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Alameda County
Environmental Health

August 26, 2011

**Mr. Mark Detterman
ACHSA
1131 Harbor Bay Parkway
Suite 250
Alameda, CA 94502-6577**

Subject: Work Plan for 5-Day Dual Phase Extraction System Test dated August 26, 2011, 17715 Mission Boulevard, Hayward, California

Dear Mr. Detterman:

Enclosed, please find a copy of Work Plan for 5-Day Dual Phase Extraction System Test dated August 26, 2011 for the subject property. With my authorization, the work was performed by Sierra Environmental, Inc. (Sierra).

I Declare, under penalty of perjury, that the information and/or recommendations contained in the report is true and correct to the best of my knowledge.

Please call me at (925) 519-9305 if you have questions.

Sincerely Yours,



**Som Gupta
ABE Petroleum LLC**

Enclosure

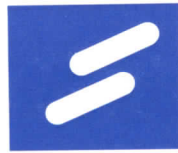
WORK PLAN FOR 5-DAY DPE SYSTEM TEST

**ABE Petroleum
17715 Mission Boulevard
Hayward, California 94539**

**Prepared for
Mr. Som Gupta
ABE Petroleum LLC**

**Prepared by
Sierra Environmental, Inc.**

**August 26, 2011
Project 11-103.11**



Sierra Environmental, Inc.
Environmental Consultants

August 26, 2011
Project 11-103.11

Mr. Som Gupta
ABE Petroleum LLC
33090 Mission Boulevard
Union City, CA 94587

**Subject: Fuel Leak Case No. RO0000257, Work Plan for 5-Day Dual Phase
Extraction System Test, 17715 Mission Boulevard, Hayward, California**

Dear Mr. Gupta:

Sierra Environmental, Inc. (Sierra) is pleased to present this work plan describing scope of high vacuum dual phase extraction (DPE) test at the subject location, hereafter, referred to as Site. The Site location is shown in Figure 1. The work plan was requested in a letter prepared by Alameda County Health Care Services (ACHCS) dated June 17, 2011. Mr. Mark Detterman is the case officer for the Site at ACHCS. Please note that Sierra has proposed ACHCS to consider a case closure for the Site in a letter dated August 15, 2011. This work plan, therefore, is presented to satisfy ACHCS's deadline presented in its June 17, 2011, letter. The followings were requested in the ACHCS letter:

- Explanation of the proposed vapor extraction and groundwater monitoring wells relationship to obtain radius of influence and need for possible additional vapor extraction wells
- Description of soil logging protocols for the proposed vapor extraction wells
- Depict utility trenches at and near the Site
- Continue with semi-annual groundwater monitoring
- Survey the wellheads to Geotracker standard

980 W. Taylor Street
San Jose, CA 95126
Phone (408) 971-6758
Fax (408) 971-6759

BACKGROUND

Please refer to Appendix A for the Site background information.

OBJECTIVE

Objective of the work proposed in this work plan is to address the above items requested by ACHCS.

SCOPE OF WORK

Presently, there are three 2-inch diameter groundwater monitoring wells (MW1 through MW3) at the Site. The wells are approximately 34 feet deep, and each one with 15-15.5 feet of perforated section. MW1 located at the source area was constructed with 15.5 feet of perforated and 17.75 feet of solid casings. Therefore, perforated section is extended from bottom of the well to approximately 18 feet below ground surface (bgs). In its September 29, 2009, Remedial Investigation/Feasibility Study report, Sierra proposed advancing two vapor extraction wells at the source area for the DPE test. Sierra proposed constructing one 4-inch diameter 18 feet deep and one 4-inch diameter 27 feet deep soil vapor extraction well (SV1 and SV2) perforated 8-18 feet bgs, and 20-27 feet bgs. Sierra's proposed number of the extraction wells was based on cost consideration, isolated nature of the source area, and MW1 also being utilized as an extraction well for determining radius of influence. However, because of unknown rate of groundwater recharge in MW1, Sierra proposes to construct two 18 feet (SV1 and SV2) and two 27 feet (SV3 and SV4) deep vapor extraction wells. Proposed location of the wells is shown in Figure 2.

Sierra will have drilling contractor to advance 4-inch diameter soil vapor extraction well SV1 through SV4 at the Site. Sierra will collect soil samples from the borings for field observations, screening, and chemical analysis.

Sierra will connect MW1, SV1 and SV3 to a high vacuum DPE system to perform a 5-day test/cleanup evaluating feasibility of using such technology to remove contaminant mass from soil and groundwater beneath the Site. SV2 and SV4 will be used to measure radius of influence. Sierra will make connection adjustments to the extraction and observation wells during evaluation of the field data.

Sierra will prepare a report summarizing the findings. Sierra will upload the report to the State Geotracker and ACHCS database in electronic format.

Sierra will perform its proposed work in accordance with the following tasks:

Task 1 - PREFIELD ACTIVITIES

After obtaining approval of this work plan from HCACS, Sierra will obtain well construction permits from Alameda County Public Works (ACPW) and notify them of the drilling time and date. Sierra will visit the Site and mark the boring/well locations. Sierra will coordinate with a state-licensed drilling contractor, a state-certified analytical laboratory, and the client. Sierra will notify Underground Services Alert (USA) to identify all underground utilities, and clear the boring locations. Sierra will prepare a health and safety plan for its workers and sub-contractors. Sierra will prepare necessary field equipment and material. Sierra will obtain a wastewater discharge permit from the local water management agency to treat and discharge the water generated by the DPE system during the 5-day test. Sierra will notify Bay Area Air Quality Management District (BAAQMD) of the date and time of DPE system operation at the Site. The DPE system has a permit to operate from BAAQMD.

Task 2 - FIELD ACTIVITIES

Drilling and Soil Sampling Activities

Sierra will retain a California-licensed drilling contractor to perform the drilling activities.

Sierra will utilize a truck-mounted drilling equipment and 8-inch-diameter continuous-fly hollow stem augers to advance the soil borings. A hand auger will be used to advance the borings to approximately 5 feet bgs to further clear underground utilities. California standard split spoon sampler lined with clean 6-inch-long stainless steel rings will be used to collect soil samples at 5-foot intervals starting at 5 feet bgs to bottom of the borings.

