Noted E. P. SO. FEB 5 1992

AQUA DUCT PLUMBING
22415 FLAGG STREET
P.O. BOX 741
HAYWARD, CA 94541

PH: (415)537-4044

FAX: (415)537-7955

Site Add = 3045 Telegraph Ave
Site Name = Lawrence Orthopedic Property

STATUS = 3A
Date 3A = 1/31/92.
1/31/92 D10 = UST
LD = L. MSL = 210 ppm TpHg

SUBJECT 3045 Telegraph Ave

DATE: _____

TO: Regional Water Quality

COMPANY: _____

FROM: Nicholas

PAGES TO FOLLOW: _____

MESSAGE: Gentlemen - Please pass copy to whomever else is required -

Thank you

Nicholas D Kaufman

IF YOU HAVE NOT RECEIVED ALL PAGES OR IF FAX IS ILLEGIBLE, PLEASE CALL (415)537-4044. THANK YOU!
PERSON TRANSMITTING FAX: _____

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

November 1, 1991

File No. 9-91-480-SI

Aqua Duct Plumbing Contractors
P.O. Box 741
Hayward, California 94541

ATTENTION: MR. NICHOLAS STAMATAKIS/FOR TIM AKIN

SUBJECT: PROPOSED WORK PLAN FOR THE PROPERTY
Located at 3045 Telegraph Avenue, In
Oakland, California

Dear Mr. Stamatakis:

The attached work plan describes what needs to be accomplished at the site in order to comply with the Alameda County Environmental Health Department (ACEHD) requirements. The work plan follows the guidelines established by the Regional Water Quality Control Board and ACEHD for investigation of an underground tank leak. It includes removal of contaminated soil from the tank area, installation of one to three monitoring wells, and analysis of soil and groundwater.

The costs of our services are tabulated in Table 1.

We will attempt to avoid drilling near any known buried utilities during our investigations. Please send us any site plans you have that show all tank locations and product lines, along with any other utility lines.

File No. 9-91-480-SI

If this plan and cost estimates (attached) are acceptable, please sign the attached form and initial all the pages and return one copy to our office.

Please call me if you have any questions.

Sincerely,

SOIL TECH ENGINEERING, INC.

Frank Hamedi-Fard

Attachments: Proposed Work Plan

TABLE 1
COST ESTIMATES

Description	Price
Work Plan and Well Permit	$1,600.00
Soil Boring (20 feet)	$400/per boring
2-inch Well to the Depth of 30 feet	$1,800/per well
4-inch Well to the Depth of 40 feet	$2,200/per well
Well Development/Groundwater Sampling	$500/per well
Field Engineer	$70/per hour
Technician	$50/per hour
Senior Engineer	$85/per hour
Report and Drawing	$65/per hour
Drilling	$130/per hour
Backhoe (extent hoe)	$70/per hour
Bio-Treatment	$40/per yard
Thermal Treatment including Loading, Trucking & Disposal	$80/per ton
Laboratory Analysis:	
TPHg with BTEX	$110/per sample
TPHd	$110/per sample
TOG	$100/per sample
8010	$140/per sample
Excavation the Backfilling are based on Time and Material	

TERMS AND CONDITIONS

Invoices will be rendered monthly, either as a final or partial billing, and will be payable upon receipt unless other arrangements have been made. Interest of 1.5% per month will be payable on accounts not paid within 30 days. Any attorney's fees or other costs incurred while collecting any delinquent amount shall be paid by the Client.

Soil Tech Engineering, Inc., warrants that our services are performed within the limits prescribed by our Clients, with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended in our proposals, contracts or reports.

Our Liability to the Client for injury or damages to persons or property arising out of work performed for the Client and for which legal liability may be found to rest upon us, other than for professional errors and omissions, will be limited to our general liability insurance coverage. For any damage on account of any error, omission, or other professional negligence, our liability will be limited to a sum not to exceed our fee.

