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

STID 3910

June 22, 1993
Project No. 9360

Stahl Woodridge Construction Co.
2428 Central Avenue
Alameda, California 94501

Attn: Mr. Steve Stahl

Re: **Reconnaissance Soil and Groundwater Assessment**
Site at 2428 Central Avenue, Alameda, CA

Dear Mr. Stahl,

Gen Tech Environmental, Inc. has prepared the attached Reconnaissance Soil and Groundwater Assessment for the above referenced property.

INTRODUCTION

Gen Tech Environmental, Inc. was retained to conduct a Reconnaissance Soil and Groundwater Assessment on the property located at 2428 Central Avenue in Alameda, California. The purpose of this Assessment was to review, to a preliminary degree, the site and site vicinity for reported or suspect contamination on or near the site property. The assessment consisted of an available aerial photographs and, site reconnaissance to observe existing site conditions. Two exploratory boreholes were drilled on the property and soil and groundwater samples collected for field and laboratory analysis.

SITE LOCATION

The site is located at the corner of Central and Park Avenues in Alameda, California. (see **Figure 1**). The site is currently occupied by the Alameda Islander Hotel. The site was previously occupied by a gasoline service station.

AERIAL PHOTOGRAPHY REVIEW

An aerial photograph review was done for air photos dating from 1947 through 1975 at the Pacific Aerial Photography Inc. library in Oakland, California. A summary for each referenced stereo pair is presented below. The site is first visible in 1947.

AV-11-06-07, 08 dated 7-3-47, Stereo Pair
The area is developed and the site is visible as an active service station. Vehicles are parked onsite and the tank area appears to be a light colored area on the northern (Park Avenue) side of the site. The pump island area occurs on the Central Avenue side roughly near the center of the site. Another service station occurs opposite of the site across Central Avenue.

The site appears essentially the same in the following air photos:

AV-28-15-28, 29 dated 3-24-50, Stereo Pair
AV-337-05 33, 34 dated 7-3-59, Stereo Pair
AV-550-38-22, 23, dated 7-25-63, Stereo Pair
AV-710-09-26, 27, dated 4-20-66, Stereo Pair
AV-844-13-33, 34, dated 4-20-68, Stereo Pair
AV-903-05-21, 22, dated 5-2-69, Stereo Pair

AV-995-03-16, 17 dated 5-19-71, Stereo Pair
The station has been removed and the site is a flat lot. It appears that the demolition was completed prior to this photography. Several parked vehicles occur on the site.

AV-1100-05-22, 23, dated 4-24-73, Stereo Pair
A multistory structure has been built on the site. The construction appears completed by the time of this photography. The service station is still located opposite of the site across Central Avenue.

AV-1193-05-19, 20, dated 5-29-75, Stereo Pair
The site appears the same as in the 1973 photographs.

REGIONAL GEOLOGY AND HYDROGEOLOGY

The site is located on central Alameda Island. The site is underlain by stream alluvium sediments deposited in the San Francisco Bay Basin. Large regional active faults lie east and west of the site. The area contains shallow unconfined and deeper confined aquifers which are recharged by the creeks.

Regional geology consists of sandy soils and sediments which have formed from the alluvium eroded from the surrounding mountains. Regionally, groundwater occurs between about 5 to 10 feet below the surface. Groundwater gradients tend to be flat in this vicinity and a northerly flow direction is estimated for the site.

FIELD METHODS

Two exploratory soil borings were drilled at the locations shown on Figure 1 using the attached Gen Tech Sampling Protocol. The borings were drilled on the Stahl property with a portable, precleaned 4-inch diameter flight auger. Soil samples were collected in precleaned split spoon samples equipped with brass liners which was driven of pushed ahead of the auger bit. the sampler was retrieved, disassembled and the brass liner covered with Teflon® paper, sealed with endcaps, logged onto chain-of-custody forms and packed on ice for transport to the laboratory. The borings were logged using the Unified Soil Classification under the supervision of a certified engineering geologist. The exploratory boring logs are attached. Grab groundwater samples were collected from each borehole using a clean bailer, and placed in laboratory prepared containers.