After collecting the soil samples, Sierra will inspect the soil for odor or stain, and record its physical characteristics in boring logs. They will also be screened with photo ionization detector (PID) for intensity of volatile petroleum hydrocarbon concentrations at different depths. Although previous soil screening has been done at the source area, Sierra will collect soil samples from the contaminated zone for chemical analysis to estimate present contaminant mass in the source area. The samples will be collected from the deeper soil vapor extraction wells/borings at 10, 15, 20, and 25 feet bgs. After collection, the samples will be sealed at both ends with Teflon tape and plastic end-caps, labeled, and stored on ice in a cooler and delivered to a State-certified analytical laboratory for chemical analysis with chain-of-custody documentation.

All sampling equipment will be washed with Liqui-Nox[®] (a phosphate-free laboratory detergent) and rinsed with clean tap water at each sampling interval.

The wash and rinse water will be stored in a 55-gallon drum at the designated location at the Site for proper disposal.

Sierra will have the driller to construct two 4-inch diameter 18 feet deep and two 4-inch diameter 27 feet deep soil vapor extraction wells. Perforated (0.02 inch) and solid schedule 40 PVC piping will be used to construct the wells. The wells (SV1 and SV2) will be perforated 10-18 feet bgs. SV3 and SV4 will be perforated 20-27 feet bgs. Coarse sand pack will be used to cover the perforated section extending to approximately 1 foot above this section. Approximately 1 foot of Bentonite pellets will be placed and hydrated on top of the sand pack. The annular space of the wells will be sealed with Portland cement.

All wellheads will be secured with expansion cap and traffic-rated manholes. Sierra will notify ACHCS and ACPW of the drilling date and time. Well locations are shown in Figure 2.

Drill cuttings will be placed in 55-gallon drums, and stored at a designated area at the Site for proper profiling and disposal.

Wellhead Survey

At the request of ACHCS, On August 18, 2011, Sierra retained services of Muir Consulting, Inc. (MCI) to survey the groundwater monitoring wellhead elevations for geographical location using the NAD 83 Datum, and for elevation to the NAVD 88 Datum from geo-positioning satellite (GPS) observations and terrestrial surveying methods. Copies of the MCI survey map and results are included in Appendix B.

Utility Trench Survey

At the request of ACHCS, Sierra reviewed utility maps for the Site's vicinity, and visited the Site on August 23, 2011, to observe and document location and depth of on-site utility trenches. Electrical power is provided to the Site via aboveground lines. On-site water and sewer trenches are approximately 18-24 inches bgs and do not extend through the source area. Figure 3 shows the trench locations.

The deepest off-site trench near the Site belongs to sewer, which extend approximately 7 feet bgs. Therefore, utility trenches do not appear to act as

conduits dispersing contaminant vapor.

Task 3 - CHEMICAL ANALYSIS

Sierra will have the soil samples analyzed for TPHG using the United State Environmental Protection Agency (EPA) method GC/MS 8260B. The samples will also be analyzed for benzene, toluene, ethyl benzene, and xylenes, and the fuel oxygenates including lead scavengers using EPA method 8260B.

TASK 4 - SEMI-ANNUAL GROUNDWATER MONITORING

Sierra will continue semi-annual groundwater monitoring of the on-site and off-site monitoring wells as scheduled by ACHCS. The groundwater monitoring reports will be submitted to the client and uploaded to the State Geotracker and ACHCS in electronic format.

Task 5 - DPE SYSTEM 5-DAY TEST

DPE System Descriptions

The following description of DPE is an excerpt from chapter XI of OUST's publication: ***How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: A Guide for Corrective Action Plan Reviewers.*** (EPA 510-B-95-007).

DPE, also known as multi-phase extraction, vacuum-enhanced extraction, or sometimes bioslurping, is an *in-situ* technology that uses pumps to remove various combinations of contaminated groundwater, separate-phase petroleum product, and hydrocarbon vapor from the subsurface. Extracted liquids and vapor are treated and collected for disposal, or re-injected to the subsurface (where permissible under applicable state laws).

Application

DPE systems can be effective in removing separate-phase product (free product) from the subsurface, thereby reducing concentrations of petroleum hydrocarbons in both the saturated and unsaturated zones of the subsurface. DPE systems are typically designed to maximize extraction rates; however, this technology also stimulates biodegradation of petroleum constituents in the unsaturated zone by increasing the supply of oxygen, in a manner similar to that of bioventing.

DPE is often selected because it enhances groundwater and/or product recovery rates, especially in layered, fine-grained soils. The application of DPE also maximizes the effectiveness of soil vapor extraction (SVE) by lowering the water table and therefore increasing air-phase permeability in the vadose zone.

Operation Principles

The vacuum applied to the subsurface with DPE systems creates vapor-phase pressure gradients toward the vacuum wells. These vapor-phase pressure gradients are also transmitted directly to the subsurface liquids present, and those liquids existing in a continuous phase (*e.g.*, water and "free" petroleum product) will flow toward the vacuum well in response to the imposed gradients (the term "free" product is a commonly used, though imprecise term because a greater fraction of resident petroleum product may be recovered using vacuum-enhanced DPE compared to the fraction of product recoverable using gravity drainage alone). The higher the applied vacuum, the larger the hydraulic gradients that can be achieved in both vapor and liquid phases, and thus the greater the vapor and liquid recovery rates.

Dramatic enhancements in both water and petroleum product recovery rates resulting from the large hydraulic gradients attainable with DPE systems have been reported in the literature (Blake and Gates, 1986; Blake, *et al.*, 1990; Bruce, *et al.*, 1992). The depressed groundwater table that results from these high recovery rates serves both to hydraulically control groundwater migration and to increase the efficiency of vapor extraction. The remedial effectiveness of DPE within the zone of dewatering that commonly develops during DPE application should be greater than that of air sparging due to the more uniform air flow developed using DPE (Johnson, *et al.*, 1992).

DPE Test Procedures

At minimum, one week after construction of the vapor extraction wells, Sierra will utilize a DPE system mounted on a structural steel base frame trailer to determine its feasibility for removing contaminant mass from the source area at the Site. The system will include a 10 hp oil sealed liquid ring pump rated for 250 ACFM at vacuum up to 29" Hg. It will also have a high efficiency liquid/vapor storage tank (separator), and steel shell oxidizer with high temperature refractory lining and Noble metal monolithic catalyst. In addition to the DPE system, Sierra will utilize a water treatment system also mounted on a trailer. The water treatment system will be equipped with a 500-gallon capacity storage tank, bag filters, two 250 lbs of virgin/activated carbon vessels, an electric pump, and a flow meter. The treated water from the water treatment trailer will be transferred into a 2,500-gallon aboveground temporary

storage tank. It will then be disposed under a general water treatment permit and disposed in sewer cleanout receptacle at the Site.

