PES Environmental, Inc.
Engineering & Environmental Services

A Workplan Prepared For:

Eden Housing, Inc.
409 Jackson Street
Hayward, California 94544

Attention: Ms. Andrea Cohen

DRAFT REMEDIAL ACTION WORKPLAN
2103 AND 2121 East 14TH STREET
SAN LEANDRO, CALIFORNIA

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1.0 INTRODUCTION

This Remedial Action Workplan (RAW) was prepared by PES Environmental, Inc. (PES) on behalf of Eden Housing, Inc. (Eden), to describe voluntary cleanup activities to be conducted on the property located at 2103 and 2121 East 14th Street, San Leandro, California (the site) (Plate 1). It is our understanding that Eden is considering acquisition of the subject property for redevelopment as affordable senior housing. We further understand that Eden is working jointly with the City of San Leandro to redevelop the property. Recent project developments and the current regulatory status of the site are described below.

In 2007, PES performed a Phase I Environmental Site Assessment (ESA) and subsequent subsurface investigation at the site to evaluate soil, soil gas, and groundwater conditions as a component of Eden's environmental due diligence related to the potential purchase and redevelopment of the property. Soil and groundwater sampling and analysis did not indicate the presence of contaminants of concern. The results of the soil gas sampling indicated the presence of benzene in soil gas at one sample location (SG-5) at a concentration exceeding the Regional Water Quality Control Board, San Francisco Bay Region (Water Board) Environmental Screening Level (ESL) for a residential setting (Water Board, 2005). The level of benzene detected in soil gas at location SG-5 exceeded the residential ESL but was below the ESL developed for commercial properties. Due to the presence of benzene in soil gas at a concentration greater than the respective residential ESL, corrective action is planned prior to redevelopment of the property for residential purposes.

PES was retained by Eden to develop a RAW to facilitate the cleanup of the site for redevelopment purposes. Based on communication between Eden and the Water Board on May 25, 2007, it was determined that the site should follow the guidelines presented in the Memorandum of Agreement (MOA) between the California Environmental Protection Agency (Cal/EPA), the Department of Toxics Substances Control (DTSC), and the Water Board. On May 25, 2007, Eden submitted to the Water Board an application for "*Request for Oversight of a Brownfield Site*" for the subject property. The RWCQB approved the application in a letter dated June 1, 2007, enlisting the Water Board as the oversight agency. On June 6, 2007, Eden and the Water Board entered a Site Cleanup Program (SCP) cost recovery (SCP) agreement for the property.

On June 7, 2007, PES met with representatives of Eden, City of San Leandro, and Water Board to discuss the project strategy and data gaps. The RAW presented herein includes a scope of work agreed upon in the June 7, 2007 meeting that was designed to: (1) address data gaps with supplemental sampling; and (2) satisfy the Water Board staff requirements for the proposed remedial action.

In consideration of the Water Board as the regulatory oversight agency and the proposed future property usage as affordable senior housing, this RAW is primarily based on ESLs developed by the Water Board for residential usage. The ESLs were developed by the Water Board to be protective of human health and the environment for potentially complete exposure pathways.

Where appropriate, alternate screening guidelines also included California Human Health Screening Levels (CHHSLs; Cal/EPA, January 2005), U.S. Environmental Protection Agency (EPA) - Region 9, Preliminary Remediation Goals (PRGs), or regional background concentrations. Details of the project's specific use of the screening guidelines are discussed further herein.

The following sections in this workplan include:

- Section 2.0, Background - presents historical site usage, regional and site geology and hydrogeology, and a summary of previous investigations including a description of the distribution of chemicals in the subsurface;

- Section 3.0, Risk Evaluation and Target Cleanup Goals – identifies applicable and established target soil cleanup levels to be applied at the property;

- Section 4.0, Implementation of Supplemental Sampling and Remedial Action - outlines the scope of work agreed upon in the June 7, 2007 meeting to fill data gaps and presents a summary of the field activities to be performed to fulfill the project remedial action objectives; and

- Section 5.0, Reporting - discusses items to be included in the post-investigation/remedial action report.

Appendix A includes tables and plates from the subsurface investigation; Appendix B presents detailed field and laboratory procedures.

2.0 BACKGROUND

2.1 Site Description

The site is located in a mixed commercial and residential area within the City of San Leandro and County of Alameda, California and is bound to the northeast by East 14th Street, to the southeast by a Salvation Army retail store and parking lot, to the southwest by a residential development and to the northwest by Estabrook Street (Plates 1 and 2).

The site consists of two parcels of land and a portion of a third parcel of land. The two parcels are identified by Alameda County Assessor's Parcel Numbers (APNs) 77-556-54 and -55, and the adjacent strip of land is a portion of APN 77-556-57-3. The site has addresses of 2103 and 2121 East 14th Street (Plate 2). Access to the site is via driveways on East 14th and Estabrook Streets.

According to the United States Geological Survey (USGS) *San Leandro, California* Quadrangle 7.5-minute series topographic map dated 1993, the site is situated at an elevation of approximately 64 feet above mean sea level. The site is relatively flat, but slopes regionally to

the west. The closest water body is San Leandro Creek, located approximately ¾ mile north of the subject property.

In 2007, PES prepared a Phase I Environmental Site Assessment (ESA) for the subject property. The results of the Phase I ESA indicated that the site was developed as an orchard in 1939 (the earliest available aerial photograph). The majority of the orchard was removed from the site by 1946 and the remaining orchard was limited to the southeastern portion of the site (PES, 2007a). During the 1960s, 1980s, and 1990s, auto repair activities may have been performed at the site. Repair activities were likely performed at the rear of 2121 East 14th Street, and in buildings no longer present at the site, but that likely existed at the southwest property boundary (Plate 1). Additionally, one offsite source of potential environmental concern to the site was identified during the Phase I ESA. In the 1950s and 1960s, a dry cleaner was present across East 14th Street, east and upgradient (with respect to the inferred westerly direction of groundwater flow) of the site (see Plate 3) (PES, 2007a).

Currently, the site is occupied by two vacant structures: a single-story wood-frame vacant office with the address of 2103 East 14th Street, and a modular building with an attached small wood-frame office and canopied parking with the address of 2121 East 14th Street (Plate 3). The office was formerly used as a residence. The total area of the structures is approximately 2,100 square feet. A canopied parking area and porch are attached to the modular building. The remainder of the site is used as a parking lot. The site is currently paved with asphalt and is enclosed by chain-link fencing.

2.2 Regional and Site Geology and Hydrogeology

Based on the results of investigations performed in the site vicinity, the subject property area is reportedly underlain by clay, silt, silty sand, and sand with interbedded gravel (Gettler-Ryan, 1997). Groundwater has been encountered in the area at depths ranging from 27 to 31 feet below ground surface (bgs), and reportedly flows to the west (Gettler-Ryan, 1997).

Based on the lithology observed during sampling on the subject property, soil beneath the site consists of silty sands and sandy silts to a depth of 33 feet bgs, the maximum depth explored. Groundwater was encountered beneath the site at approximately 27 feet bgs in a silty sand layer (PES, 2007b)

2.3 Scope of Previous Investigations

In April 2007, PES performed a subsurface investigation at the site. The objectives of this investigation were to:

- Assess potential impacts to shallow soil gas from potential releases of dry-cleaning solvents at the nearby former dry cleaner and petroleum hydrocarbon-related constituents from site historical uses;

- Evaluate whether the subsurface soil had been impacted by petroleum hydrocarbon-related constituents from historic auto repair activities; and

- Assess whether groundwater had been impacted by potential contamination migrating from the former dry cleaner.

The investigation included conducting an active soil gas survey, soil sampling, and limited groundwater sampling. Soil gas samples were collected at 6 locations and analyzed for volatile organic compounds (VOCs) using U.S. EPA Test Method 8260B (PES, 2007b).

Soil sampling was conducted at six locations; the soil samples were analyzed for total petroleum hydrocarbons quantified as diesel (TPHd) and motor oil (TPHmo) using U.S. EPA Test Methods 3550 Modified and 8015-Modified, and VOCs and TPH quantified as gasoline (TPHg) using U.S. EPA Test Methods 5030 and 8260B.

Grab groundwater sampling was conducted at one location in the eastern corner of the site to assess potential groundwater contamination migrating from the former dry cleaner. The grab groundwater sample was analyzed for VOCs using U.S. EPA Test Method 8260B.

Tables and plates from the subsurface investigation are presented in Appendix A.

2.4 Distribution of Chemicals

2.4.1 Soil Gas

Benzene, toluene, and total xylenes were the only VOCs detected in the soil gas samples collected beneath the site (Plate 3). Benzene, which was detected at a concentration of 0.22 micrograms per liter (μg/L) in the soil gas sample from location SG-5, was the only constituent that exceeded its respective residential ESL of 0.085 μg/L (Appendix A). Toluene and total xylenes were detected in all soil gas samples collected at the site at concentrations ranging from 0.24 to 1.2 μg/L. The maximum concentrations of toluene and total xylenes (1.2 μg/L and 0.78 μg/L, respectively) were detected at soil gas location SG-5; both of these results are well below their respective ESLs of 63 μg/L and 150 μg/L.

2.4.2 Soil and Groundwater

VOCs, petroleum hydrocarbons, and petroleum hydrocarbon-related constituents were not detected in any of the soil samples or the grab groundwater sample collected at the site.