In the event that the Client makes claim against Soil Tech Engineering, Inc., at law or otherwise, for any alleged error, omission, or other act arising out of their performance of our

professional services, and the Client fails to prove such claim upon final adjudication, then the Client shall pay all costs incurred by Soil Tech Engineering, Inc., in defending itself against the claim, including, but not limited to, personnel related costs, attorney's fees, court costs, and other claim-related expenses.

We will not be liable for damage or injury arising from damage to subterranean structures (pipes, tanks, telephone cables, etc.), which are not called to our attention and correctly shown on the plans furnished to us in connection with work performed by us.

File No. 9-91-480-SI

AUTHORIZATION

I/we have read and understood the above proposal and hereby agree to and accept it. I/we also agree to and understand that the attached schedule of charges, terms and conditions, form an express part of this agreement as evidenced by my/our signature below.

SIGNATURE/TITLE: _____ DATE: _____

File No. 9-91-480-SI

PROPOSED WORK PLAN FOR
TIM AKIN
LAURENCE ORTHOPEDIC PROPERTY
LOCATED AT 3045 TELEGRAPH AVENUE
OAKLAND, CALIFORNIA
NOVEMBER 1, 1991

PREPARED FOR:
AQUA DUCT PLUMBING CONTRACTORS
P.O. BOX 741
HAYWARD, CALIFORNIA 94541

BY:
SOIL TECH ENGINEERING, INC.
298 BROKAW ROAD
SANTA CLARA, CALIFORNIA 95050

SOIL TECH ENGINEERING, INC.

File No. 9-91-480-SI

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

November 1, 1991

File No. 9-91-480-SI

Aqua Duct Plumbing Contractors
P.O. Box 741
Hayward, California 94541

ATTENTION: MR. NICHOLAS STAMATAKIS

SUBJECT: PROPOSED WORK PLAN FOR THE PROPERTY
Located at 3045 Telegraph Avenue, in
Oakland, California

Dear Mr. Stamatakis:

Soil Tech Engineering, Inc. (STE), is pleased to present the enclosed work plan as requested by you and to comply with Alameda County Environmental Health Department (ACEHD) requirements. This work plan has been prepared in accordance with the Regional Water Quality Control Board (RWQCB) Fuel Leak Guidelines.

The proposed work includes the removal of hydrocarbon impacted soil from the underground tank area, backfilling of the excavation, disposal of the soil and installation of one to three monitoring wells.

File No. 9-91-480-SI

Upon your authorization and Alameda County Environmental Health Department (ACEHD) approval of this plan, we will initiate activities. A summary report will be prepared upon completion of activities and receipt of laboratory analysis results.

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

Sincerely,

SOIL TECH ENGINEERING, INC.

Lynette D. Smith

LYNETTE SMITH
ENVIRONMENTAL EDITOR

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

FRANK HAMEDI-FARD
GENERAL MANAGER

File No. 9-91-480-SI

PROPOSED WORK PLAN
FOR [redacted] PROPERTY
LOCATED AT 3045 TELEGRAPH AVENUE
OAKLAND, CALIFORNIA

This report describes the scope of proposed work for the property located at 3045 Telegraph Avenue, in Oakland, California (Figure 1). Following completion of work, the results of this investigation will be presented in a technical report, which should be submitted to the Alameda County Environmental Health Department, the Regional Water Quality Control Board, and the City of Hayward Fire Department.

This work plan has been prepared in accordance with the California Tri-Regional Water Quality Control Board Staff Guidelines for Underground Tank Sites, dated August 1990.

BACKGROUND:

On May 4, 1990, Sampling Specialists collected three soil samples, which were analyzed for Total Petroleum Hydrocarbons as gasoline and diesel (TPHg and TPHd) and for Benzene, Toluene, Ethylbenzene and Xylenes (BTEX). The soil analytical results showed TPHg, TPHd and BTEX to be non-detectable in two of the samples. However, one soil sample showed TPHg at 210 milligrams per kilogram (mg/Kg), TPHd at 3,400 mg/Kg, Benzene at 2.9 mg/Kg, Toluene at 0.026 mg/Kg, Ethylbenzene at 1.1 mg/Kg, and Xylenes at 1.6 mg/Kg.