The DPE and water treatment systems will be connected together via automated control panels. A generator will provide power to the systems. The oxidation system will operate under BAAQMD general air emission permit. Sierra will connect the system to groundwater monitoring well MW1 (2-inch diameter), and soil vapor extraction well SV1 and SV3.

Vapor concentrations will be periodically checked with a photo ionization detector, and documented on field forms. Sierra will collect total inlet vapor sample at the beginning, middle, and end of the test for chemical analysis. The samples will be collected in Tedlar[®] bags, labeled, and submitted to a State-certified analytical laboratory with chain-of-custody to be analyzed for the constituents explained in Task 3.

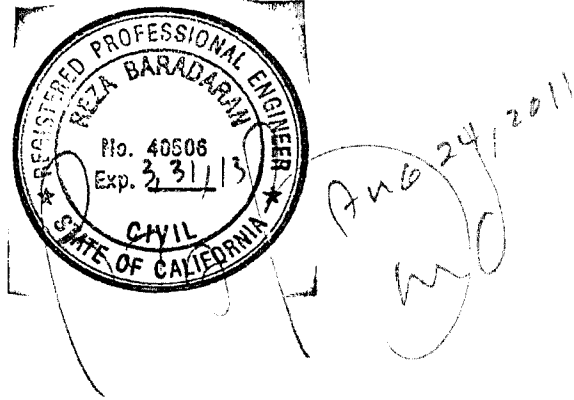
Sierra will also monitor and record vacuum indicative of radius of influence created by the DPE system at SV2 and SV4 wellheads using magnehelic gauges. Any fluctuation of groundwater levels in MW2 and MW3 during extraction from MW1 will also be recorded. Vapor volume, oxidizer temperature, system vacuum, and volume of extracted groundwater will also be recorded in the field notes.

Task 6 - REPORT PREPARATION AND SUBMITTAL

Sierra will prepare a report documenting the field observations, soil boring logs, and well construction diagrams, and the analytical results. Additionally, the report will summarize contaminant mass removed, radius of influence, and soil-vapor analytical results related to the DPE system test. The report will document the findings, and provide recommendations. Copies of the report will be submitted to the client, and uploaded electronically to State Geotracker and ACHCS databases. Sierra will complete State Water Resources Well Completion Form and submit to appropriate agencies.

Please feel welcome to call us if you have questions.

Very Truly Yours,
Sierra Environmental, Inc.



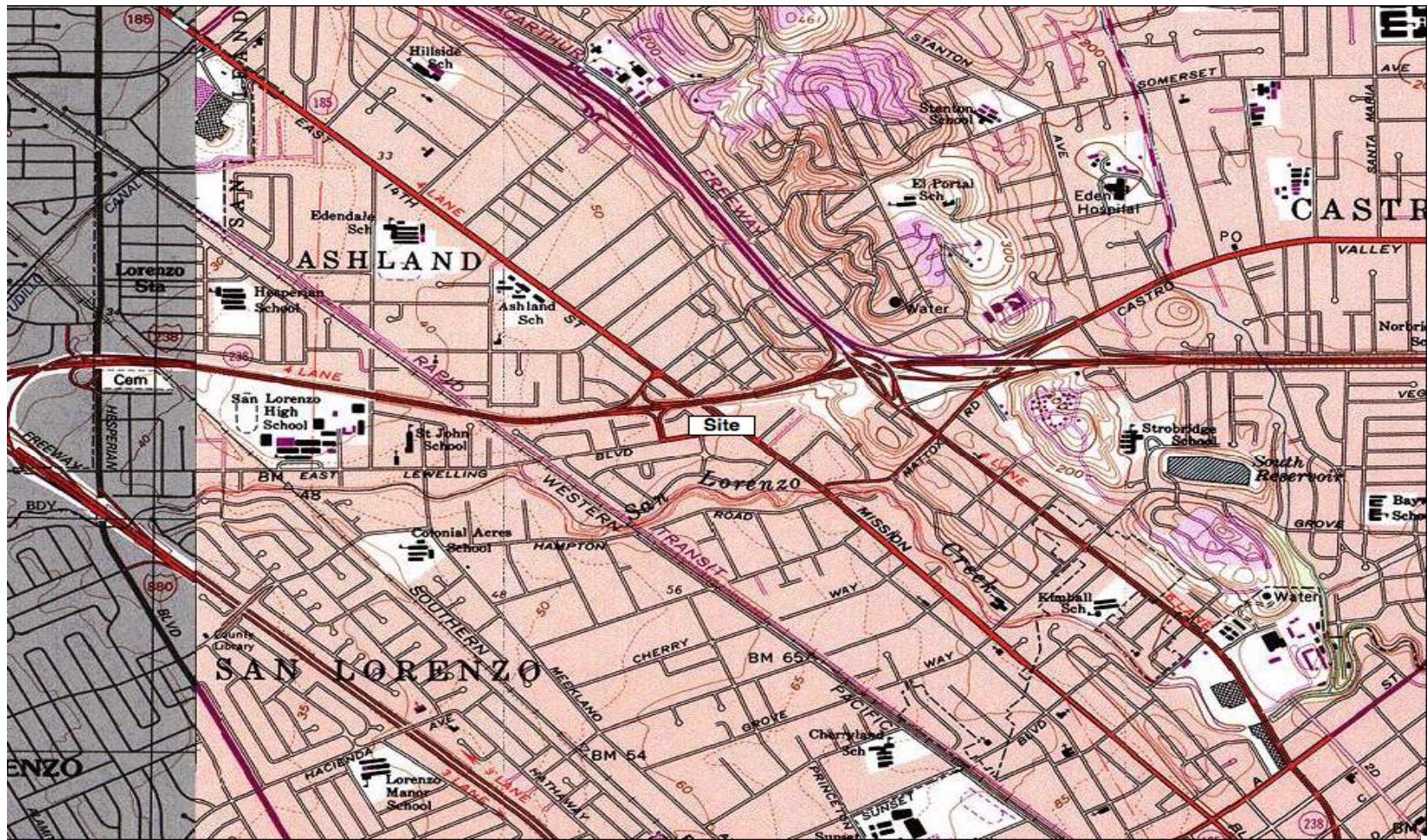
Reza Baradaran, PE, GE
principal

A handwritten signature in black ink, appearing to read "Mitch Hajiaghai".

