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

July 12, 1994

3687

Alameda County Health Care Services
Department of Environmental Health
Hazardous Materials Division
1131 Harbor Bay Parkway, Second Floor
Alameda, CA 94502

Attn: Barney M. Chan - Haz. Mat. Specialist

Subject: Supplemental Technical Report Letter on Bioremediation of Contaminated Soils and Trench Installation for the Di Salvo Trucking Facility at 4919 Tidewater Ave., Oakland, CA 94601

Dear Mr. Chan,

This letter answers, in behalf Charles Lawlor, items questioned in your June 1, 1994 *Request for Technical Reports* document concerning the subject project.

Item #1

Please find attached the legal Chains of Custodies and Analytical Lab reports of the two sampling events in which the bioremediated soils on site were sampled and tested for TPHd. Earlier chemical testing of the stockpiled soils, performed by Aqua Terra Technologies and Med-Tox had determined that the soil was non-hazardous by Title 22 CCR 66305 criteria. Therefore, only TPHd was required for analytical testing.

January 17, 1990 Stockpile Sampling Event:

quantity of spoils ?

The first sampling event took place on January 17, 1990; during which nine samples were taken from locations as shown on the sample map attached to the C.O.C.. The number of samples, sample locations, and analytical test methods were cleared through Ariu Levie of the Alameda County Department of Environmental Health, who at the time, was the oversight case worker. Each of the samples was tested at Anametrics, Inc., a state certified lab. Concentrations of diesel found in samples taken during this event ranged from 800 to 1800 PPM. Because the concentrations were all above the permissible limits, treatment of the soil continued for several months.

?

May 21, 1990 Stockpile Sampling Event:

The second sampling event was performed on May 21, 1990 -after bioremediation and tilling of the soil had continued for an additional four months. Sample locations and depths are depicted on the attached Chain of Custody. Concentrations of diesel in seven of the nine soil samples was less than 10 PPM. One of the samples contained 14 PPM and one was at 46 PPM.

All soil sampling was performed in accordance with **Geo-Environmental's Drilling, Sealing, and Sampling Protocol** attached hereto.

reused spoils.

Based on the final results, some of the treated soil was used to fill "pot holes" and depressions on site, and the remainder was moved to the front of the property (bordering Tidewater Ave.) and used for a planter berm.

Item #2

Interceptor Trench and Recovery Drain:

No sampling was performed during the installation of the interceptor trench and the recovery Drain. These units were installed by Geo-Environmental in the summer of 1991 and constructed in accordance with the March 12, 1991 work plan. Please refer to **Figures TD-1 and 6** (attached) for trench and recovery drain construction details, and for the physical location of the trench and drain. In an effort to reduce cost, rather than install the network of trenches as was proposed in the March 12th work plan, the trench installation was limited to the areas depicted on the map - which were the areas containing the highest concentrations of free product at that time. While it was intended (and proposed) to initiate free product removal from this system, client finances stayed the start-up of this activity.

Remote Dispensers:

No additional soil sampling has been performed at this site - outside of the reported sampling events and sample locations. The remote dispenser line (which has been depicted to travel underneath the loading dock building) could not be readily accessed or removed due to the fact that it was run underneath the building. This line was severed at the building upon removal of the other hydrant lines. The line reportedly terminates directly on the opposite side of the building. Further investigation of this line will be addressed in future work plans and reports.

Overview of the Initiation of Groundwater Remediation:

GTE is in the process of preparing a work plan for the initiation of groundwater migration control and water treatment at the subject site. This plan would essentially provide stop-gap measures during the period of the pending negotiations and litigation with Standard Oil to take the lead in the site clean-up.

