Gen-Tech Environmental

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4070 Douglas Parking
JE TP

June 8, 1994
Project No. 9432

Douglas Parking
1721 Webster Street
Oakland, California 94612

Attn: Mr. Leland Douglas

Re: **Proposed Exploratory Boring and Monitoring Well Installation Workplan Site at 1721 Webster Street, Oakland, CA**

Dear Mr. Douglas,

Gen Tech Environmental, Inc. (GTE) has prepared this workplan for the above referenced site. As you know, two underground fuel storage tanks have been removed from this site. The proposed work is in response to a request from the Alameda County Department of Environmental Health (ACHD) for site assessment and cleanup.

Background

Two underground storage tanks were removed from the site in August, 1992. The former tank location is located in a sidewalk between Webster Avenue and a building, hence the working are is very cramped (see Figure 1). Soil sampling which followed tank removals showed that contamination exceeding 1,000 parts per million of Total Petroleum Hydrocarbons as Gasoline (TPHG) remain in soil (see Figure 2). Groundwater was not encountered in the excavation. Following the tank removal and sampling, the excavation was then backfilled and resurfaced.

Technical Approach

The technical approach to this project is to build upon the previous work. Three groundwater monitoring wells will be placed at the locations shown on Figure 1. The wells will provide groundwater gradient and quality information and will be used for quarterly monitoring. Three additional exploratory borings will be placed at the locations shown on Figure 1 to allow for a rapid reconnaissance of the soil and reconnaissance groundwater sampling plume.

Scope of Work

Exploratory Borings

Six exploratory borings will be drilled at the locations shown on Figure 1. Drilling and well installation permits will be secured from the Alameda County Flood Control and Water Conservation District prior to doing the field work. Three boreholes will be converted to groundwater monitoring wells. The boreholes will be drilled with hand auger tools and truck mounted hollowstem auger drilling equipment. All drilling equipment and sampling tools will be cleaned prior to arriving, and before leaving the site. The augers will be advanced to the desired sampling depth interval, and a drive split spoon sampler will be driven ahead of the drill bit. The sampler will then be retrieved and dissembled, and the soil filled brass liner will be sealed with Teflon® paper and plastic endcaps, labeled, logged onto chain-of-custody forms and place in a chilled ice chest.

The boreholes will be logged using the Unified Soil Classification System under the supervision of a registered geologist using the attached GTE Sampling Protocol. Additional lithologic information will be collected to describe the subsurface geology. The samples will be collected at five-foot intervals, at intervals of obvious contamination and at stratigraphic features of interest. Upon completion of the borehole drilling and collection of information, the boreholes not converted to monitoring wells will be backfilled with grout, placed from the bottom to top of the borehole.

Monitoring Well Installation

Three monitoring wells will be installed. The wells will be cased with Sch. 40 PVC casing, threaded together; glues will not be used. The slotted interval will be a 0.020 inch slot and the annular space around the slots will be backfilled with a 2/12 size sand. Previous experience has shown this to be a reliable well design in fine grained and stratified depositional environments. Final well design will be modified to the site specific conditions encountered in the borehole during drilling. Once the aquifer strata has been defined, the casing will be lowered to the bottom of the borehole, leaving a slotted interval above the occurrence of groundwater to observe for floating product. The sand pack will be placed to a point about two feet above the slots. A bentonite seal will be placed atop the sand pack, and a cement grout seal placed atop the bentonite using a tremie line, filling from the bottom to top of the borehole. A traffic rated well head access box and security device will complete the well.

Well Head Survey

All wells will be surveyed to mean sea level using a known datum. This will allow accurate measurements and groundwater gradient to be calculated.

Monitoring Well Sampling and Development

All monitoring wells will be developed to remove the drilling muck, grade the sand pack and provide a more complete hydraulic connection to the aquifer. The well volume will be calculated and a number of those volumes will be removed until the water becomes clear and the amount of sand pumped is minimal. The well will be allowed to recover for at least 72 hours prior to sampling. A log of the development will be kept for each well.

