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

February 4, 1994
Project No. 9342

R. J. Quick Clean
2522 Castro Valley Boulevard
Castro Valley, CA 94546

Attn: Mr. Ray Lorge

Re: **Soil Sampling and Analysis Site Investigation**
Site at 2522 Castro Valley Blvd., Castro Valley, CA

Dear Mr. Lorge,

Gen Tech Environmental, Inc. (GTE) has completed the soil sampling and analysis for the above referenced site. This work is required by the Alameda County Health Care Services, Department of Environmental Health (ACHD) in their letter dated December 18, 1992. This was addressed in the work plan presented to ACHD by GTE on October 7, 1993 and amended in conversations with the ACHD representatives. Previous remedial work has occurred at this site, and is referenced at the end of this letter. The purpose of this work is to search for potential soil and groundwater contamination beyond the area of the underground storage tanks excavated areas.

BACKGROUND

Two underground storage tanks (700 and 1,000 gallon) were located on a separate property, which was subsequently acquired by R. J. Quick Clean (see Figures 1 and 2). Reports regarding the tank closures were prepared by KTW Associates. The two tanks had apparently stored gasoline, and were estimated to be about 45 years old and apparently had been out of service for about 30 years. The tanks and attendant piping were removed. Samples of soil and groundwater in the former tank vicinity revealed contamination. Contaminated soil was excavated and disposed offsite and the pits were backfilled with clean fill.

A Thrifty Oil service station bordering the opposite side of the site has a known leak. One monitoring well was installed on-site to monitor possible movement plume movement toward R. J. Quick Clean.

A Preliminary Site Assessment was performed for the evaluation of Corrective Action for the site (French, 1992). That evaluation indicated that cleanup of impacted soil and groundwater could not be economically cleaned to yield equal water quality benefit given the site hydrogeology. A "monitoring *only*" was suggested as a possible approach. Further, ACHD surmises that other plumes could be moving toward the R. J. Quick Clean site from a site uphill (to the west of R. J. Quick Clean).

Technical Approach

Gen Tech Environmental, Inc. (GTE) initially proposed to investigate the site using exploratory soil borings, to collect soil samples and reconnaissance groundwater samples. This approach was modified since the Client is experiencing financial distress, and soil borings were substituted for the wells and groundwater samples, which was verbally approved by the ACHD representative. Previous site work has identified that only Total Petroleum Hydrocarbons as Gasoline (TPHG) and Benzene, Toluene, Ethylbenzene and Xylene (BTEX) are the contaminants on-site. The data collected would be used to ascertain contaminant presence and the need for further work

Field Methods

Four exploratory borings will be drilled at the locations shown on Figure 2. All drilling and well installation was done under approved ACHD permits, and according to the attached GTE protocols for soil sampling and reconnaissance groundwater sampling. Exploratory borings were drilled using precleaned hollowstem flight auger. Soil samples were collected with split spoon samplers equipped with clean brass liners. The liners were advanced by pushing or driving into undisturbed soil ahead of the drill bit. The sampler was retrieved, and soil filled liners capped with Teflon® paper, capped, labeled, logged onto chain of custody forms and stored in a chilled cooler for transport to the laboratory. Soil samples were logged using the Unified Soil Classification System under the supervision of a registered geologist. Each soil sample retained for laboratory analysis will be sealed in the metal liner, sealed with Teflon® paper and endcaps, labeled, logged onto a chain-of-custody form and packed on ice for shipment to the laboratory.

Groundwater samples were not collected since groundwater was not encountered in any borehole.

Subsurface Conditions

Four exploratory borings were drilled at the locations shown on Figure 2. The soils observed were silty clays which were plastic and damp. These soils were in gradational contact with, and appear to be forming on, the underlying shale bedrock. The shale was weathered but became less weathered with depth. The boreholes were advanced until the driller called auger advancement and sampler refusal.

Groundwater was not encountered in any borehole, and the boreholes were left open for between four to six hours. Groundwater was not observed to enter any borehole at the end of the day. Each borehole had been advanced across the silty clay/weathered shale contact. Upon completion, the boreholes were backfilled with cement grout.

Chemical Analysis and Results

Seven soil samples and three groundwater samples will be analyzed for Total Petroleum Hydrocarbons as Gasoline (TPHG) and Diesel (TPHD) and Benzene, Toluene, Ethylbenzene and Xylene (BTEX) using EPA Methods 5030, 8015 and 8020, and Total Lead using Atomic Adsorption. The analysis were performed at Chromalab, Inc. a state-certified laboratory under a "normal" turnaround basis. The results are attached.

