File No. 8-90-420-GI

PROPOSED WORK PLAN FOR ADDITIONAL SOIL & GROUNDWATER INVESTIGATION AT THE PROPERTY LOCATED AT 5175 BROADWAY STREET OAKLAND, CALIFORNIA

OCTOBER 5, 1994

PREPARED FOR:

MR. MOHAMMAD MEHDIZADEH

150 RANDOM WAY

PLEASANT HILL, CALIFORNIA 94523

BY:

SOIL TECH ENGINEERING, INC.

298 BROKAW ROAD

SANTA CLARA, CALIFORNIA 95050

SOIL TECH ENGINEERING, INC.

File No. 8-90-420-GI

LIST OF TABLES

LIST OF FIGURES

File No. 8-90-420-GI

LIST OF APPENDICES

APPENDIX "A" ... TABLE 1 AND TABLE 2.

APPENDIX "B" ... FIGURE 1 AND FIGURE 2.

APPENDIX "C" ... STANDARD OPERATION PROCEDURES, VOLUME OF WATER IN CASING OR HOLE, SAMPLE MANAGEMENT AND GENERAL FORMAT.

APPENDIX "D" ... OUTLINE OF DRUM HANDLING PROCEDURES.

APPENDIX "E" ... HEALTH AND SAFETY PLAN, AND TYPES OF PROTECTIVE CLOTHING AND RESPIRATION THAT SHOULD BE USED AT HAZARDOUS WASTE SITES.

File No. 8-90-420-GI

TABLE OF CONTENTS **Page No.**

TABLE OF CONTENTS CONT'D **Page No.**

SOIL TECH ENGINEERING

Soil, Foundation and Geological Engineers

298 BROKAW ROAD, SANTA CLARA, CA 95050 ■ (408) 496-0265 OR (408) 496-0266

October 5, 1994

File No. 8-90-420-GI

Mr. Mohammad Mehdizadeh
150 Random Way
Pleasant Hill, California 94523

SUBJECT: PROPOSED WORK PLAN FOR ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION AT THE PROPERTY Located at 5175 Broadway Street, in Oakland, California

Dear Mr. Mehdizadeh:

The attached work plan presents a scope of work for characterization of the extent and magnitude of dissolved petroleum hydrocarbons at your site. This additional investigation is required by the Alameda County Health Care Services-Department of Environmental Health (ACHCS--DEH) and the California Regional Water Quality Control Board (CRWQCB) requirements. The Local and State agencies may require remediation of the elevated levels of dissolved petroleum hydrocarbons. The level to which clean up is required will be determined by negotiation with the appropriate agencies and based on the magnitude of the concentrations.

Please submit a copy of the work plan to ACHCS--DEH and the CRWQCB. Upon their approval, we will initiate the investigation within two weeks.

File No. 8-90-420-GI

If you have any questions or require additional information, please feel free to contact our office at your convenience.

Sincerely,

SOIL TECH ENGINEERING, INC.

NOORI AMELI
PROJECT ENGINEER

FRANK HAMEDI-FARD
GENERAL MANAGER

LAWRENCE KOO, P. E.
C. E. #34928

File No. 8-90-420-GI

PROPOSED WORK PLAN FOR ADDITIONAL SOIL & GROUNDWATER INVESTIGATION FOR THE PROPERTY LOCATED AT 5175 BROADWAY STREET OAKLAND, CALIFORNIA OCTOBER 5, 1994

This work plan presents the scope of work for evaluating the lateral and vertical extent of dissolved petroleum hydrocarbons in soil and groundwater at Mr. Mehdizadeh's property, located at 5175 Broadway Street, in Oakland, California (Figure 1).

The main objective of this additional investigation is to define the extent of dissolved hydrocarbon plume, to identify possible off-site source and to evaluate an interim remediation alternatives.

SITE DESCRIPTION:

The site is located at 5175 Broadway Street, in Oakland, California. The area in the immediate vicinity of the site consist of residential and light commercial (Figure 1).

PREVIOUS INVESTIGATION:

In January 1990, Tank Protect Engineering, Inc. (TPE), was retained to supervise the removal of underground fuel tanks and to

conduct soil sampling, soil excavation, soil treatment and disposal. In addition, TPE installed three monitoring wells on-site.

Initial analytical results of soil samples taken after the tank removal showed moderate levels of Total Petroleum Hydrocarbons as gasoline (TPHg) in two locations. The results of the samples showed TPHg ranging from non-detected to less than 120 parts per million (ppm). Due to presence of elevated levels of TPHg detected in the excavation, TPE installed three on-site monitoring wells (MW-1 to MW-3), as required by state and local regulatory agencies (Figure 2). TPE's preliminary groundwater assessment also indicated that the shallow groundwater had been impacted.

The Alameda County Health Department (ACHD) requested the property owner to conduct further investigation in order to define the extent of dissolved hydrocarbon contamination in the groundwater.

Soil Tech Engineering, Inc. (STE) was retained in September 1990 to conduct monitoring and sampling of the on-site monitoring wells. The objective of the quarterly groundwater sampling program was to monitor seasonal and long-term variations in the conditions of the shallow aquifer beneath the site and to assess the direction of the groundwater flow for further investigation.

STE sampled the three on-site groundwater monitoring wells (MW-1 to MW-3) on September 26, 1990, January 14, 1991, and August 15, 1994. The sampling was conducted in accordance with ACHD and California Regional Water Quality Control Board (CRWQCB) guidelines and STE's Standard Operating Procedures (SOP) included in Appendix "C".

The three on-site wells contained moderate to high levels of dissolved hydrocarbons. A comparison of the September 1990 sampling with TPE's analytical results of April 1990 showed an increase in dissolved hydrocarbons in wells MW-1 and MW-2. In well MW-3 (the down-gradient well), TPHg and Toluene levels decreased whereas Benzene, Ethylbenzene and Total Xylenes increased slightly.

The Alameda County Health Department (ACHD) in a letter dated March 29, 1991, requested additional investigation to define the extent of dissolved hydrocarbons plume. STE installed two additional monitoring wells STMW-1 (STMW-4) and STMW-2 (STMW-5) on June 21, 1991. The July 3, 1991, water sampling results showed low levels of dissolved Total Petroleum Hydrocarbons as gasoline (TPHg), Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX) in all five wells. The presence of low levels of TPHg and BTEX in the up-gradient well, STMW-1 (STMW-4), (located in the east corner of the property) indicated a potential off-site source. Based on the water level data, the groundwater direction was west to southwest on July 3, 1991. The detail of this investigation is summarized in STE's report dated July 23, 1991. STE recommended a quarterly monitoring and sampling of five on-site wells for at least a year.

The quarterly sampling of the five on-site wells continued until January of 1993. The five on-site wells continued to detect low to moderate levels of TPH as gasoline and BTEX. No quarterly monitoring and sampling was conducted between January 1993 to July 1994. The quarterly monitoring and sampling resumed in August 1994. The analytical results showed all five on-site wells were impacted with low to moderate levels of TPHg and BTEX. The ground-water flow direction was in the westerly direction, towards the residential building, as of August 1994.

STE will continue quarterly monitoring and sampling of the on-site wells as required by Alameda County Health Care Services Agency (ACHCSA) guidelines. The results of quarterly sampling and monitoring are summarized in Table 1 and Table 2, attached in Appendix "A".

SCOPE OF WORK:

The objective of the additional investigation is to define the extent and magnitude of dissolved petroleum hydrocarbons. The activities described in this proposal are intended to provide information for characterizing the extent and magnitude of BTEX. Once results from these activities are available, a plan for remediation will be developed.

The remediation plan would include identifying the type(s) and location(s) of possible remedial actions, estimating the projected effectiveness and costs of those options, assessing the selected

option's benefits and appropriateness, and other such aspects. From an engineering perspective, a remedial plan should not be developed at the present time since the extent of dissolved product is not well defined. Without that information, the effectiveness of remedial options can not be evaluated.

Proposed scope of work is as follows:

Task 1. Obtain permits and necessary access.

Task 2. Health and Safety Plan.

Task 3. Drill and sample soil borings (maximum three).

Task 4. Install monitoring wells.

Task 5. Measure water levels.

Task 6. Develop and sample monitoring wells.

Task 7. Laboratory analyses

Task 8. Data analyses and report preparation.

Task 9. Waste management.

A detailed description of these tasks are as follow:

TASK 1. OBTAIN PERMITS AND NECESSARY PERMITS TO OFF-SITE LOCATIONS:

Off-site sampling stations are generally planned to be on city property. STE's staff will make the initial contacts to gain per-

mission to access city property. Some modifications to sampling locations may need to be made if access is not easily granted.