3.0 RISK EVALUATION AND TARGET CLEANUP GOALS

Section 3.0 presents a discussion of the appropriate target cleanup goals that will be used to determine if further remediation is required at the subject property. The target cleanup goals

selected for this project are conservative screening levels that have been developed by various regulatory agencies with jurisdiction within California. Use of the proposed target cleanup goals further described below will ensure remediation of the site will be conducted to levels that are appropriate for and protective of residential uses.

Evaluation of risks associated with detected concentrations of constituents in site soil and soil gas will be conducted primarily based on target cleanup goals (ESLs for a residential setting) established by the Water Board, where available. As stated previously, ESLs may not be established for certain potential constituents of concern at this site; in this event, where appropriate, alternate target cleanup goals may also include CHHSLs (Cal/EPA, January 2005), U.S. EPA PRGs, or regional background concentrations.

Currently, ESLs for a residential setting are established for many petroleum hydrocarbon-related compounds in soil gas and soil including TPHg, TPHd, TPHmo, BTEX compounds, and MTBE, and several fuel oxygenates. ESLs have not been established for organochlorine pesticides at this time, therefore, use of the CHHSLs for these compounds is proposed. Although ESLs have been established for arsenic and total lead in soil, the use of regional background concentrations for naturally occurring metals such as these is appropriate and relevant.

Soil gas and soil analytical data obtained in the supplemental sampling and remedial action will be compared to the above-mentioned screening criteria for evaluation of soil reuse and offsite disposal options. Decisions regarding the disposition and management of impacted site soil will be based on several factors, including: concentrations and type of detected constituents, the risk presented to human health and the environment by the impacted soil, if any, the volume of impacted soil, and time considerations.

4.0 IMPLEMENTATION OF SUPPLEMENTAL SAMPLING AND REMEDIAL ACTION

Section 4.0 presents the objectives and scope of work for the supplemental sampling and the remedial action, followed by the proposed laboratory analyses, and a description of the field activities associated with the RAW.

4.1 Supplemental Soil and Soil Gas Sampling

Supplemental sampling is proposed to address potential data gaps identified based on conversations with Water Board staff.

4.1.1 Objectives

The objective of the voluntary supplemental sampling is to confirm existing soil gas data at SG-5, and to address data gaps regarding the potential presence of:

- Petroleum hydrocarbons and related constituents and VOCs in soil gas in areas along the southern site perimeter;

- Petroleum hydrocarbons and related constituents (specifically benzene, toluene, ethylbenzene, and total xylenes [BTEX] and fuel oxygenates) in soil immediately below the asphalt and gravel base in the southern parking area;

- Organochlorine pesticides in soil immediately below the asphalt and gravel base that may be related to the historic use of the site as an orchard; and

- Select metals (specifically arsenic and lead) in soil immediately below the asphalt and gravel base that may be related to historic site practices.

4.1.2 Scope of Work

Plate 3 presents the proposed supplemental sampling locations. The supplemental sampling includes the following scope of work:

- **Soil Sampling -** Soil samples will be collected from two depths (approximately 6 and 18 inches below the asphalt and gravel base) at ten locations (SB-7 through SB-16) across the site to evaluate the potential for petroleum hydrocarbons and related constituents, BTEX, fuel oxygenates, organochlorine pesticides, arsenic, and/or total lead (the deeper samples will be held at the laboratory pending receipt of the results of the shallow samples). Analysis of tetraethyl lead may be performed if results warrant.

- **Active Soil Gas Sampling -** Active soil gas samples will be collected at:

  - One location (SG-7) near previous soil gas sampling location SG-5 to confirm existing results indicating a benzene concentration in soil gas above the residential ESL;

  - Three locations (SG-8, SG-9, and SG-10) along the southern site perimeter to evaluate the potential presence of petroleum hydrocarbons and VOCs in soil gas (Plate 3); and

  - Two locations (SG-11 and SG-12) in the southeast parking lot evaluate the potential presence of petroleum hydrocarbons and VOCs in soil gas.

Sampling locations for organochlorine pesticides, arsenic and lead have been selected in order to assess: (1) the potential presence of pesticides and related metals in shallow soil across the subject property; and (2) the potential presence of pesticides and related metals in shallow soil in areas formerly occupied by structures that were present at the time the property was used as an orchard.

If the results of the supplemental soil gas and soil sampling analyses indicate chemical concentrations in exceedence of the proposed site cleanup criteria, the remedial action described below will be expanded to address the appropriate chemicals of concern and affected areas. In this event, PES will communicate with Water Board staff for concurrence on the appropriate expanded action.

4.2 Soil Exploration and Remedial Action

4.2.1 Objective

The objective of the soil exploration and remedial action specified in this RAW is to evaluate soil in the vicinity of previous soil gas sample location SG-5.

4.2.2 Scope of Work

The remedial action includes the following scope of work:

- **Removal of Asphalt in the Vicinity of SG-5 -** following utility clearance, the asphalt and underlying gravel base will be removed in the area shown on Plate 3; this will allow for visual inspection of shallow soil to identify stains that may indicate potential historic petroleum hydrocarbon releases;

- **Field Screening -** concurrent with visual inspections, the exposed soil will be screened for VOCs using a photo-ionization detector (PID);

- **Test Pit Excavation -** based on the results of the visual inspections and field screening, approximately 6 to 8 test pits will be excavated in the area shown on Plate 3. One test pit will be completed in the vicinity of SG-5. The locations of the remaining test pits will be either in: (1) targeted areas of staining and/or elevated PID readings (if observed following removal of the asphalt pavement), or (2) randomly distributed in the asphalt-cleared area (if staining and/or PID elevated readings are not observed);

- **Test Pit Verification Sampling -** if field screening with the PID indicates VOCs are present in soil at the bottom and/or sidewalls of the test pit, soil samples will be collected from the test pit for petroleum hydrocarbon and VOC analyses;

- **Stockpile Soil Verification and Waste Characterization Sampling -** 4-point composite soil samples will be collected from the stockpiled soil for analyses of petroleum hydrocarbons and VOCs; a sampling ratio of one 4-point composite sample per approximate 100 cubic yards of excavated soil will be implemented; and

- **Test Pit Backfilling and Compaction -** test pits will be backfilled with clean material and then compacted to the extent practicable with a backhoe.

4.3 Laboratory Analyses

In accordance with the items discussed in the June 7, 2007 meeting, analyses for soil gas and/or soil samples will include: TPHg, VOCs including BTEX/fuel oxygenates using EPA Test Method 8260B, organochlorine pesticides using EPA Test Method 8081A, arsenic using EPA Test Method 7060A, and/or total lead using EPA Test Method 7421. Table 1 outlines the specified analyses for each soil, 4-point composite stockpile soil, and soil gas sample. Soil samples with total lead concentrations exceeding expected background concentrations (approximately 15 mg/kg) will also be analyzed for tetraethyl lead using EPA Test Method 120.1 (LBNL, 1995).

4.4 Supplemental Investigation and Remedial Activities

4.4.1 Preliminary Activities and Site Preparation

PES' existing site-specific Health and Safety Plan (HASP) will be modified prior to conducting the supplemental sampling and remedial actions to comply with Occupational Safety and Health Administration, 29 CFR 1910.120 and California Code of Regulations Title 8 CCR G150 5192. Additionally, any subcontractors selected to perform work onsite will be required to prepare a HASP for their own staff and work activities. PES personnel and subcontractors will be required to have 40-hour Hazardous Waste Operations (HAZWOPER) training and current 8-hour HAZWOPER refresher training.

Prior to conducting the field activities, necessary permits needed to complete the project will be obtained by PES or the selected earthwork contractor. Expected permits may include, but are not limited to drilling, surface grading, and excavation permits, where required. PES will obtain the necessary permits for the supplemental soil sampling.

A private underground utility locating service will be retained to clear the proposed sampling and exploration test pit locations of subsurface utilities. In addition, Underground Service Alert will be contacted to arrange utility clearances to be performed by public and private utility companies.

4.4.2 Supplemental Soil Sampling

Soil samples will be collected using direct-push technology at the locations shown on Plate 3. The proposed borings will be drilled utilizing a truck-mounted direct push drilling rig. The boring for each sampling location will be continuously cored using hydraulic direct push methodology to identify lithologic conditions and the top of the saturated zone. A PES geologist or engineer will supervise the drilling activities and prepare a lithologic log of each boring using the Unified Soil Classification System and Munsell Color Index. Selected soil samples will be screened in the field for the presence of VOCs using a PID. The PID readings will be recorded on the lithologic logs.

Soil samples will be collected from each boring. Each boring will be advanced to 4 feet bgs. Soil samples will be collected from the continuous core in an acetate sleeve from two depths (approximately 6 and 18 inches below the asphalt and gravel base). Soil samples to be analyzed for non-volatile compounds (e.g., pesticides and metals) will be collected by cutting the desired sampling interval directly out of the core with a decontaminated hand saw, then sealing each end with Teflon sheets and plastic end caps. EnCore™ samplers will be prepared for soil samples to be analyzed for VOCs and TPHg in accordance with U.S. EPA Preparation Method 5035 by quickly pushing the sampler into a freshly exposed surface of soil in a separate portion of the core, then securing the cap. The Encore™ sampler device is made of an inert composite polymer designed to collect, store, and deliver soil in a sealed, headspace-free state. Soil samples will be labeled for identification and immediately placed in a chilled, thermally insulated cooler. Soil samples will be transported under chain-of-custody protocol to a mobile laboratory or a stationary laboratory for analysis of TPHg, and VOCs including BTEX/fuel oxygenates using EPA Test Method 8260B, organochlorine pesticides using EPA Test Method 8081A, arsenic using EPA Test Method 7060A, and/or total lead using EPA Test Method 7421.