STE's staff excavated contaminated soil from around the tank on September 23, 1991. Since contaminated soil was still found in the excavation walls, further excavation will be needed.

PURPOSE:

The objectives of this proposed investigation are to evaluate the extent of petroleum hydrocarbons in the soil around the tank area, to remove affected soil, and to evaluate whether groundwater at the site has been impacted.

The proposed scope of work will address the following:

- Supervising the removal of contaminated soil from the underground tank area.
- Characterizing the excavated soil for proper disposal and/or on-site treatment.
- Backfilling the excavation.
- Installing monitoring wells in the vicinity of the underground tank area.

SCOPE OF WORK:

To accomplish these objectives, Soil Tech Engineering, Inc., proposes the following tasks:

Task 1: Obtain all necessary permits from local and state regulatory agencies.

Task 2: Prepare a Health and Safety Plan.

Task 3: Supervise the excavation of the impacted soil from the tank area and conduct soil sampling of the excavation per state and local agencies' requirements.

Task 4: Characterize the excavated soil for proper disposal.

Task 5: Backfill the excavation.

Task 6: Install monitoring wells near the tank area: including drilling, soil sampling, well development, purging, water sampling and laboratory analysis.

Task 7: Prepare a technical report.

DESCRIPTION OF TASKS:

Task 1: Permits and Coordination

All necessary permits for excavation, groundwater well installation, and on-site soil remediation (if needed) will be obtained prior to starting work.

Task 2: Health and Safety Plan

Per OSHA requirements, a site Health and Safety Plan for the proposed work will be prepared. The main purpose of this plan is to protect the staff and involved personnel against potential physical and chemical hazards associated with excavation, sampling

and drilling. All employees and subcontractors will be required to read and comply with this plan (which is attached in Appendix "C").

The designated project engineer will be responsible for monitoring and implementing the plan.

Task 3: Excavation of Impacted Soil from Tank Area

STE's staff will supervise the excavation of soil from the underground tank area where levels of TPH and BTEX were detected. The approximate extent of excavation will depend on visual observation and the use of a photoionization detector (PID). The maximum depth of the excavation will be determined by the field engineer.

Before excavation begins, a cyclone fence, cones, barriers and signs will be installed to mark field work areas.

Excavated soil will be separated into two groups: clean soil and contaminated soil. The PhotoVac TIP 1 (PID) will be used to screen the soil for segregation. Any soil that exceeds 50 parts per million (ppm) will be classified as contaminated soil should be 10 ppm

During excavation, soil with obvious petroleum odor or visual staining will be segregated and stockpiled in a designated area. This soil will be placed on and covered with plastic liners to minimize infiltration of rain water and potential contaminate run-off. The clean soil will be stockpiled in a similar manner.

During excavation, STE's staff will obtain soil samples by partially filling a sample tube with excavated soil and then using the PID to detect volatile components. This process will involve capping and agitating the tube to allow volatilization of petroleum hydrocarbons from the soil, then piercing the sample cap with the PID and collecting headspace readings.

The excavation will be expanded until PID readings show Volatile Organic Vapor concentrations of less than 10 parts per million (ppm), or until further excavation is not feasible due to building foundations or adjacent utilities.

Following removal of the contaminated soil, discrete soil samples will be taken from the base of the excavation. Clearance samples will be taken in brass tubes from a backhoe bucket or using a hand held sampling device. The ends of the brass liner will be covered tightly with aluminum foil and plastic caps, sealed with tape, logged and stored in a cooled ice chest for transport to a state-certified analytical laboratory. Soil will be analyzed for TPHg, TPHd and BTEX.

Task 4: Stockpiled Soil Characterization

The excavated stockpiled soil will be sampled and analyzed in accordance with Bay Area Air Quality Management District guidelines (BAAQMD), Regulation 8, Rule 40, as approved on February 15, 1989, for proper disposal.

