October 11, 2005

Jerry Wickham
Alameda County Health Care Services
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject: Field Work Plan for 1200 20th Street, Oakland, California

Dear Mr. Wickham:

Enclosed please find a field work plan intended to address the comments outlined in your letter from Alameda County Environmental Health, to J.W. Silveira Realty, dated July 19, 2005.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge. Please let me know if you have any questions or concerns regarding this submittal.

Sincerely,

J.W. Silveira
J.W. Silveira Realty

See attachments
cc: File

R0504

DRAFT

Work Plan
Former Underground Storage Tank Site at 1200 20th Avenue Oakland, California

October 11, 2005

Prepared for:
J.W. SILVEIRA REALTY
499 Embarcadero
Oakland, California 94606

Prepared by:
TETRA TECH EM INC.
135 Main Street, Suite 1800
San Francisco, California 94105
(415) 543-4880

Penny Wilson, Project Manager

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Appendix

FIGURES

ACRONYMS AND ABBREVIATIONS

µg/L	Microgram per liter
ACEH	Alameda County Department of Environmental Health
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
EPA	U.S. Environmental Protection Agency
ESL	Environmental screening level
mg/kg	Milligram per kilogram
MTBE	Methyl tertiary-butyl ether
PID	Photoionization detector
PVC	Polyvinyl chloride
Tetra Tech	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
TPH-d	Total petroleum hydrocarbons as diesel
TPH-g	Total petroleum hydrocarbons as gasoline
USA	Underground Service Alert
UST	Underground storage tank
Water Board	Regional Water Quality Control Board

APPROVAL PAGE

This Work Plan for the underground storage tank site, located at 1200 20th Avenue in Oakland, California, was prepared for J.W. Silveira Realty, the owner of the site. I certify that this Work Plan was prepared by a licensed professional using professional judgment. Should you have any questions regarding this Work Plan, please contact Penny Wilson at (415) 222-8203.

Darren Croteau, P.G.
California Professional Geologist # 7495

1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) has prepared this field work plan to further investigate the nature and extent of contamination at J.W. Silveira Company's underground storage tank (UST) site at 1200 20th Avenue in Oakland, California. This work plan also addresses concerns raised by the Alameda County Department of Environmental Health (ACEH) in a letter dated July 19, 2005, and during a site walk in September 2005.

The following sections summarize purpose and objective of the investigation and the organization of this work plan.

1.1 PURPOSE AND OBJECTIVE

The purpose of the proposed investigation is to provide field and laboratory data that will help determine the nature and extent of contamination that resulted from a former UST. This work plan presents the proposed field work and technical approach for measuring the hydraulic gradient, determining the vertical and lateral extent of contamination in soil and groundwater, and evaluating any potential preferential pathways for the J.W. Silveira Company's UST site at 1200 20th Avenue in Oakland, California (see Figures 1 and 2).

Results of evaluations based on data gathered during the field investigation will be used to determine if any additional action is required in support of site closure. The field investigation includes the following specific objectives:

- Establish hydraulic gradient
- Define lateral and vertical extent of soil and groundwater contamination
- Evaluate potential preferential pathways

Depending on the results of the investigation, additional sampling and analysis may be necessary to further assess the potential impact to human health and the environment from contaminant sources at the UST site. When closure of the site is reevaluated, groundwater concentrations will be compared to environmental screening levels (ESL) from the Regional Water Quality Control Board (Water Board) (Water Board 2005).

1.2 REPORT ORGANIZATION

Following this introduction, the work plan is divided into four sections as follows:

- Section 2.0, Background – describes the background of the UST site, including the site location and previous investigations and activities conducted at the site.
- Section 3.0, Field and Site Assessment Activities – outlines the proposed field activities, including obtaining permits, performing utility surveys, installing soil borings and monitoring wells, developing and sampling wells, and performing well surveys.
- Section 4.0, Data Evaluation and Management – discusses the evaluation and management of data from the field investigation.
- Section 5.0 References, – presents the references cited in this work plan.

Figures follow the references of this report.

2.0 BACKGROUND

The following sections describe the UST site and summarize previous investigations and activities conducted at the UST site.

2.1 SITE DESCRIPTION

Two USTs were previously located at the eastern corner of the intersection of 20th Avenue and Solano Way in Oakland, California (see Figure 2). The two 600-gallon USTs, which reportedly contained gasoline, were removed in January 1994. The physical size of both of the tanks (estimated during the removal activities) was approximately 8 feet long by 3.5 feet in diameter.