The site was also observed for the presence of asbestos in acoustic blown ceiling covering and other areas. Evidence of asbestos was not observed in the two units and parking garage. GTE spoke the the manager on duty and asked him of possible knowledge containing asbestos. To the manager's recollection, every unit has sheet rock coverings and ceiling subsequently asbestos is not known to be present in the structure and, none was observed.

SUBSURFACE CONDITIONS

The exploratory borings were advanced to a depth of about 15 feet on the property. Borehole EB-1 was drilled in the vicinity of the apparent pump island, and EB-2 drilled in that area which appeared to correspond to the subsurface tanks location. Silty sand was encountered to the depth explored. Groundwater was encountered at a depth of about 10 feet in each borehole and appeared to be unconfined. Field test using the Hanby field Test indicated that hydrocarbons (Toluene) was present at the groundwater interface.

The boreholes were backfilled with grout upon completion.

CHEMICAL ANALYSIS AND RESULTS

Four soil samples and two groundwater samples were analyzed for Total Petroleum Hydrocarbons as Gasoline and Diesel (TPHG and TPHD) and Benzene, Toluene Ethylbenzene and Xylene (BTEX) using EPA Methods 8015 and 8020. The analyses were performed at Geochem, a State certified analytical laboratory. The results area attached.

The results show that TPHG and BTEX were detected in soil and groundwater from Borehole EB-1. Up to 211 parts per million (ppm) TPHG and 7 ppm Benzene were present. Contaminants were not detected in Borehole EB-2.

CONCLUSIONS AND RECOMMENDATIONS

A review of aerial photos indicates that an active service station operated on-site from at least 1947 until about 1970. Exploratory borings revealed that field evidence of hydrocarbon contaminants were present near the capillary fringe in both boreholes. Chemical results show the TPHG and BTEX are present in the area that apparently was the pump island location. In our opinion the site is hydrocarbons attributed to the previous service station pump island use. The levels of contaminants observed exceed State mandated levels and require further investigation.

A copyof this report should be sent to:

County of Alameda, Department of Environmental Health
Department of Hazardous Materials
200 Swan Way
Oakland, CA 94621 Attn: Ms. Eva Chu

LIMITATIONS

Gen Tech Environmental, Inc. shall not be responsible for conditions or consequences arising from facts and information that were withheld or concealed, or not fully disclosed at the time this evaluation was performed. Conclusions and recommendations made in this report for this site and are based on the data and available information reviewed during the assessment. Please note that contamination must be reported ina timley manner. This preliminary site assessment was prepared to assist in decisions regarding this property, and its possible environmental hazards.

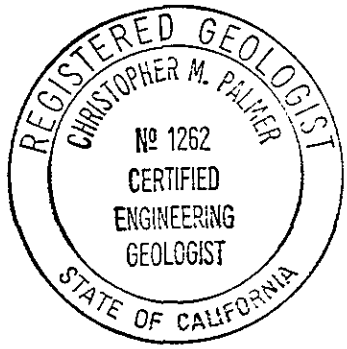
Gen Tech is not responsible for errors in agency files or

databases. Gen Tech is not responsible for chemical analytical laboratory errors and reporting and no warranty or guarantee is expressed or implied thereon.

If you have any questions, please call

Sincerely,
Gen Tech Environmental, Inc.