Task 5: Backfilling the Excavation

The excavation will be backfilled with clean materials and compacted as described in our Standard Operating Procedures for Backfilling. The materials to be used are: 1) on-site, clean native soil, 2) imported clean materials or 3) pea gravel or sand.

Task 6: Installation of Monitoring Wells

The proposed monitoring wells will be installed near the tank excavation area after the excavated area has been properly backfilled (with one monitoring well less than 10 feet from the excavation).

Drilling, soil sampling, well installation and development will be conducted in accordance with Alameda County Water District-Zone 7 requirements and STE's Standard Operating Procedures (SOP), included in Appendix "B". The approximate locations of the proposed monitoring wells are shown in Figure 2.

Following well development and stabilization, four to six well-volumes of water will be removed from the well by a Teflon bailer or submersible pump until the water indicates stabilization of temperature, pH and conductivity. A water sample from the well will be collected using a clean stainless steel or Teflon bailer. Samples will be labeled and stored in a cool ice chest for delivery to a state-certified laboratory. The water samples will be analyzed for TPHg, TPHd and BTEX.

After initial monitoring and sampling of the newly installed wells, a monitoring and sampling program will be initiated, if necessary.

Task 7: Preparation of a Technical Report

A detailed report will be prepared including field methods used, interpretation of data obtained from soil and groundwater results and findings of the investigation. This report will also include recommendations for further investigation, if necessary.

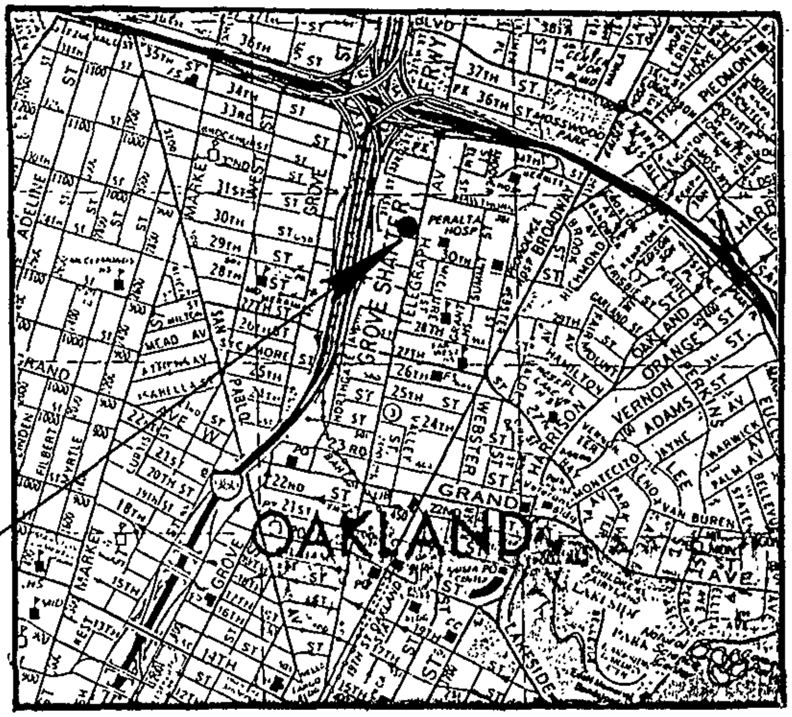
SCHEDULE:

STE will start scheduling work within one week following your approval of this work plan. All regulatory agencies will be notified prior to starting excavation. The report of our findings will be prepared within six to eight weeks following the receipt of the laboratory results and will include field activities, soil lithology, soil and groundwater analytical results, conclusions and recommendations.