4.4.3 Asphalt Removal and Excavation of Test Pits

As discussed above, the general approach to evaluating the potential presence of petroleum hydrocarbons and related constituents and VOCs in the subsurface surrounding SG-5 is to remove the overlying asphalt in the area shown on Plate 3, to expose the underlying gravel base and soil for visual inspection and field screening for VOCs with a PID. The estimated area where asphalt is to be removed is approximately 7,800 square feet (Plate 3). The rationale for the area where test pit excavations will be performed was discussed with the Water Board in the June 7, 2007 meeting and is summarized below.

As shown on Plate 3, the asphalt will be removed in an area that is: (1) semi-circular, with SG-5 as the center point and a radius of approximately 42 feet. A radius of 42 feet was selected because it is one-half the distance (84 feet) between SG-5 and SG-6, and it is expected that the area containing benzene in soil gas above the ESL is most likely limited to the immediate vicinity of SG-5. Field screening will be conducted to assess whether appropriate limits for the excavation were established. For slope stability purposes, test pits will not be excavated within a 5-foot offset from the property boundary.

Six to eight test pits (approximately 5 feet long by 2.5 feet wide and up to 6 feet deep) will be excavated by a licensed subcontractor under the supervision of a PES geologist or engineer. At the time the soil is excavated, visual observations of potential indications of historic petroleum hydrocarbon releases (e.g., staining) will be recorded. A PID will be used to monitor the potential presence of VOCs in the excavation and the breathing space. If field observations indicate the number of test pits has not sufficiently identified affected soils, the number of test pits may be expanded accordingly.

If petroleum hydrocarbon-affected soil is encountered, excavations will be extended laterally and vertically to the extent practicable to remove the affected soil. Verification soil samples will be collected from excavation sidewalls at a frequency of one sample per 20 linear feet of sidewall and one bottom sample per 400 square feet of excavation bottom. Verification soil samples will be analyzed for TPHd and TPHmo using U.S. EPA Test Method 8015M and TPHg and VOCs using U.S. EPA Test Method 8260B.

The excavated soil will be placed on plastic sheeting and screened for VOCs using a PID. If during the excavation petroleum hydrocarbon-affected soil is observed (based on field screening and PID readings), the soils will be segregated and placed onto a separate stockpile for further examination, sampling, and potential offsite disposal. Soil stockpiles will be covered when not in use and will be covered at the end of the work day.

Based on the results of the field screening, test pits may be left open overnight pending receipt of the soil analytical results. In the event a test pit is left open, barricades with flashing lights and flagging will be placed around each test pit for safety purposes. Small excavations may be covered with planks and/or trench plates. If an open test pit is deeper than 5 feet, it will be constructed with a ramp for ingress/egress or will be benched or sloped. Alternatively, Eden may elect to contract with a security service to monitor the premises during non-working hours and weekends.

4.4.4 Test Pit and Stockpile Soil Verification Sampling

If PID measurements indicate VOCs are present in soil in the sidewalls and/or at the bottom of a test pit, soil samples will be collected from the sidewalls and the base of the test pit for TPHd and TPHmo using U.S. EPA Test Method 8015M and TPHg and VOC analyses using U.S. EPA Test Method 8260B (Table 1). Four-point composite samples will be collected from the stockpiled soil for analyses of petroleum hydrocarbons and VOCs using U.S. EPA Test Methods 8015M and 8260B, respectively, for soil characterization, disposal, and/or recycling purposes. A sampling ratio of one 4-point composite sample per approximate 100 cubic yards of excavated soil will be implemented.

4.4.5 Soil Remediation

If petroleum hydrocarbon-affected soil is encountered, excavations will be extended laterally and vertically to the extent practicable to remove the affected soil. Additionally, if the results of the supplemental soil gas and soil sampling analyses indicate chemical concentrations of organochlorine pesticides, metals or petroleum hydrocarbons and/or related compounds in excess of the proposed site cleanup criteria, soil excavations will be conducted to remediate the identified chemicals of concern and affected areas. As noted above, in the event these conditions are encountered, PES will communicate with Water Board staff for concurrence on the appropriate expanded action.

During excavation activities, a PES engineer or geologist will be present to observe the excavation of petroleum hydrocarbon, pesticide and/or metal-affected soil, if encountered.

Soil will be evaluated for the presence of petroleum hydrocarbons during excavation based on sensory evidence, such as soil discoloration and odors, and field screening using a PID. Field screening using ambient-temperature headspace analysis will be conducted in the following manner. Approximately 5 grams of soil will be placed into a reseable plastic bag; the soil will be allowed to volatilize at ambient temperature within the sealed bag for approximately 15 minutes. After 15 minutes of volatilization, the probe of the PID will be placed into the bag and the level of detected total volatile organic compounds will be recorded.

Verification soil samples will be collected from excavation sidewalls at a frequency of one sample per 20 linear feet of sidewall and one bottom sample per 400 square feet of excavation bottom. Verification soil samples will be analyzed for TPHg, and VOCs including BTEX/fuel oxygenates using EPA Test Method 8260B, organochlorine pesticides using EPA Test Method 8081A, arsenic using EPA Test Method 7060A, and/or total lead using EPA Test Method 7421. The appropriate analytical suite will be determined based on the target compounds detected in the area of concern.

Soil excavations may be left open overnight pending receipt of the soil analytical results. In the event an excavation is left open, barricades with flashing lights and flagging will be placed around the excavation for safety purposes. Smaller excavations may be covered with planks and/or trench plates. If an excavation is deeper than 5 feet, it will be constructed with a ramp for ingress/egress or it will be benched or sloped. Alternatively, Eden may elect to hire a security service to monitor the premises during non-working hours and weekends.

It is estimated that excavation of the affected soil, if encountered, may require between 2 and 8 weeks to complete. The time required will depend on field conditions, volume of affected soil, if any, receipt and review of laboratory analytical data, and contractor availability. In the event that the soil remediation exceeds 8 weeks, Water Board staff will be contacted for concurrence and approval.

4.4.6 Soil Stockpiling and Transport

Excavated soil will be reused onsite, disposed offsite, and/or recycled offsite pending the results of the soil chemical analyses. Decision criteria for onsite reuse versus offsite disposal of affected soils will be based on a comparison of the soil analytical results to applicable target cleanup goals. Applicable target cleanup goals will be ESLs (where available), CHSSLs, PRGs, or background levels as described in Section 3.0. Reuse onsite, offsite recycling or disposal of soil will be conducted with concurrence of Water Board staff. Soil with concentrations of petroleum hydrocarbons, VOCs, pesticides or metals in excess of the target cleanup goals or background levels will be transported offsite for disposal or recycling. Excavated material types (possibly petroleum hydrocarbon-affected soil, pesticide-affected soil and metal-affected soil) will be stockpiled separately from each other to the extent practicable.

The material stockpiles will be constructed with plastic sheeting beneath and above the material to prevent runon/runoff and fugitive dust emissions. Stockpiles will be covered and secured at the end of each day.

If the stockpiled soil is determined to be unsuitable for residential reuse based on exceedences of the target cleanup goals, offsite disposal to a licensed disposal and/or recycling facility (if warranted) will be arranged. Following acceptance of the affected soil at an appropriate disposal facility, the soil will be loaded in licensed haul trucks (end-dumps or transfers) and transported off the site following appropriate California and federal waste manifesting procedures. The soil will be disposed or recycled offsite in accordance with applicable local, state, and federal regulations.

Based on current site data, the volume of soil to be excavated is not expected to exceed 2,500 cubic yards. However, the actual volume will be dependent on whether the laboratory results for the stockpiles indicate exceedences of the cleanup goals, as stated above. It is estimated that soil stockpiles will remain on site between 2 and 8 weeks, based on the parameters discussed in Section 4.4.5.

The appropriate waste manifest documentation will be provided to the truck driver hauling the affected soil offsite. As each truck is filled, an inspection will be made to verify that the affected soil is securely covered and that the tires of the haul trucks are reasonably free of accumulated soil prior to leaving the site. Similarly, truck exteriors will be inspected for residual site soil. If accumulated soil is observed, the truck exteriors will be cleaned with wire brushes, stiff-bristled brooms or a water rinse to remove the soil. A street sweeper will be made available, as needed, to keep the loading area and haul roads clean. The soil will be wetted, as necessary, to reduce the potential for dust generation during loading and transportation activities.

4.4.7 Dust and Odor Control

Depending upon the soil conditions, during excavation there is a potential to generate a nuisance dust condition. Water will be applied to the work area where soil is being disturbed on an as needed basis to mitigate the potential for dust generation. In the event larger areas of the site are excavated for remediation, dust level monitoring of air will be conducted to evaluate the potential exposure to site personnel and to offsite downwind receptors. The presence of airborne dust will be evaluated through the use of real time personal sampling equipment and perimeter air sampling. The dust standard will be based on a ceiling level of no more than 50 micrograms per cubic meter difference between upwind and downwind sampling locations. If this level is exceeded additional dust suppression activities such as water application, will be conducted in the areas of active soil excavation and handling. Information gathered will be used to verify the adequacy of the levels of protection being employed at the

site, and may be used as the basis for upgrading or downgrading levels of personal protection, at the discretion of a Site Safety Officer.