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



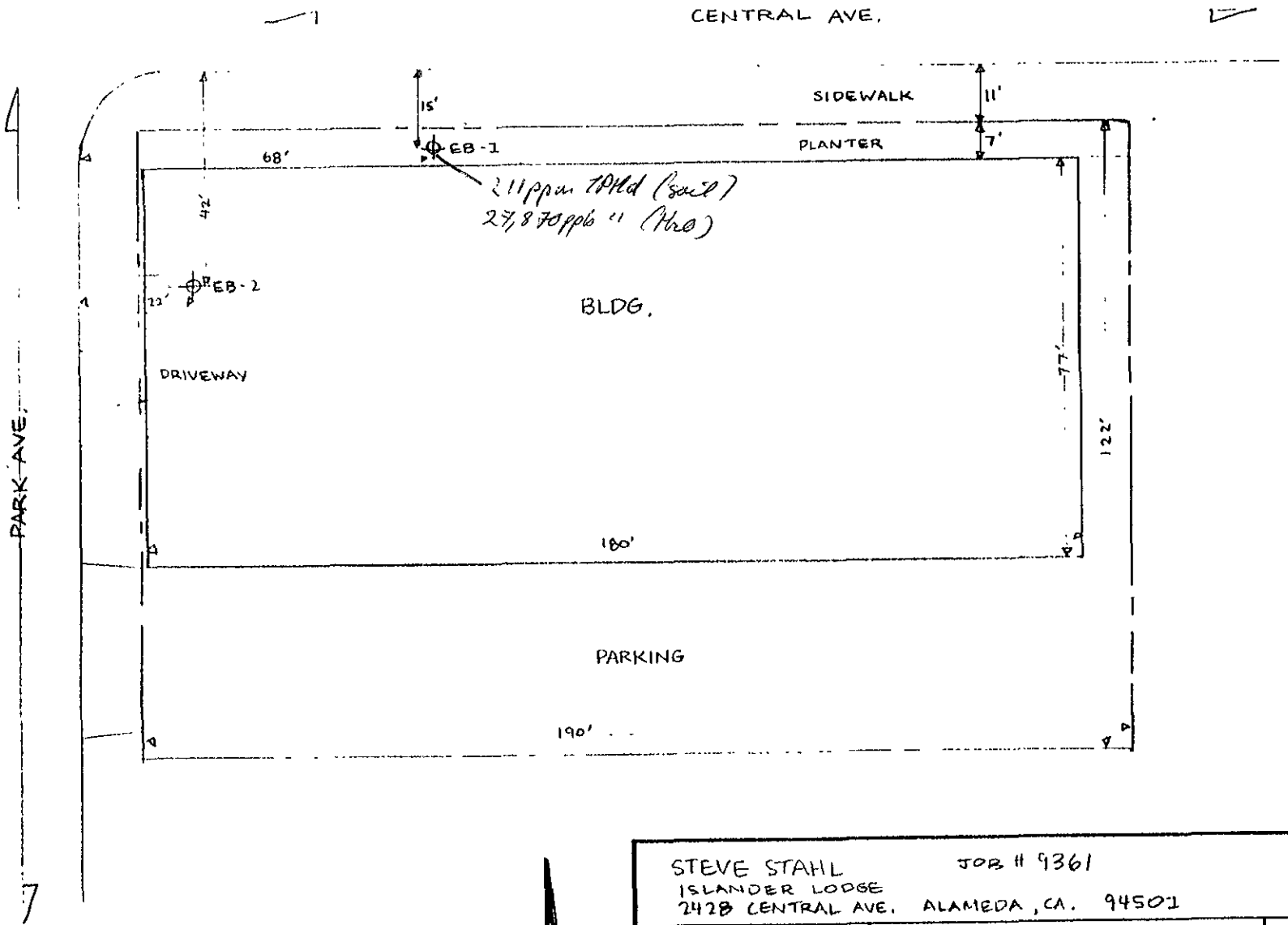
attachments: Figure 1. Exploratory Boring Location Map
Exploratory Boring Logs
Chemical Analytical Reports and Chain-of-Custody
Gen Tech Sampling Protocol

REFERENCES

Pacific Aerial Photo, Inc. Library, Oakland, CA; Photographs: Stereo Pairs AV-11-06-07, 08 dated 7-3-47, Stereo Pair; AV-28-15-28, 29 dated 3-24-50, Stereo Pair; AV-337-05 33, 34 dated 7-3-59, Stereo Pair; AV-550-38-22, 23, dated 7-25-63, Stereo Pair; AV-710-09-26, 27, dated 4-20-66, Stereo Pair; AV-844-13-33, 34, dated 4-20-68, Stereo Pair; AV-903-05-21, 22, dated 5-2-69, Stereo Pair; AV-995-03-16, 17 dated 5-19-71, Stereo Pair; AV-1100-05-22, 23, dated 4-24-73, Stereo Pair; AV-1193-05-19, 20, dated 5-29-75, Stereo Pair.