Well drilling permits and utility clearances will also be obtained, as required, for installation of the monitoring wells once locations have been selected and approved by the City.

TASK 2. HEALTH AND SAFETY PLAN:

Per OSHA requirements, a site Health and Safety Plan has been prepared. The main purpose of the plan is to protect the staff including uninvolved personnel against potential physical and chemical hazards associated with drilling, sampling and field activities. All employee and subcontractor will be required to read and comply with the plan. The site Health and Safety Plan is developed for the project and attached in Appendix "E".

TASK 3. DRILL AND SAMPLE SOIL BORINGS:

Soil samples will be collected from each borings drilled on-site and off-site using a hollow stem power auger and modified California sampler. Soil samples will be collected from these borings in clean brass tube at intervals of no more than 5 feet. Each of these samples will be screened in the field using a portable organic vapor analyzer calibrated to a Benzene standard to map the relative concentrations of volatile organic compounds. Selected soil samples from each boring will be retained for chemical analyses.

Completed borings will be kept open overnight to allow measurement of depth to groundwater. After these measurements, three borings will be converted into monitoring wells (STMW-6 to STMW-8). The approximate locations are shown in Figure 2.

TASK 4. INSTALL MONITORING WELLS:

As indicated in task 3, the borings will be converted into shallow monitoring wells and installed in accordance to Alameda County guidelines. Since the depth to groundwater is approximately 9.0 to 12.5 feet, shallow wells will be completed to a depth of and estimated 20 to 25 feet. The actual length and depth of the perforated intervals will be determined in the field based on the depth to groundwater, the types, the depths and thickness of sediments encountered. The bottom of each well will be placed in a lower-permeability zone, if possible. The perforated interval will be selected to sample groundwater from the shallowest and more permeable sediments. The water table will be below the top of the perforated section.

After well casing has been placed in the completed borehole, the well annulus opposite the perforated interval will be backfilled with an appropriately-sized sand pack to approximately one or two feet above the perforations. Bentonite will be placed above the sand pack to isolate the perforated interval from material above and prevent the entrance of grout into the sand pack. A

cement-bentonite grout will then be placed above the bentonite seal to the land surface to seal the remainder of the borehole interval from surface water. A protective, locking steel cover will then be placed over the top of the casing to protect the well's integrity. A weatherproof and tamper-proof metal or concrete box and cover will then be cemented in place, flushed with the surface grade over the top of the well.

TASK 5. MEASURE WATER LEVELS:

Prior to any sampling activities, the depth to water will be measured for both the new wells and existing monitoring wells. This data will be measured using a stiff, then rod marked and/or weighted steel tape with special water and gasoline finding paste, as well as with a Flexidip (electronic product/water interface sounder).

The new and existing wells will be surveyed to the nearest 0.01 foot using a local bench mark to allow accurate groundwater elevation measurement.

TASK 6. DEVELOP AND SAMPLE MONITORING WELLS:

The new monitoring wells will be developed by pumping, surging and/or bailing to remove finer particles near the well screen and improve hydraulic communication with the surrounding formation. Water clarity, pH, temperature, specific conductance and volume

extracted will be measured during development. Development will terminate when the well visually produces little or no sediments, and water-quality indicators measured during development and sampling are stabilized. All water will be stored in temporary holding tanks pending receipt of the water-quality results.

The new wells will be sampled after at least three to four well casing volumes have been withdrawn from each well or, if the water levels recover slowly after purging. After water-level recovery, samples will be collected using a Teflon bailer. The bailer will be cleaned with laboratory-grade detergent followed by a deionized water rinse between each sampling. Samples will be decanted from the bailer into 40-ml VOA vials with Teflon septa and stored in a chilled cooler for delivery to the laboratory.

Existing on-site monitoring wells and the newly installed wells will also be sampled once in the same manner as the new wells to update and verify earlier data.

TASK 7. LABORATORY ANALYSES:

Approximately 8 water samples will be chemically analyzed for Total Petroleum Hydrocarbons (TPH) and BTEX using modified EPA Methods 8015/8020/5030/602.

Approximately nine soil samples (three from each soil boring) will be analyzed for Total Petroleum Hydrocarbons and BTEX using modified EPA Method 8015/8020.

TASK 8. DATA ANALYSES AND REPORT PREPARATION:

The data gathered during the course of investigation will be evaluated and a report prepared. The report will present the assessment of the extent and concentration of chemicals detected in the sampled area. The report will include detailed descriptions of the methodologies used to collect and analyze data, the interpretations data, and the technical rationale for the conclusions reached.

TASK 9. WASTE MANAGEMENT:

All drilling equipment and sampling tools will be steam cleaned. It is anticipated that water for cleaning activities will be obtained from on-site. All equipment cleaning will occur on the property.

Waste soil and waste water produced from the drilling and sampling activities will be placed in drums or other suitable containers supplied by STE. The client will be responsible for waste storage and disposal, although STE will help coordinate these activities with a licensed subcontractor. After receiving analytical results, STE will assist client in identifying disposal options. The cost of waste disposal will depend on the amounts, types and concentrations of chemicals contained in the waste. STE will interact with the California Department of Health Services,

File No. 8-90-420-GI

TABLE 1
GROUNDWATER MONITORING DATA
IN FEET

Date	Well No.	Water Elevation	Water Depth*	Product Thickness	Petroleum Odor
5/17/90**	MW-1	NA	9.26	Not Available	NA
	MW-2	NA	10.00	Not Available	NA
	MW-3	NA	12.42	Not Available	NA
9/26/90	MW-1	NA	9.92	Not Present	Mild
	MW-2	NA	10.83	Not Present	Mild
	MW-3	NA	13.50	Not Present	Mild
1/14/91	MW-1 (97.71)	89.01	9.54	Not Present	Mild
	MW-2 (97.78)	87.53	10.63	Not Present	None
	MW-3 (98.14)	86.20	12.58	Light Sheen	None

TABLE 1 CONT'D
GROUNDWATER MONITORING DATA
IN FEET

Date	Well No.	Water Elevation	Water Depth*	Product Thickness	Petroleum Odor
7/03/91	MW-1 (102.04)	92.50	9.417	Not Present	Mild
	MW-2 (102.02)	91.85	10.083	Not Present	Mild
	MW-3 (102.46)	90.00	12.083	Sheen	Strong
	STMW-1 (103.58)	92.39	11.00	Sheen	Mild
	STMW-2 (101.99)	87.72	13.917	Not Present	None
11/11/91	MW-1 (102.04)	92.59	9.45	Not Present	Mild
	MW-2 (102.02)	91.81	10.21	Not Present	Mild
	MW-3 (102.46)	90.17	12.29	Light Sheen	Mild
	STMW-4*** (103.58)	92.50	11.08	Light Sheen	Strong
	STMW-5**** (101.99)	87.99	14.00	Not Present	Mild

TABLE 1 CONT'D
GROUNDWATER MONITORING DATA
IN FEET

Date	Well No.	Water Elevation	Water Depth*	Product Thickness	Petroleum Odor
3/04/92	MW-1 (101.83)	93.90	7.93	Not Present	Mild
	MW-2 (101.67)	92.97	8.70	Not Present	Mild
	MW-3 (102.18)	91.92	10.26	Dark Brown Sheen	Strong
	STMW-4 (103.08)	93.64	9.44	Brown Sheen	Mild
	STMW-5 (101.36)	89.56	11.80	Not Present	V. Mild
6/02/92	MW-1 (101.83)	92.85	8.98	Not Present	Mild
	MW-2 (101.67)	92.15	9.52	Not Present	Mild
	MW-3 (102.18)	90.78	11.40	Light Sheen	Moderate
	STMW-4 (103.08)	92.76	10.32	Not Present	V. Mild
	STMW-5 (101.36)	88.30	13.06	Not Present	Mild

TABLE 1 CONT'D
GROUNDWATER MONITORING DATA
IN FEET

Date	Well No.	Water Elevation	Water Depth*	Product Thickness	Odor
9/28/92	MW-1 (101.83)	92.54	9.29	Not Present	Mild
	MW-2 (101.67)	91.58	10.09	Not Present	Mild
	MW-3 (102.18)	89.54	12.64	Light Sheen	Strong
	STMW-4 (103.08)	92.32	10.76	Brown Sheen	Mild
	STMW-5 (101.36)	87.32	14.04	Not Present	Mild
1/11/93	MW-1 (101.83)	94.27	7.56	Not Present	Rotten Egg Odor
	MW-2 (101.67)	93.15	8.52	Not Present	Rotten Egg Odor
	MW-3 (102.18)	92.08	10.10	Light Rainbow Sheen	Mild Petroleum
	STMW-4 (103.08)	93.80	9.28	Brown Sheen	Mild Petroleum
	STMW-5 (101.36)	89.75	11.61	Not Present	Rotten Egg Odor

TABLE 1 CONT'D
GROUNDWATER MONITORING DATA
IN FEET

Date	Well No.	Water Elevation	Water Depth*	Product Thickness	Odor
8/15/94	MW-1 (101.83)	92.64	9.19	Not Present	Mild Sewage
	MW-2 (101.67)	91.76	9.91	Not Present	Light Petroleum
	MW-3 (102.18)	89.98	12.20	Brown Sheen Spots	Mild Petroleum
	STMW-4 (103.08)	92.54	10.54	Light Rainbow Sheen Spots	Light Petroleum
	STMW-5 (101.36)	87.61	13.85	Not Present	Mild Sewage

* - Below Ground Surface
** - Measured by TPE
NA - Not Available
*** - STMW-4 is the same well as STMW-1.
**** - STMW-5 is the same well as STMW-2.