Trucks used for transporting affected soil will be covered and decontaminated prior to leaving the site to reduce the potential for fugitive dust during transport to the disposal facility, as described in Section 4.4.6. Street sweeping will be used to remove soil/dust from public roadways as required. Swept material will be added to soil stockpiles for subsequent disposal offsite.

Although the proposed remedial action is not a soil aeration process, some volatilization of lighter-fraction hydrocarbons may occur during excavation and soil management activities. Consequently, guidelines and notification requirements set by the Bay Area Air Quality Management Division (BAAQMD) in Regulation 8, Rule 40 of the BAAQMD Rules and Regulations for aeration of contaminated soil may apply to the remedial action. Notification will be provided to BAAQMD as required.

4.4.8 Exploration Test Pit Backfilling Procedures

The exploration test pits will be backfilled with clean backfill and compacted to the extent practicable using a backhoe. Excavated material will be placed back in the test pits at the depths removed, to the extent practicable. Reuse of excavated soil will not be conducted until receipt of laboratory analytical results indicating the soil is acceptable for a residential setting and Water Board staff concurrence is obtained. The decision to reuse excavated soil onsite will be based on a comparison of the soil analytical results to applicable target soil cleanup goals as stated above in Section 3.0. If imported clean backfill is required, the material will be tested and the laboratory analytical results will be compared to the applicable target soil cleanup levels to ensure the material is acceptable for use in a residential setting.

In the event larger areas of the site are excavated to remediate affected soil, soil backfilling will be conducted using earthwork equipment and density testing will be conducted by a geotechnical engineer. The excavation bottoms will be moisture conditioned to the optimum moisture content, and will be compacted to a minimum of at least 90 percent relative compaction[1]. Fill material will be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture-conditioned to optimum moisture content, and compacted to at least 90 percent relative compaction. This process will be repeated until the final soil subgrade elevation is achieved.

4.4.9 Supplemental Active Soil Gas Sampling

A supplemental active soil gas survey will be conducted at the six locations (SG-7 through SG-12) shown on Plate 3. The survey will follow the procedures outlined in the advisory for active soil gas surveys published by the DTSC and the California Regional Water Quality

[1] Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557-00 laboratory compaction procedure.

Control Board, Los Angeles Region dated January 28, 2003 (soil gas advisory). An ambient air sample (sample designation "Ambient") will also collected in the vicinity of the location with the highest concentration of detected VOCs.

Transglobal Environmental Geochemistry (TEG) of Woodland, California, will utilize a direct-push drilling rig to advance stainless-steel soil gas sampling probes to approximately 5 feet bgs at each location. The probe and associated tubing will be allowed to equilibrate with the surrounding soil for a minimum of 30 minutes prior to conducting the purging and sampling activities described below.

To determine the purge volumes for the soil gas sampling, a purge volume/concentration test consisting of the evacuation of 1, 3, and 7 purge volumes will be conducted at location SG-7. One purge volume is equivalent to the volume of the interior of the sampling tube, plus the volume of the screened portion of the borehole. Sample identifications will indicate the purge volumes for each sample (e.g., SG-7-1x = 1 purge volume, SG-7-3x = 3 purge volumes, etc.).

As recommended in the soil gas advisory, a purging and sampling rate of approximately 100 to 200 milliliters per minute (ml/min) will be used. Prior to and during sample collection, a leak detection compound containing an appropriate tracer compound (e.g., butane or isopropanol) will be applied in the areas sealed with bentonite (i.e., tubing fittings and the probe surface seal) to assess whether ambient air may be entering the sample train. The soil gas samples will be collected in laboratory-supplied, pre-cleaned syringes, and then transported to a State of California-Certified onsite mobile laboratory for analyses of TPHg and VOCs using U.S. EPA Test Method 8260B to confirm that the cleanup goal of the residential ESL for benzene (0.085 μg/L) has been met.

To minimize the potential for cross-contamination between sampling locations, soil gas sampling equipment will be thoroughly cleaned with a high-pressure hot water wash prior to initiating work and between each sampling location. Upon completion of sampling activities, each borehole will be grouted to the surface with a cement grout in accordance with Alameda County requirements.

Sample handling, labeling, documentation, and chain of custody procedures will be performed as described in the Verification Sampling and Analysis Plan (Appendix B).

4.4.10 Decontamination Procedures

Reusable equipment contacting excavation materials will be cleaned using a stiff-bristled broom or wire brush, and if necessary, a hot water wash or a mild phosphate-free detergent solution and double rinsed with deionized water, prior to leaving the remedial action activities area. Reusable verification sampling equipment will be cleaned with a mild phosphate-free detergent solution and double rinsed with deionized water prior to beginning sampling and between each sample location. Decontamination fluids will be stored in Department of Transportation

(DOT)-approved drums, labeled appropriately (including the accumulation date), and stored onsite pending characterization and transportation offsite for disposal or recycling at a licensed facility. The drums of decontamination fluids will not remain onsite for more than 90 days. The work areas will be kept clean and free of excessive soil or debris.

4.4.11 Soil Disposal Options

Excavated soil which contains concentrations of petroleum hydrocarbons, VOCs, pesticides or metals in excess of the applicable target cleanup goals or background levels will be transported offsite for disposal or recycling. Recycling of the affected soil will be conducted to the extent practicable (e.g., the soil contains non-hazardous levels of petroleum hydrocarbons and the material is suitable for recycling and reuse as road base material). Offsite disposal will be conducted in the event recycling options are not available due to the types and concentrations of the compounds affecting the soil. As noted above in Section 4.4.6, recycling or disposal of affected soil at offsite locations will be conducted in accordance with applicable local, state, and federal regulations.

5.0 REPORTING

The results of the supplemental sampling and remedial actions will be presented in a remedial action report. The report will be submitted to the Water Board in draft format no later than 45 days following completion of the field work and receipt of the laboratory analytical reports.

The report will provide the following information:

- A summary of the results of the supplemental sampling, including a discussion of the field activities, analytical results;
- A summary of remedial activities conducted and description and basis for deviations, if any, from this RAW;
- Findings of the test pit observations, soil excavation, and estimated quantity of soil excavated;
- Results of the soil verification sampling and laboratory analyses;
- Documentation of soil reuse, offsite disposal, or recycling, if applicable; and
- Recommendations, as appropriate.

The report will be presented to Water Board staff for review and approval of the remediation project.

6.0 REFERENCES

California Regional Water Quality Control Board – San Francisco Bay Region, 2005. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*. February 2005.

Gettler-Ryan Inc., 1997. *Well Installation Report for Chevron Service Station #9-3768, 1990 East 14th Street, San Leandro, California*. October 1.

Lawrence Berkeley National Laboratory, 1995. *Protocol for Determining Background Concentrations of Metals in Soil at Lawrence Berkeley National Laboratory (LBNL)*. August.

PES, Inc., 2007a. *Phase I Environmental Site Assessment Report, 2103 and 2121 East 14th Street, San Leandro, California*. April 27.

PES, Inc., 2007b. *Subsurface Investigation Report, 2103 and 2121 East 14th Street, San Leandro, California*. May 22.

TABLE

Table 1
Proposed Laboratory Analyses
Remedial Action Workplan
2103 and 2121 E. 14th Street
San Leandro, California

Sample Location	Matrix	LABORATORY ANALYSES				
		VOCs/TPHg[1]	TPH/BTEX/Fuel Oxygenates[2]	Organochlorine Pesticides[3]	Arsenic[4]	Total Lead[5]/ Tetraethyl Lead[6]
SB-7	Soil			X	X	X
SB-8	Soil			X	X	X
SB-9	Soil			X	X	X
SB-10	Soil		X		X	X
SB-11	Soil		X	X	X	X
SB-12	Soil			X	X	X
SB-13	Soil			X	X	X
SB-14	Soil		X		X	X
SB-15	Soil		X	X	X	X
SB-16	Soil		X	X	X	X
SG-7	Soil gas	X				
SG-8	Soil gas	X				
SG-9	Soil gas	X				
SG-10	Soil gas	X				
SG-11	Soil gas	X				
SG-12	Soil gas	X				

Table 1
Proposed Laboratory Analyses
Remedial Action Workplan
2103 and 2121 E. 14th Street
San Leandro, California

Sample Location	Matrix	LABORATORY ANALYSES				
		VOCs/TPHg[1]	TPH/BTEX/Fuel Oxygenates[2]	Organochlorine Pesticides[3]	Arsenic[4]	Total Lead[5]/ Tetraethyl Lead[6]
Stockpile[7]	Soil	X	X			
Test Pits[8]	Soil	X	X			

Notes:

[1] Volatile organic compounds (VOCs)/total petroleum hydrocarbons as gasoline (TPHg) analyzed using EPA Test Method 8260B.

[2] TPH/Benzene, toluene, ethylbenzene, and total xylenes (BTEX)/fuel oxygenates analyzed using EPA Test Methods 8015M 8010/8020.

TPH includes total petroleum hydrocarbons quanitifed as gasoline (TPHg), diesel (TPHd), and motor oil (TPHmo). Fuel oxygenates include metyl-tert butyl ether (MTBE), tert-amyl methyl ether (TAME), di-isopropyl ether (DIPE), ethyl-tert butyl ether (ETBE), tert-amyl alchohol (TAA), tert-butyl alchohol (TBA), and ethanol.