FIGURE 1

SITE PLAN



STEVE STAHL JOB # 9361
ISLANDER LODGE
2428 CENTRAL AVE. ALAMEDA, CA. 94501

SCALE: 1" = 30'	APPROVED BY:	DRAWN BY L.L.
DATE: 6-16-93		REVISED

SITE PLAN

⊕ = E-BORING LOCATION(S)

DRAWING NUMBER
9361-01

Gen-Tech Environmental
1936 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

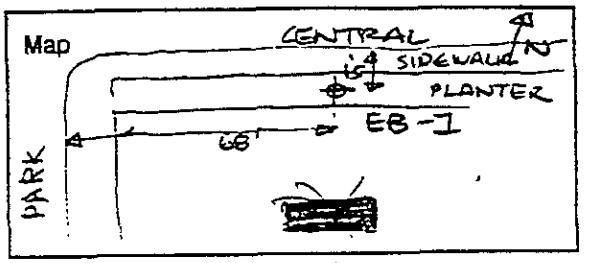
MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than half of material is larger than No. 200 sieve size	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size	Clean Gravels	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded 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.

Gen Tech Environmental, Inc. San Jose, CA

Project No. 4361 Boring No. EB-1
Client STEVE STAHL
Driller G.T.E.
Method LITTLE BEAVER 4"
Permit No. _____ Agency _____
Water Levels - 1st Enc 10' Static 9.91' AFTER 15 MIN.
10.21' AFTER 1 HR.



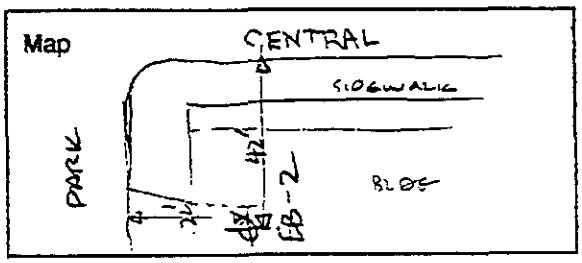
Sample No.	OV	Blow Count	Depth	Lithology Log	H2O Mark	Well Detail
EB-1 @5'		SS	0 SM	FROM SURFACE SILTY SAND - 10% SILT - NO. 40-200 SAND MUNSEL P. 2.5 Y [6/4] LIGHT YELLOWISH BROWN. DRY, NO PLANT, VERY LOOSE, NO ODOR		
			5'	FIELD TEST @ 5' - NON-DETECT		
			6' SM	MATERIAL COLOR CHANGE (SAME MATERIAL) MUNSEL P. 5Y [4/2] OLIVE GREY - SLIGHTLY DAMP, VERY LOOSE, SLIGHT DIESEL ODOR		
EB-1 @10'		SS	10' SM	FIELD TEST @ 10' - <5 PPM TOLUENE DRILLER CALL H_2O @ 10' → DESCRIPTION - SAME AS ABOVE W/ FLOWING SAND VERY WET, DIESEL ODOR PRESENT	▽ 10.21'	
			14'	14' B.O.H.		

(EB-1-GW3)
* GRAB WATER SAMPLE TAKEN
+ SLIGHT SHEEN
+ SLIGHT DIESEL ODOR

Gen Tech Environmental, Inc. San Jose, CA

Project No. 9361 Boring No. GB-2
Client STEGE STAHL
Driller G.I.E.
Method LITTLE BEAVER 4"
Permit No. _____ Agency _____
Water Levels - 1st Enc 9:35' Static 10.17'