File No. 9-91-480-SI

A P P E N D I X "A"

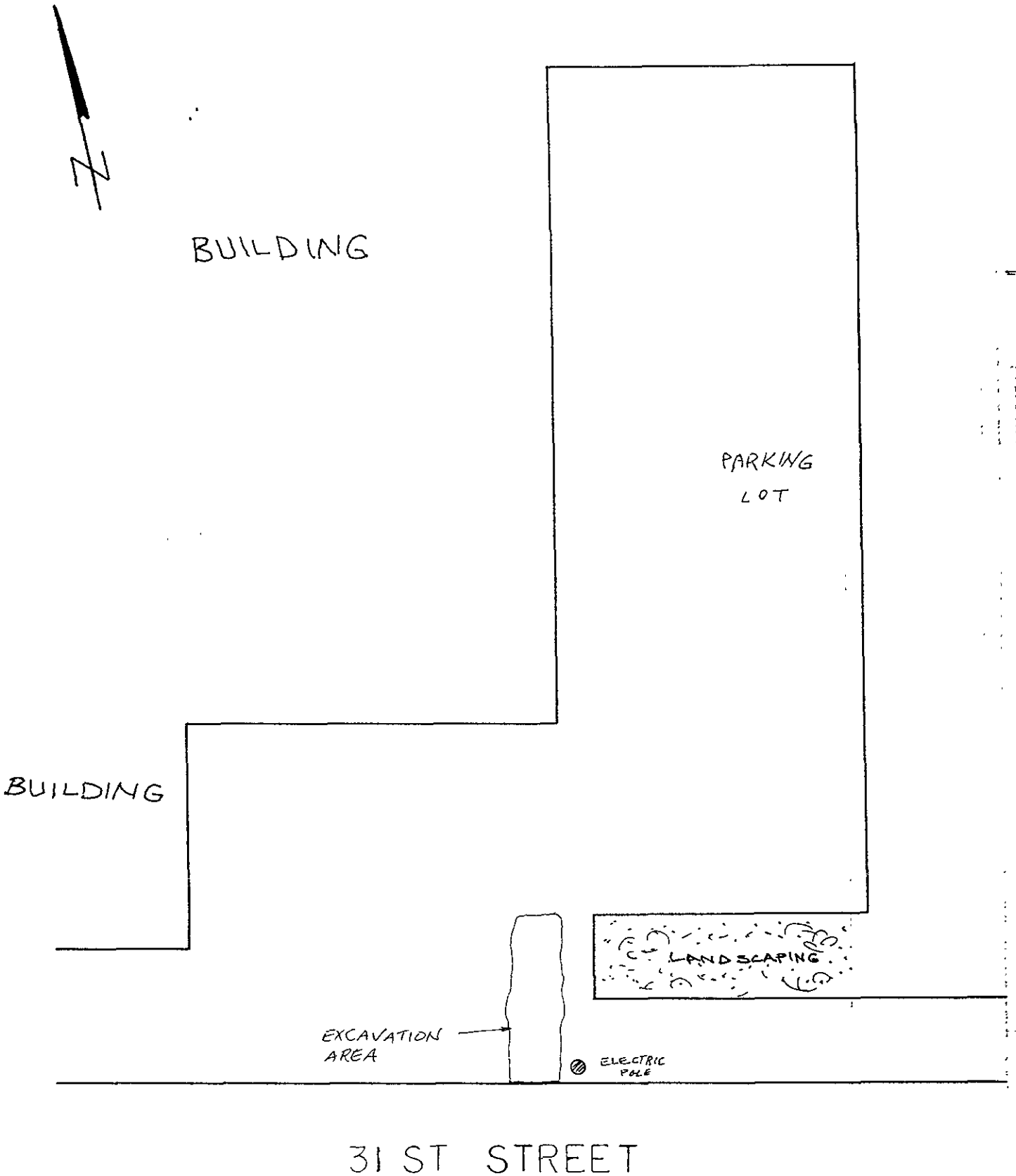
SOIL TECH ENGINEERING, INC.



Site Location

Thomas Brothers Map 1982 Edition
Alameda - Contra Costa Counties

Page 9 B2



SCALE: 1" = 20'

Figure 2

File No. 9-91-480-SI

A P P E N D I X "B"

SOIL TECH ENGINEERING, INC.

File No. 9-91-480-SI

SITE GRADING AND BACKFILLING
FOR
AQUA-DUCT PLUMBING'S PROPERTY
LOCATED AT 3045 TELEGRAPH AVENUE
OAKLAND, CALIFORNIA

Site clearing, placement of fill and the control of grading operations at the site must be conducted in accordance with the following recommendations and under a supervision of a Project Engineer.