File No. 8-90-420-GI

TABLE 2
GROUNDWATER ANALYTICAL RESULTS
IN
PARTS PER MILLION (ppm)

Date	Well Number	TPHg	B	T	E	X
4/30/89*	MW-1	0.2	0.018	0.005	0.002	0.012
	MW-2	0.23	0.039	0.018	0.005	0.023
	MW-3	56	3.6	8.6	1.3	7.2
9/26/90	MW-1	1.3	0.055	0.031	0.12	0.1
	MW-2	0.85	0.94	0.005	0.025	0.047
	MW-3	54	5.1	0.42	1.6	8.0
1/14/91	MW-1	1.7	0.057	0.028	0.042	0.053
	MW-2	3.1	0.35	0.083	0.086	0.135
	MW-3	35	2.6	6.6	1.5	5.7
7/03/91	MW-1	0.58	0.032	0.041	0.04	0.055
	MW-2	1.59	0.03	0.052	0.024	0.034
	MW-3	33	4.12	4.3	1.4	4.8
	STMW-1**	3.1	0.61	0.062	0.039	0.15
	STMW-2**	0.69	0.099	0.081	0.019	0.098

TABLE 2 CONT'D
GROUNDWATER ANALYTICAL RESULTS
IN
PARTS PER MILLION (PPM)

Date	Well Number	TPHg	B	T	E	X
11/11/91	MW-1	0.33	0.02	0.002	0.002	0.011
	MW-2	0.96	0.32	0.015	0.004	0.029
	MW-3	57	3.9	8.4	2.1	14
	STMW-4***	3.6	0.99	0.025	0.003	0.18
	STMW-5****	0.41	0.061	0.002	0.001	0.02
3/04/92	MW-1	0.81	0.011	0.0051	0.0097	0.023
	MW-2	1.5	0.0095	0.0084	0.0098	0.022
	MW-3	57	0.72	0.87	0.81	3.1
	STMW-4***	5.0	0.035	0.02	0.022	0.071
	STMW-5****	0.46	0.013	0.0065	0.011	0.018
6/02/92	MW-1	2.2	0.093	0.032	0.04	0.12
	MW-2	2.8	0.084	0.041	0.059	0.095
	MW-3	50	0.24	0.24	0.22	0.74
	STMW-4***	13	0.14	0.045	0.063	0.21
	STMW-5****	1.86	0.027	0.02	0.021	0.043

TABLE 2 CONT'D
GROUNDWATER ANALYTICAL RESULTS
IN
PARTS PER MILLION (PPM)

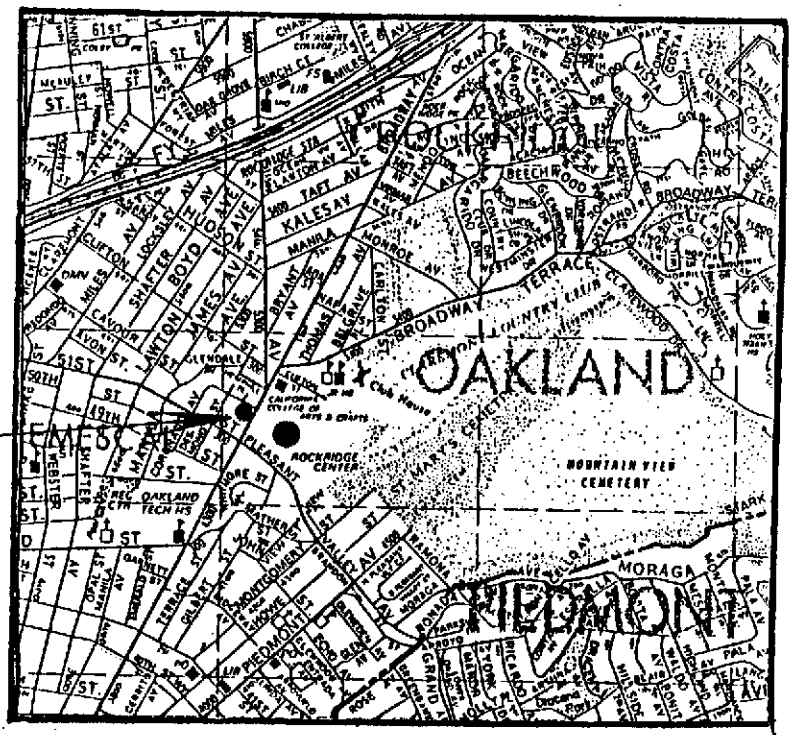
Date	Well Number	TPHg	B	T	E	X
9/28/92	MW-1	2.9	0.024	0.0078	0.019	0.037
	MW-2	1.6	0.047	0.020	0.047	0.097
	MW-3	64	0.11	0.093	0.097	0.25
	STMW-4***	40	0.035	0.020	0.048	0.11
	STMW-5****	1.5	0.014	0.0061	0.018	0.022
1/11/93	MW-1	1.7	0.0057	0.006	0.011	0.028
	MW-2	2.5	0.0086	0.01	0.017	0.032
	MW-3	61	0.21	0.28	0.36	0.99
	STMW-4***	24	0.026	0.088	0.092	0.28
	STMW-5****	0.8	0.0018	0.003	0.0031	0.0094
8/15/94	MW-1	2.0	0.12	0.003	0.006	0.016
	MW-2	6.0	0.45	0.06	0.1	0.095

File No. 8-90-420-GI

TABLE 2 CONT'D
GROUNDWATER ANALYTICAL RESULTS
IN
PARTS PER MILLION (PPM)

Date	Well Number	TPHg	B	T	E	X
8/15/94	MW-3	50.0	0.87	1.2	1.3	3.0
	STMW-4	9.0	0.5	0.034	0.046	0.13
	STMW-5	3.0	0.32	0.062	0.034	0.22

TPHg - Total Petroleum Hydrocarbons as gasoline
BTEX - Benzene, Toluene, Ethylbenzene, Xylenes
* - Analytical Results from TPE Site Assessment
** - Soil Tech Engineering, Inc., Monitoring Wells
*** - STMW-4 is the same well as STMW-1.
**** - STMW-5 is the same well as STMW-2.