Mitch Hajiaghai, REA II, CAC
Principal

- Attachments:
- Figure 1 - Site Location Map
 - Figure 2 - Proposed Soil Vapor Extraction Well Locations
 - Figure 3 - On-Site and Off-Site Utility Trench Locations
 - Appendix A - Site Background Information
 - Appendix B - Groundwater Monitoring Wellhead Survey Results

cc: Mr. Mark Detterman, ACHCS (Electronically)



TN \star MN
15°

0 1000 FEET 0 500 1000 METERS
0 5 1 MILE

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)



SIERRA ENVIRONMENTAL, INC.
Environmental Consultants

980 W. Taylor Street, San Jose, CA 95126
Phone [408] 971-6758 • Fax [408] 971-6759

SITE LOCATION MAP

**5-Day DPE Test
ABE Petroleum LLC**





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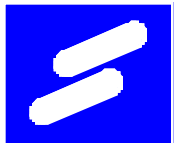
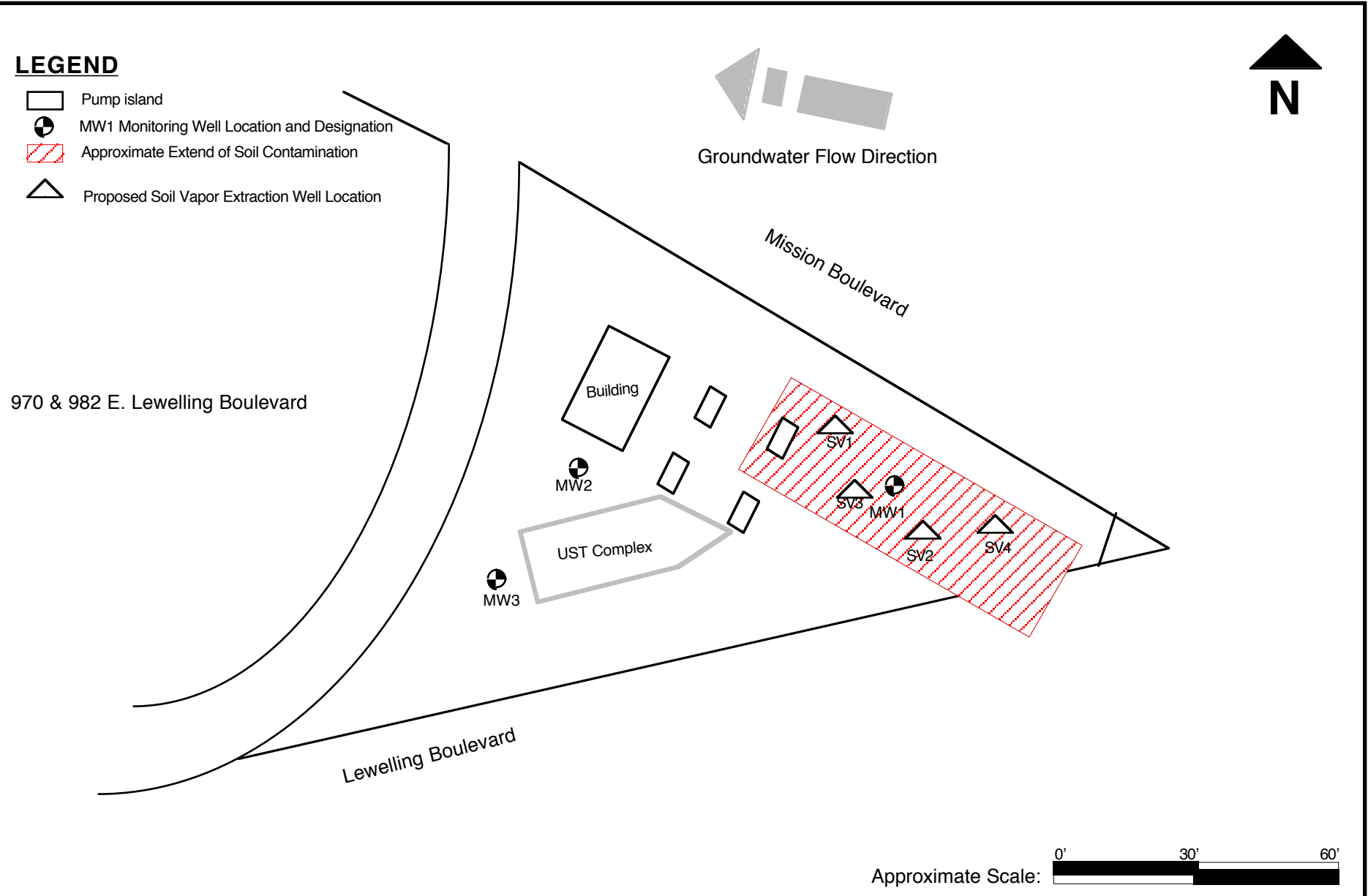
FIGURE

1

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LEGEND

-  Pump island
-  MW1 Monitoring Well Location and Designation
-  Approximate Extend of Soil Contamination
-  Proposed Soil Vapor Extraction Well Location



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Proposed Soil Vapor Extraction Well Locations