Soil Sample Results

Sample No.	TPHG	Benzene	Toluene	Ethylben	Xylene	Lead
	mg/kg	----------	ug/kg	----------		mg/kg
EB-1@5'	ND	ND	ND	ND	ND	ND
EB-1@10'	ND	ND	ND	ND	ND	ND
EB-2@5'	1.6	49	ND	53	22	ND
EB-2@10'	ND	ND	ND	13	19	ND
EB-3@5'	25	84	120	550	300	12
EB-3@10'	2.6	5.8	7.9	37	5.6	3.5
EB-4@5'	ND	ND	ND	ND	ND	ND

mg/kg - Milligram per kilogram
ug/kg - Microgram per kilogram
ND - None Detected

Discussion

The soil data indicate that the previous site tank excavation and remedial work was effective in removing petroleum contamination. Contaminants were present in only trace levels in three boreholes. EB-4 placed furthest outside and downgradient of the largest excavation area revealed that contaminants were not detected. Contaminants present in EB-3 are interpreted to be minor residuals left from the former tank area. Since water was observed in the backfill well in the excavation, but not in the soil at EB-3, the water is attributed to filling from seasonal precipitation, lawn irrigation or sewers and is retained in the excavation area proper. The contaminants observed at EB-3 attenuate with depth, indicative of residual quantities and a very slow vertical migration or are absorbed to soil. Concentrations of lead appear typical for soil and geology of this area.

Exploratory borings were drilled across the soil/weathered shale contact and groundwater was not observed. Soil and rock color observed did not indicate groundwater residence, and groundwater was lacking during the rainy season. Water observed in the backfill well near EB-3 is clearly contained in the excavation backfill and does not represent potentiometric surface since groundwater is not present in the vicinity. The occurrence of groundwater in these clayey sediments and shale rock in these locations are interpreted to be minimal in quantity and ephemeral. Consequently, vertical and horizontal migration of any residual contaminants is anticipated to be minimal.

Conclusions and Recommendations

Four exploratory borings were drilled next to former tank locations and at an "upgradient" location of anticipated groundwater movement. Groundwater was not encountered in any borehole, even when boreholes were left open for several hours. The silty soils are forming on, and underlain by, a weathered shale bedrock.

Soil chemical analysis indicates that TPHG and BTEX contaminants are either present at trace levels or were not detected. Minor soil contamination is present at EB-3 at 5 feet but attenuates at the 10 foot depth. The clayey soil and rock, and the lack of groundwater, tend to retain these very low residual quantities of contaminants, which are expected to continue to degrade with time. Lateral and vertical migration is not anticipated given the low concentrations and clayey soil and rock. Since groundwater is not present, monitoring well installation is not needed.

In GTE's opinion, further work is not warranted at this time, and this site is proposed for site closure consideration by ACHD.

If you have any questions, please call.

Sincerely,
Gen Tech Environmental, Inc.

Christopher M. Palmer, C. E. G. 1262

Attachments: Figure 1. Location Map
Figure 2. Site Plan and Exploratory Boring Map
Chemical Analytical Results and Chain-of-Custody
Gen Tech Drilling and Sampling Protocols