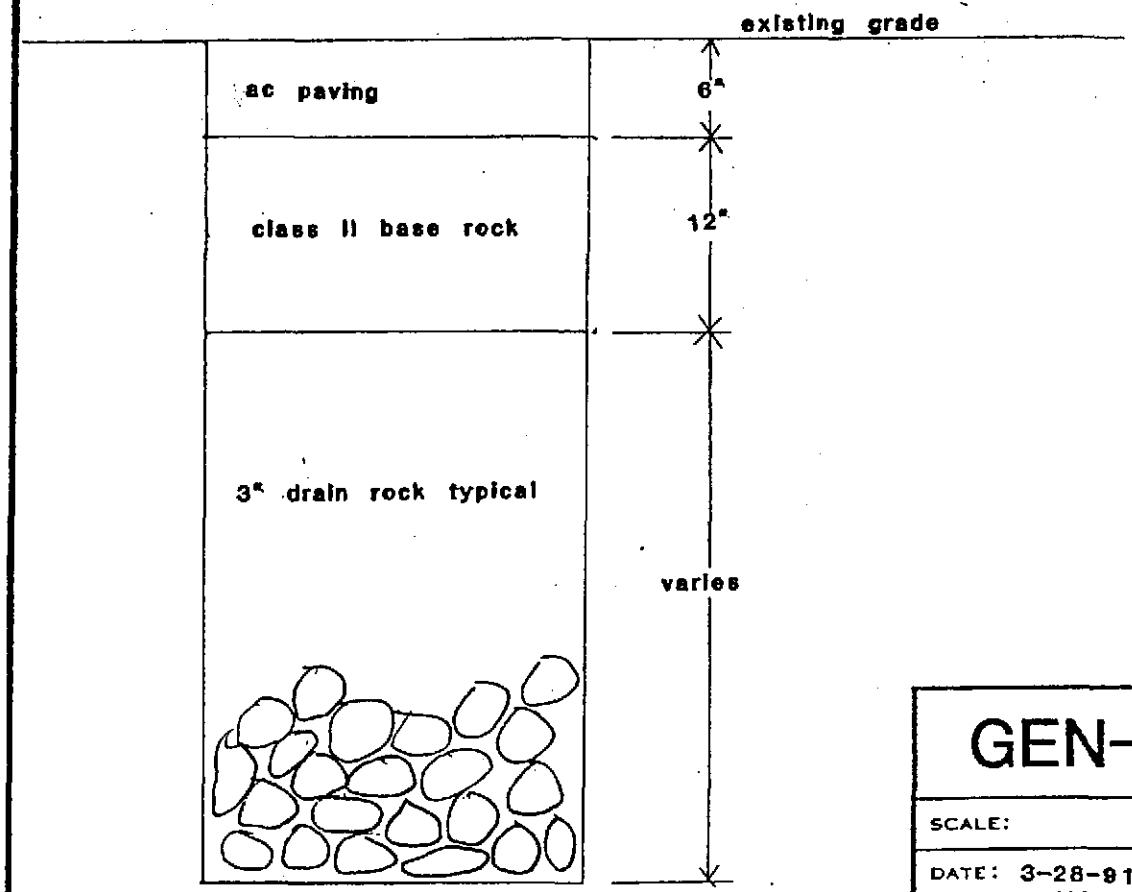
GTE is proposing to initiate the pumping of total fluids (including dissolved and free phased product) from the existing recovery sump system. The groundwater and free product would be pumped - in cycles - into the existing 10,000 gallon above ground diesel tank currently located at the site. Free product would be skimmed from the water within the tank, and disposed of by waste oil hauler. The water within the tank would be inoculated with hydrocarbon degrading microbes, and aerated throughout the decontamination process. The cleaned water would then be discharged under Waiver from the Regional Water Quality Control Board and used for dust control, irrigation, or for other beneficial purposes. Once the water within the tank had been treated and discharged, the cycle would be repeated. This process could continue indefinitely (until the problem is corrected), or until an alternative clean-up method is decided upon - based on the available of capital to employ such an alternative) perhaps when settlement is reached with Standard Oil).

If you are basically in agreement with this interim approach, please contact GTE with your comments and suggestions. The work plan is anticipated to be submitted by July 30, 1994 assuming that the Agency is in agreement.

If you have any questions, please do not hesitate to call.