5-Day DPE Test
ABE Petroleum LLC






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FIGURE

2

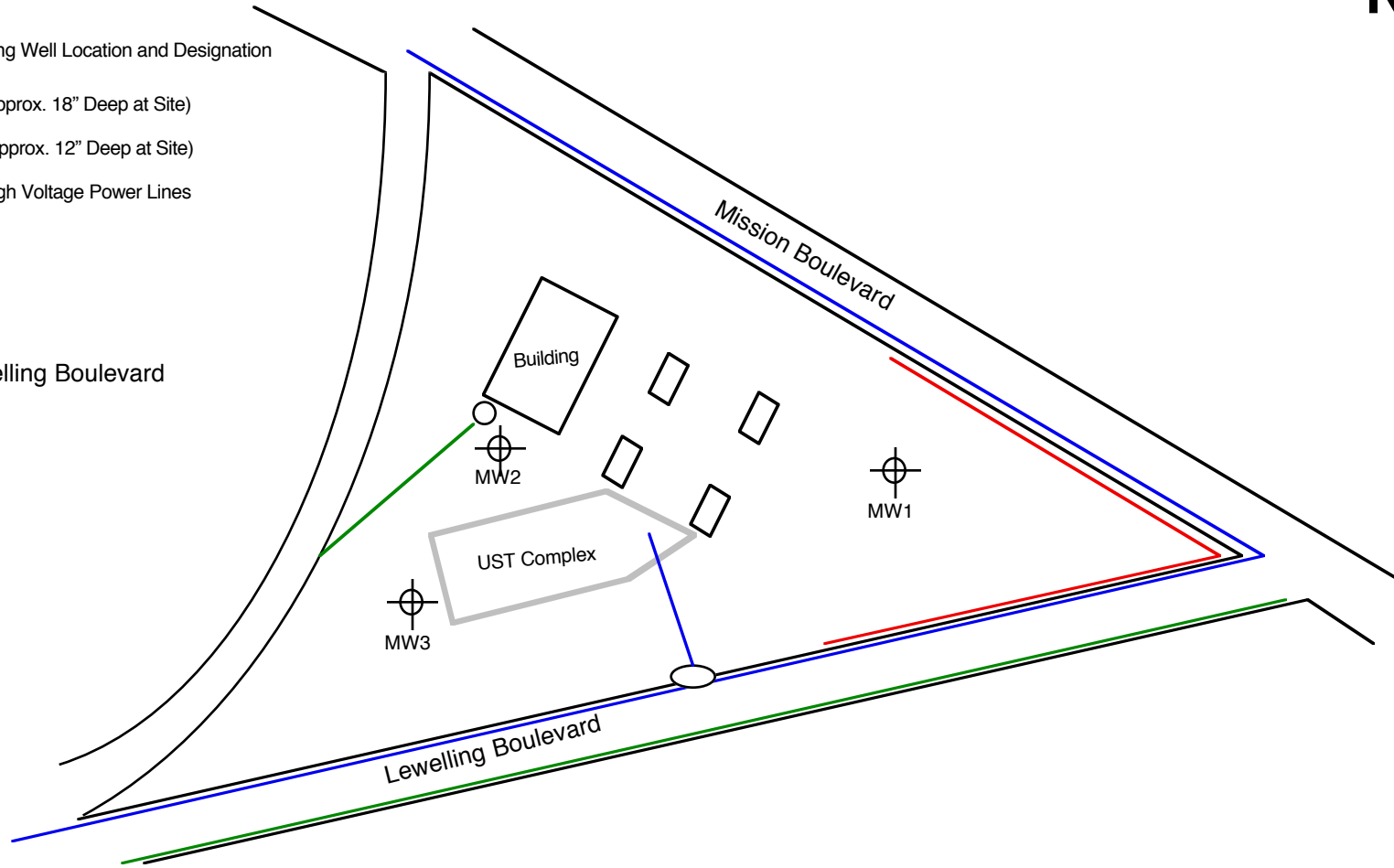
August 26, 2011
 Project 11-103.11

LEGEND

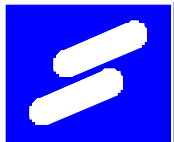
-  Pump island
-  MW1 Monitoring Well Location and Designation
-  Water Line (Approx. 18" Deep at Site)
-  Sewer Line (Approx. 12" Deep at Site)
-  Over-Head High Voltage Power Lines



970 & 982 E. Lewelling Boulevard



Approximate Scale: 



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Environmental Consultants

980 W. Taylor St., San Jose, CA 95126
Phone [408]971-6758 • Fax [408] 971-6759

On-Site and Off-Site Utility Line Locations

5-Day DPE Test
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FIGURE

3

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Appendix A
SITE BACKGROUND INFORMATION

BACKGROUND

On September 16, 1997, Balch Petroleum Contractors & Builders, Inc. (Balch) of Milpitas, California, removed one 2,000-gallon, two 6,000-gallon, one 10,000-gallon single-wall steel gasoline, and one 500-gallon single-wall steel waste oil USTs from the Site. Former UST locations are shown in Figure A of this appendix.

No hole or damage was observed in the tanks. No groundwater was encountered in the tank excavations. After UST removal, Sierra collected soil samples from the tank excavations for chemical analysis.

Up to 2,300 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHG) was detected in the soil samples collected from beneath the tanks at approximately 14 feet below ground surface (bgs). The soil sample locations are shown in Figure A.

On August 14, 2000, Sierra drilled three exploratory soil borings and converted them to groundwater monitoring well MW1 through MW3. The wells are approximately 35 feet deep. Sierra collected soil and groundwater samples from the borings/wells for chemical analysis. The analytical results showed up to 720 ppm TPHG, 2.2 ppm benzene, and 3.4 ppm methyl tertiary butyl ether (MTBE) in the soil samples. Up to 290000 ppb TPHG, 10000 ppb benzene, and 4300 ppb MTBE were detected in the groundwater samples. Gasoline constituents were detected in groundwater samples collected from all three monitoring wells. Groundwater monitoring well locations is shown on Figure B of this Appendix.

On May 4, 2006, Sierra retained services of Vironex Environmental Services (Vironex) to drill soil boring B1 through B4 at the Jack In The Box and Cal/Trans properties. Sierra collected grab groundwater samples from the borings for chemical analysis. Up to 370 µg/l total petroleum hydrocarbons as gasoline (TPHG), 16 µg/l toluene, 15 µg/l ethylbenzene, and 100 µg/l xylenes were detected in the water sample collected from the borings (B3 and B4) advanced at the Jack In The Box property. No benzene or MTBE was detected in water samples collected at this property. 3.2 µg/l MTBE was detected in the water samples collected from the borings advanced at the Cal/Trans properties. The MTBE was detected in boring B2 located within 300 feet northwest at hydraulic down gradient of the Site. On May 10 and 11, 2006, Sierra retained services of Hew Drilling Company, Inc. (Hew) to construct 4 groundwater monitoring wells (MW4 through MW7) at the CalTrans properties, and Langton Drive. After the well construction, Sierra had the wellheads surveyed, developed the wells, and collected groundwater samples from the wells for chemical analysis. No gasoline constituents were detected in the groundwater samples collected from the wells. The analytical results for the soil and groundwater samples collected from the boring and the wells suggest the tip of the dissolved MTBE plume in the groundwater is confined within 300 feet northwest of the Site. The length of the dissolved

plume of other gasoline constituents in groundwater were shorter than the MTBE plume. Figure B shows the groundwater monitoring well locations.

On September 11, 2006, Sierra started quarterly groundwater monitoring of MW1 through MW7. Table I and II presents the groundwater measurement and analytical data.