During removal of the USTs, it was noted that the single-walled steel tanks had rusted through and had leaked. The approximate surface area of the removal excavation was about 20 feet by 10 feet. Approximately 80 cubic yards of soil was over-excavated and transported off site for disposal. The bottom of the excavation was approximately 15 feet below ground surface (bgs). The exact depth to the bottom of the USTs was not recorded during the removal activities; the estimated depth to the bottom of the former USTs is 6 to 8 feet bgs.

2.2 PREVIOUS INVESTIGATIONS AND ACTIVITIES

Six soil samples were collected from the sidewalls and the bottom of the removal excavation. The soil samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX); total petroleum hydrocarbons (TPH) as gasoline (TPH-g); and TPH as diesel (TPH-d). The highest concentrations of BTEX compounds and TPH-g were detected at the southwestern edge of the excavation along 20th Avenue. TPH-d was not detected in any of the soil samples. Groundwater was not encountered during removal of the USTs.

As part of the UST removal action activities, three soil borings were advanced and completed as groundwater monitoring wells in February 1995. The three monitoring wells (MW-1, MW-2, and MW-3) were constructed to a depth of 30, 35, and 30 feet bgs, respectively (see Figure 2). Two soil samples were collected from each of the three soil borings and analyzed for TPH-g and BTEX. The samples collected from the soil boring for MW-1 contained concentrations of TPH-g and BTEX compounds. TPH-g was detected in soil from MW-1 at concentrations of 4.8 milligrams per kilogram (mg/kg) at 5 feet bgs and 1.3 mg/kg at 15 feet bgs. No TPH-g or BTEX compounds were detected in the remaining four soil samples from MW-2 and MW-3.

In June 1999, two additional soil borings (SB-1 and SB-2) were also advanced to determine if soil or groundwater contamination was present south and east of the former UST location. Two

soil samples were collected and analyzed for TPH-g, BTEX, and methyl tertiary-butyl ether (MTBE). No contamination was detected in these soil samples. Groundwater samples were not collected because groundwater was not encountered in the two soil borings that were drilled to a depth of 36 and 38 feet bgs. Figure 2 shows the locations of all soil borings and groundwater monitoring wells at the UST site.

TPH-g has been detected in groundwater through time in well MW-1 at concentrations ranging from 1,300 micrograms per liter (µg/L) in October 1995 to 23,000 µg/L in July 1998. The most recent detection was 5,400 µg/L in August 2001. TPH-g was detected only once in well MW-2 at 55 µg/L in October 1995, and TPH-g was detected in well MW-3 from 96 to 160 µg/L, but has not been detected since 1996.

Benzene was detected in well MW-1 at concentrations ranging from 92 µg/L in February 2005 to 3,700 µg/L in May 2000. The most recent detection of benzene was 850 µg/L in August 2001. Benzene has not been detected in either well MW-2 or well MW-3 since January 1997 (2.6 µg/L in MW-2).

MTBE has not been detected in any of the wells.

3.0 FIELD AND SITE ASSESSMENT ACTIVITIES

The following sections describe the field activities to be conducted at the former UST site as requested by ACEH (2005) and as confirmed during the site visit in September 2005.

3.1 PERMITS

Drilling permits will be obtained from ACEH and encroachment permits will be obtained from the city of Oakland for the well and soil borings located along 20th Avenue and Solano Way.

3.2 UTILITY SURVEY

A minimum of 48 hours prior to drilling, Tetra Tech will contact Underground Service Alert (USA) to locate utilities along 20th Avenue, Solano Way, and entering 1200 20th Avenue.

In addition to contacting USA, Tetra Tech will perform a utility survey of available information by contacting the utility companies and inquiring about utility depth, location, size, and backfill information. This information will be used to construct a utility map of the site and evaluate if the utility corridors are acting as preferential pathways for chemical migration.

3.3 UPGRADE OF EXISTING WELLS

As requested in the site walk with ACEH, Tetra Tech will install new Christy boxes on wells MW-1, MW-2, and MW-3.

3.4 MONITORING WELL AND SOIL BORING INSTALLATION

In order to obtain information to evaluate the lateral and vertical extent of contamination at the UST site, Tetra Tech will install two groundwater monitoring wells and advance two soil borings. Details of the monitoring well and soil boring drilling and sample collection are presented below.

3.4.1 Installation of Groundwater Monitoring Wells

The groundwater elevation measured in well MW-2 is more than 4 feet below mean sea level and is consistently approximately 2 feet lower than the groundwater elevations measured in wells MW-1 and MW-3. As a result, the apparent hydraulic gradient is to the north, which is not consistent with the expected regional groundwater flow direction. Land surface in the surrounding area slopes to the south. Well MW-2 was constructed to a depth of 35 feet below grade, approximately 5 feet deeper than wells MW-1 and MW-3, and terminates in a gravel layer. Hydraulic gradients as high as 0.06 feet per feet were estimated based on comparison of water levels in the three wells. Based on these large water elevation differences, it appears that well MW-2 may not be hydraulically connected with the former UST site.