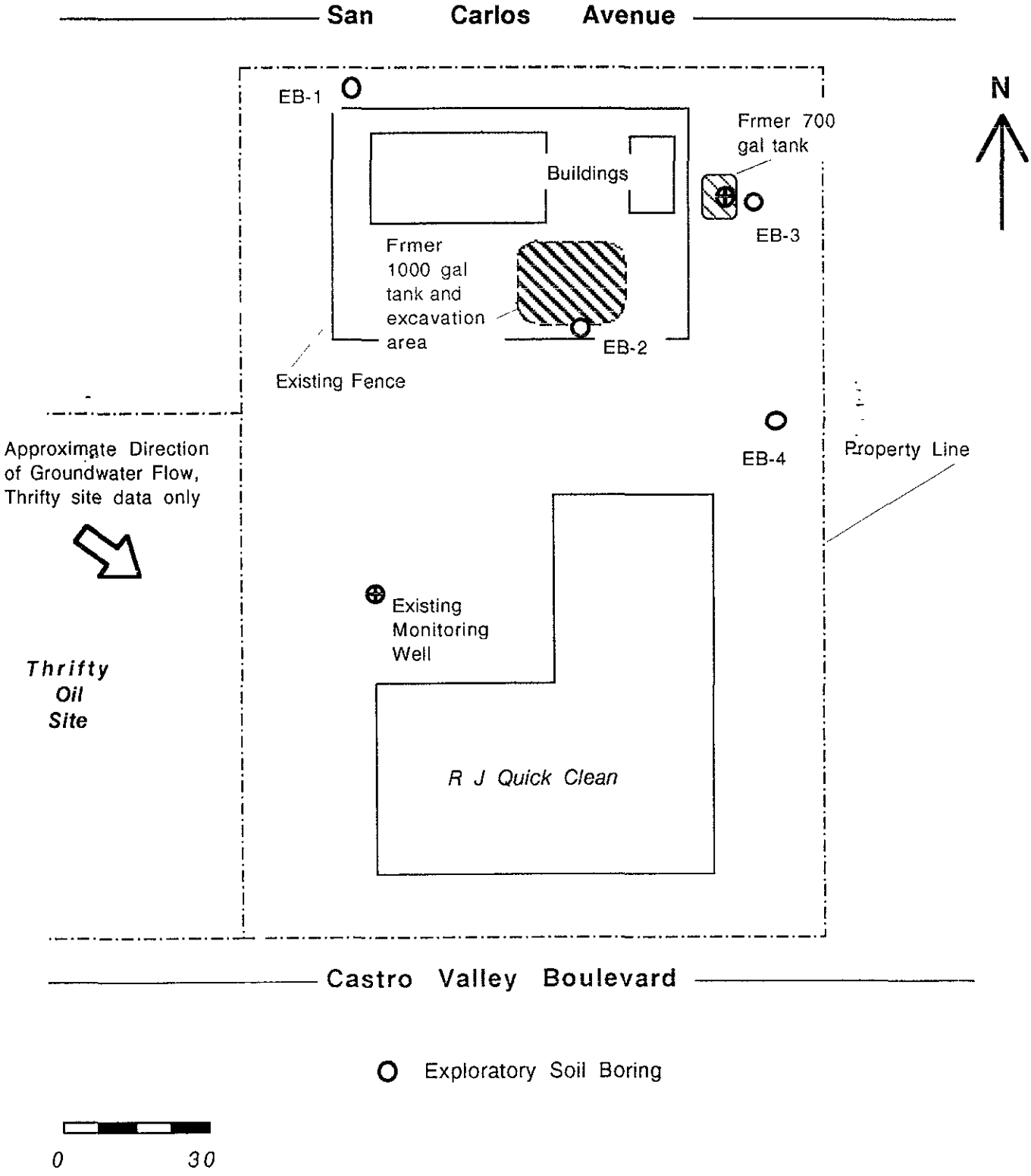
cc: Mr. Scott Seery, Alameda County Health Department

References

Alameda County Health Department, letter to Mr. Ray Lorge dated November, 24, 1992, STID 659, regarding Preliminary Site Assessment-2522 Castro Valley Boulevard/2517 San Carlos Boulevard, Castro Valley.

KTW Associates, Project 1231, Tank Closure Report No. 1 (1,000 gallons) and No. 2 (700 gallons), RJ Quick Clean, 2522 Castro Valley Boulevard, Castro Valley, dated March 8 and March 9, 1991.

Christopher M. French, RG, letter to Mr. Jeff Scharff, Preliminary Site Assessment and Preliminary Evaluation of Corrective Action Alternatives the 2522 Castro Valley Blvd. 2517 San Carlos Ave., Castro Valley, 14 pg.