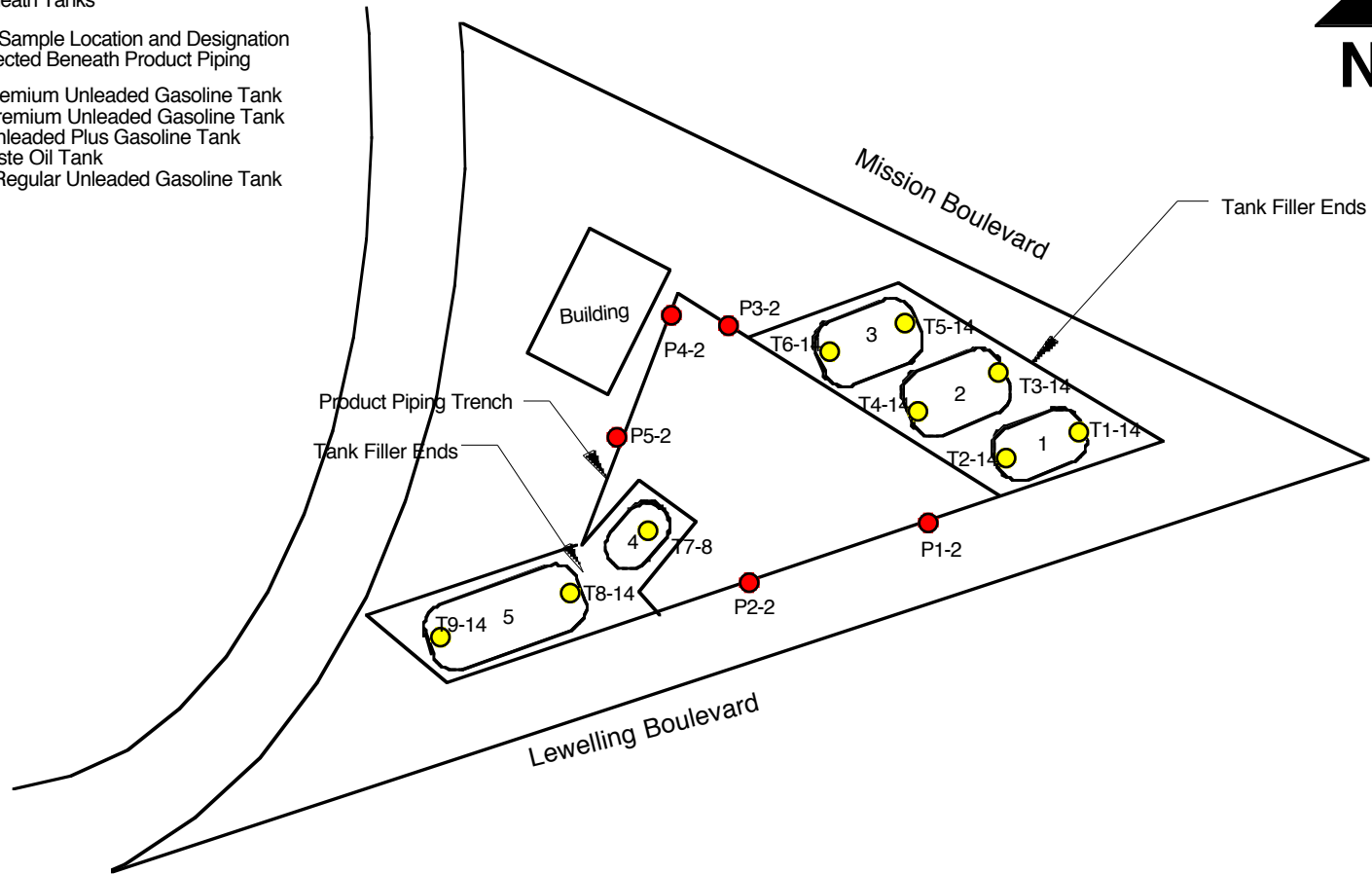
On August 27, 28, and 31 2009, Sierra had 9 membrane interface probes [MIP (B1 through B9)] advanced at the Site. The MIPs were extended to 40 feet bgs. Before advancing the MIPs, on August 27, 2009, Sierra had confirmatory soil boring S1 advanced near MW1 to explore depth of first encountered groundwater, and collected soil and groundwater samples for chemical analysis, soil oxygen demand (SOD), permeability, and gradations tests. Soil explored/tested at the Site consisted of silty clay/silty sandy clay to approximately 35 feet bgs and sandy gravel encountered at 35 through 40 feet below ground surface. Groundwater was first encountered in boring S1 at approximately 31 feet bgs and raised to 25 feet bgs.

The MIP results suggest that soil impacted with the gasoline constituents exist from approximately 10 feet bgs to the saturated zone. The horizontal extend of impacted soil is within approximately 25 feet radius of MW1. MIP results depicted higher contaminant concentrations at 20-25 feet and 30-32 feet bgs.

Up to 320,000 $\mu\text{g}/\text{kg}$ TPHG, 1170 $\mu\text{g}/\text{kg}$ benzene, and 1150 $\mu\text{g}/\text{kg}$ MTBE were detected in the soil representing 20 feet bgs in boring S1 (confirmatory boring), at the source area. Also, up to 59,900 $\mu\text{g}/\text{l}$ of TPHG, 1680 $\mu\text{g}/\text{l}$ benzene, and 893 $\mu\text{g}/\text{l}$ MTBE were detected in the grab water collected from boring S1. High/moderate concentrations of gasoline constituents were also detected in grab groundwater samples at all the MIP borings. Summary of the above work was presented in "Remedial Investigation/Feasibility Study" report dated September 29, 2009. The MIP boring locations are shown in Figure C of this Appendix.

LEGEND

- T1-14 Soil Sample Location and Designation Collected Beneath Tanks
 - P1-2 Soil Sample Location and Designation Collected Beneath Product Piping
- 1 = 2,000-Gallon Premium Unleaded Gasoline Tank
 2 = 6,000-Gallon Premium Unleaded Gasoline Tank
 3 = 6,000-Gallon Unleaded Plus Gasoline Tank
 4 = 500-Gallon Waste Oil Tank
 5 = 10,000-Gallon Regular Unleaded Gasoline Tank