Reconnaissance Groundwater Sampling and Monitoring Well Sampling

Each exploratory boring and monitoring well will be sampled. The three reconnaissance ground water samples collected from the boreholes will be used for a rapid reconnaissance of the site groundwater contamination. The boreholes and wells will be sampled using the attached GTE Sampling Protocol. A brief summary of these procedures follows: Each borehole will be advanced into the aquifer and temporarily cased. The water entering the borehole will be sampled using a clean disposable bailer, and carefully poured into the appropriate laboratory prepared container with minimum cavitation. Upon completion of sampling the boreholes, the boreholes will be sealed from the bottom to top using a neat cement grout.

Each monitoring well will be purged using precleaned equipment using calculated well volumes based upon the depth to water in each casing. Depth to groundwater measurements will be made to the nearest one-one hundredth of one foot, and also checked for the presence of separate phase product. As each purge volume is removed, measurements of pH, electrical conductivity and temperature will be taken until these parameters stabilize, which is interpreted to be aquifer water entering the casing. The sample will be carefully collected with a clean bailer and poured into the appropriate laboratory prepared container with minimum cavitation.

Each water sample will be labeled, logged onto a chain-of-custody form, and placed in a chilled ice chest. Upon completion of the borehole sampling, the borehole will be sealed. Upon completion of well sampling, the well will be closed and locked and the sampler will move to the next well.

Chemical Analysis

Six soil and six groundwater samples will be analyzed at a State certified analytical laboratory. Samples will be tested for the following; Total Petroleum hydrocarbons as Gasoline (TPHG), Benzene (B), Toluene (T), Ethylbenzene (E) and Xylene (X) using EPA Methods 3510/8015, and 8020. The analyses will be run on an "normal" turnaround (ten working days).

Report

A report of the findings of this site investigation will be prepared. The report will include the field methods, permits, exploratory boring logs, monitoring well construction details, chemical analytical data and report narrative. The report will include estimates of contaminant extent, conclusions and recommendations for site cleanup.

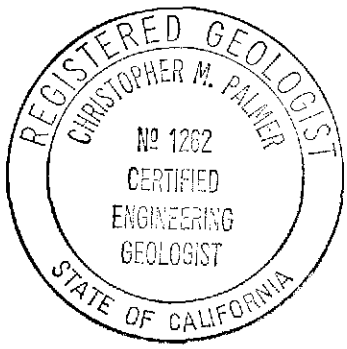
If you have any questions, please call.

Sincerely,
Gen Tech Environmental, Inc.