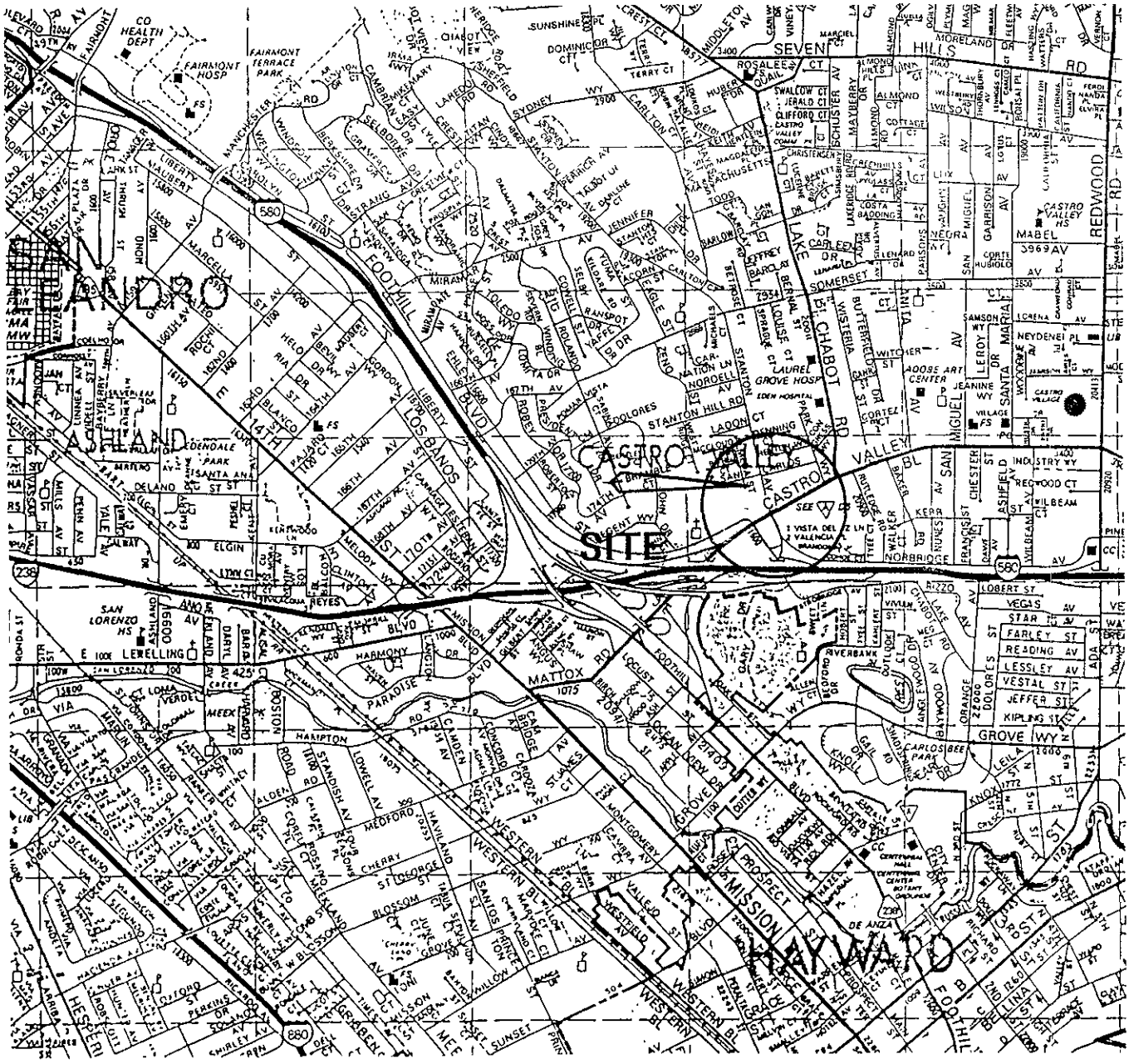


GEN TECH ENVIRONMENTAL, INC.
SAN JOSE, CA

SITE PLAN
Exploratory Boring Locations
RJ Quick Clean
2522 Castro Valley Blvd.
Castro Valley, CA

Project No. 9342-R
Scale: 1' = 30
Date: July, 1993

FIGURE 2



VICINITY MAP

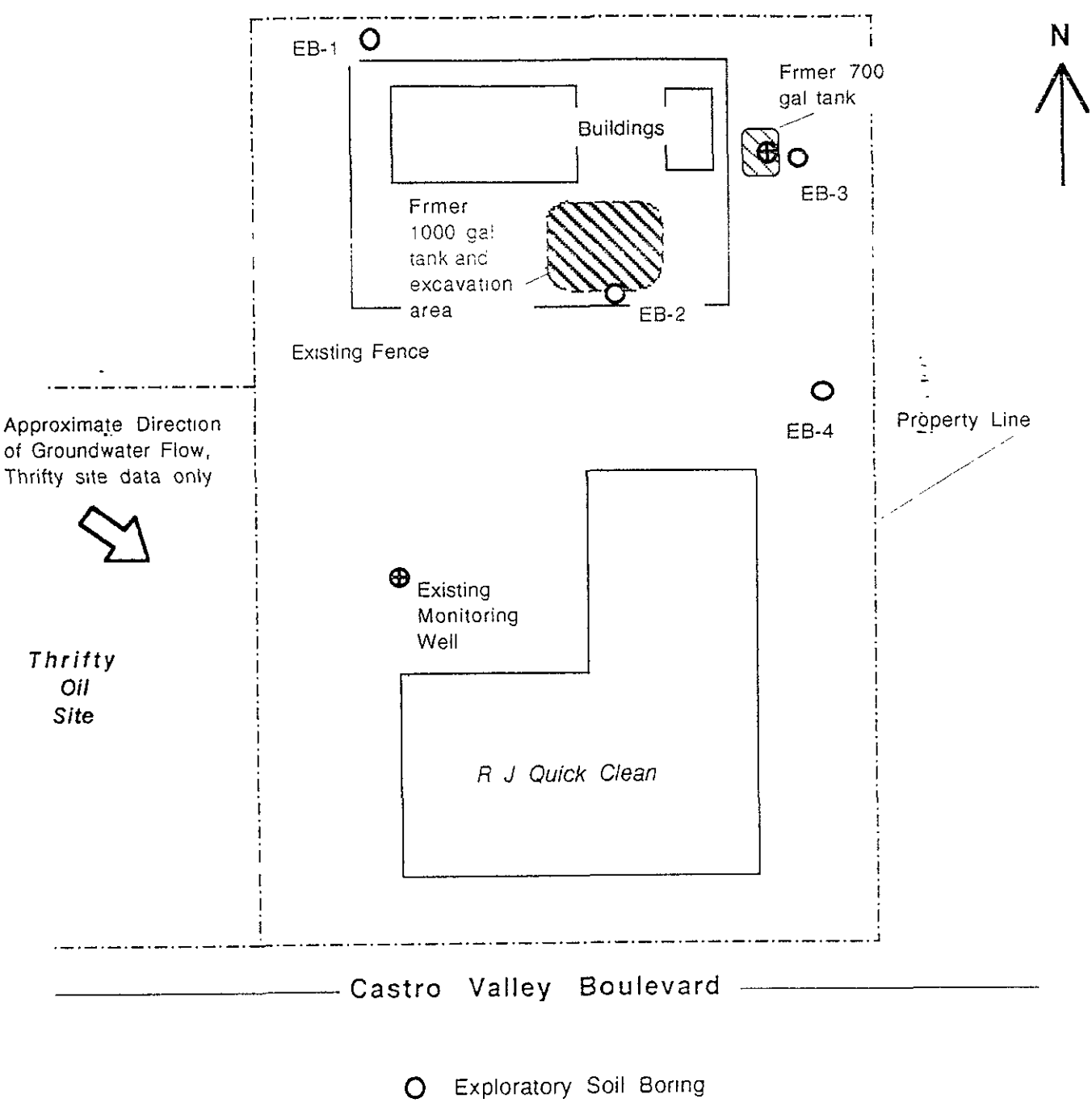
R. J. Quick Clean
2522 Castro Valley Blvd.
Castro Valley, CA 94546