SIERRA ENVIRONMENTAL, INC.
Environmental Consultants

980 W. Taylor St., San Jose, CA 95126
 Phone [408]971-6758 • Fax [408] 971-6759

Former UST and Soil Sample Locations

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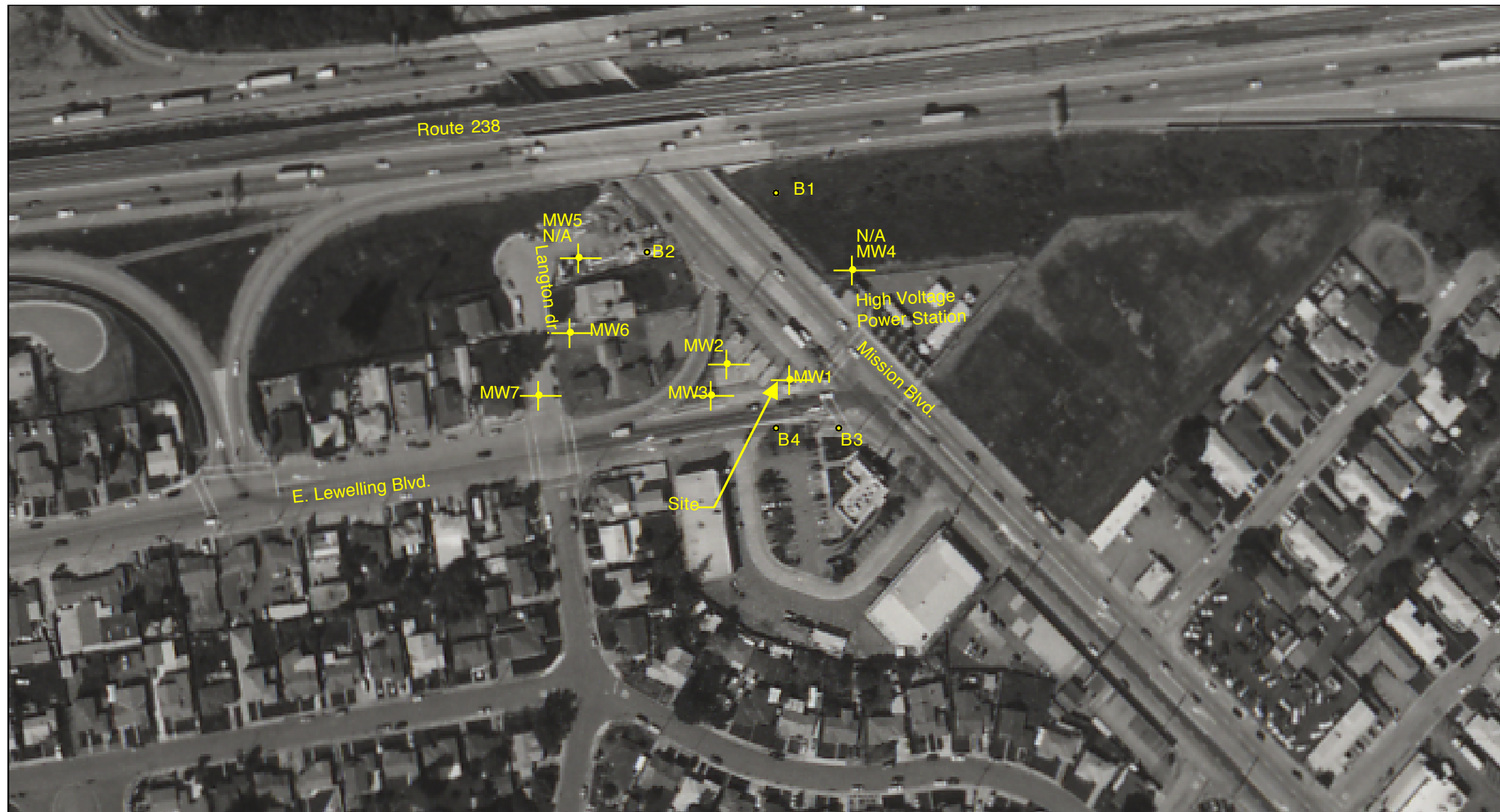
FIGURE

A

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LEGEND

- B1 Historical Soil Boring Location And Designation
- ✦ MW4 Groundwater Monitoring Well Location And Designation
- N/A Not Accessible



Source: Pacific Aerial Surveys 3-11-05



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Environmental Consultants

980 W. Taylor Street, San Jose, CA 95126
 Phone [408]971-6758 • Fax [408]971-6759

On-Site & Off-Site Monitoring Well and Boring Locations

**5-DAY DPE TEST
 ABE PETROLEUM LLC**





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FIGURE

B

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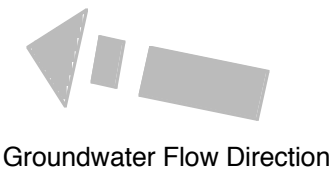
LEGEND

-  Pump island
-  MW1 Monitoring Well Location and Designation
-  B1 MIP Location and Designation
-  S1 Confirmatory Soil Boring Location and Designation