Therefore, Tetra Tech proposes to install a shallower well (MW-2A) adjacent to well MW-2 to yield a groundwater elevation more consistent with wells MW-1 and MW-3. One additional monitoring well (MW-4) will be drilled and installed in Solano Way, southwest of the former USTs (see Figure 2), to further define the lateral extent of contamination in groundwater. Hollow-stem auger drilling equipment will be used to drill the two soil borings to approximately 30 feet bgs. Soil samples will be collected for logging purposes at 5-foot intervals. The borings will be logged in the field by a Tetra Tech geologist. Preparation of the final well logs will be supervised by a California Professional Geologist. Soil samples for laboratory analysis will be collected from approximately 10 feet bgs and up to two additional samples will be collected above first encountered groundwater, based on screening with a photoionization detector (PID). Soil samples submitted to the laboratory will be analyzed for TPH-g and TPH-d by U.S. Environmental Protection Agency (EPA) Method 8015 M and BTEX and MTBE by EPA Method 8260B (EPA 2003).

The new wells will consist of 2-inch-diameter schedule 40 polyvinyl chloride (PVC) casing, with 0.02-inch slotted screen extending from approximately 20 to 30 feet bgs and blank casing from

20 feet bgs to the ground surface. A sand filter pack will be installed from the bottom of the borehole to approximately 1 foot above the screened interval, followed by a 2-foot bentonite seal. Once the bentonite has hydrated, a cement grout slurry, will be installed to 1 foot bgs. The ground surface will be completed with a traffic-rated Christy box cemented in place. Final well construction details will be determined in the field based on the geology encountered and the occurrence of first groundwater.

Soil cuttings from the well drilling activities will be stored on site in 55-gallon drums and clearly labeled as soil cuttings pending laboratory analysis and disposal. A composite soil sample will be collected from the drum and submitted for laboratory analysis. The sample will be analyzed for TPH-g and TPH-d by EPA Method 8015M, BTEX and MTBE by EPA Method 8260B, and metals by EPA Method 6010 (EPA 2003).

3.4.2 Drilling of Soil Borings

To further determine the lateral extent of contamination, one soil boring (SB-3) will be advanced within the building at 1200 20th Avenue, southeast of the former USTs. The boring will be advanced with limited access Geoprobe® drilling equipment to approximately 20 to 30 feet bgs, depending on the depth of first encountered groundwater. Continuous core soil samples will be collected from the boring and logged in the field by a Tetra Tech geologist. Preparation of the final boring log will be supervised by a California Professional Geologist. Soil samples for laboratory analysis will be collected from approximately 10 feet bgs and up to two additional samples will be collected above first encountered groundwater, based on screening with a PID. . A grab groundwater sample will be collected for laboratory analysis at first encountered groundwater. If groundwater recharge is slow, temporary 0.75-inch slotted PVC casing will be place in the boring. The samples will be analyzed by the laboratory for TPH-g and TPH-d by EPA Method 8015M and BTEX and MTBE by EPA Method 8260B (EPA 2003).

If results of the utility survey show that utility backfill material in 20th Avenue could be acting as a preferential pathway for dissolved contamination in groundwater, a second soil boring (SB-4) may be advanced near the intersection of 20th Avenue and Solano Way (see Figure 2). The boring will be advanced and sampled similarly to SB-3 and will be located within 5 feet of the identified utility corridor.

Cuttings from the soil borings not submitted for laboratory analysis will be stored on site in 55-gallon drums. The drums will be clearly labeled as drilling cuttings pending laboratory analysis and disposal. A composite soil sample will be collected from the cuttings and submitted for laboratory analysis. The sample will be analyzed for TPH-g and TPH-d by EPA

Method 8015M, BTEX and MTBE by EPA Method 8260B, and metals by EPA Method 6010 (EPA 2003).

Following sample collection, the boring will be backfilled with cement grout.

Appendix A to this work plan provides the field forms to be used during drilling activities.

3.5 WELL DEVELOPMENT, SAMPLING, AND CHEMICAL ANALYSIS

The following sections summarize development of the monitoring wells, the requirements to be following during sampling, and procedures for chemical analysis of the collected samples.

3.5.1 Well Development

The two new monitoring wells will be developed so that water samples are representative of the groundwater, which includes minimizing turbidity. Well development will be conducted no sooner than 24 hours following placement of the annular grout seal. Well development water will be stored on site in 55-gallon drums and labeled as purge water pending laboratory analysis and disposal.

