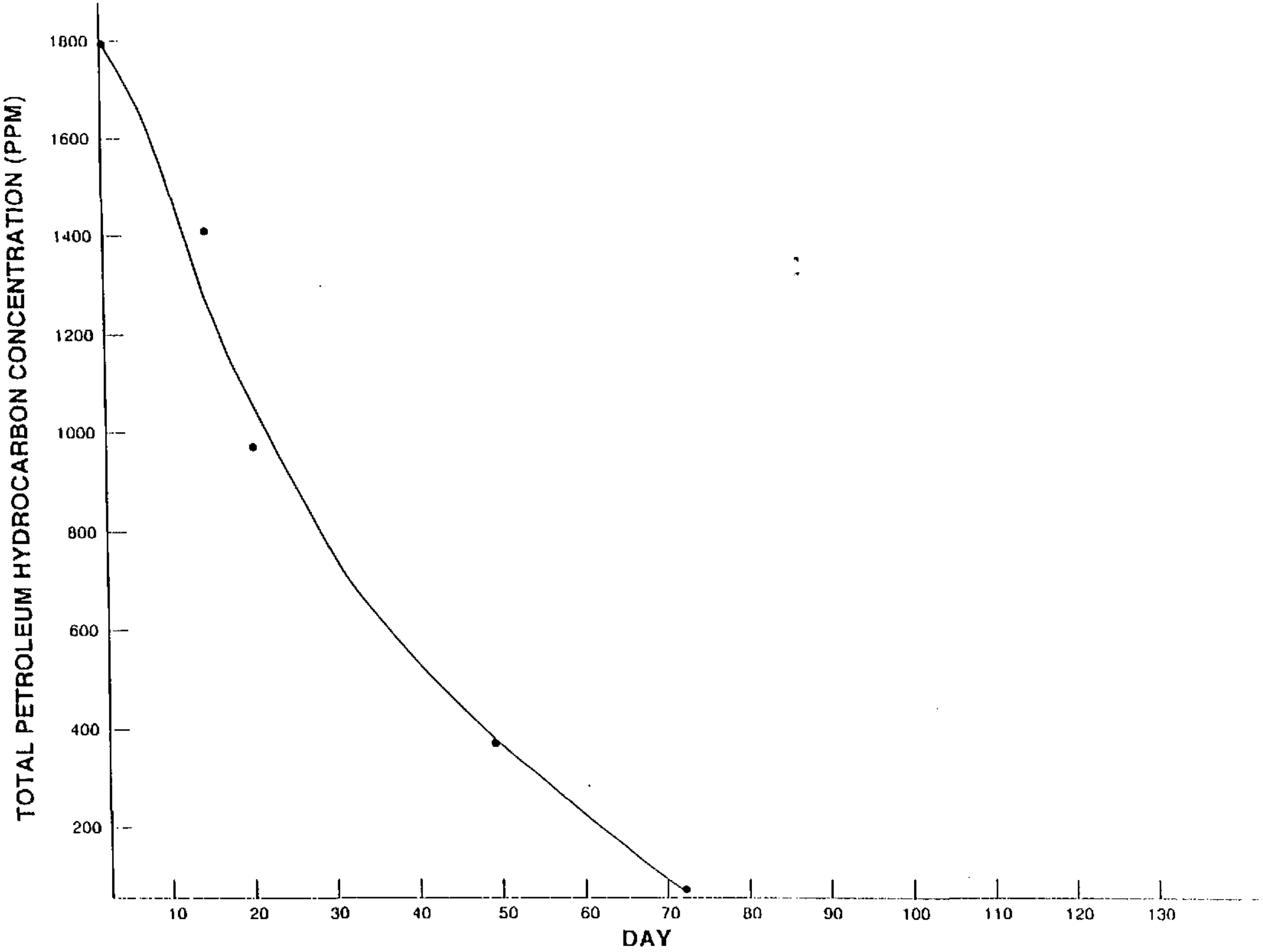
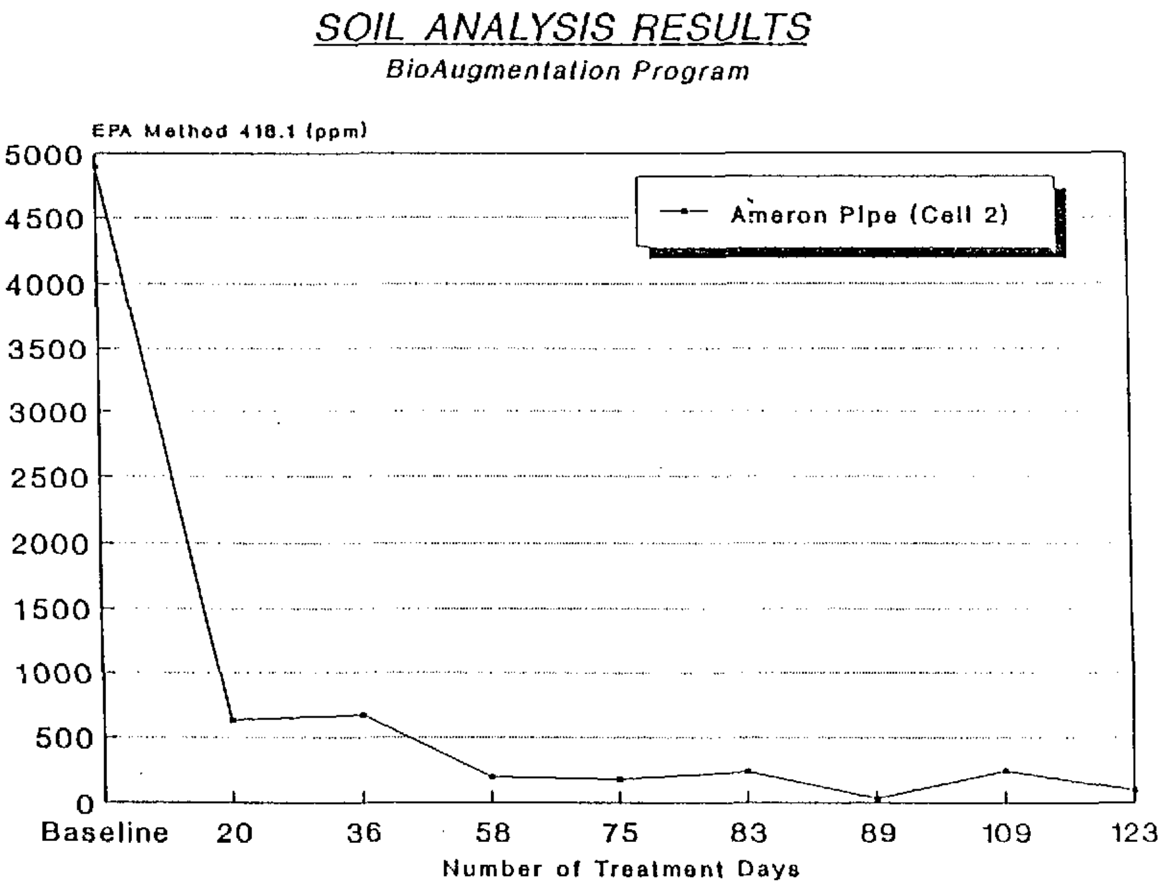