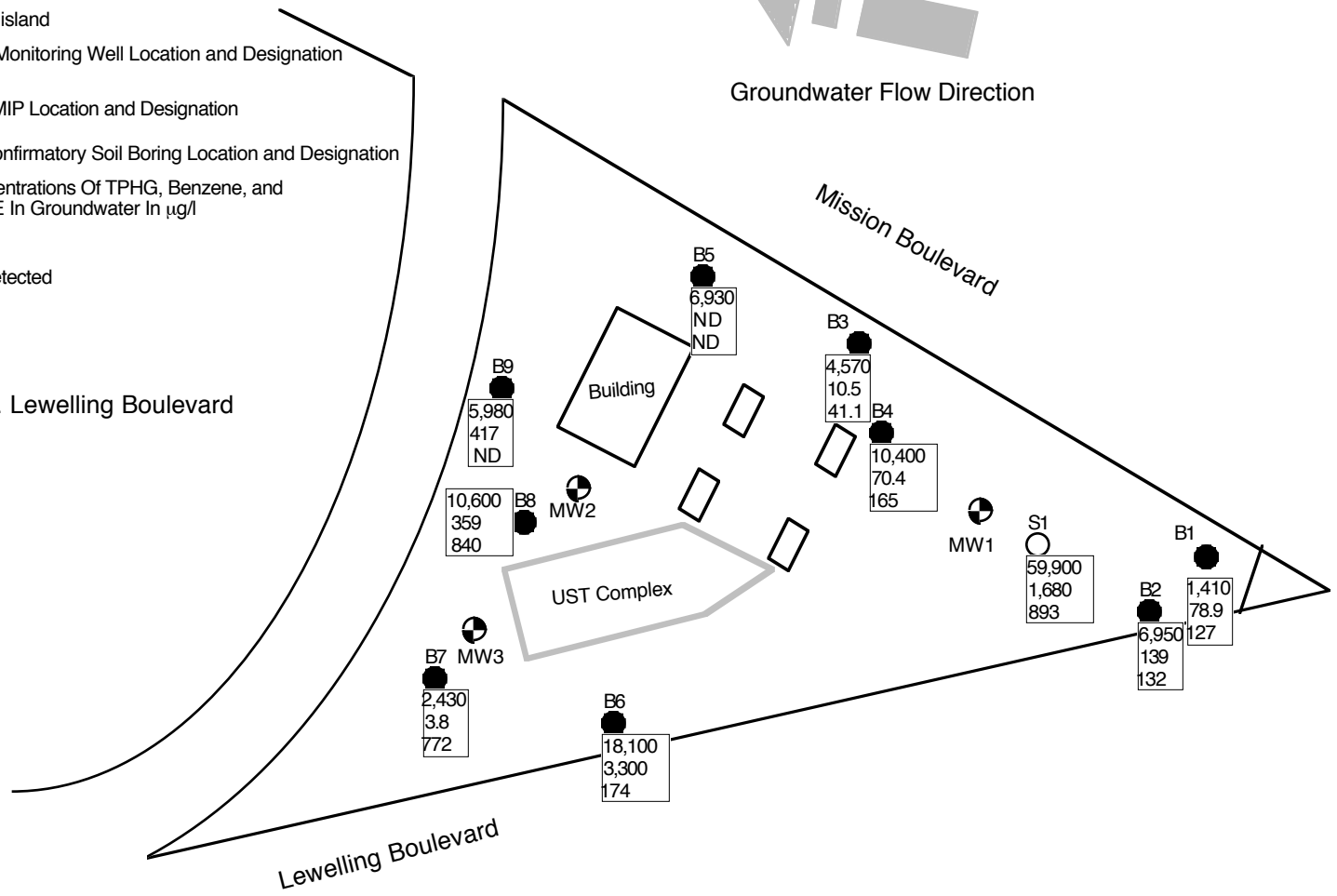
1,410
78.9
127

Concentrations Of TPHG, Benzene, and
MTBE In Groundwater In µg/l

ND Not Detected



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Lewelling Boulevard



SIERRA ENVIRONMENTAL, INC.
Environmental Consultants

980 W. Taylor St., San Jose, CA 95126
Phone [408]971-6758 • Fax [408] 971-6759

MIP Boring Locations

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ABE Petroleum LLC

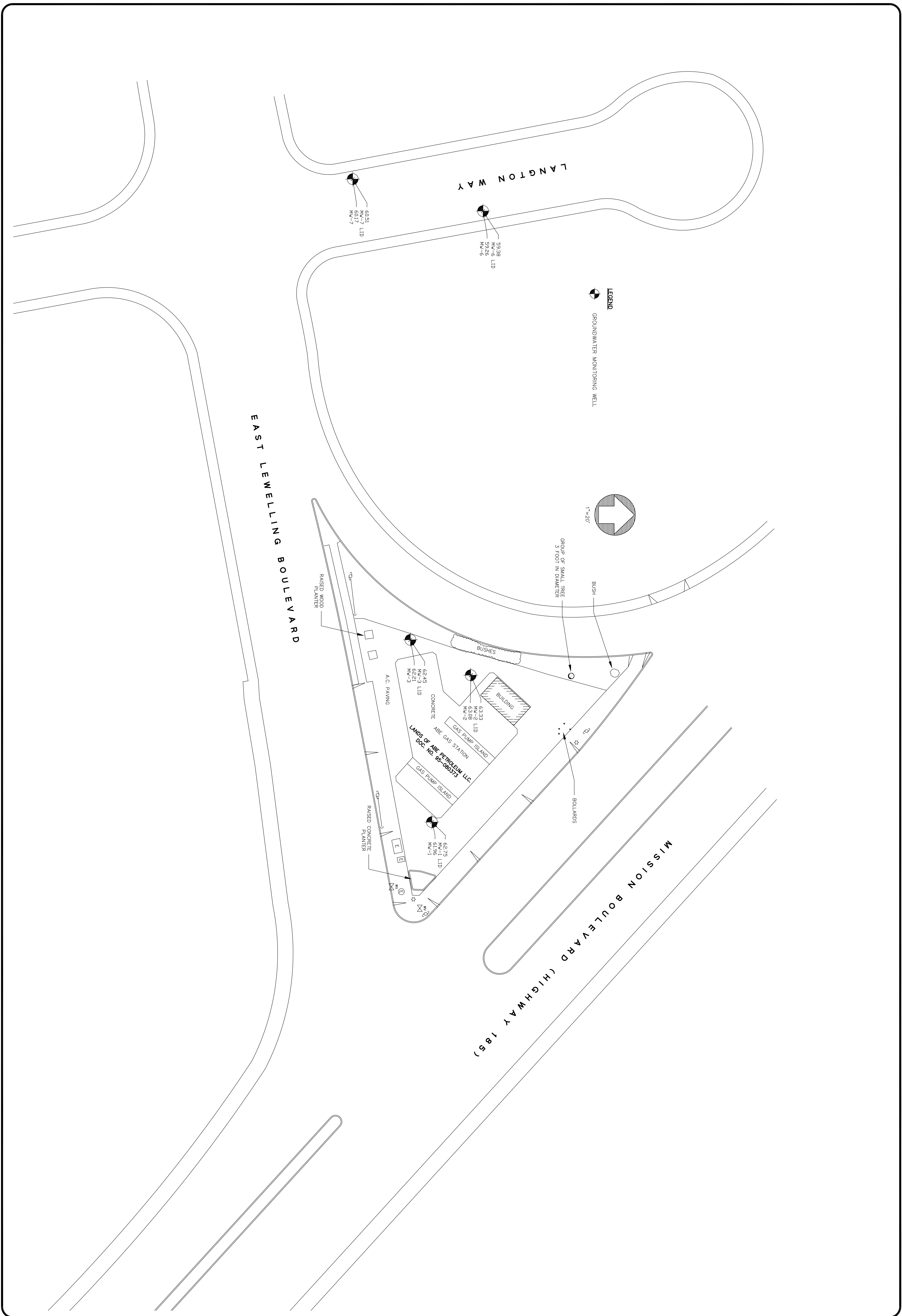
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FIGURE

C

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Appendix B
GROUNDWATER MONITORING WELLHEAD
SURVEY



REVISIONS	JOB NUMBER	DATE
	4171-01	08/17/11

ENVIRONMENTAL WELL SURVEY
17715 MISSION BOULEVARD
 HAYWARD ALAMEDA COUNTY CALIFORNIA

	MUIR CONSULTING, INC. 139 CHURCH AVENUE OAKDALE, CA 95361 (209) 845-8630 FAX (209) 845-8639 LAND SURVEYING • GPS • PLANNING www.muirconsulting.com
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DRAWN BY DAJ CHECKED BY JMS DATE 08/17/11	DRAWING NAME 4171-01.DWG SHEET NO. 1 OF 1
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