Immediately before well development begins, the depth to groundwater (with respect to the top of the PVC casing) will be measured with a water level indicator. Well development will be accomplished by cycles of surging followed by bailing or pumping. First, heavy sediments must be removed that may have accumulated during well construction using a piston-type bottom suction bailer. Once the well sediments are removed, the well will be surged with a vented surge block to destroy bridging, agitate the formation, and to help remove fine sediments from the filter pack. The surge block will be allowed to free fall to create a vigorous outward surge. Beginning at the top of the well screen, the surge block will be lowered and raised in a pumping action using a pump stroke of approximately 3 feet. The surge block will then be moved downward to surge the next 3 feet of well screen. After surging the entire length of the screened interval, the surge block will be removed and an electric submersible pump (or bailer) will be installed near the bottom of the well screen to purge one casing volume.

Following the pumping of each casing volume, the following parameters will be monitored: pH, specific conductance (conductivity), temperature, and turbidity. A minimum of two casing volumes will be purged. Additional cycles of surging and purging will continue for a maximum of six casing volumes (roughly equivalent to three well volumes, which include groundwater in the filter pack) or until the field parameters stabilize.

Appendix A includes a well development log.

3.5.2 Groundwater Sampling and Water Level Measurements

Groundwater samples will be collected from wells MW-2A and MW-4 and submitted to a California-certified laboratory for analysis of TPH-g, TPH-d by EPA Method 8015M, and BTEX and MTBE by EPA Method 8260B. If no chemicals are detected above the laboratory reporting limits in well MW-2A then no additional sampling will be conducted. If no chemicals are detected above the laboratory reporting limits in well MW-4, then one additional sample will collected the following quarter. If chemicals are detected in wells MW-2A and MW-4, three additional quarters of groundwater sampling will be conducted.

Tetra Tech will collect four quarters of groundwater level measurements from wells MW-1, MW-2, MW-2A, MW-3, and MW-4. Because well MW-2 yields disparate water levels from MW-1 and MW-3, it may not be used to construct future groundwater contour maps.

Appendix A to this work plan provides the field forms to be used during groundwater sampling activities.

3.5.3 Sample Collection and Handling

The groundwater samples will be collected with a bailer or peristaltic pump. Samples to be analyzed for BTEX and MTBE will be collected first at each monitoring well. Sample containers will be filled, sealed, and placed in coolers packed with ice. Groundwater samples will be collected in certified, clean laboratory-supplied bottles. The groundwater samples will be identified, labeled, and documented.

A chain-of-custody (see Appendix A) will be used to trace the possession of the sample from field collection to the analytical laboratory. The chain-of-custody record will be made in triplicate, so a copy of the record can be retained by the sampler and the original record can be submitted with the samples to the appropriate laboratory. The chain-of-custody must contain the project and site location data, name and shipping address of the receiving laboratories, and contact personnel at the site and laboratory. The chain-of-custody will also contain site information, sample identification, date and time of sampling, type of sample, number of containers, turnaround time, required analyses, and sample preservation. At the end of the sample collection, the samples will be logged onto the chain-of-custody and packed in a cooler with ice for shipment to the laboratory.

3.6 WELL SURVEYING

Wells MW-1, MW-2, MW-2A, MW-3, and MW-4 and soil borings SB-3 and SB-4 will be surveyed by a licensed professional surveyor using NAD 83 datum. The top of casing and ground surface elevations, along with latitude and longitude will be collected at each location.

Based on available information Tetra Tech will locate all monitoring and production wells (active, inactive, standby, decommissioned, abandoned) and cathodic protection wells (dewatering and drainage) within 2,000 feet of the site. Tetra Tech will obtain well information from both Alameda County Public Works Agency and the California Department of Water Resources. A map showing the location of all wells identified in the study and summary tables will be used to report the data collected.

4.0 DATA EVALUATION AND MANAGEMENT

The following sections summarize the evaluation and documentation of data following this field effort, as well as the data submittal requirements for GeoTracker.

4.1 DATA EVALUATION AND DOCUMENTATION

As requested by ACEH, a soil and groundwater investigation report will be prepared to summarize and evaluate environmental data generated during this field effort. The report will be submitted within 120 days following ACEH approval of this work plan.

4.2 GEOTRACKER SUBMITTALS

In accordance with the *California Code of Regulations* Sections 2729 and 2729.1, Tetra Tech will submit analytical data, survey coordinates of permanent monitoring points, and an electronic copy of the summary report in portable document format (also known as "PDF") to the State Water Resources Control Board GeoTracker system.