Thomas Brothers Map 1993 Edition
San Francisco, Alameda
and Contra Costa Counties

Page 4 D6

Figure 1

File No. 8-90-420-GI

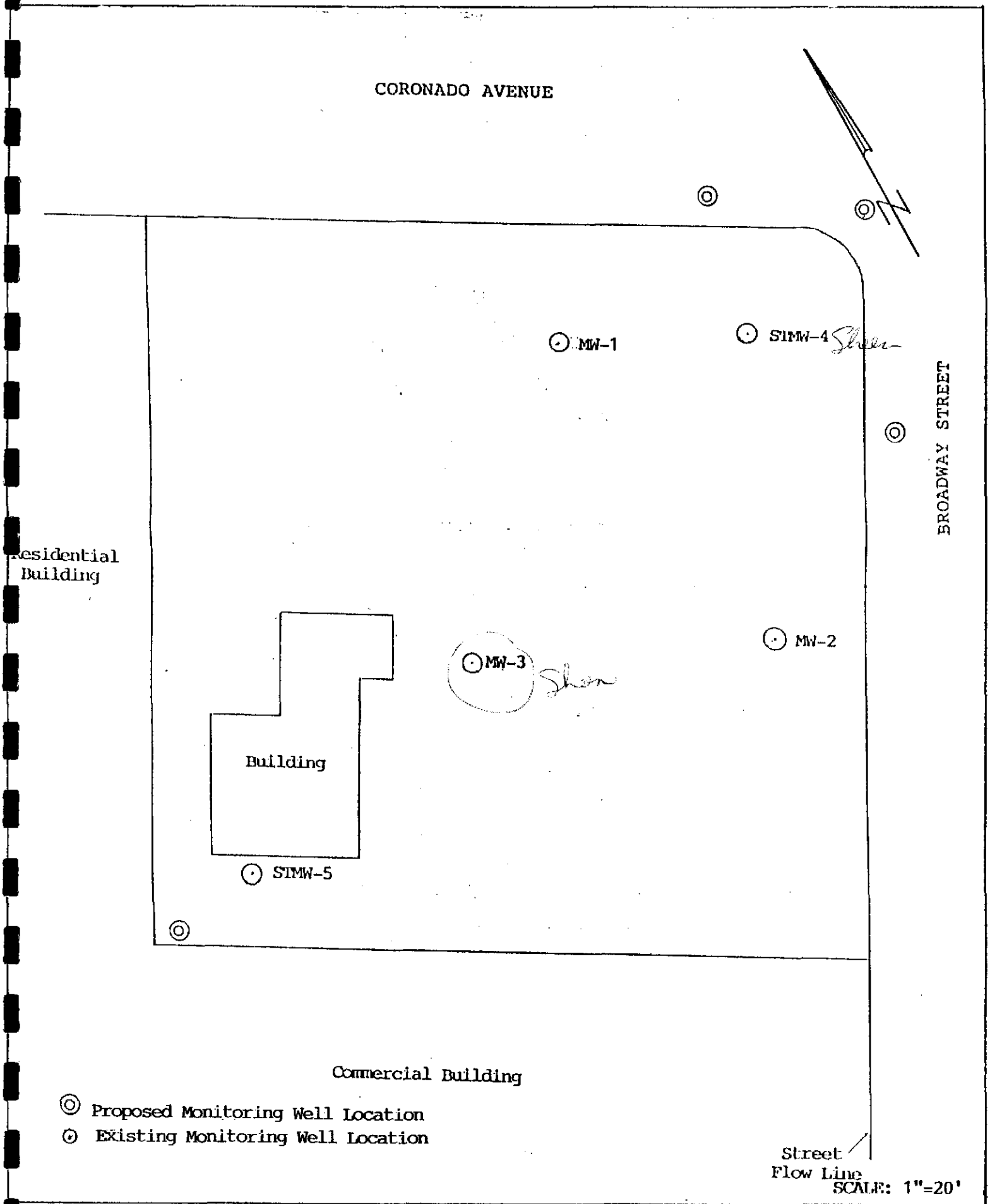


Figure 2

M2

SOIL TECH ENGINEERING, INC.

File No. 8-90-420-GI

DRILLING AND SOIL SAMPLING PROCEDURE

A truck-mounted drill rig, using a continuous, solid-flight, hollow stem auger will be used in drilling soil borings to the desired depths.

Prior to drilling, all drilling equipment (i.e. auger, pin, and drilling head) will be thoroughly steam-cleaned to minimize the possibility of cross-contamination and/or vertical migration of possible contaminants.

In addition, prior to obtaining each individual soil sample, all sampling tools, including the split-spoon sampler and brass liners will be thoroughly washed in a Tri-Sodium Phosphate (TSP) solution followed by a rinse in distilled water.

During the drilling operation, relatively undisturbed soil samples will be taken from the required depth by forcing a 2-inch I.D., split-spoon sampler insert with a brass liner into the ground by means of a 140-lb. hammer, falling 30-inches or by hydraulic forces, at various depths.

The samplers will contain relatively undisturbed soil. In general, the first section of soil from the sampler (shoe) will be used in the field for lithologic inspection and evidence of contamination. The selected brass liner will be immediately trimmed, and the ends of the brass liner will be covered tightly

with aluminum foil and plastic caps, sealed with tape, labeled, placed in a plastic bag and store in an ice chest on blue ice in order to minimize the escape of any volatiles present in the samples. Soil samples for analysis are subsequently sent to a State Certified Hazardous Waste Laboratory accompanied by a chain-of-custody record.

Soil samples collected at each sampling interval will be inspected for possible contamination (odor or peculiar colors). Soil vapor concentrations are measured in the field by using Photoionization Detector (PID), PhotoVac-Tip Air Analyzer. The purpose of this field analysis is to qualitatively determine the presence or absence of hydrocarbons and to establish which soil samples will be analyzed at the laboratory. The soil sample is sealed in a zip-lock plastic bag and placed in the sun to enhance volatilization of the hydrocarbons from the sample. The data is recorded on the drilling log at the depth corresponding to the sampling point.

Other soil samples may be collected to document the stratigraphy and estimate relative permeability of the subsurface materials.

Soil tailings obtained during drilling will be stored on-site in steel drums, pending the analytical test results, for proper disposal.

SOIL TECH ENGINEERING
Soil, Foundation and Geological Engineers
290 DROKAW ROAD, SANTA CLARA, CA 95050 ■ (408)496-0265 ■ (408)496-0266

File No. _____

Date _____

By _____

Job _____

Site Description _____ (continued on reverse side)

Type of Drill Rig _____ Hole Diameter _____

(NOTE WATER LEVEL, TIME, DATE AT END OF LOG, CAVING, ETC...)

Elevation _____ Datum _____

Sample Quality	Blows/6 inches	Sample Loc.	Sample Number	Depth	Soil Characterization	Penetrometer
				1		
				2		
				3		
				4		
				5		
				6		
				7		
				8		
				9		
				0		
				1		
				2		
				3		
				4		
				5		
				6		
				7		
				8		SOP3
				9		

File No. 8-90-420-GI

MONITORING WELL INSTALLATION

Prior to well installation, all the necessary permits will be obtained from the local regulatory agencies.

The boreholes for monitor wells are drilled with the diameter at least two inches larger than the casing outside diameter (O.D.).

Monitor wells will be cased with threaded factory perforated and blank, schedule 40 P.V.C. The perforated interval consists of slotted casing, generally 0.010 to 0.040 inch wide by 1.5 inch long slots, with 42 slots per foot (slots which match formation grain size as determined by field grain-size distribution analysis), a P.V.C. cap is fastened to the bottom of the casing (no solvents, adhesive, or cements are used). The well casing is thoroughly washed and steam-cleaned.

After setting the casing inside the borehole, kiln dried sand or gravel filter-material is poured into the annular space from the bottom of the boring to 2 feet above the perforated interval. A 1 to 2-feet thick bentonite plug will be placed above this filter material to prevent grout infiltration into the filter material. Approximately 1 to 2 gallons of distilled water will be added to hydrate the bentonite pellets. The well is then sealed from the top of the bentonite seal to the surface with concrete or neat cement (containing about 5% bentonite) (see Well Construction Detail).

For protection from vandalism and surface water contamination, Christy boxes with a special type of Allen screw are installed around the well head, (for wells in parking lots, drive-ways and building areas). Steel stovepipes with padlocks are usually set over well heads in landscaped areas.

In general, groundwater monitoring wells shall extend to the base of the upper aquifer, as defined by the consistent (less than 5 feet thick) clay layer below the upper aquifer, or at least 10 to 15 feet below the top of the upper aquifer, whichever is shallower. The wells shall not extend through the laterally extensive clay layer below the upper aquifer. The wells shall be terminated 1 foot to 2 feet into such a clay layer.