Very truly yours,

Stuart G. Solomon
Principal

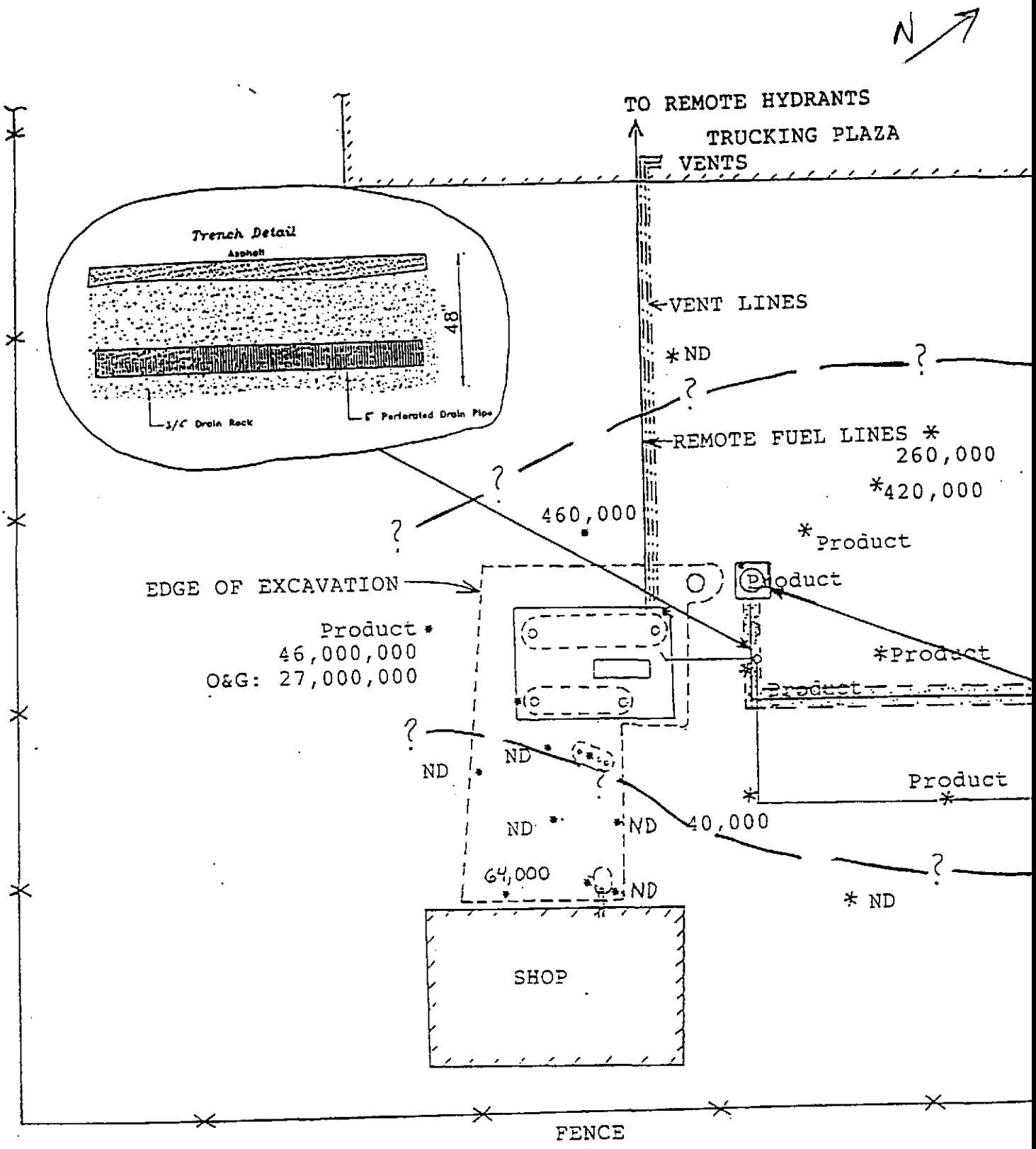


GEN-TECH ENVIRONMENTAL

SCALE:	APPROVED BY:	DRAWN BY DBG
DATE: 3-28-91		REVISED

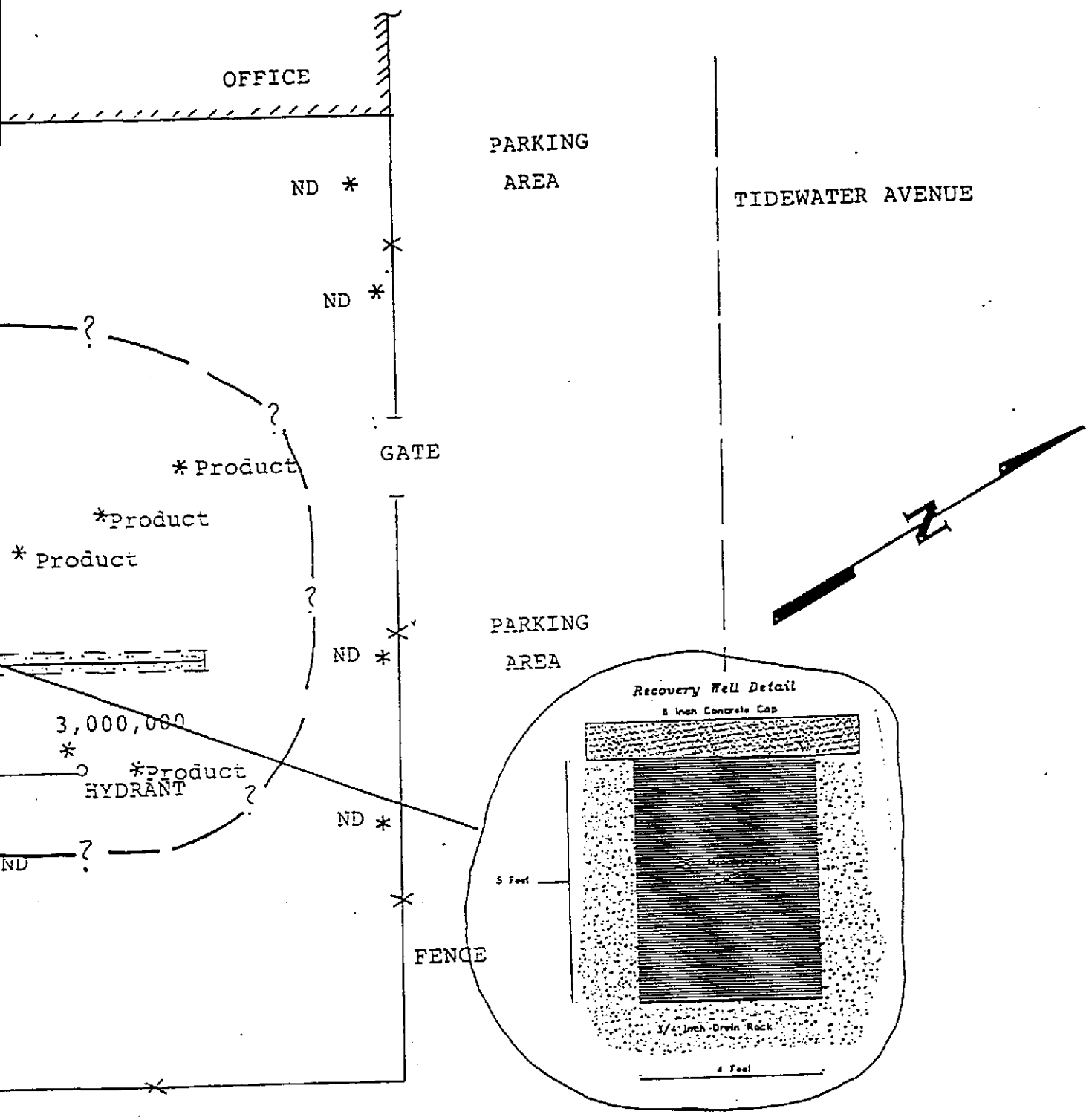
TRENCH DETAIL

4919 Tidewater Avenue Oakland, California	DRAWING NUMBER TD-1



* - SAMPLE LOCATIONS WITH TPH AS DIESEL CONCENTRATIONS IN PPB

Note: Trench design and product sump recovery design by Clean Environmental Engineers and Geo-Environmental Technology, April-June, 1989.



Product Recovery Sump and Trench

DiSalvo Trucking
4919 Tidewater Avenue
Oakland, CA

Project No. 9407
Scale: 1"= 30'
Date: Mar., 1994

Figure 6

Geo-Environmental Technology

CHAIN OF CUSTODY RECORD

PROJECT NO.	SITE NAME & ADDRESS
03038-1	DiSalvo / Tidewater

WITNESSING AGENCY / INSPECTOR NAME / DATE: John Schuetze 1-17-90

ID NO.	DATE	TIME	SOIL	WATER	SAMPLING LOCATION	TPH (Gasoline) & B, T, X, & E	TPH (Diesel) & [redacted]	Total Oil & Grease	Halogenated HC's	B, T, X & E	Heavy Metals	REMARKS
1	1-17	1:00 PM	X		#1		X					BTX THT
2	1-17	1:00	X		#2		X					"
3	1-17	1:00	X		#3		X					"
4	1-17	1:00	X		#4		X					"
5	1-17	1:00	X		#5		X					"
6	1-17	1:00	X		#6		X					"
7	1-17	1:00	X		#7		X					"
8	1-17	1:00	X		#8		X					"
9	1-17	1:00	X		#9		X					"
					See Map							