[3] Organochlorine pesticides analyzed using EPA Test Method 8081A.

[4] Arsenic analyzed using EPA Test Method 7060A.

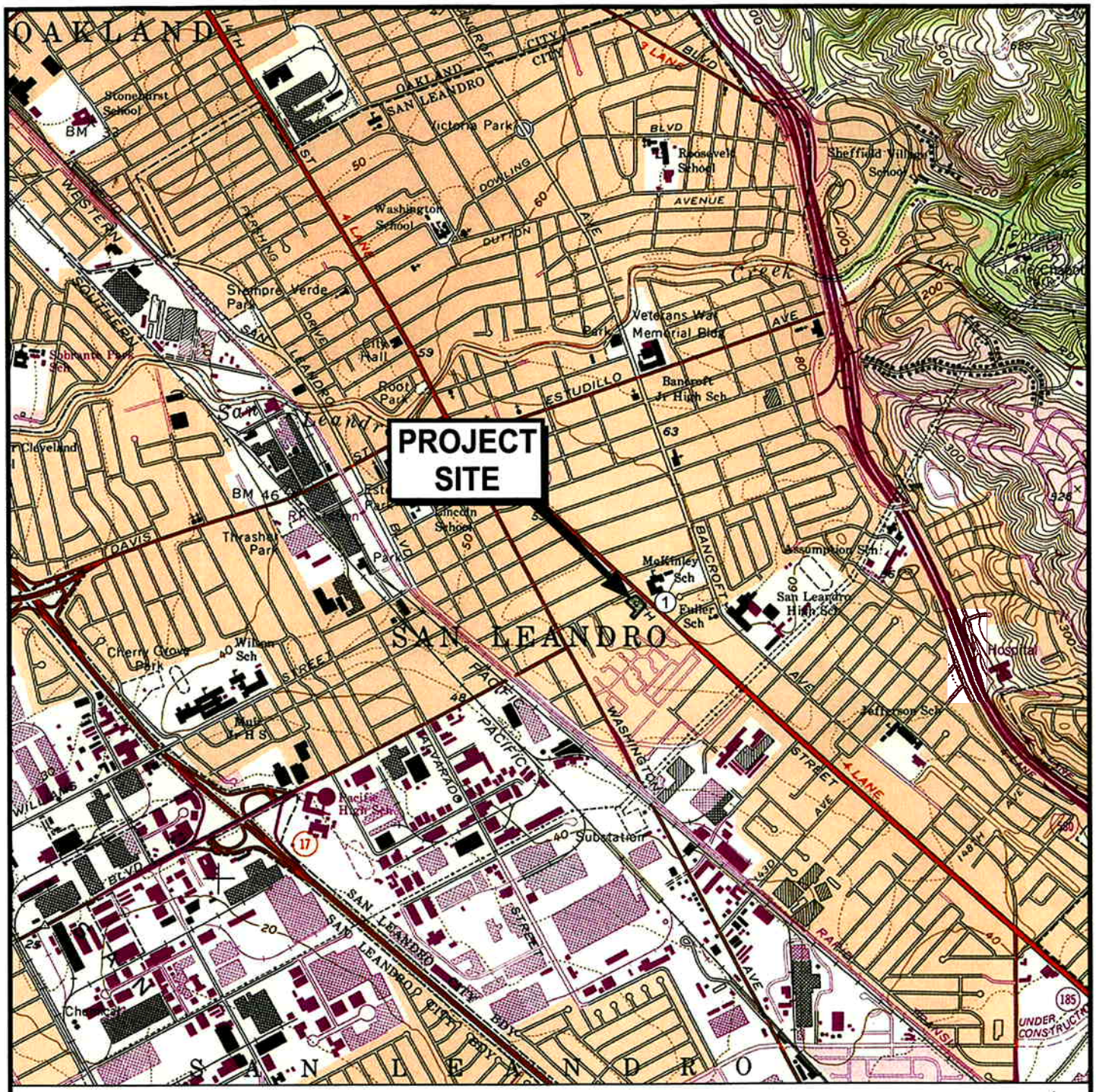
[5] Total lead analyzed using EPA Test Method 7421.

[6] Samples exceeding expected background levels for total lead will be analyzed for tetraethyl lead using EPA Test Method 120.1.

[7] Four-point composite samples will be collected from the soil stockpile at an approximate ratio of one 4-point sample per 100 cubic yards of soil. Analyses will initially include only VOCs/TPHg; if organochlorine pesticides, arsenic, and total lead are detected in soil samples above their respective project screening level, the stockpile analyses will be expanded to include these analytes.

[8] If field screening with a photo-ionization detector indicates the presence of VOCs in the sidewalls and/or bottom of an exploration test pit, a soil sample will be collected for VOC/TPH analyses.

PLATES



U.S.G.S. Topo Map - San Leandro, California, 7.5-minute quadrangle.1959 photorevised 1980.

PES Environmental, Inc.
Engineering & Environmental Services

Site Location Map
Remedial Action Workplan
2103 and 2121 E. 14th Street
San Leandro, California

PLATE
1

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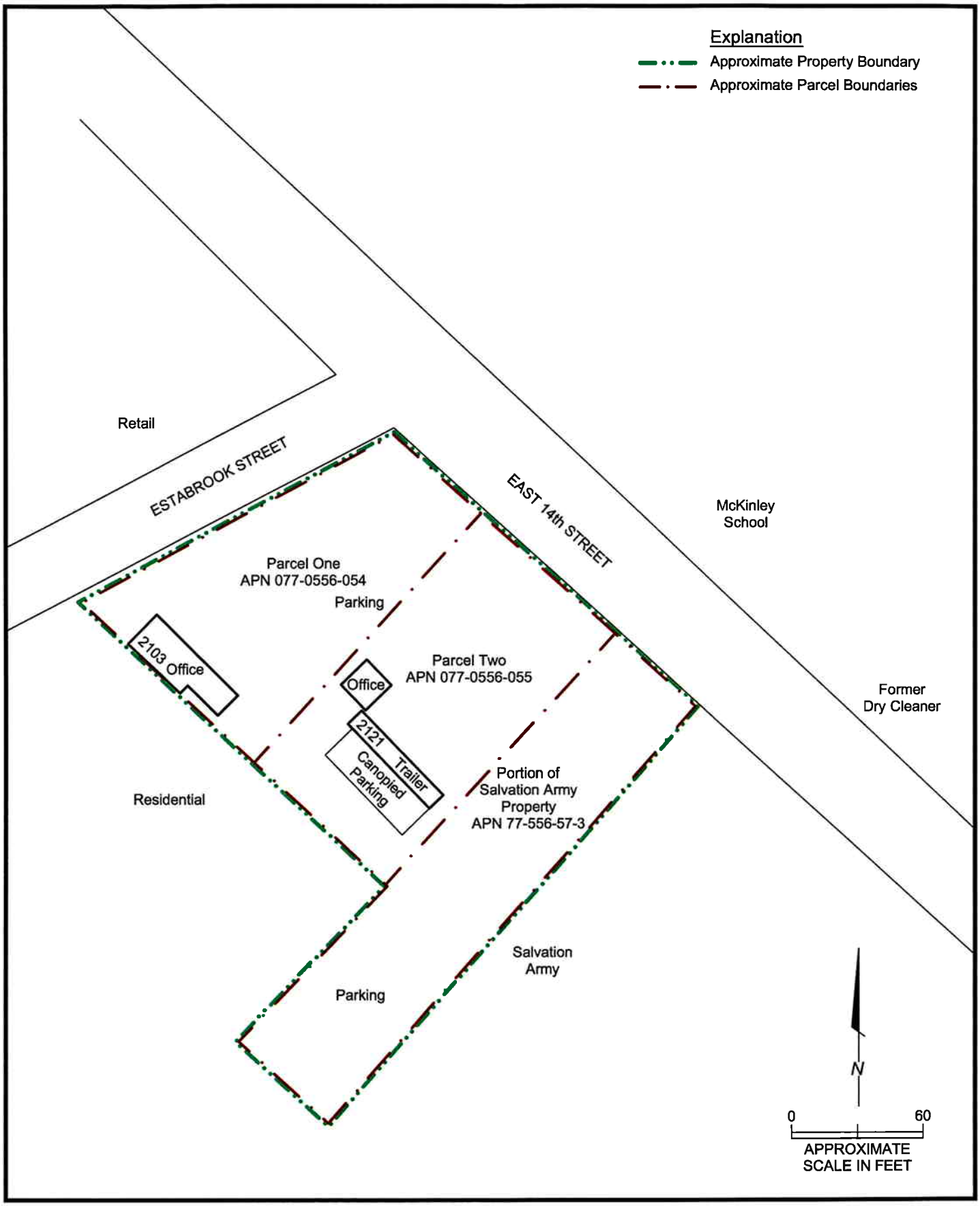
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE

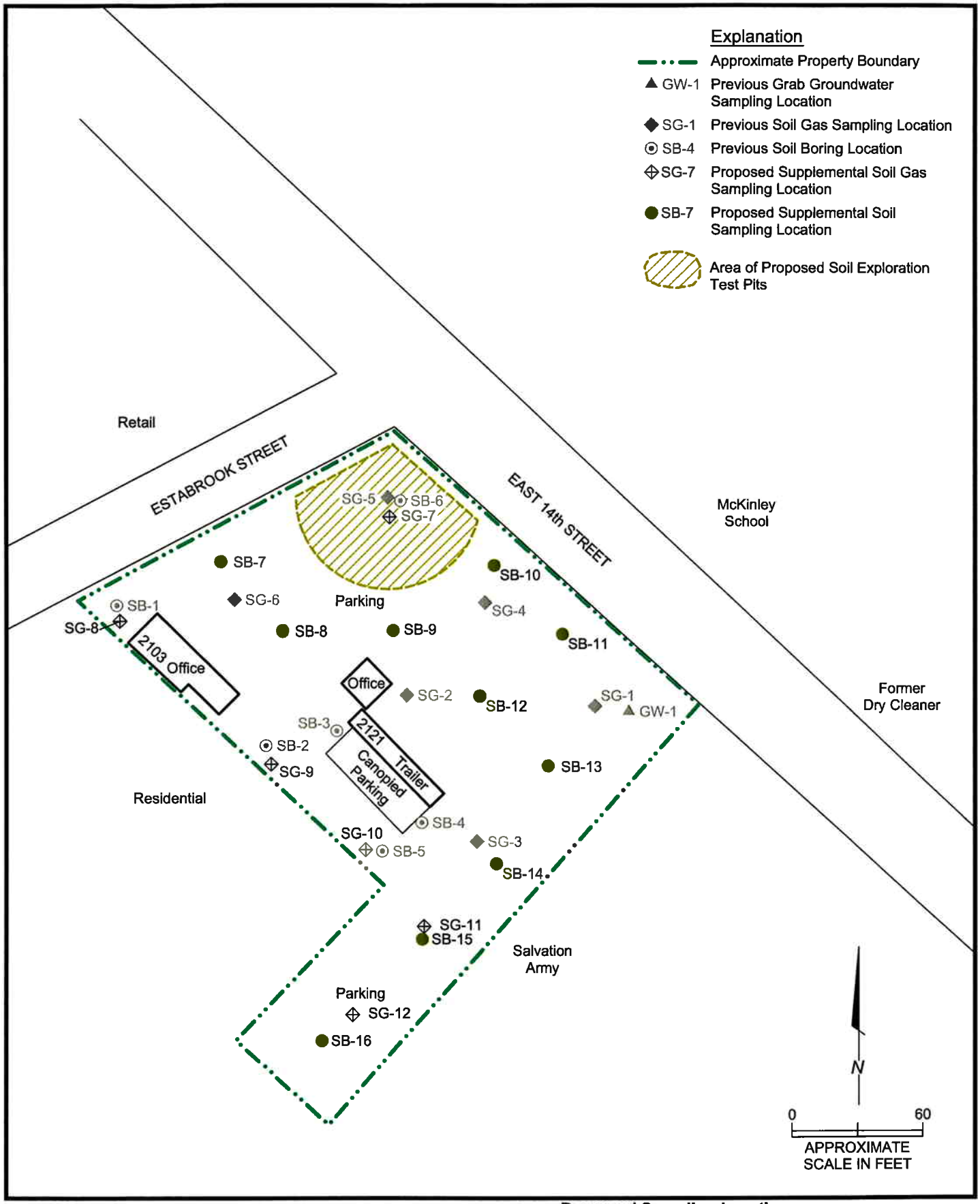


PES Environmental, Inc.
Engineering & Environmental Services

Site Plan and Parcel Boundary Map
Remedial Action Workplan
2103 and 2121 E. 14th Street
San Leandro, California

PLATE
2

956.007.01.002	956-00701002_RAW_1-2	DRAFT	6/07
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE



PES Environmental, Inc.
Engineering & Environmental Services

Proposed Sampling Locations and Area of Exploration Test Pits
Remedial Action Workplan
2103 and 2121 E. 14th Street
San Leandro, California

PLATE 3

956.007.01.002	956-00701002_RAW_1-2	DRAFT	6/07
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE

APPENDIX A

TABLE AND PLATES FROM SUBSURFACE INVESTIGATION

Table 1
Summary of Soil Gas Analytical Results
2103 and 2121 East 14th Street
San Leandro, California

Sample Location	Sample Identification	Sample Date	Benzene µg/l	Toluene µg/l	Total Xylenes µg/l
SG-1[1]	SG-1-1x	4/30/2007	ND(0.1)	ND(0.1)	0.26
	SG-1-3x	4/30/2007	ND(0.1)	0.59	0.33
	SG-1-7x	4/30/2007	ND(0.1)	0.59	0.32
SG-2	SG-2-3x	4/30/2007	ND(0.1)	0.50	0.27
SG-3	SG-3-3x	4/30/2007	ND(0.1)	0.40	0.24
SG-4	SG-4-3x	4/30/2007	ND(0.1)	0.77	0.36
SG-5	SG-5-3x	4/30/2007	0.22	1.2	0.78
SG-6	SG-6-3x	4/30/2007	ND(0.1)	0.78	0.44
Ambient Air[2]	Ambient Air	4/30/2007	ND(0.1)	ND(0.1)	ND(0.1)
Soil Gas ESL[3]			**0.085**	**63**	**150**

Notes:

All samples collected at approximately 5 feet below ground surface (bgs)

[1] = Results for SG-1-1x, SG-1-3x, and SG-1-7x are for samples collected after purging 1, 3, and 7 volumes, respectively.

[2] = The ambient air sample was collected in the vicinity of sample location SG-5.

[3] = California Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, February 2005. Table E-2, Shallow Soil Gas Environmental Screening Levels (ESLs) For Evaluation of Potential Vapor Intrusion Concerns.

Results exceeding ESLs are shaded

µg/L = Micrograms per liter of air

ND = Not detected at or above the indicated laboratory reporting limit

Table 2
Summary of Soil Analytical Results
2103 and 2121 East 14th Street
San Leandro, California

Sample Location	Sample Identification	Sample Depth (Feet bgs)	Sample Date	VOCs[1] µg/kg	TPH as Gasoline µg/kg	TPH as Diesel mg/kg	TPH as Motor Oil mg/kg
SB-1	SB-1-2.0	2-2.5	4/30/2007	All ND	ND(200)	ND(10)	ND(200)
SB-2	SB-2-2.0	2-2.5	4/30/2007	All ND	ND(200)	ND(10)	ND(200)
SB-3	SB-3-2.0	2-2.5	4/30/2007	All ND	ND(200)	ND(10)	ND(200)
SB-5	SB-5-2.0	2-2.5	4/30/2007	All ND	ND(200)	ND(10)	ND(200)
SB-6	SB-6-4.0	4-4.5	4/30/2007	All ND	ND(200)	ND(10)	ND(200)
Soil ESL[2]				**NA**	**100,000**	**100**	**500**

Notes:

VOCs[1] = Volatile Organic Compounds (VOCs) analyzed using EPA Test Method 8260B

ESL[2] = San Francisco Bay Regional Water Quality Control Board (RWQCB) Environmental Screening Level (ESL) for residential land use where potentially impacted groundwater is not a current or potential drinking water resource.

TPH = Total petroleum hydrocarbons

bgs = Below ground surface

µg/kg = Micrograms per kilogram

mg/kg = Milligrams per kilogram

All ND = No VOCs were detected at or above their respective laboratory reporting limits

ND = Not detected at or above the indicated laboratory reporting limit

NA = Not Applicable

Table 3
Summary of Groundwater Analytical Results
2103 and 2121 East 14th Street
San Leandro, California

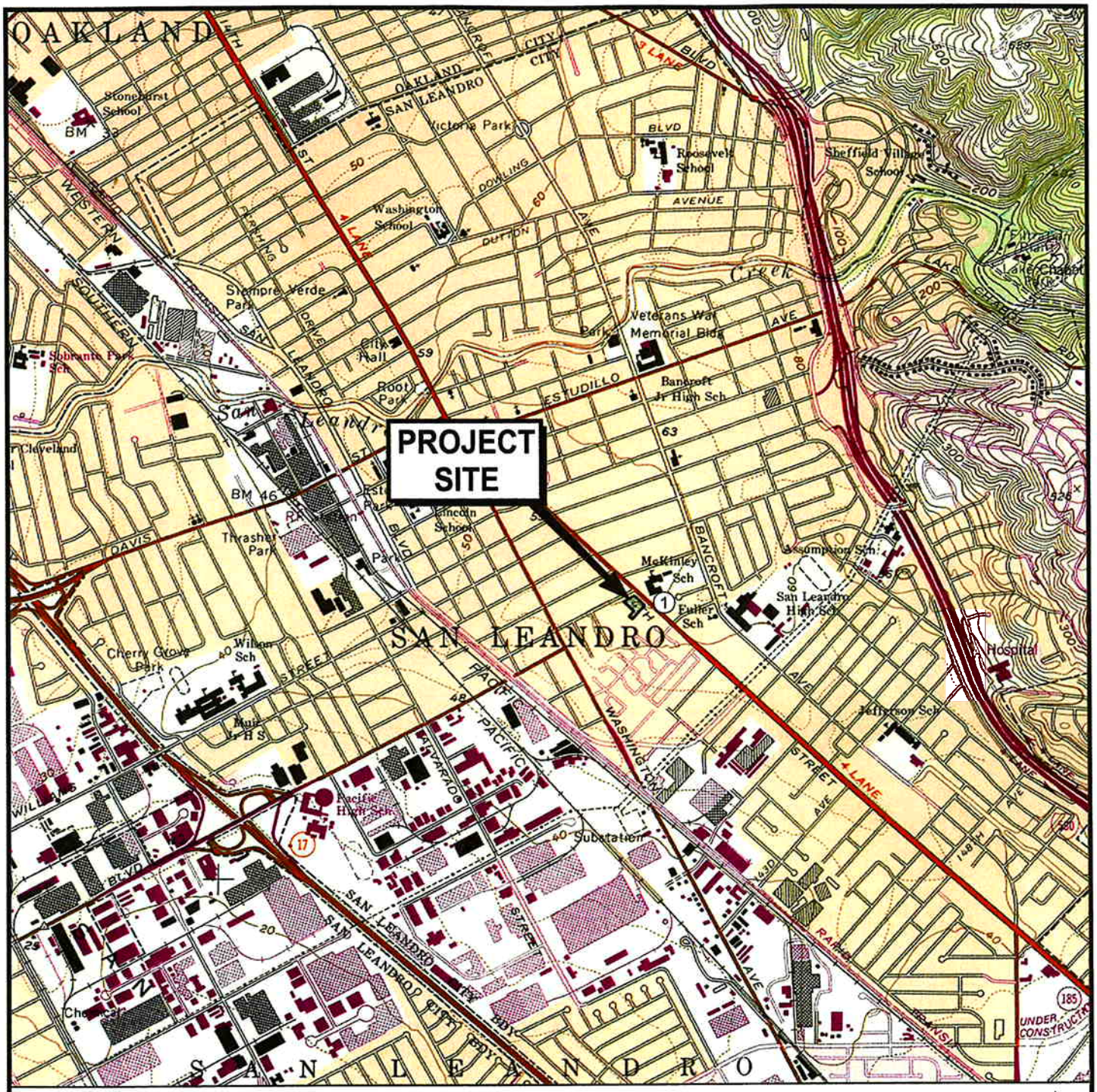
Sample Location	Sample Identification	Sample Date	VOCs[1] µg/L
GW-1	GW-1	4/30/2007	All ND