1) The depression left by the removal of contaminated soil should be cleaned of all debris and backfilled with clean soil. This backfill must be engineering fill. This operation must be conducted under the supervision of the Project Engineer.

2) All engineering fill, whether native or imported soil, should be placed in uniform horizontal lifts not more than 6 to 8 inches in uncompacted thickness and compacted to not less than 90% relative compaction according to ASTM D1557-78 procedure.

3) Before compaction begins, the fill material whether native or imported soil shall be brought to water content that will permit compaction by either:

   A) Aerating the material if it is too wet, or
   B) Spraying the material with water if it is too dry.

Each lift shall be thoroughly mixed before compaction. No rocks larger than 4 inches in diameter should be used.

4) No soil shall be placed or compacted during periods of rain nor on ground which is not drained of all free water. Soil which has been soaked and wetted by rain or any other cause, shall not be compacted until completely drained and the moisture content is within the limits herein described or approved by the Project Engineer. Prior approval by the Project Engineer shall be obtained before continuing the grading operations.

5) The contractor shall conduct all grading operations in such a manner as to preclude wind blow dirt, dust and related damage to neighboring properties. The means of dust control shall be left to the discretion of the contractor. the contractor shall assume liability for claims related to wind blow materials.

6) Any import soil for engineering fill shall be approved by the Project Engineer before the grading operation.

7) All grading shall be observed and approved by Project Engineer and shall prepare a final report upon completion of the back-filling operations.

File No. 9-91-480-SI

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
298 BROKAW ROAD, SANTA CLARA, CA 95050

File No. _____

Date _____

By _____

Job _____

Site Description _____ (continued on reverse side)

Type of Drill Rig _____ Hole Dia. _____

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

Elev. _____ Datum _____

ample ality	Blows/6 inches	Sample Loc.	Sample No.	Depth		Soil Classification	Penetrometer
				1			
				2			
				3			
				4			
				5			
				6			
				7			
				8			
				9			
				0			
				1			
				2			
				3			
				4			
				5			
				6			
				7			
				8			
				9			
				0			
				1			

File No. 9-91-480-SI

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.