TOTAL PETROLEUM HYDROCARBON CONCENTRATION (PPM)
1800
1600
1400
1200
1000
800
600
400
200
10
20
30
40
50
60
70
80
90
100
110
120
130
DAY

FIGURE 2



SOIL ANALYSIS RESULTS

BioAugmentation Program

Courtesy of: ProTek Environmental, Inc.
Huntington Beach, CA (714)897-0781

Figure 3

TYPICAL DEGRADATION RESULTS

BioAugmentation Process

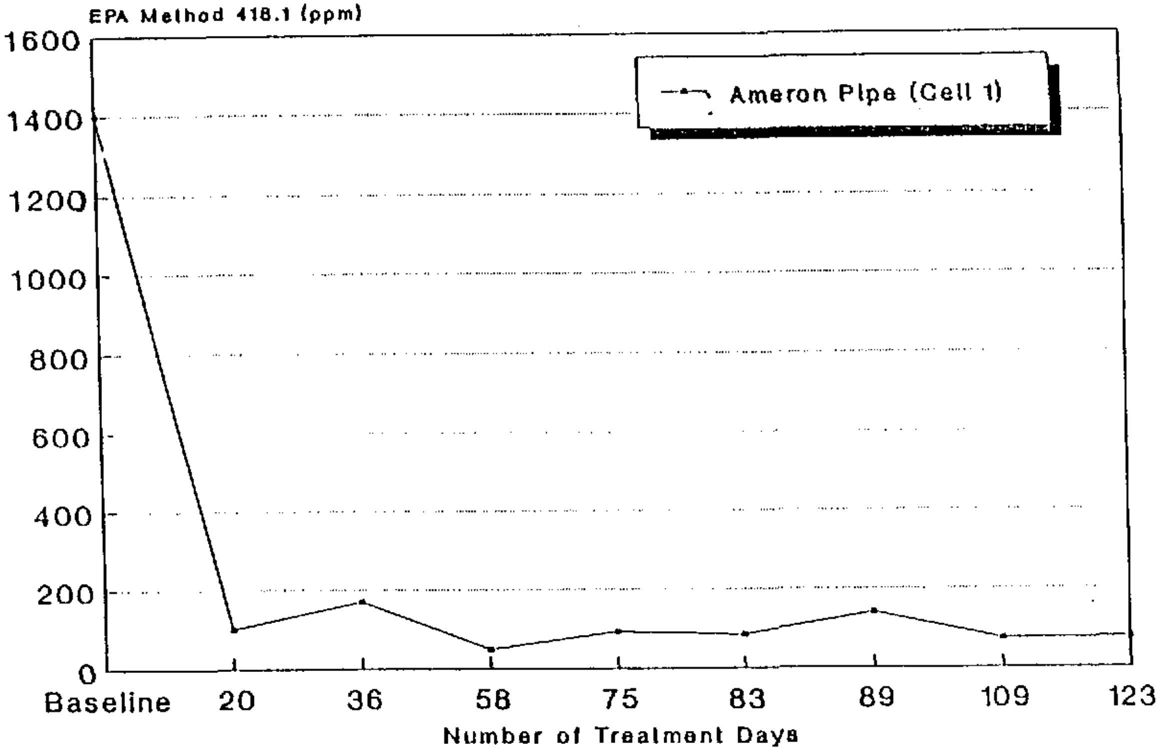


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Figure 4