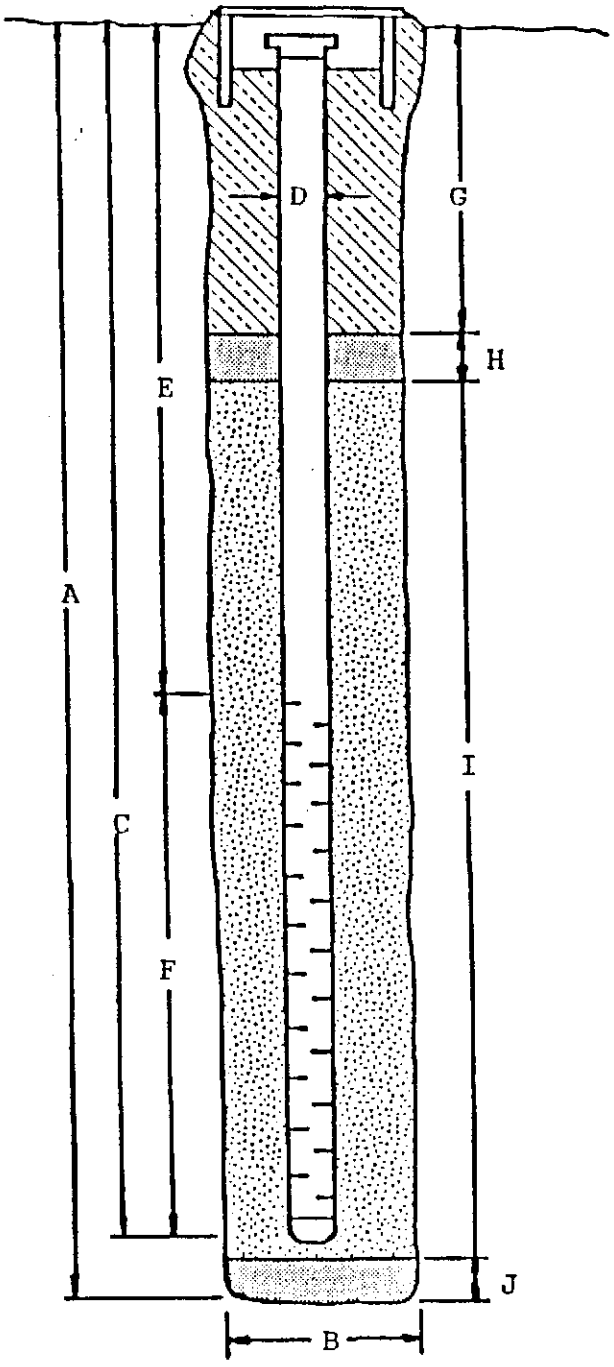
WELL DETAILS

PROJECT NAME:_____ BORING/WELL NO._____

PROJECT NUMBER:_____ CASING ELEVATION:_____

WELL PERMIT NO.:_____ SURFACE ELEVATION:_____

G-5 Vault Box



A. Total Depth:_____

B. Boring Diameter:_____

Drilling method:_____

C. Casing Length:_____

Material:_____

D. Casing Diameter:_____

E. Depth to Perforations:_____

F. Perforated Length:_____

Perforated Interval:_____

Perforation Type:_____

Perforation Size:_____

G. Surface Seal:_____

Seal Material:_____

H. Seal:_____

Seal Material:_____

I. Gravel Pack:_____

Pack Material:_____

Size:_____

J. Bottom Seal:_____

Seal Material:_____

File No. 8-90-420-GI

WELL DEVELOPMENT AND WATER LEVEL MEASUREMENTS

For all newly-installed groundwater monitoring wells, the well casing, filter pack and adjacent formation shall be cleared of disturbed sediment and water.

Well development techniques will include pumping, bailing, surging, swabbing, jetting, flushing and air lifting by using a stainless steel or Teflon bailer, submersible stainless steel pump, or air lift pump. The well development will continue until the groundwater appears to be relatively free of fine-grained sediments and/or until field measurements of pH, electrical conductivity and temperature stabilize.

To assure that cross-contamination does not occur between wells, all well development tools be thoroughly washed in a Tri-Sodium Phosphate (TSP) solution followed by a rinse in distilled water or steam-cleaned before each well development.

Subsequent to well installation, the well(s) will be surveyed to the nearest benchmark to an accuracy of 0.01 feet, in order to accurately measure the groundwater elevation. The depth to the static water surface in all wells will be measured monthly.

SOIL TECH ENGINEERING

Soil, Foundation and Geological Engineers

298 BROKAW ROAD, SANTA CLARA, CA 95050 ■ (408) 496-0265 OR (408) 496-0266

FILE NO.: _____ WELL NO.: _____

DATE: _____ SAMPLER: _____

DEPTH TO WELL: _____ 1 WELL VOLUME: _____

DEPTH TO WATER: _____ 5 WELL VOLUMES: _____

HEIGHT OF WATER COLUMN: _____ ACTUAL PURGED VOLUME: _____

CASING DIAMETER: _____ 2" _____ 4"

CALCULATIONS:

2" - x 0.1632 _____

4" - 0.653 _____

PURGE METHOD: _____ BAILER _____ DISPLACEMENT PUMP _____ OTHER

SAMPLE METHOD: _____ BAILER _____ OTHER

SHEEN: _____ NO _____ YES, DESCRIBE: _____

ODOR: _____ NO _____ YES, DESCRIBE: _____

FIELD MEASUREMENTS

TIME	VOLUME	pH	TEMP.	E.C.

File No. 8-90-420-GI

GROUNDWATER SAMPLING

Prior to collection of groundwater samples, all of the sampling equipment (i.e. bailer, cables, bladder pump, discharge lines and etc...) are cleaned by pumping TSP water solution followed by distilled water.

Prior to purging the well, "Water Sampling Field Survey Forms" will be filled out (depth to water level and total depth of well and well casing volume calculated). The well will be then bailed or pumped to remove four to ten well-volumes or until the discharged water temperature, conductivity and pH stabilize. "Stabilized" is defined as three consecutive readings within 15% of one another.

The groundwater sample will be collected when the water level in the well recovers to 80% of its static level.

Forty milliliter (ml.) glass Volatile Organic Analysis (VOA) vials with Teflon septa will be used as sample containers. The groundwater sample will be decanted into each VOA vial in such a manner that no air space is present. The cap is quickly placed over the top of the vial and securely tightened. The groundwater sample will be labeled and refrigerated for delivery with proper chain-of-custody to the laboratory. Chain-of-custody information should include a sample identification number, job identification number, date, time, type of analysis requested, and the sampler's name.

In general, a laboratory-cleaned bailer will be used for each monitoring well sampled.

SOIL TECH ENGINEERING

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WELL MONITORING/SAMPLING

Name:_____ Date:_____

FACILITY NAME AND ADDRESS:_____

_____

DATE WELLS DEVELOPED:_____

FIELD ACTIVITIES

DEVELOPING	MONITORING		PURGING (PUMP/BAIL)			SAMPLING	
WELL NUMBER	WELL DEPTH	WATER DEPTH	PRODUCT THICKNESS	SHEEN PRESENCE	ODOR	VOLUME WATER	PURGED PRODUCT

SKETCH -- REMARKS

Volume of Water in Casing or Hole

Diameter of Casing or Hole (In)	Gallons per foot of Depth	Cubic Feet per Foot of Depth	Liters per Meter of Depth	Cubic Meters per Meter of Depth
1	0.041	0.0055	0.509	0.509×10^{-3}
1½	0.092	0.0123	1.142	1.142×10^{-3}
2	0.163	0.0218	2.024	2.024×10^{-3}
2½	0.255	0.0341	3.167	3.167×10^{-3}
3	0.367	0.0491	4.558	4.558×10^{-3}
3½	0.500	0.0668	6.209	6.209×10^{-3}
4	0.653	0.0873	8.110	8.110×10^{-3}
4½	0.826	0.1104	10.26	10.26×10^{-3}
5	1.020	0.1364	12.67	12.67×10^{-3}
5½	1.234	0.1650	15.33	15.33×10^{-3}
6	1.469	0.1963	18.24	18.24×10^{-3}
7	2.000	0.2673	24.84	24.84×10^{3}
8	2.611	0.3491	32.43	32.43×10^{3}
9	3.305	0.4418	41.04	41.04×10^{3}
10	4.080	0.5454	50.67	50.67×10^{3}
11	4.937	0.6600	61.31	61.31×10^{3}
12	5.875	0.7854	72.96	72.96×10^{3}
14	8.000	1.069	99.35	99.35×10^{3}
16	10.44	1.396	129.65	129.65×10^{3}
18	13.22	1.767	164.18	164.18×10^{3}
20	16.32	2.182	202.68	202.68×10^{3}
22	19.75	2.640	245.28	245.28×10^{3}
24	23.50	3.142	291.85	291.85×10^{3}
26	27.58	3.687	342.52	342.52×10^{3}
28	32.00	4.276	397.41	397.41×10^{3}
30	36.72	4.909	456.02	456.02×10^{3}
32	41.78	5.585	518.87	518.87×10^{3}
34	47.16	6.305	585.68	585.68×10^{3}
36	52.88	7.069	656.72	656.72×10^{3}