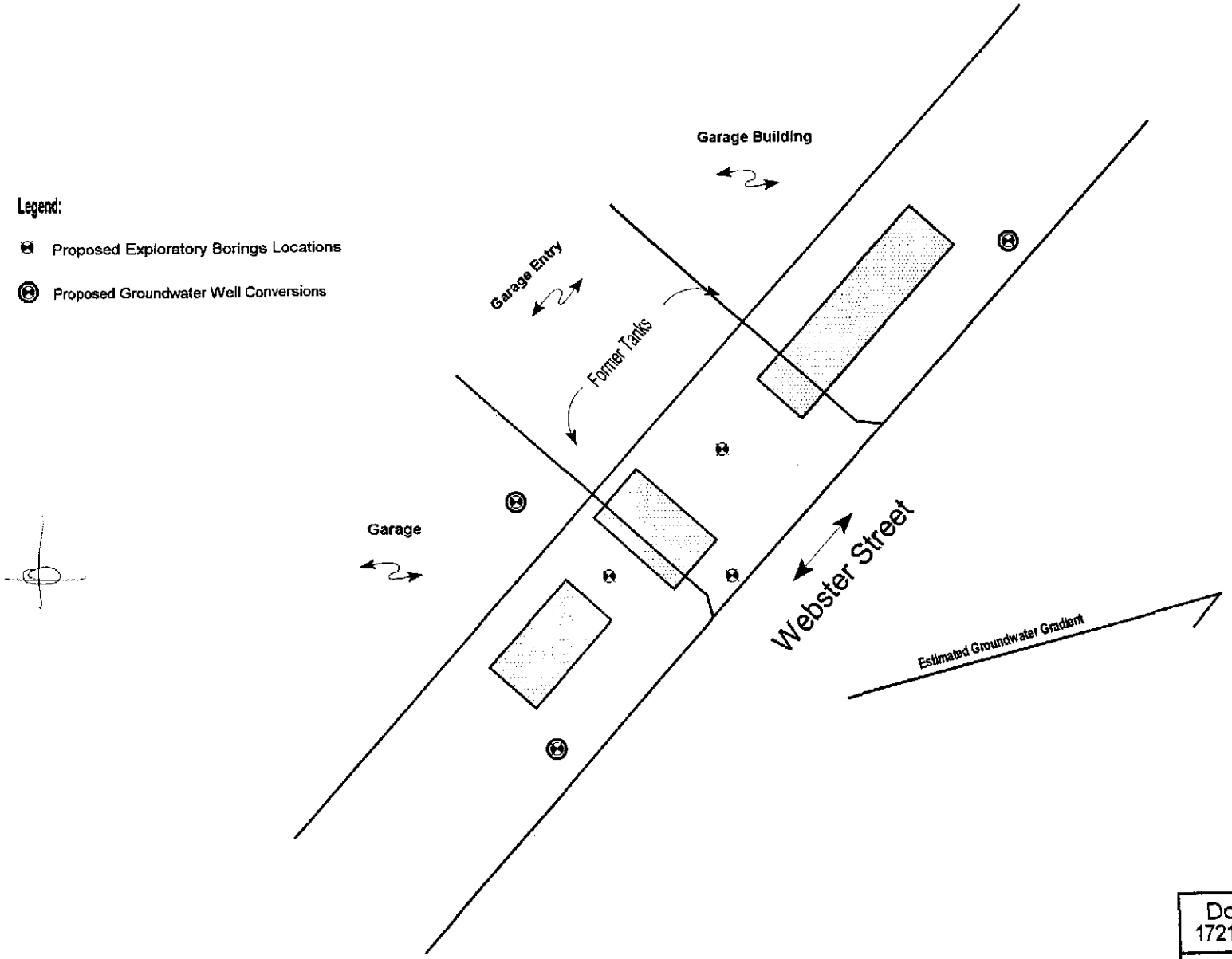
Stuart Solomon
Principal

Christopher M. Palmer
C. E. G. 1262

attachments: Figure 1. Proposed Exploratory Boring and Monitoring Well Locations
Figure 2. Soil Sampling Results from Tank Removal
GTE Sampling and Well Construction Protocol



Douglas Parking - Webster St.



Douglas Parking Garage 1721 Webster Street, Oakland, CA	
Figure 1	Exposed Exploratory Borings and Monitoring Well Locations
Scale: 1"= 10 ft.	Date: June 13, 1994