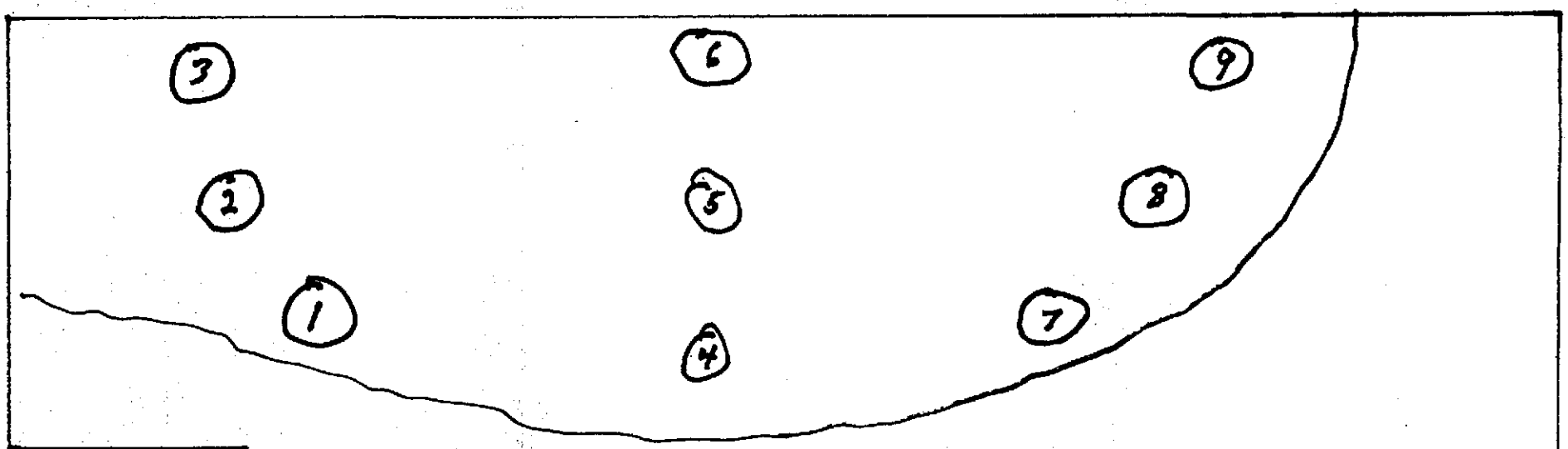
	Date/Time	
Relinquished by: (Signature)	1-17-90 1330 PM	Received by: (Signature)
Relinquished by: (Signature)	1-18-90 1240	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Rec'd for Laboratory by: (Signature)

The following MUST BE completed by the laboratory accepting samples for analysis:

1. Have all samples received for analysis been stored in ice? Yes
2. Will samples remain refrigerated until analyzed? Yes
3. Did any samples received for analysis have head space? No
4. Were samples in appropriate containers and properly packaged? Yes

Signature: [signature] Title: Courier Date: 1-18-90

Rev: 12-88



ALL SAMPLES TAKEN AT 6" DEPTH

TRUCK SHOP

TERMINAL TRUCK DI SAIVO

- 4919 TIDEWATER AVE, OAKLAND

REPORT SUMMARY
ANAMETRIX, INC. (408) 432-8192

Client : Geo-Environmental Technology
Address : 1936 Camden Avenue
Unit 4
City : San Jose, CA 95124
Attn. : Dave Swietanski

Anametrix W.O.#: 9001168
Date Received : 01/18/90
Purchase Order#: N/A
Project No. : 03038-1
Date Released : 01/31/90