1 Gallon = 3.785 Liters
1 Meter = 3.281 Feet
1 Gallon Water Weighs 8.33 lbs. = 3.785 Kilograms
1 Liter Water Weighs 1 Kilogram = 2.205 lbs.
1 Gallon per foot of depth = 12.419 liters per foot of depth
1 Gallon per meter of depth = 12.419×10^{3} cubic meters per meter of depth

From Groundwater and Wells, Second Edition

CHAIN OF CUSTODY RECORD

PROJ. NO.	NAME
SAMPLERS. *(Signature)*	

NO.	DATE	TIME	SOIL	WATER	LOCATION	CONTAINER	ANALYSES REQUESTED (2)	REMARKS

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Receive by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

SOP12

SOIL TECH ENGINEERING

Soil, Foundation and Geological Engineers

[redacted]29[redacted]OKA[redacted]AD, [redacted]TA [redacted]RA, [redacted]95050 [redacted] (408) 866-0910 [redacted] (415) 791-6406

Sample Type: Soils, Oils, Solvents, Polids, Highly Contaminated Liquids (c)

General Composition	Sample Volume	Sample Container	Preservative	Holding Time (recommended/regulatory)
Weak Acids and Bases		plastic or glass		
Photosensitive materials		amber glass		
Volatile organics		40 ml glass vial with TFE lined septum		
Non-volatile organics		glass with TFE lined cap		
Measurement - General Chemical Categories, Inorganic				
Inorganics, general		plastic or glass		
Metals, total		plastic or glass		
Measurement - General Chemical Categories, Organic				
Acid extractables		glass with TFE lined cap		
Base/neutral extractables		glass with TFE lined cap		
Measurement Specific Chemicals - Inorganic				
Hydrofluoric acid		plastic		
Phosphoric acid		plastic		

SAMPLE MANAGEMENT

Sample Type: Waste

General Composition	Sample Volume	Sample Container	Preservative	Holding Time (d) (recommended/regulatory)
Measurement - Specific Chemicals, Inorganic				
Ammonia			add 1 ml conc H_3PO_4	24 hrs
Arsenic			add 6 ml conc HNO_3/L	6 months
Chlorine			cool 4°C	24 hrs
Chromium VI			add 6 ml conc H_2SO_4/L	24 Hrs
Cyanide, total			add 2.5 ml of 50% NaOH/L, cool 4°C	24 hrs
Fluoride			cool 4°C	7 days
Mercury, total			add 5 ml conc HNO_3L	38 days
Mercury, dissolved			filter, add 5 ml conc HNO_3/L	38 days
Selenius			add 5 ml conc HNO_3/L	6 months
Sulfide			add 2 ml conc HC1/1	24 hrs
Zinc			add 2 ml conc HC1/1	-

Sample Type: Soils, Oils, Solvents, Solids, Highly Contaminated Liquids (c)

Strong acids, pH<2	glass
Strong bases, pH>12.5	plastic

Sample Type: Water and Wastewater

General Composition	Sample Volume	Sample Container	Preservative	Holding Time (d) (recommended/regulatory)
Sulfate	50 ml	plastic or glass	cool 4°C	7 days/28 days
Sulfide	500 ml	plastic or glass	cool 4°C, add 4 drops 2N Zn acetate/100 ml	24 hrs/28 days
Sulfite	50 ml	plastic or glass	determine on site	no holding
Measurement - Specific Chemicals, Organic				
NTA	50 ml	plastic or glass waterline & center	cool 4°C	24 hrs
Measurement - Physical Properties				
Acidity			cool 4°C	24 hrs
Alkalinity			cool 4°C	24 hrs
pH			determine on site	6 hrs
			cool 4°C	
Measurement - General Chemical Categories, Inorganic				
Metals, dissolved			filter on site, add 5 ml conc HNO_3/L	6 months
Metals, total			add 5 ml conc HNO_3/L	6 months
Measurement - General Chemical Categories, Organic				
Phenolics			add H_3PO_4 to pH 4 and 1 g $CuSO_4$/L, cool 4°C	24 hrs

Sample Type: Water and Wastewater

General Composition	Sample Volume	Sample Container	Preservative	Holding Time (d) (recommended/regulatory)
Measurements - Specific Chemicals, Inorganic				
Ammonium	500 ml	plastic or glass	cool, 4°C, add H_2SO_4 to pH<2	24 hr/28 days
Boron	100 ml	plastic	none required	28 days/28 days
Chlorine	200 ml	plastic or glass	determine on site	no holding
Chromium VI	300 ml	plastic or glass, rinse with 1:1 HNO_3	cool, 4°C	24 hrs/28 days
Cyanide, total	500 ml	plastic or glass add NaOH to pH>12	cool, 4°C, dark	24 hrs/14 days
Cyanide, amenable to chlorination	50 ml	plastic or glass	add 100 mg NaS_2O_3	
Fluoride	300 ml	plastic	none required	7 days/28 days
Iodide	100 ml	plastic or glass	cool, 4°C	24 hrs/ -
Iodine	500 ml	plastic or glass	determine on site	1/2 hr/ -
Mercury, total	500 ml	plastic or glass rinsed with 1:1 HNO_3	cool, 4°C add HNO_3 to pH<2	28 days/28 days
Mercury, dissolved	100 ml	plastic or glass	filter on site add HNO_3 to pH<1	glass: 38 days hard plastic: 13 days
Nitrate	100 ml	plastic or glass	cool, 4°C add H_2SO_4 to pH<2	24 hrs/48 hrs
Nitrate & nitrate	200 ml	plastic or glass	cool, 4°C add H_2SO_4	24 hrs/28 days
Nitrate	100 ml	plastic or glass	cool, 4°C or freeze	

SAMPLE MANAGEMENT

Sample Type: Water and Wastewater

General Composition	Sample Volume	Sample Container	Preservative	Holding Time (d) (recommended/regulatory)
Measurement - General Chemical Categories, Organic				
Acid extractables		2 liter glass with TFE lined cap		
Base/neutral extractable		2 liter glass with TFE lined cap		
MBA's	250 ml	plastic or glass	cool, 4°C	24 hr
Oil and Grease	1000 ml	glass, wide mouthed, calibrated	cool, 4°C, H_2SO_4 to pH<2	24 hr/28 days 24 hr/28 days
Organics		glass rinsed with organic solvents, TFE cap		
Phenolics	500 ml	glass		24 hr/28 days
Purgeables by purge and trap	50 ml	glass, TFE lined cap		

Sample Type: Water and Wastewater (a,b,c)

General Composition	Sample Volume	Sample Container	Preservative	Holdin Time (d) (recommended/regulatory)
Nonvolatile organics		2 liter glass with TFE lined cap		
Photosensitive materials		1 liter amber glass		
Volatile organics		40 ml glass vial with TFE lined cap (collect in duplicate)		
Volatile	100 ml	Plastic or glass	cool, 4°C	7 days
Measurement - Physical Properties				
Acidity	100 ml	plastic or borosilicate glass	cool, 4°C	24 hr/14/days
Alkalinity	200 ml	plastic or glass	cool, 4°C	24 hr/14/days
pH	25 ml	plastic or glass	determine on site	2 hr/2 hr
Temperature	1000 ml	plastic or glass	determine on site	no holding
Measurement - General Chemical Categories, Inorganic				
metals, dissolved	200 ml	plastic(g) or glass	filter on site (f)	6 mos (e)
metals, total	100 ml	plastic(g) or glass rinsed with 1:1 HNO_3	HNO_3 to pH<2 (g)	6 mos/6 mos (e)

SOIL TECH ENGINEERING

Soil, Foundation and Geological Engineers

298 BROKAW ROAD, SANTA CLARA, CA 95050 ■ (408) 866-0919 ■ (415) 791-6406

GENERAL FORMAT
SOIL SAMPLING FOR DISPOSAL
and/or
SITE SUPERVISION

REPRESENTATIVE_____ DATE_____

FACILITY NAME AND ADDRESS_____

_____

FACILITY CONTACT/ENGINEER:_____ PHONE:(___)_____

DEALER/OWNER :_____ PHONE:(___)_____

CONTRACTOR :_____ PHONE:(___)_____

FIRE DEPARTMENT :_____ PHONE:(___)_____

COUNTY HEALTH DEPARTMENT :_____ PHONE:(___)_____

STATE AGENCY :_____ PHONE:(___)_____

SOIL DESCRIPTION(Circle one): SANDY SILTY CLAY SANDY/CLAY SILTY/SAND

ODOR DESCRIPTION (Circle one): NONE FAINT MINOR STRONG

SOIL SAMPLING

NUMBER OF COMPOSITE SAMPLES:_____DEPTH SAMPLES TAKEN AT:_____(FT)

NUMBER OF SAMPLES PER COMPOSITE:_____

SITE SUPERVISION

AERATION: DATE PERMISSION OBTAINED FROM BAAQMD:_____

TOTAL VOLUME OF SOIL TO BE AERATED :_____cu.yds.