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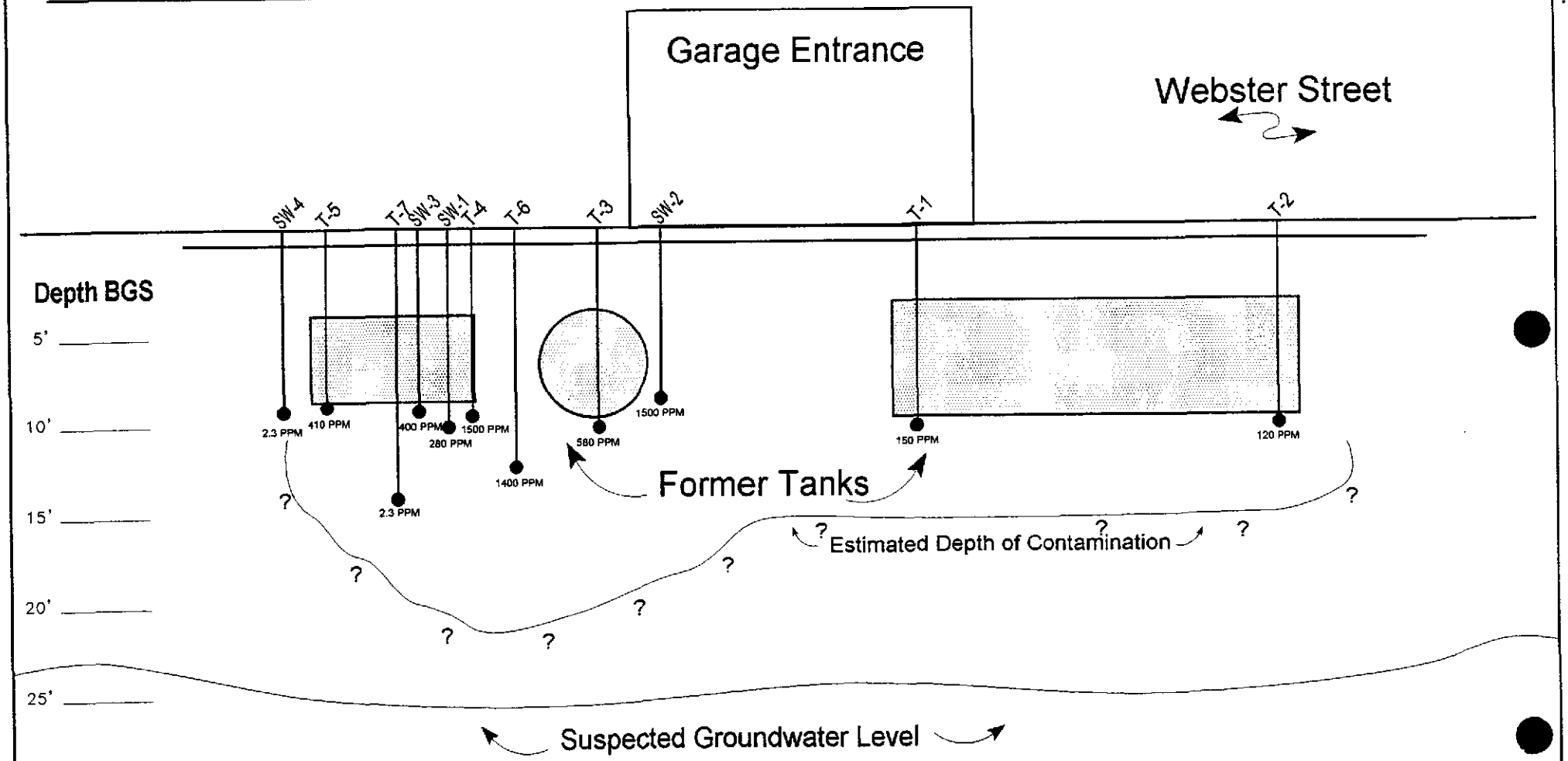
Douglas Parking



Douglas Parking Garage *1721 Webster Street, Oakland, CA*	
Soil Sampling Results From Tank Removal	
Figure 2	June 13, 1994

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Douglas Parking
1721 Webster Street, Oakland, California
Soil Sample Analysis Results*
Samples Collected on August3 and 6, 1992

Sample Number	Depth	TPH-g	Benzene	Toluene	Ethylbenzene	Xylenes
Samples From Beneath the Tanks						
T-1	9′	150	2.2	2.9	1.8	13
T-2	9′	120	0.62	0.56	0.87	2.2
T-3	8′	580	1.7	5.9	5.6	43
T-4	8′	1,500	11	140	48	280
T-5	8′	410	6.7	22	6.2	35
T-6	12′	1,400	12	71	29	150
T-7	14′	2.3	0.11	0.19	0.050	0.31
Samples from the south excavation side walls						
SW1	9.5′	280	2.9	5.8	3.2	15
SW2	7′	1,500	5.7	40	18	150
SW3	8′	400	2.7	5.8	4.0	21
SW4	9′	2.3	0.42	0.028	0.077	0.18
Composited Sample from the soil pile						
C1	1.5′	560	ND<0.1	5.0	3.1	24
Samples from the line and pump trenches						
L-1	1.5′	2.6	ND	0.010	ND	0.030
L-2	1.5′	ND	ND	ND	ND	ND
L-3	1.5′	ND	ND	ND	ND	ND
L-4	1.5′	ND	ND	ND	ND	ND
L-5	2.0′	8.2	0.010	0.020	0.012	0.092
L-6	2.0′	ND	ND	0.007	ND	0.034

* TPH (as gasoline) and BTEX are in parts per million. ND = Not Detected

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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.

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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.