Project No. 9342-R

Scale. None
Date. Feb. 1994

FIGURE 1

GEN TECH
ENVIRONMENTAL, INC.
SAN JOSE, CA



GEN TECH
ENVIRONMENTAL, INC.
SAN JOSE, CA

SITE PLAN
Exploratory Boring Locations
RJ Quick Clean
2522 Castro Valley Blvd.
Castro Valley, CA

Project No 9342-R
Scale 1" = 30
Date July, 1993

FIGURE 2

Environmental
1936 Camden Ave., Suite 1
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.

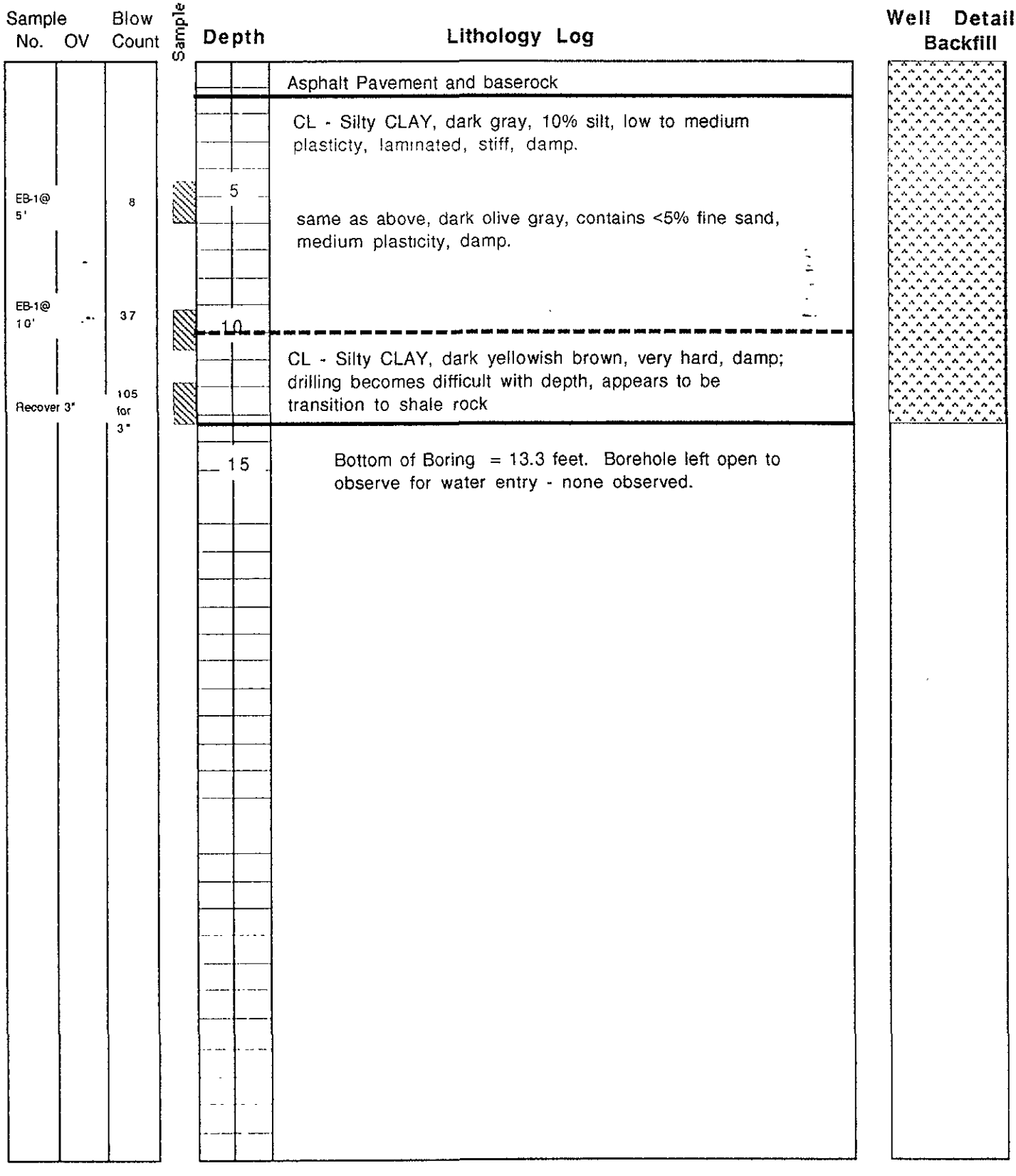
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9342-R **Boring/Well No.** EB-1
Client: Lorge **Date Drilled:** January 7, 1994
Location: 2522 Castro Valley Blvd. **Logged by:** EL
Drilling Method: Hollowstem **Permit:** N/A
Water Levels: 1st Enc: None Static:

Borehole Completion
Well Installed: None

Cement Grout Seal: 13.3' to surface



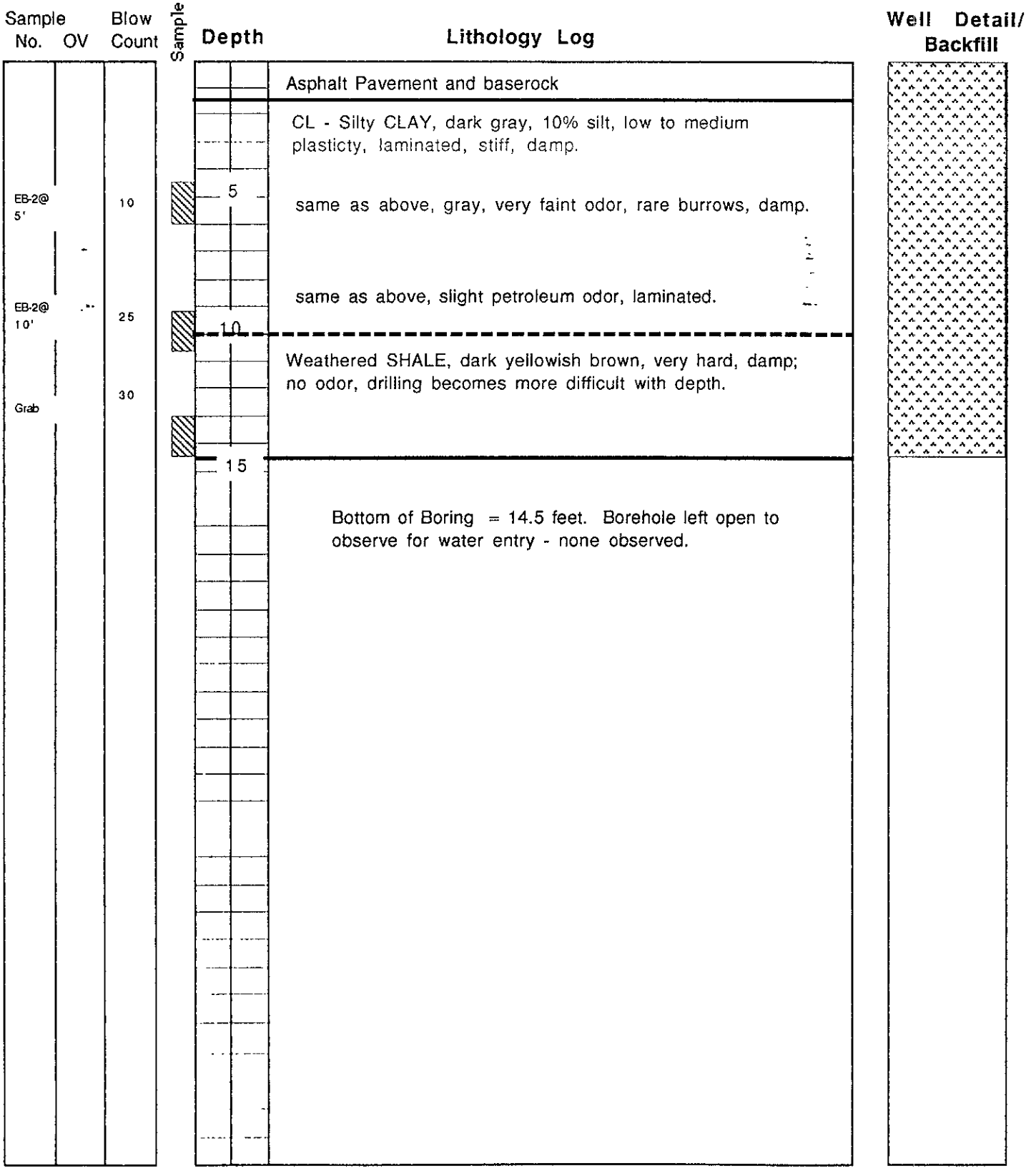
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9342-R **Boring/Well No.** EB-2
Client: Lorge **Date Drilled:** January 7, 1994
Location: 2522 Castro Valley Blvd. **Logged by:** EL
Drilling Method: Hollowstem **Permit:** N/A
Water Levels: 1st Enc: None Static:

Borehole Completion
Well Installed: None

Cement Grout Seal: 14.5' to surface



Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9342-R **Boring/Well No.** EB-3
Client: Lorge **Date Drilled:** January 7, 1994
Location: 2522 Castro Valley Blvd. **Logged by:** EL
Drilling Method: Hollowstem **Permit:** N/A
Water Levels: 1st Enc: None Static:

Borehole Completion
Well Installed: None

Cement Grout Seal: 15.5' to surface

Sample No.	OV	Blow Count	Sample	Depth	Lithology Log	Well Detail/ Backfill
					Asphalt Pavement and baserock	
					CL - Silty CLAY, dark gray, 10% silt, low to medium plasticty, laminated, stiff, damp.	
EB-3@ 5'		11		5	same as above, gray, very faint odor, rare burrows, damp.	
EB-3@ 10'		13		10	same as above, slight petroleum odor, med. to high plasticity; gradual color change to yellowish brown, rare burrows.	
Grab		36			Weathered SHALE, dark yellowish brown, very hard, damp; no odor, drilling becomes more difficult with depth.	
Grab		42		15	driller calls auger refusal	
					Bottom of Boring = 15.5 feet. Borehole left open to observe for water entry - none observed. Drilled next to former tank excavtion, 5-6 foot deep backfill well in excavation contains water.	

Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9342-R **Boring/Well No.** EB-4
Client: Lorge **Date Drilled:** January 7, 1994
Location: 2522 Castro Valley Blvd. **Logged by:** EL
Drilling Method: Hollowstem **Permit:** N/A
Water Levels: 1st Enc: None Static:

Borehole Completion
Well Installed: None

Cement Grout Seal: 10' to surface

Sample No.	OV	Blow Count	Sample	Depth	Lithology Log	Well Detail/ Backfill
					Asphalt Pavement and baserock	
					CL - Silty CLAY, dark gray, 10% silt, low to medium plasticty, laminated, stiff, damp.	
EB-4@ 5'		8		5	same as above, rare burrows, damp.	
					CL Silty CLAY to Weathered SHALE, dark yellowish brown, mixed rock fragments and clay, very hard, damp;	
Grab		90 for 10"		10	Bottom of Boring = 10 feet. Borehole left open to observe for water entry - none observed.	

CHROMALAB, INC.

DOHS 1094

SUB #: 9461062
CLIENT: GENTECH
DUE: 01/14/94
REF: 14709

14709

Chain of Custod

DATE 1-7-94 PAGE 1 OF 1

PROJ MGR: ERIC LISSOL
COMPANY: G.T.E.
ADDRESS: 1136 CAMPBELL AVE. #1
SAN JOSE, CA. 95124
SAMPLERS (SIGNATURE): (PHONE NO) (408)559-1248

RECEIVED
JAN 27 1994

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)	ORGANIC LEAD	NUMBER OF CONTAINERS
EB-1@5'	1-7-94	9:50A	SOIL			X	X												X		X	1
CB-1@10'	"	10:20A	"			X	X												X		X	1
EB-2@5'	"	11:35A	"			X	X												X		X	1
CB-2@10'	"	11:55A	"			X	X												X		X	1
EB-3@5'	"	2:00P	"			X	X												X		X	1
CB-3@10'	"	2:20P	"			X	X												X		X	1
CB-4@5'	"	1:10P	"			X	X												X		X	1
EB-4@10'	"		"			X	X												X		X	1

NO

PROJECT INFORMATION

PROJECT NAME: RAM LOADER
PROJECT NUMBER: 41424-12
PO #:

SAMPLE RECEIPT

TOTAL NO OF CONTAINERS: 7
HEAD SPACE:
RECD GOOD CONDITION/COLD:
CONFORMS TO RECORD:

TAT: STANDARD 5-DAY | 24 | 48 | 72 | OTHER

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY 1	RELINQUISHED BY 2	RELINQUISHED BY 3
(SIGNATURE) 3:30PM (TIME)	(SIGNATURE) (TIME)	(SIGNATURE) (TIME)
ERIC LISSOL 1-7-94 (PRINTED NAME) (DATE)	(PRINTED NAME) (DATE)	(PRINTED NAME) (DATE)
G.T.E. (COMPANY)	(COMPANY)	(COMPANY)
RECEIVED BY 1	**RECEIVED BY 2**	**RECEIVED BY (LABORATORY) 3**
(SIGNATURE) (TIME)	(SIGNATURE) (TIME)	(SIGNATURE) 3:30 (TIME)
(PRINTED NAME) (DATE)	(PRINTED NAME) (DATE)	J. MOORE 1/7/94 (PRINTED NAME) (DATE)
(COMPANY)	(COMPANY)	CHROMALAB (LAB)

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

January 14, 1994 ChromaLab File#: 9401062

GEN-TECH ENVIRONMENTAL

Atten: Eric Lissol

Project: RAY LORGE Project#: 9342-R
Submitted: January 7, 1994

re: 7 samples for Gasoline and BTEX analysis.

Matrix: SOIL
Sampled on: January 7, 1994 *Analyzed on:* January 10, 1994
Method: EPA 5030/8015/8020 *Run#:* 2003

Lab # SAMPLE ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
40944 EB-1 @ 5'	N.D.	N.D.	N.D.	N.D.	N.D.
40945 EB-1 @ 10'	N.D.	N.D.	N.D.	N.D.	N.D.
40946 EB-2 @ 5'	1.6	49	N.D.	53	22
40947 EB-2 @ 10'	N.D.	N.D.	N.D.	13	19
40948 EB-3 @ 5'	25	84	120	550	300
40949 EB-3 @ 10'	2.6	5.8	7.9	37	5.6
40950 EB-4 @ 5'	N.D.	N.D.	N.D.	N.D.	N.D.
DETECTION LIMITS	1.0	5.0	5.0	5.0	5.0
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.
BLANK SPIKE RECOVERY(%)	98	100	96	94	96

ChromaLab, Inc.

Jack Kelly
Chemist

Eric Tam
Laboratory Director

RECEIVED
JAN 27 1994
ANSWERED

2239 Omega Road, #1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

January 14, 1994 ChromaLab File No.: 9401062

GEN-TECH ENVIRONMENTAL

Attn: Eric Lissol

RE: Seven soil samples for Diesel analysis

Project Name: RAY LORGE
Project Number: 9342-R
Date Sampled: January 7, 1994 Date Submitted: January 7, 1994
Date Extracted: January 11, 1994 Date Analyzed: January 11, 1994

RESULTS:

Sample I.D.	Diesel (mg/Kg)
EB-1@5'	N.D.
EB-1@10'	N.D.
EB-2@5'	N.D.
EB-2@10'	N.D.
EB-3@5'	12
EB-3@10'	3.5
EB-4@5'	N.D.
BLANK	N.D.
SPIKE RECOVERY	82%
DUP SPIKE RECOVERY	88%
DETECTION LIMIT	1.0
METHOD OF ANALYSIS	3550/8015

ChromaLab, Inc.

Alex Tam
Analytical Chemist

Eric Tam
Laboratory Director

RECEIVED
JAN 27 1994
ANSWERED

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

January 14, 1994 ChromaLab File#: 9401062

GEN-TECH ENVIRONMENTAL

Atten: Eric Lissol

Project: RAY LORGE **Project#:** 9342-R
Submitted: January 7, 1994

re: 7 samples for lead analysis.

Matrix: SOIL *Extracted:* January 11, 1994
Sampled on: January 7, 1994 *Analyzed on:* January 11, 1994
Method: EPA 3050/6010 *Run#:* 2016

LAB #	CLIENT SAMPLE ID	RESULT (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
40944	EB-1 @ 5'	1.1	0.50	N.D.	81
40945	EB-1 @ 10'	3.1	0.50	N.D.	81
40946	EB-2 @ 5'	4.6	0.50	N.D.	81
40947	EB-2 @ 10'	1.6	0.50	N.D.	81
40948	EB-3 @ 5'	6.3	0.50	N.D.	81
40949	EB-3 @ 10'	2.9	0.50	N.D.	81
40950	EB-4 @ 5'	5.7	0.50	N.D.	81

ChromaLab, Inc.

Refaat Mankarious

Charles Woolley
Chemist

Refaat Mankarious
Inorganics Supervisor

RECEIVED
JAN 27 1994
ANSWERED_____

2239 Omega Road, #1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

Gen-Tech Environmental

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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.