Map



Sample No.	OV	Blow Count	Depth	Lithology Log	H2O Mark	Well Detail
				5" CONCRETE SLAB SURFACE		
				SILTY SAND - 10% SILT - NO. 40 - 200 SAND MUNSELL P. 10YR [4/6] DARK YELLOWISH BROWN - DRY, NO PLAST. VERY LOOSE, NO ODOR		
GB-2 @5'		SS	5'	FIELD TEST @ 5' - NON-DETECT		
				* DRILLER CALLS H_2O @ 10'±		
GB-2 @10'		SS	10'	FIELD TEST @ 10' - <5 PPM TOLUENE SILTY SAND - 10% SILT - NO. 40 - 200 SAND MUNSELL P. 5GY [4/1] DARK GREENISH GREY - WET, NO PLAST. VERY LOOSE, NO ODOR * FLOWING SAND	▽	10.17'
			15'	- 15.35' B.O.H		
				(GB-2-GW) * GRAB WATER SAMPLE TAKEN - NO FLOATING PRODUCT - VERY SLIGHT ODOR		

Chemical Reports and Chain-of-Custody

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

CHAIN OF CUSTODY RECORD

Date 6-16-93 Page 1 of 1

CLIENT	PROJECT NAME
GEN-TECH ENVIRON.	STEVE STAHL JOB #9361
ADDRESS	PROJECT MANAGER
1936 CAMDEN AVE #I	ERIC LISSOL
SAN JOSE, CA. 95124	PHONE NUMBER

SAMPLE I.D.	LOCATION DESCRIPTION	DATE	TIME	MATRIX AIR	MATRIX WATER	MATRIX SOIL	NO. OF CTNR	418.1/TRPH	8010 (601)	8015 E/TPH-diesel	8015 M/TPH-gasoline	8020 (602) BTEX	7420/Total Lead	Organic Lead			Archive
EB-1@5'	NORTHSIDE PLUG	6-16	9:40A			✓	1			✓	✓	✓					
EB-1@10'	" " "	"	9:55A			✓	1			✓	✓	✓					
EB-1-GWS	RAN WATER FROM C CHANNEL	"	10:10A		✓		4			✓	✓	✓					
EB-2@5'	" " "	"	11:15A			✓	1			✓	✓	✓					
EB-2@10'	" " "	"	11:35A			✓	1			✓	✓	✓					
EB-2-GWS	CONNECTION TO C CHANNEL	"	12:00N	HAW	✓		4			✓	✓	✓					

TESTS REQUIRED

Sampled/Relinquished by: ERIC LISSOL	Received by: Cheryl Trulla	Date 6-16-93	Time 2:05 PM
Relinquished by: Cheryl Trulla	Received by: D. Thomas	Date 6/17/93	Time 8:00
Relinquished by:	Received by:	Date	Time

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

****

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

Date Sampled: 06/16/93
Date Received: 06/16/93
Date Analyzed: 06/21/93
Batch:SD-210 Matrix: Soil
Conc. Unit mg/kg (ppm)

Project: Steve Stahl (Proj.#9361)

****

"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.	8015M/TPH Gasoline	8015M/TPH Diesel	8020 B / T / E / X
DETECTION LIMIT	0.05 ppm	0.05 ppm	0.0005 ppm
EB-1@5'	ND	ND	ND / ND / ND / ND
EB-1@10'	~~ND~~	~~211.94~~	7.9414/ 7.9068/ 8.3755/ 7.7143
EB-2@5'	ND	ND	ND / ND / ND / ND
EB-2@10'	ND	ND	ND / ND / ND / ND

Reviewed and approved by George Tsai, June 22, 1993
George Tsai, Laboratory Director

Geochem ENVIRONMENTAL LABORATORIES

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

ANALYTICAL REPORT

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

Date Sampled: 06/16/93
Date Received: 06/16/93
Date Analyzed: 06/21/93
Batch:SD-210 Matrix: Water
Conc. Unit ug/kg (ppb)

Project: Steve Stahl (Proj.#9361)

"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.	8015M/TPH Gasoline	8015M/TPH Diesel	602 B / T / E / X
DETECTION LIMIT	50 ppb	50 ppb	0.5 ppb
EB-1-GWS	~~ND~~ 27870	~~27870~~ ND	1787.2/ 1092.8/ 175.7 / 798.3
EB-2-GWS	ND	ND	ND / ND / ND / ND

Reviewed and approved by George Tsai, June 22, 1993
George Tsai, Laboratory Director

Gen Tech Sampling Protocol

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:

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

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

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

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

- o **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.