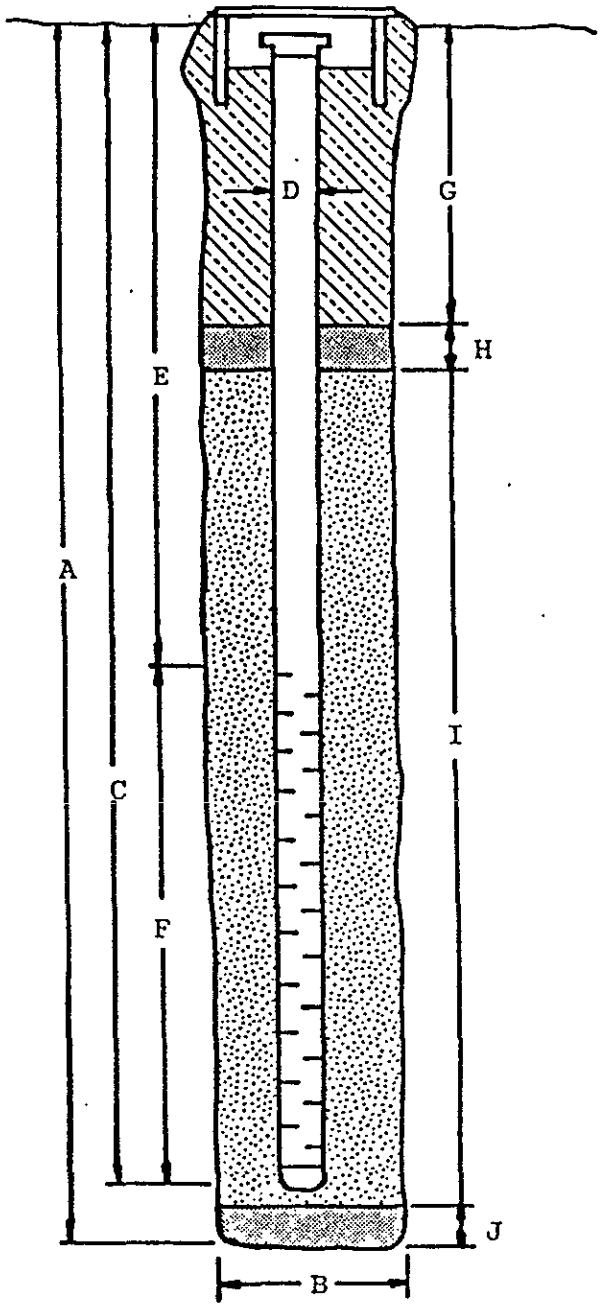
WELL DETAILS

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. 9-91-480-SI

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, INC.

SOIL TECH ENGINEERING

Soil, Foundation and Geological Engineers

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

MONITORING WELL SURVEY SHEET

NAME: _____ DATE: _____

FACILITY NAME AND ADDRESS: _____

_____

DATE WELLS SURVEYED: _____

FIELD ACTIVITIES

	RUN 1		RUN 2		RUN 3	
WELL NUMBER	ROD READING	RIM ELEVATION	ROD READING	RIM ELEVATION	ROD READING	RIM ELEVATION

WARNING: HAVE YOU SURVEYED ALL WELLS? LOCATED ALL WELLS?

HAVE YOU CHECKED FOR AND SURVEYED EXISTING MONITORING WELLS ON ADJACENT PROPERTIES OR PROPERTIES ACROSS THE STREET?

DO WE HAVE ACCURATE SKETCHES AT 1"=30' (AND 1"=100' IF NECESSARY)? IF NOT, MAKE THEM.

\SURVEY

File No. 9-91-480-SI

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

Soil, Foundation and Geological Engineers

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

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}
$1\frac{1}{2}$	0.092	0.0123	1.142	1.142×10^{-3}
2	0.163	0.0218	2.024	2.024×10^{-3}
$2\frac{1}{2}$	0.255	0.0341	3.167	3.167×10^{-3}
3	0.367	0.0491	4.558	4.558×10^{-3}
$3\frac{1}{2}$	0.500	0.0668	6.209	6.209×10^{-3}
4	0.653	0.0873	8.110	8.110×10^{-3}
$4\frac{1}{2}$	0.826	0.1104	10.26	10.26×10^{-3}
5	1.020	0.1364	12.67	12.67×10^{-3}
$5\frac{1}{2}$	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	

SOIL TECH ENGINEERING

Soil, Foundation and Geological Engineers

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

SAMPLE MANAGEMENT

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 MANAGEMENT

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 MANAGEMENT

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 MANAGEMENT

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. 9-91-480-SI

**OUTLINE OF DRUM HANDLING PROCEDURES
FOR AQUA DUCT PLUMBING'S PROPERTY
LOCATED AT 3045 TELEGRAPH AVENUE
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.

SOIL TECH ENGINEERING, INC.

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.

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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. 9-91-480-SI

A P P E N D I X "C"

SOIL TECH ENGINEERING, INC.

File No. 9-91-480-SI

HEALTH AND SAFETY PLAN
FOR
AQUA DUCT PLUMBING'S PROPERTY
LOCATED AT 3045 TELEGRAPH AVENUE
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

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.

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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
Station 15, 455 27th Street, Oakland

Medical Center MAgnetic Imaging (415) 893-2600
3000 Telegraph Avenue, Oakland, CA

Additional Contingency Telephone Numbers:

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

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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.

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TYPES OF PROTECTIVE CLOTHING AND RESPIRATION THAT SHOULD BE USED AT HAZARDOUS WASTE SITES AQUA DUCT PLUMBING'S PROPERTY LOCATED AT 3045 TELEGRAPH AVENUE 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.

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Respirators are of two basic types, 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.