VOLUME OF SOIL AERATED ON THIS DATE :_____cu.yds.

EXCAVATION: DESCRIBE PURPOSE:_____

_____

_____

APPROXIMATE VOLUME OF SOIL EXCAVATED:_____cu.yds.

_____

REMARKS:_____

_____

_____

File No. 8-90-420-GI

OUTLINE OF DRUM HANDLING PROCEDURES FOR THE PROPERTY LOCATED AT 5175 BROADWAY STREET OAKLAND, CALIFORNIA

1. Test material per site-specific test requirements.

2. Classify Material as: Clean/Non-Hazardous.

3. Labeling of Drums:

   * Pending Label: Used to describe material pending final analytical testing. Labels must be immediately affixed to drum during field work.

   * Non-Hazardous Label: Required within 24 hours after analytical results are received.

   * Hazardous Label: Required within 24 hours after analytical results are received.

   * For Pick-Up Label: Must be affixed to drum prior to arranged pick-up date by certified hauler.

4. Remove within 21 days of generation. Empty drums, where material was disposed in bulk, must be removed the same day they are emptied.

5. Disposal of Material:

   * Clean: Any local landfill.

   * Non-Hazardous: Class III landfill.

   * Hazardous: Class I landfill.

6. Manifests may be signed by the on-site contractor or consultant, owner, or other authorized representatives. The transporter should not sign the manifest.

   It is the responsibility of the contractor, consultant and owner to arrange for a person to sign the manifest on the day of pick-up.

7. Reporting:

   Reports shall include the following:

   * Completed soil and water worksheets.

   * Copy of the analytical results.

   * State how and where material was disposed.

   * If drums are emptied and material was disposed of in bulk, state how empty drums were handled.

   * The signed blue and yellow copies of the hazardous waste manifest.

SOIL:

1. Test Requirements and Methods: Per STE site-specific test requirements.

   * TPH: EPA Method 8015.

   * BTEX: EPA Method 8020.

   * O&G: 503 D&E.

   * Lead:

     -Total Lead - EPA Method 7421.

-Inorganic (soluble) Lead: DOS Title 22, Waste Extraction Test, §22-66700.

-Organic - EPA Method 8240.

* Ignitable:

2. Classification:

* Clean: TPH, BTEX, O&G, VOC and non-detectable (<100 ppm).

* Non-Hazardous if any are true:

-TPH less than 1,000 ppm.

-Lead - Inorganic (soluble) Lead less than 5 ppm (STLC) or less than 100 ppm (TTLC).
- Organic Lead less than 13 ppm (TTLC).

* Hazardous if any are true:

-TPH greater than 1,000 ppm.

-Lead - Inorganic (soluble) Lead greater than 5 ppm (STLC) or greater than 1,000 ppm (TTLC).
- Organic Lead greater than 13 ppm (TTLC).

-Ignitable - If TPH > 1,000 ppm, then conduct Bunsen Burner Test.
- If soil bums vigorously and persistently, soils are RCRA D001.

* VOC - less than 1,000 ppm.

3. Responsibility for Disposal:

* Clean: Consultant, contractor or owner.

* Non-Hazardous: Consultant, contractor or owner.

4. Types of Drums: DOT-17H for a solid, solidified, or sludge material.

5. Disposal Facility:

   * Clean: Any local landfill.

   * Non-Hazardous: Class III or II landfill.

   * Hazardous: Class I landfill.

WATER:

1. Test Requirements and Methods: Per site-specific test requirements.

   * TPH: EPA Method 8015.

   * BTEX: EPA Method 602.

2. Classification:

   * Clean Water: TPH and BTEX non-detectable.

   * Hazardous:

     -Water with dissolved product and detectable TPH and BTEX.

     -Water with free product.

     -Free product only.

3. Responsibility for Disposal:

   * Clean: Consultant/Contractor.

   * Non-Hazardous: Consultant, contractor or owner.

4. Types of Drums: DOT-17C or DOT-17E for liquid or slurry.

5. Disposal Facility:

* Clean Water: Into sanitary sewer per Local Sewer District approval or into storm sewer with proper approval from Water Board.

* Non-Hazardous:

  -Water with TPH and BTEX only.

  -Water with free product.

  -Arrange certified waste hauler to pick and dispose.

* Hazardous:

  -Free product only.

  -Arrange disposal by a certified hazardous waste hauler.

File No. 8-90-420-GI

HEALTH AND SAFETY PLAN
FOR THE PROPERTY
LOCATED AT 5175 BROADWAY STREET
OAKLAND, CALIFORNIA

General:

This Health and Safety Plan (HSP) contains the minimum requirements for the subject site field work. The field activities include drilling, soil sampling and water sampling. All personnel and contractors will be required to strictly adhere with this HSP requirements.

The objective of the HSP plan is to describe procedures and actions to protect the worker, as well as unauthorized person, from inhalation and ingestion of, and direct skin contact with potentially hazardous materials that may be encountered at the site. The plan describes (1) personnel responsibilities and (2) protective equipment to be used as deemed when working on the site. At a minimum, all personnel working at the site must read and understand the requirements of this HSP. A copy of this HSP will be on-site, easily accessible to all staff and government field representative.

Hazard Assessment:

The major contaminants expected to be encountered on the project are gasoline and its hydrocarbon constituents. The anti-

cipated contaminants and their exposure standards are listed in Table 1. It is not anticipated that the potential levels of exposure will reach the permissible exposure limits (PEL) or threshold limit values (TLV). Inhalation and dermal contact are the potential exposure pathways. Protective clothing will be mandatory for field personnel specified in this Plan. In addition, respiratory protective devices are required to be worn by each person on-site or to be within easy reach should irritating odors be detected or irritation of the respiratory tract occur.

TABLE 1
EXPOSURE LIMITS OF ANTICIPATED CHEMICAL CONTAMINANTS IN PARTS PER MILLION (ppm)

Contaminant	PEL	EL	ED	CL	TWA	STEL
Benzene* [skin] & [carc]	1	---	--------	---	10	5
Ethylbenzene	100	---	--------	---	100	125
Toluene [skin]	100	200	10 min per 8 hours	500	100	150
Xylene (o, m, & p isomers) [skin]	100	200	30 min per 8 hours	300	100	150

PEL - permissible exposure limit: 8 hours, time-weighted average, California Occupational Safety and Health Administration Standard (CAL-OSHA).

EL - excursion limit: maximum concentration of an airborne contaminant to which an employee may be exposed without regard to duration provided the 8 hours time-weighted average for PEL is not exceeded (CAL-OSHA).

ED - excursion duration: maximum time period permitted for an exposure above the excursion limit but not exceeding the ceiling limit (CAL-OSHA).

CL - Ceiling limit: maximum concentration of airborne contaminant which employees may be exposed permitted (CAL-OSHA).

TWA - time-weighted average: 8 hours, [same as threshold limit value (TLV)], American Conference of Governmental Industrial Hygienists (ACGIH).

STEL - short-term exposure limit: 15 minutes time-weighted average (ACGIH).

[carc] - substance identified as a suspected or confirmed carcinogen.

[skin] - substance may be absorbed into the bloodstream through the skin, mucous membranes or eyes.

* - Federal OSHA benzene limits given for PEL and STEL; STEL has a 50 minutes duration limit.

A brief description of the physical characteristics, incompatibilities, toxic effects, routes of entry and target organs has been summarized from the NIOSH Pocket Guide to Chemical Hazards for the contaminants anticipated to be encountered. This information is used in on-site safety meetings to alert personnel to the hazards associated with the expected contaminants.

Benzene:

Benzene is a colorless, aromatic liquid. Benzene may create an explosion hazard. Benzene is incompatible with strong oxidizers, chlorine, and bromine with iron. Benzene is irritating to the eyes, nose and respiratory system. Prolonged exposure may result in giddiness, headache, nausea, staggering gait, fatigue, bone marrow depression or abdominal pain. Routes of entry include inhalation, absorption, ingestion and skin or eye contact. The target organs are blood, the central nervous system (CNS), skin, bone marrow, eyes and respiratory system. Benzene is carcinogenic.