Anametrix I.D.	Sample I.D.	Matrix	Date Sampled	Method	Date Extract	Date Analyzed	Inst I.D.
RESULTS							
9001168-01	1	SOIL	01/17/90	TPHd	01/24/90	01/29/90	N/A
9001168-02	2	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A
9001168-03	3	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A
9001168-04	4	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A
9001168-05	5	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A
9001168-06	6	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A
9001168-07	7	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A
9001168-08	8	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A
9001168-09	9	SOIL	01/17/90	TPHd	01/24/90	01/30/90	N/A

AVERAGE 1200 ppm

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 03038-1 1	Anametrix I.D.	: 9001168-01
Matrix	: SOIL	Analyst	: CB
Date sampled	: 01/17/90	Supervisor	: TC
Date anl.TPHg	: N/A	Date released	: 01/31/90
Date ext.TPHd	: 01/24/90	Date ext. TOG	: N/A
Date anl.TPHd	: 01/29/90	Date anl. TOG	: N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	870000

ND - Not detected at or above the practical quantitation limit for the method.

TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 03038-1 2	Anametrix I.D.	: 9001168-02
Matrix	: SOIL	Analyst	: CP
Date sampled	: 01/17/90	Supervisor	: TC
Date anl.TPHg	: N/A	Date released	: 01/31/90
Date ext.TPHd	: 01/24/90	Date ext. TOG	: N/A
Date anl.TPHd	: 01/30/90	Date anl. TOG	: N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	1700000

ND - Not detected at or above the practical quantitation limit for the method.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 03038-1 3	Anametrix I.D.	: 9001168-03
Matrix	: SOIL	Analyst	: CA
Date sampled	: 01/17/90	Supervisor	: TC
Date anl.TPHg	: N/A	Date released	: 01/31/90
Date ext.TPHd	: 01/24/90	Date ext. TOG	: N/A
Date anl.TPHd	: 01/30/90	Date anl. TOG	: N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	1200000

ND - Not detected at or above the practical quantitation limit for the method.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 03038-1 4
Matrix : SOIL
Date sampled : 01/17/90
Date anl.TPHg: N/A
Date ext.TPHd: 01/24/90
Date anl.TPHd: 01/30/90

Anametrix I.D. : 9001168-04
Analyst : cb
Supervisor : TC
Date released : 01/31/90
Date ext. TOG : N/A
Date anl. TOG : N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	880000

ND - Not detected at or above the practical quantitation limit for the method.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 03038-1 5	Anametrix I.D.	: 9001168-05
Matrix	: SOIL	Analyst	: CB
Date sampled	: 01/17/90	Supervisor	: TC
Date anl.TPHg	: N/A	Date released	: 01/31/90
Date ext.TPHd	: 01/24/90	Date ext. TOG	: N/A
Date anl.TPHd	: 01/30/90	Date anl. TOG	: N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	950000

ND - Not detected at or above the practical quantitation limit for the method.

TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 03038-1 6	Anametrix I.D.	: 9001168-06
Matrix	: SOIL	Analyst	: CB
Date sampled	: 01/17/90	Supervisor	: TC
Date anl.TPHg	: N/A	Date released	: 01/31/90
Date ext.TPHd	: 01/24/90	Date ext. TOG	: N/A
Date anl.TPHd	: 01/30/90	Date anl. TOG	: N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	1800000

ND - Not detected at or above the practical quantitation limit for the method.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D. : 03038-1 7
Matrix : SOIL
Date sampled : 01/17/90
Date anl.TPHg: N/A
Date ext.TPHd: 01/24/90
Date anl.TPHd: 01/30/90

Anametrix I.D. : 9001168-07
Analyst : CB
Supervisor : TC
Date released : 01/31/90
Date ext. TOG : N/A
Date anl. TOG : N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	800000

ND - Not detected at or above the practical quantitation limit for the method.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

: 03038-1 8		Anametrix I.D.	: 9001168-08
: SOIL		Analyst	: CB
: 01/17/90		Supervisor	: JC
: N/A		Date released	: 01/31/90
: 01/24/90		Date ext. TOG	: N/A
: 01/30/90		Date anl. TOG	: N/A

Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
TPH as Diesel	10000	1200000

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thod.
Petroleum Hydrocarbons as diesel is determined by GCFID
ing either EPA Method 3510 or 3550.

sting procedures follow California Department of Health
es (Cal-DHS) approved methods.