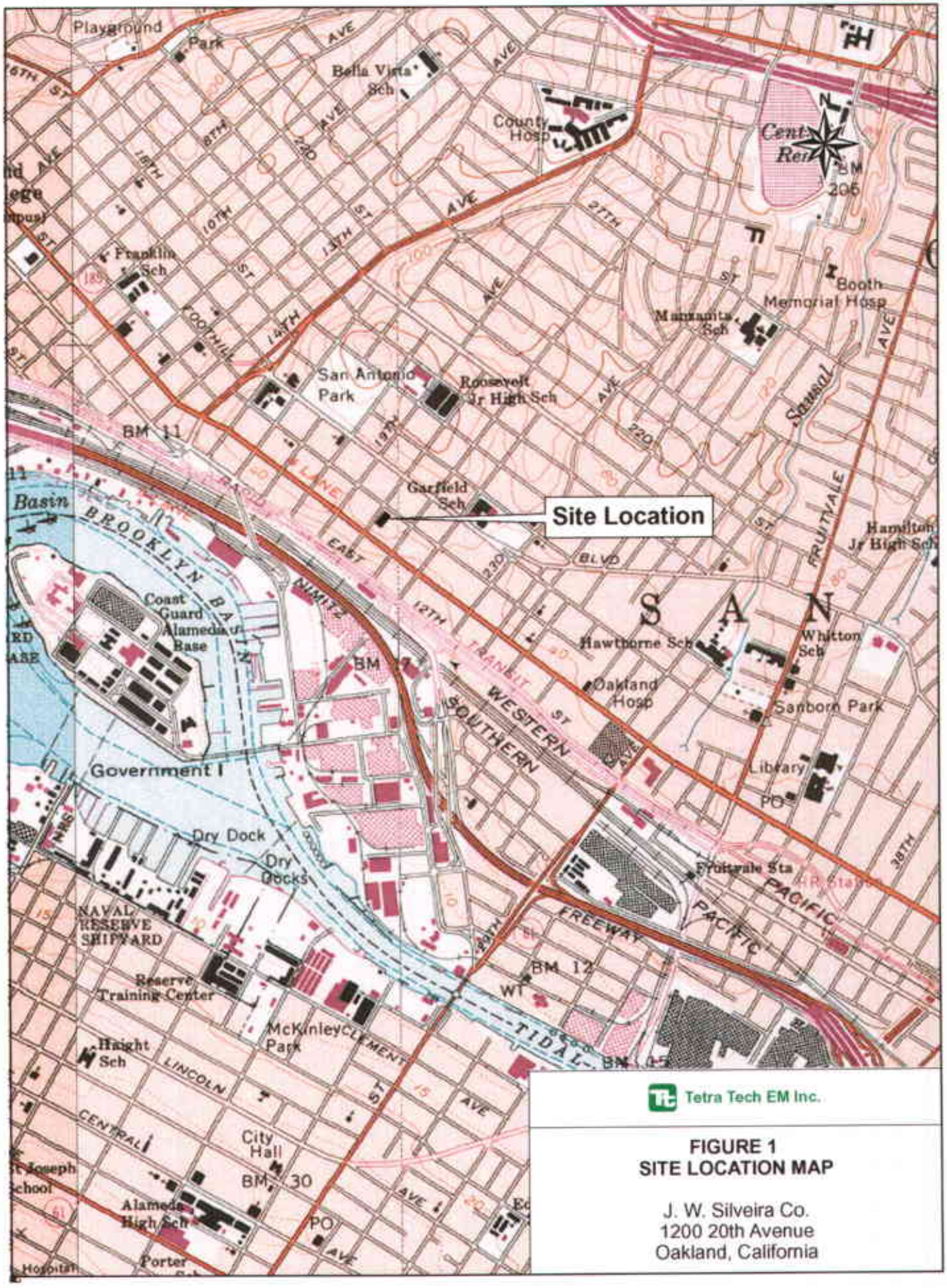
5.0 REFERENCES

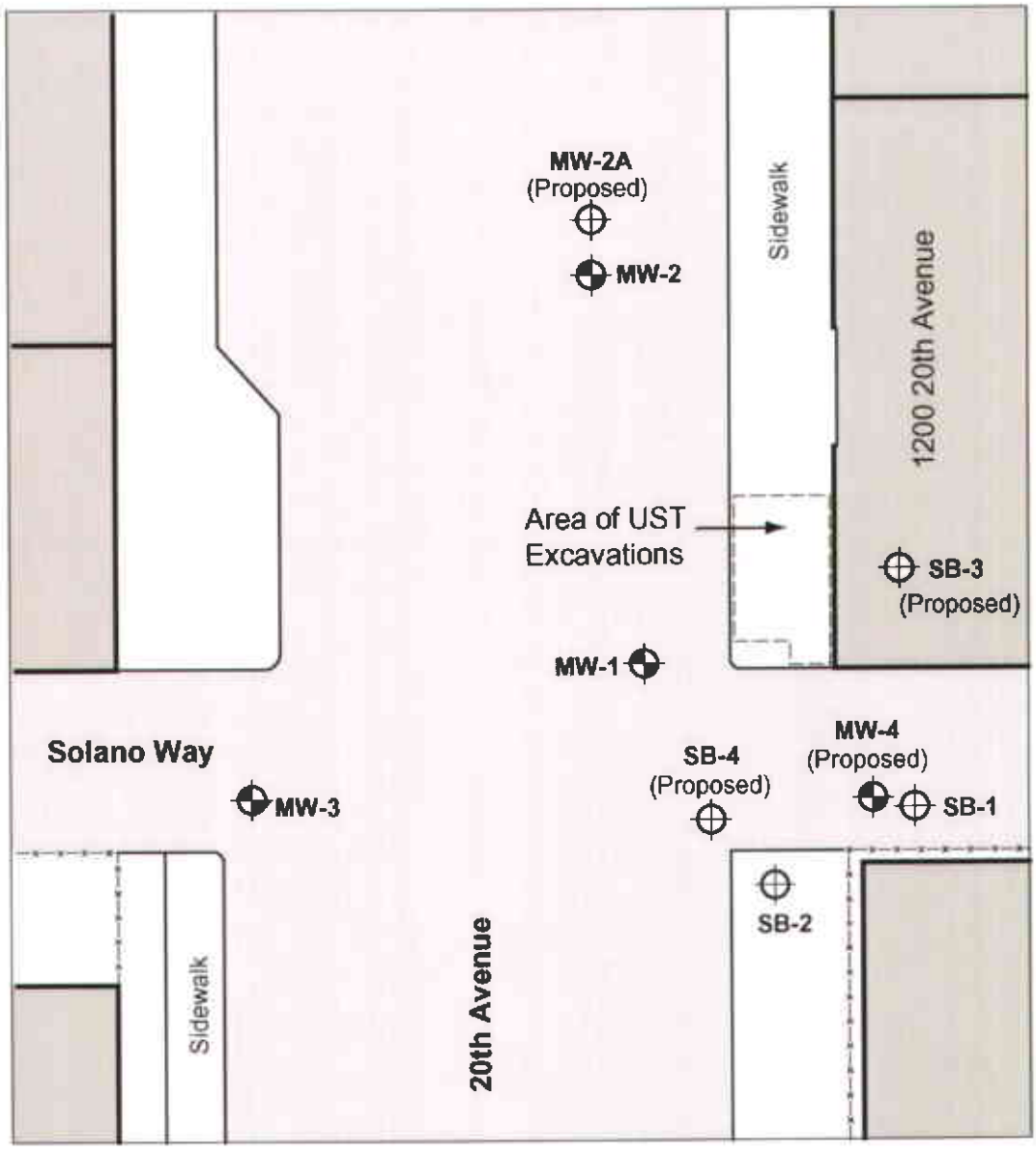
Alameda County Division of Environmental Health (ACEH). 2005. Letter Regarding Fuel Leak Case No. RO0000504 at 1200 20th Avenue, Oakland, California. From Jerry Wickham, ACEH. To J.W. Silveira. July 19.

Regional Water Quality Control Board (Water Board). 2005. "Screening for Environmental Screening Concerns at Sites with Contaminated Soil and Groundwater." February. Available Online at: http://www.swrcb.ca.gov/rwqcb2/esl.htm

Environmental Protection Agency (EPA). 2003. "Index to EPA Test Methods." Available Online at: http://www.epa.gov/epahome/index/

Tetra Tech EM Inc. 2003. "Site Closure Report, 1200 20th Avenue, Oakland California." December.


Site Location
Tetra Tech EM Inc.
FIGURE 1
SITE LOCATION MAP
J. W. Silveira Co.
1200 20th Avenue
Oakland, California



Notes:

Monitoring Well (MW)

Soil Boring (SB)

Tetra Tech EM Inc.

FIGURE 2
SITE LOCATION MAP

J. W. Silveira Co.
2301 East 12Th Street
Oakland, California

Appendix A

Field Forms:

- **Soil Boring and Well Installation and Visual Classification Log**
- **Monitoring Well Completion Record**
- **Photographic Log**
- **Groundwater Level Measurements Log**
- **Daily Field Log**
- **Chain of Custody Record**
- **Well Development Data Sheet**

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION AND VISUAL CLASSIFICATION LOG

Bldg./Site:

Project Name:

Boring Number:	Date Started:
Drilling Method: (*Circle one*) HSA Continuous Core/GeoProbe/Hand Auger	Date Completed:
Air Rotary/Mud Rotary/Dual Tube Percussion/Sonic/Vacuum	Logged By:
Outer Diameter of Boring:	Drilling Subcontractor:
Inner Diameter of Well Casing:	Driller:
Depth to Water (ft./bgs.)	Location Sketch:

Time	Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	V.H. utility type, dia. / Blow count (per 6 inches)	Description	USCS soil symbol	Well construction	OVM (ppm)

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION AND VISUAL CLASSIFICATION LOG

Bldg./Site:

Project Name:

Time	Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	Blow count (per 6 inches) / V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)

TETRATECH EM INC

MONITORING WELL COMPLETION RECORD

DRILLING INFORMATION

DRILLING BEGAN:
DATE _____ TIME _____
WELL INSTALLATION BEGAN:
DATE _____ TIME _____
WELL COMPLETION FINISHED:
DATE _____ TIME _____
DRILLING CO. _____
DRILLER _____
LICENSE _____
DRILL RIG _____
DRILLING METHOD:
☐ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ _____
DIAMETER OF AUGERS:
ID _____ OD _____

BENTONITE SEAL

AMOUNT CALCULATED _____
AMOUNT USED _____
☐ PELLETS, SIZE _____
☐ CHIPS, SIZE _____
☐ _____
PRODUCT _____
MFG. BY _____
METHOD INSTALLED:
☐ POURED ☐ TREMIE
AMOUNT OF WATER USED _____

FILTER PACK

AMOUNT CALCULATED _____
AMOUNT USED _____
☐ SAND, SIZE _____
☐ FORMATION COLLAPSE:
FROM _____ TO _____
PRODUCT _____
MFG. BY _____
METHOD INSTALLED:
☐ POURED ☐ TREMIE

SURVEY INFORMATION

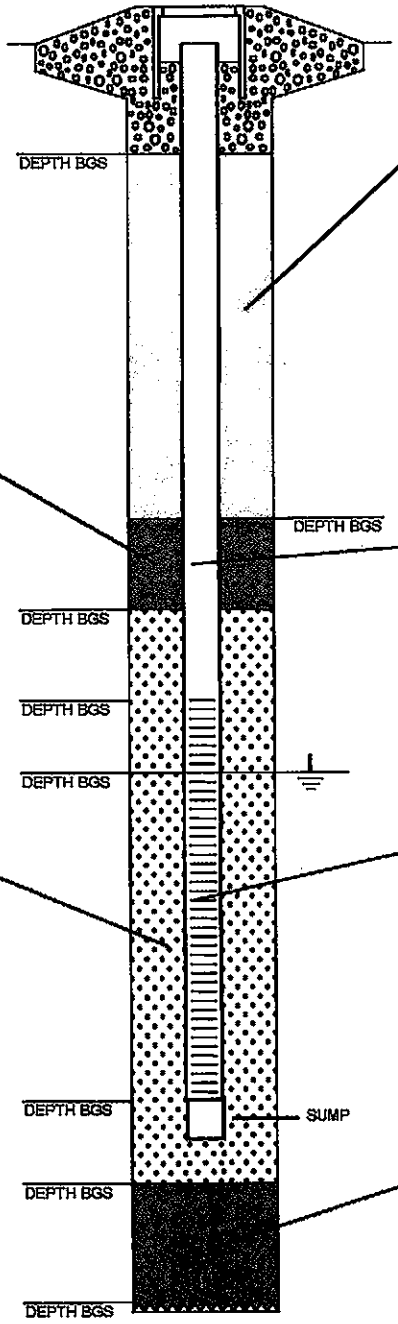
TOC ELEVATION _____
GROUND ELEVATION _____
NORTHING CORD. _____
EASTING CORD. _____
DATE SURVEYED _____
SURVEY CO. _____

CENTRALIZERS USED?

☐ YES ☐ NO;
CENTRALIZER DEPTHS: _____, _____

SURFACE COMPLETION

☐ FLUSH MOUNT
☐ ABOVE GROUND W/BUMPER POST
☐ CONCRETE ☐ ASPHALT



MONITORING WELL

MONITORING WELL NO. _____
PROJECT _____
SITE _____
BOREHOLE NO. _____
WELL PERMIT NO. _____
TOC TO BOTTOM OF WELL _____

ANNULAR SEAL

AMOUNT CALCULATED _____
AMOUNT USED _____
☐ GROUT FORMULA
PORTLAND CEMENT _____
BENTONITE _____
WATER _____
☐ PREPARED MIX
PRODUCT _____
MFG. BY _____
METHOD INSTALLED:
☐ POURED ☐ TREMIE

CASING

☐ SCHEDULE 40 PVC
☐ _____
PRODUCT _____
MFG. BY _____
CASING DIAMETER:
ID _____ OD _____
LENGTH OF CASING _____

WELL SCREEN

☐ SCHEDULE 40 PVC
☐ _____
PRODUCT _____
MFG. BY _____
CASING DIAMETER:
ID _____ OD _____
SLOT SIZE _____
LENGTH OF SCREEN _____