Ethylbenzene:

Ethylbenzene is a colorless, aromatic liquid. Ethylbenzene may create an explosion hazard. Ethylbenzene is incompatible with strong oxidizers. Ethylbenzene is irritating to the eyes and mucous membranes. Prolonged exposure may result in headache, dermatitis, narcosis or coma. Routes of entry include inhalation, ingestion and skin or eye contact. The target organs are the eyes, upper respiratory system, skin and the CNS.

Toluene:

Toluene is a colorless, aromatic liquid. Toluene may create an explosion hazard. Toluene is incompatible with strong oxidizers. Prolonged exposure may result in fatigue, confusion, euphoria, dizziness, headache, dilation of pupils, lacrimation,

insomnia, dermatitis or photophobia. Routes of entry are inhalation, absorption, ingestion and skin or eye contact. The target organs are the CNS, liver, kidneys and skin.

Xylene Isomers:

Xylene is a colorless, aromatic liquid. Xylene may create an explosion hazard. Xylene is incompatible with strong oxidizers. Xylene is irritating to the eyes, nose and throat. Prolonged exposure may result in dizziness, excitement, drowsiness, staggering gait, corneal vacuolization, vomiting, abdominal pain or dermatitis. Routes of entry are inhalation, absorption, ingestion and skin or eye contact. The target organs are the CNS, eyes, gastrointestinal tract, blood, liver, kidneys and skin.

General Project Safety Responsibilities:

Key personnel directly involved in the investigation will be responsible for monitoring the implementation of safe work practices and the provisions of this plan are (1) the drilling project supervisor and (2) Soil Tech Engineering, Inc. (STE) project field engineer. These personnel are responsible for knowing the provisions of the plan, communicating plan requirements to workers under their supervision and regulatory agencies inspectors and for enforcing the plan.

The personnel-protective equipment will be selected to prevent field personnel from exposure to fuel hydrocarbons that may be present at the site. To prevent direct skin contact, the following protective clothing will be worn as appropriate while working at the site:

1. Tyvek coveralls.
2. Butyl rubber or disposable vinyl gloves.
3. Hard hat with optional face shield.
4. Steel toe boots.
5. Goggles or safety glasses.

The type of gloves used will be determined by the type of work being performed. Drilling personnel will be required to wear butyl rubber gloves because they may have long duration contact with the subsurface materials. STE sampling staff will wear disposable gloves when handling any sample. These gloves will be charged between each sample.

Personnel protective equipment shall be put on before entering the immediate work area. The sleeves of the overalls shall be outside of the cuffs of the gloves to facilitate removal of clothing with the least potential contamination of personnel. If at any time protective clothing (coveralls, boots or gloves) become torn, wet or excessively soiled, it will be replaced immediately.

Total organic vapors will be monitored at the site with a portable PID. Should the total organic vapor content approach that of the threshold limit value (TLV) for any of the substances listed in Table 1, appropriate safety measures will be implemented under the supervision of the site project engineer. These precautions include, but are not limited to, the following: (1) Donning of respirators (with appropriate cartridges) by site personnel, (2) forced ventilation of the site, (3) shutdown of work until such time as appropriate safety measures sufficient to insure the health and safety of site personnel can be implemented.

No eating, drinking or smoking will be allowed in the vicinity of the drilling operations. STE will designate a separate area on site for eating and drinking. Smoking will not allowed at the vicinity of the site except in designated areas. No contact lenses will be worn by field personnel.

WORK ZONES AND SECURITY MEASURES:

The Project Engineer will call Underground Service Alert (USA) and the utilities will be marked before any drilling is conducted on-site, and the borings will be drilled at safe distances from the utilities. The client will also be advised to have a representative on-site to advise us in selecting locations of borings with respect to utilities or underground structures. Soil Tech Engineering, Inc. assumes no responsibility to utilities not so located. The first 5 feet will be hand augered before any drilling equipment is operated.

Each of the areas where the borings will be drilled will be designated as Exclusion Zones. Only essential personnel will be allowed into an Exclusion Zone. When it is practical and local topography allows, approximately 25 to 75 feet of space surrounding those Exclusion Zones will be designated as Contamination Reduction Zones.

Cones, wooden barricades or a suitable alternative will be used to deny public access to these Contamination Reduction Zones. The general public will not be allowed close to the work area under any conditions. If for any reason the safety of a member of the public (e.g. motorist or pedestrian) may be endangered, work will cease until the situation is remedied. Cones and warning signs will be used when necessary to redirect motorists or pedestrians.

Location and Phone Numbers of Emergency Facilities:

For emergency reasons, the closest facilities addresses and phone numbers are listed below:

Oakland Fire Department 911

Kaiser Permanente (510) 596-1000
280 West MacArthur Blvd., Oakland, CA

Additional Contingency Telephone Numbers:

Poison Control Center . . . . . (800) 523-2222

Soil Tech Engineering Administrative Office . . . . (408) 496-0265

CHEMTREC . . . . . (800) 424-9300

Note: Only call CHEMTREC stands for Chemical Transportation Emergency Center, a public service of the Chemical Manufacturer's Association. CHEMTREC can usually provide hazard information, warnings and guidance when given the identification number or the name of the product and the nature of the problem. CHEMTREC can also contact the appropriate experts.

This Site Safety Plan has been reviewed by the project engineer, STE field personnel and all subcontractors.

Amendments or modifications to this Plan may be written on a separate page and attached to this Plan. Any amendments or modifications must be reviewed and approved by the personnel name above.

File No. 8-90-420-GI

TYPES OF PROTECTIVE CLOTHING AND RESPIRATION THAT SHOULD BE USED AT HAZARDOUS WASTE SITES LOCATED AT 5175 BROADWAY STREET OAKLAND, CALIFORNIA

The degree of hazard is based on the waste material's physical, chemical, and biological properties and anticipated concentrations of the waste. The level of protective clothing and equipment worn must be sufficient to safeguard the individual. A four category system is described below.

LEVEL A

Level A consists of a pressure-demand SCBA (air supplying respirator with back mounted cylinders), fully encapsulated resistant suit, inner and outer chemical resistant gloves, chemical resistant steel safety boots (toe, shank, and metatarsal protection), and hard hat. Optional equipment might include cooling systems, abrasive resistant gloves, disposable oversuit and boot covers, communication equipment, and safety line. Level A is worn when the highest level of respiratory, skin, and eye protection is required. Most samplers will never wear Level A protection.

LEVEL B

Level B protection is utilized in areas where full respiratory protection is warranted, but a lower level of skin and eye protection is sufficient (only a small area of head and neck is exposed). Level B consists of SCBA, splash suit (one or two piece) or disposable chemical resistant coveralls, inner and outer chemical resistant gloves, chemical resistant safety boots, and hard hat with face shield. Optional items include glove and boot covers and inner chemical resistant fabric coveralls.

LEVEL C

Level C permits the utilization of air-purifying respirators. Level B body, foot, and hand protection is normally maintained. Many organizations will permit only the use of approved full-face masks equipped with a chin or harness-mounted canister. However, many sites are visited by personnel wearing a half-mask cartridge respirator.

LEVEL D

Level D protection consists of a standard work uniform of coveralls, gloves, safety shoes or boots, hard hat, and goggles or safety glasses.

Two basic types of respirators are air-purifying and air-supplying. Air-purifying respirators are designed to remove specific contaminants by means of filters and/or sorbents. Air-purifying respirators come in various sizes, shapes, and models and can be outfitted with a variety of filters, cartridges, and canisters. Each mask and cartridge or canister is designed for protection against certain contaminant concentrations. Just because a cartridge says it is for use against organic vapors does not mean that it is good for all organic vapors.

Air-supplying respirators are utilized in oxygen-deficient atmospheres (less than 19.5 percent) or when an air-purifying device is not sufficient. Air is supplied to a face-mask from an uncontaminated source of air via and air line from stationary tanks, from a compressor, or from air cylinders worn on the back (SCBA). Rated capacities of the SCBA's are normally between 30 and 60 minutes. Only positive pressure (pressure demand) respirators should be used in high concentration hazardous environments.

Respirators often malfunction during cold weather or after continued use. Only NIOSH (National Institute for Occupational Safety and Health) MSHA (Mine Safety and Health Administration) approved respirators should be used.

Contact lenses are not permitted for use with any respirator. Contact lenses should not be worn at any site since they tend to concentrate organic materials around the eyes; soft plastic contact

lenses can absorb chemicals directly. In addition, rapid removal of contact lenses may be difficult in an emergency. Since eye glasses can prevent a good seal around the temple when wearing goggles or full face masks, spectacle adapters are available for masks and goggles.