ANALYSIS DATA SHEET - PETROLEUM HYDROCARBON COMPOUNDS
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 03038-1 9	Anametrix I.D.	: 9001168-09
Matrix	: SOIL	Analyst	: CB
Date sampled	: 01/17/90	Supervisor	: TC
Date anl.TPHg	: N/A	Date released	: 01/31/90
Date ext.TPHd	: 01/24/90	Date ext. TOG	: N/A
Date anl.TPHd	: 01/30/90	Date anl. TOG	: N/A

CAS #	Compound Name	Reporting Limit (ug/kg)	Amount Found (ug/kg)
	TPH as Diesel	10000	1400000

ND - Not detected at or above the practical quantitation limit for the method.
TPHd - Total Petroleum Hydrocarbons as diesel is determined by GCFID following either EPA Method 3510 or 3550.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

CHROMALAB, INC.

2239 Omega Road, 415/831-178

CHROMALAB FILE # 590165

Chain of Custod

DATE 5/21/90 PAGE 1 OF 1

Site: Desalvo 4919 Tidewater

PROJ. MGR. Smith

COMPANY Geo-Environmental

ADDRESS

SAMPLERS (SIGNATURE) Thomas A Smith (PHONE NO.) 4155591220

ANALYSIS REQUEST

SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.	TPH - Gasoline (EPA 5030)	TPH - Gasoline (5030) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510, 3550)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240)	BASE/NEUTRALS, ACIDS (EPA 624/627, 8270)	TOTAL OIL & GREASE (EPA 5030E)	PESTICIDES/PCB (EPA 608, 8080)	PHENOLS (EPA 604, 8040)			METALS: Cd, Cr, Pb, Zn	CAM METALS (18) w/Cr VI	PRIORITY POLLUTANT METALS (13)							NUMBER OF CONTAINERS
1	5/21	1230	Soil				X																			1
2							X																			1
3							X																			1
4							X																			1
5							X																			1
6							X																			1
7							X																			1
8							X																			1
9							X																			1

PROJECT INFORMATION

PROJECT:

Q NO.

SHIPPING ID. NO.

VIA:

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	9
CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	
LAB NO.	

SPECIAL INSTRUCTIONS/COMMENTS:

9
8
7
6
5
4
3
2
1

Composite - grab samples 6" deep

RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
Thomas A Smith		
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
Thomas A. Smith 5/21/90		
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
Geo-Environmental		
(Company)	(Company)	(Company)
RECEIVED BY 1.	**RECEIVED BY 2.**	**RECEIVED BY (LABORATORY) 3.**
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
		5-22-90 1320
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (DATE)
(Company)	(Company)	(LAB)

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#238)
- Drinking Water (#955)
- Waste Water
- Consultation

May 30, 1990

ChromaLab File No.: 0590165

GEO-ENVIRONMENTAL TECHNOLOGY, INC.

Attn: Thomas Smith

Deborah Leather
Stockpiled Soil
Results

RE: Nine soil samples for Diesel analysis

Project Site: DESALVO, 4919 TIDEWATER
Date Sampled: 5/21/90 Date Submitted: 5/22/90
Date Extracted: 5/29-30/90 Date Analyzed: 5/29-30/90

RESULTS:

Sample No.	Diesel (mg/Kg)
#1	7.8*
#2	14*
#3	N.D.
#4	9.1*
#5	N.D.
#6	6.6*
#7	N.D.
#8	N.D.
#9	46*
BLANK	N.D.
SPIKED RECOVERY	93.5%
DUPLICATED SPIKE RECOVERY	86.4%
DETECTION LIMIT	5
METHOD OF ANALYSIS	3550/8015

*Hydrocarbon compounds found in Diesel range

ChromaLab, Inc.

David Duong
Senior Chemist

Eric Tam
Laboratory Director

2239 Omega Road, #1 • San Ramon, California 94583
415/831-1788 • Facsimile 415/831-8798

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.

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

Monitoring Well Development

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

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

Monitoring Well Sampling

. Depth to groundwater will be measured to the nearest 0.01 ot, and the well checked for presence of separate phase product. f present, the apparent thickness of the product will be measured. he well will not be sampled if separate phase product is present.

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

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

. The bailer will be thoroughly steam-cleaned or cleaned with oapy (TSP) water, rinsed with tap water, and finally rinsed with eionized or distilled water prior to the collection of each ample. A separate clean bailer will be used to sample each ndividual 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.