BOREHOLE BACKFILL

AMOUNT CALCULATED _____
AMOUNT USED _____
☐ BENTONITE CHIPS, SIZE _____
☐ BENTONITE PELLETS, SIZE _____
☐ SLURRY
☐ FORMATION COLLAPSE
PRODUCT _____
MFG. BY _____
METHOD INSTALLED:
☐ POURED ☐ TREMIE

PHOTOGRAPH LOG

Camera ID:____________________ Photographer:____________________

Picture Number	Date	Time	Direction Facing	Description

TETRA TECH EM INC.
GROUNDWATER LEVEL MEASUREMENTS LOG

Circle type of organic vapor meter used: PID FID

Well Number	PID/FID Reading (ppm)	Time	Depth to Groundwater (ft.) (three measurements)			Depth to Bottom (ft.)	Comments
			1st	2nd	3rd		

Date: _____

Field Staff: _____ **Field Staff Signature:** _____

Page No.: _____

DAILY FIELD LOG

Project: Fort Irwin Well Installation and Sampling **Date:** _____

Project Work Plan: FTIR-02 Monitoring Well Installations

TtEMI Field Crew: Darren Croteau, Rich Howell,
Site Safety Officer: Rich Howell

Subcontractors: None

Weather:

Site Visitors:

Signing below indicates that you have read the general and site specific health and safety plans and agree to follow the procedures contained within.

Name: _____ Signature: _____

Name: _____ Signature: _____

Name: _____ Signature: _____

Log of Today's Field Activities:

Activities Planned for Tomorrow:

Tetra Tech EM Inc.
San Francisco Office

135 Main St. Suite 1800
San Francisco. CA 94105
415-543-4880
Fax 415-543-5480

Chain of Custody Record No. _____

Page _____ of _____

Lab PO#:	Lab:
Project name:	TtEMI technical contact:	Field samplers:
Project (CTO) number:	TtEMI project manager:	Field samplers' signatures:

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	No./Container Types: 40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar				Preservative Added	Analysis Required: VOA	SVOA	Pest/PCBs	Metals	TPH Purgables	TPH Extractables									

	Name (print)	Company Name	Date	Time
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #:

WHITE-Laboratory Copy YELLOW-Sample Tracker PINK-File Copy

WELL DEVELOPMENT DATA SHEET

Boring No. _____ Well No. _____

Project _____
Project No. _____
Date(s) of Installation _____
Date(s) of Development _____
Personnel/Company _____
_____
Type of Rig Used _____

Casing Diameter/Type _____
Borehole Diameter _____
Screened Interval(s) _____
Total Length of Well Casing _____
Measured Total Depth (TOC) Initial _____
Final _____
Initial Depth to Water
(TOC) _____ Date _____ Time _____
Stabilized Depth to Water
(TOC) _____ Date _____ Time _____

DEVELOPMENT

TECHNIQUE(S) EQUIPMENT TYPE/CAPACITY

___ Jetting (Airlift) _____
___ Surge Block _____
___ Bailing _____
___ Pumping _____
___ Other _____

FLUIDS ADDED

Lost Drilling Fluid: _____ Gallons
Lost Purge Water: _____ Gallons
Water During Installation: _____ Gallons
Total Fluids Added: _____ Gallons
Source of Added Water: _____
Ground Water Quality Parameters of
Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: _____ Feet of Water
X _____ Gallons/Foot
= _____ Gallons per Single Casing Volume
Sand Pack Volume: _____ Ft. of Saturated Sand Pack
X _____ Gallons/Ft. (Borehole Dia.)
= _____ Gallons (in Borehole)
- _____ Gallons of Casing Volume
= _____ x 0.3 (Assuming porosity = 30%)
= _____ Gallons within Sand Pack
Single Purge Volume: _____ Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: _____ Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: _____
Rate of Development _____ Gallons/Minute (Hour,Day)
Pumping Rate/Depth _____ @ _____ Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness _____

INSTRUMENT CALIBRATION

pH Meter: _____ Spec. Conductance Meter: _____
pH 4.0 = _____ @ ___ °C Standard _____ µmhos/cm@ 25°C
pH 7.0 = _____ @ ___ °C Reading _____ µmhos/cm @ _____ °C
pH 10.0 = _____ @ ___ °C Turbidity Meter: _____
Dissolved Oxygen Meter: _____ Other: _____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity or D.O.	Clarity, Odor PID Readings, Other:

Development Completed at _____ Gallons Discharged. Date: _____ Time: _____
Criteria: _____ Personnel: _____

* Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.