Notes:

VOCs[1] = Volatile Organic Compounds (VOCs) analyzed using EPA Test Method 8260B

µg/L = Micrograms per liter

All ND = No VOCs were detected at or above their respective laboratory reporting limits



U.S.G.S. Topo Map - San Leandro, California, 7.5-minute quadrangle.1959 photorevised 1980.

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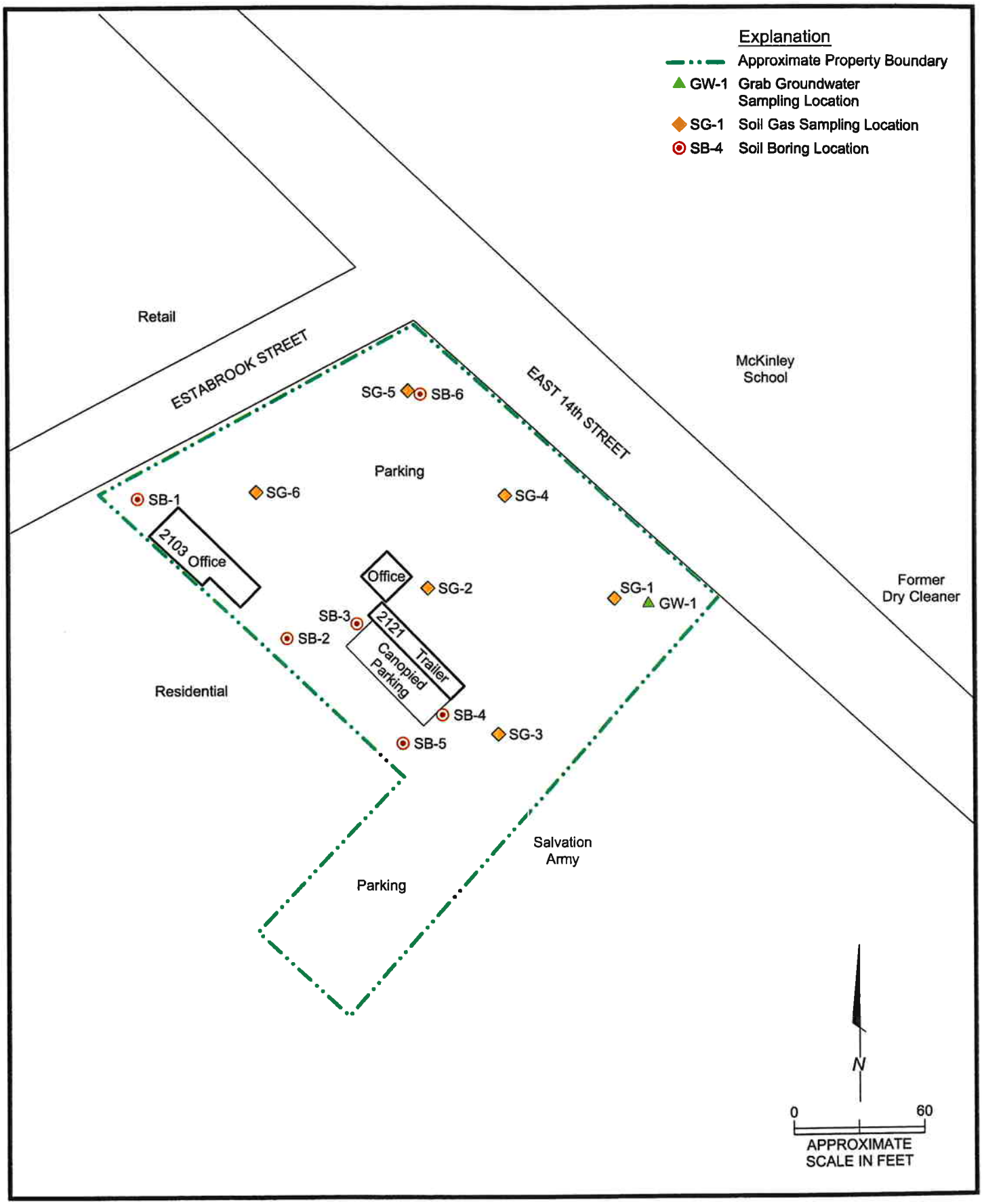
Site Location Map
Subsurface Investigation
2103 and 2121 E. 14th Street
San Leandro, California

PLATE
1

956.007.01.002	956-00701002_SSI_1-2	TMH	5/07
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE



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Site Plan and Sampling Location Map
Subsurface Investigation
2103 and 2121 E. 14th Street
San Leandro, California

PLATE
2

956.007.01.002	956-00701002_SSI_1-2	TMH	5/07
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE

APPENDIX B

VERIFICATION AND WASTE CHARACTERIZATION SAMPLING AND ANALYSIS PLAN

APPENDIX B

Verification and Waste Characterization Sampling and Analysis Plan
Voluntary Soil Remediation
2103 and 2121 East 14th Street
San Leandro, California

B1.0 INTRODUCTION

This Verification and Waste Characterization Sampling and Analysis Plan is an element of the Remedial Action Workplan (RAW) for the property located at 2103 and 2121 East 14th Street, San Leandro, California. The RAW describes general procedures for excavation, sampling, and potential reuse or disposal of soil that may contain soil gas with benzene in excess of the target soil gas cleanup level (i.e., Regional Water Quality Control Board, San Francisco Bay Region (Water Board) Environmental Screening Level [ESL] for benzene in soil gas in a residential setting).

The objective of the verification sampling is to confirm that the target soil gas cleanup concentration has been met, as described in the RAW. The objective of the waste characterization sampling is to generate analytical data to accurately characterize the stockpiled soil for potential reuse or offsite disposal and/or recycling.

B2.0 PERFORMANCE STANDARDS AND GUIDANCE

Sampling and analyses will be performed in accordance with applicable guidance and requirements set forth pursuant to the Comprehensive Environmental Response Compensation Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA); the National Contingency Plan (NCP); and local, State and Federal practices in effect at the time of performance of the work.

B3.0 SAMPLING PROCEDURES

B3.1 Test Pit and Stockpile Soil Verification Sampling

If field screening with the photo-ionization detector (PID) indicates volatile organic compounds (VOCs) are present in test pit sidewalls or bottom, soil samples will be collected from the sidewall and the base of the test pit for petroleum hydrocarbon and VOC analysis. Four-point composite soil samples will be collected from the stockpiled soil at an approximate ratio of one composite sample per 100 cubic yards of excavated soil. Soil generated during supplemental sampling and remedial action activities will be temporarily stored onsite on plastic sheeting

pending receipt of the 4-point composite soil sampling analytical results for reuse or offsite disposal and/or recycling.

If petroleum hydrocarbon-affected soil is encountered, excavations will be extended laterally and vertically to the extent practicable to remove the affected soil. Verification soil samples will be collected from excavation sidewalls at a frequency of one sample per 20 linear feet of sidewall and one bottom sample per 400 square feet of excavation bottom. Verification soil samples will be analyzed for TPHd and TPHmo using U.S. EPA Test Method 8015M and TPHg and VOCs using U.S. EPA Test Method 8260B.

The following is a summary of equipment that may be used during sampling of exploration test pits and stockpiled soil verification sampling activities:

- Hand trowel;
- Hand-held impact sampler;
- Hand-held EnCore t-bar sampling tool, if needed;
- Tape line (in feet and inches);
- 5-gram disposable EnCore sample containers, if needed;
- 8-ounce precleaned, lab-supplied, glass sample jars, if needed;
- Precleaned stainless-steel soil sample sleeve;
- Re-sealable plastic bags;
- Personal protective equipment;
- Ice, insulated cooler and appropriate packing supplies;
- Buckets, brushes and detergents for equipment decontamination;
- Sample labels;
- Chain-of-custody forms; and
- Sample collection log, sub-area field map, water-resistant ink pen, and daily field report forms.

Sampling will be conducted according to the procedures described below. Soil samples submitted for laboratory chemical analysis of VOCs (including total petroleum hydrocarbons quantified as gasoline [TPHg]) will be collected in accordance with U.S. Environmental Protection Agency (EPA) Test Method 5035.

Each sampler will be labeled with a sample identification number, placed in a resealable plastic bag and immediately placed in a chilled, thermally insulated cooler (containing bagged ice). Samples will be delivered, under chain-of-custody protocol, to a state-certified laboratory. The soil samples will be either processed and preserved by the analytical laboratory in accordance with U.S. EPA Method 5035 for subsequent analysis or analyzed by the analytical laboratory within 48 hours of sample collection. The samples will be analyzed for total petroleum hydrocarbons quantified as diesel (TPHd) and motor oil (TPHmo) using U.S. EPA Test Method 8015M, and TPHg and VOCs using U.S. EPA Method 8260B. If results of the supplemental soil sampling indicate the presence of organochlorine pesticides, arsenic, and lead above actionable levels, the stockpiled soil will also be analyzed for these analytes using the methods described in Table 1 of this RAW.

B3.2 Decontamination Water

Decontaminate rinsate generated during remedial action activities will be stored in a polyethylene (poly) tank or Department of Transportation (DOT)-approved poly drums pending characterization for offsite disposal and/or recycling. Decontamination water will be characterized by lowering a new disposable plastic bailer into the tank or drums to collect a representative rinsate sample. The rinsate sample will be transferred directly from the bailer into the appropriate laboratory supplied sample bottles. The sample bottles will be filled slowly to minimize sample volatilization and to ensure that the sample is free of trapped air.

Each sample container will be labeled for identification and placed in a re-sealable plastic bag and immediately placed in a chilled, thermally insulated cooler (containing bagged or Blue ice) for delivery, under chain-of-custody protocol, to a state-certified laboratory.

B3.3 Active Soil Gas Verification Sampling

An active soil gas survey will be conducted at the six locations (SG-7 through SG-12) to evaluate soil gas in the vicinity of the previous sample SG-5, along the southwestern property boundary, and at the southeast portion of the site near the parking area. The survey will follow the procedures outlined in the advisory for active soil gas surveys published by the Department of Toxic Substances Control and the California Regional Water Quality Control Board, Los Angeles Region dated January 28, 2003 (soil gas advisory). An ambient air sample (sample designation "Ambient") will also collected in the vicinity of the location with the highest concentration of detected VOCs.

Transglobal Environmental Geochemistry (TEG of Woodland, California, will utilize a direct-push drilling rig to advance stainless-steel soil gas sampling probes to approximately 5 feet bgs at each location. The probe and associated tubing will be allowed to equilibrate with the surrounding soil for a minimum of 30 minutes prior to conducting the purging and sampling activities described below.

To determine the purge volumes for the soil gas sampling, a purge volume/concentration test consisting of the evacuation of 1, 3, and 7 purge volumes will be conducted at location SG-7. One purge volume is equivalent to the volume of the interior of the sampling tube, plus the volume of the screened portion of the borehole. Sample identifications will indicate the purge volumes for each sample (e.g., SG-7-1x = 1 purge volume, SG-7-3x = 3 purge volumes, etc.).

As recommended in the soil gas advisory, a purging and sampling rate of approximately 100 to 200 milliliters per minute (ml/min) will be used. Prior to and during sample collection, a leak detection compound containing iso-propyl alcohol will be applied in the areas sealed with bentonite (i.e., tubing fittings and the probe surface seal) to assess whether ambient air may be entering the sample train. The soil gas samples will be collected in laboratory-supplied, pre-cleaned syringes, and then transported to a State of California-Certified onsite mobile laboratory for analyses of TPHg and VOCs using U.S. EPA Test Method 8260B.

To minimize the potential for cross-contamination between sampling locations, soil gas sampling equipment will be thoroughly cleaned with a high-pressure hot water wash prior to initiating work and between each sampling location. Upon completion of sampling activities, each borehole will be grouted to the surface with a cement grout in accordance with Alameda County requirements.

B4.0 DECONTAMINATION AND SAMPLE HANDLING PROCEDURES

The sample collection equipment will be cleaned with a mild phosphate-free detergent solution and double rinsed with deionized water between sample locations. Decontamination fluids will be stored in a poly tank or DOT-approved poly drums pending characterization and disposal. Solid waste materials (i.e., gloves, paper towels, etc.) will be stored in drums or bins pending disposal.

Sample containers will be labeled and placed in a thermally insulated cooler that is chilled to a temperature of approximately four degrees Centigrade for transport to the project analytical laboratory under chain-of-custody protocol.

Decontamination rinsate characterization samples will be identified using an identification system that will consist of: (1) the letters “RDWW” to indicate remedial action activities derived wastewater; and (2) the date the sample was collected. Samples will be identified with a label affixed to the sample container. The following information will be specified on each label:

- Project name;
- Project number;
- Date and time of sample collection; and

- Sample identification number;

Individual sample containers will be placed in sealed plastic bags to prevent intrusion of moisture into sample containers and damage to sample labels. The coolers will be chilled using ice packaged in doubled plastic bags or "blue-ice" packs. Coolers will be transported to the laboratory either by laboratory couriers or field sampling personnel.

Samples will be accompanied by 3-copy, pressure sensitive chain-of-custody documents. The form will accompany every sample shipment to the analytical laboratory to document sample possession from the time of collection. The form will contain the following information:

- Sample identification number;
- Signature of collector;
- Date and time of collection;
- Site name and project number;
- Sample matrix;
- Sample container description;
- Analyses requested;
- Special analytical procedures requested;
- Remarks (expected interferences, hazards, unusual events at the time of sampling, if applicable);
- Preservatives added (if any);
- Any special sample preparation (if applicable);
- Destination of samples (laboratory name);
- Signature of persons involved in chain of possession (relinquished by and received by); and
- Date and time of sample receipt at laboratory.

The two top sheets of the chain-of-custody form will be placed in a watertight plastic bag that will be placed in the cooler for transport.

When transferring samples, the individuals relinquishing and receiving the samples will sign, date, and record the time on the chain-of-custody form. A separate chain-of-custody form will

accompany each sample shipment. The method of shipment and courier name(s) will be entered on the chain-of-custody form.

Daily field activities will be recorded on daily field report forms which indicate the date and time of field observations made by field personnel. Field forms will be signed by field personnel.

Original data recorded in field logs, chain-of-custody forms, and on other forms will be written in water-resistant ink. None of these documents will be destroyed or discarded, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual will make corrections by drawing a line through the error, entering the correct information, and initialing and dating the change. The erroneous information should not be obliterated. If possible, any subsequent error(s) discovered on a document will be corrected by the person who made the entry.

B5.0 LABORATORY PROCEDURES

Samples will be analyzed by a laboratory that is certified by the California Department of Health Services for performing the analyses specified in the RAW. Sample handling procedures used by the laboratory may vary from the procedures specified herein as long as they fulfill the objective of maintaining sample integrity and traceability.

B5.1 Chain-of-Custody Procedures

The sample custodian at the laboratory accepts custody of delivered samples and verifies the following information:

1. All samples are present;

2. All samples are in good condition;

3. All samples are accompanied by a properly completed chain-of-custody form;

4. The sample identification is complete and corresponds to the chain-of-custody form; and

5. The condition of custody seals, if used, and temperature of the chest interior.

If sample integrity is questionable, the sample custodian will immediately notify the laboratory's project administrator, who in turn will notify the PES project manager. The sample custodian will document the sample condition on the sample custody log and sign the chain-of-custody form.

B5.2 Logging of Laboratory Samples

After chain-of-custody procedures are complete and acceptable, the sample custodian will assign laboratory identification numbers to the samples. Laboratory sample identification numbers may be written on the chain-of-custody form for tracing purposes. The custodian will transfer the samples to the proper analyst(s) or store the samples in an appropriate secure area.

Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted. Data sheets and laboratory records are retained by the laboratory as part of the permanent documentation for at least three years.

B5.3 Sample Preparation and Analysis

Samples collected for verification and characterization will be prepared for analysis by the laboratory in accordance with U.S. EPA-approved methods. The program for the analyses of soil and soil gas samples will be conducted following the procedures outlined in U.S. EPA's Methods for Evaluating Solid Waste (SW-846) (U.S. EPA, 1986). Analyses may include the following: TPHd and TPHmo using U.S. EPA Test Method 8015M; TPHg and VOCs by U.S. EPA Method 8260B; TPHg, benzene, toluene, ethylbenzene, and total xylenes (BTEX), and fuel oxygenates using U.S. EPA Test Methods 8010/8020; organochlorine pesticides using U.S. EPA Test Methods 8081A/8082B; arsenic using U.S. EPA Test Method 7060A; total lead using U.S. EPA Test Method 7421, and tetraethyl lead using U.S. EPA Test Method 120.1.

B5.4 Sample Storage

Samples and extracts are retained by the analytical laboratory for up to 180 days after the data are reported by the laboratory. Unless notified by the program managers, excess or unused samples will be disposed by the laboratory in a manner consistent with appropriate government regulations.