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Alameda County
Environmental Health

SAMPLING AND ANALYSIS PLAN
AMBASSADOR LAUNDRY SITE
1160-1168 36TH STREET AND
3601 AND 3623 ADELINE STREET
EMERYVILLE, CALIFORNIA

May 2, 2007

KLEINFELDER
An employee owned company

May 2, 2007

Ms. Susanne Perkins
Brownfields Coordinator
Environmental Protection Agency Region IX
75 Hawthorne Street,
San Francisco, California

Subject: Response to Comments on the Review of the Sampling and Analysis Plan Ambassador Laundry Site, 1160 – 1168 36th Street and 3601 and 3623 Adeline Street, Emeryville, California (EPA QA Office DCN: BNFD0260SV1)

Dear Ms. Perkins:

Thank you for reviewing and commenting on the Sampling and Analysis Plan Ambassador Laundry Site, 1160 – 1168 36th Street and 3601 and 3623 Adeline Street, Emeryville, California, submitted to your attention on January 23, 2007.

Kleinfelder reviewed and addressed each of the comments in EPA's letter dated March 8, 2007. The revised Sampling and Analysis Plan is transmitted herewith.

As requested, attached with this letter is a table that summarizes the EPA's Comments, and indicates how the comments were addressed in the revised Sampling and Analysis Plan.

If you have any questions or additional comments, please do not hesitate to contact the undersigned at (510) 628-9000.

Sincerely,

KLEINFELDER WEST, INC.

Nadia Borisova
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Project Professional

Joel R Kushins FOR
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Environmental Group Manager

Response to Comments on the Sampling and Analysis Plan Ambassador Laundry Site, 1160 – 1168 36th Street and 3601 and 3623 Adeline Street, Emeryville, California

Comment 1: [Approval Page; Section 1.4, Project Organization] Two different individuals are identified as the Kleinfelder Quality Assurance Manager in the above cited parts of the plan. This should be corrected.	Ms. Lynne Srinivasan was identified as the Quality Assurance (QA) Manager.
Comment 2: [Section 1.0, Introduction] The acronym "SAP" is defined in the current plan as "Soil and Analysis Plan." EPA Region 9 common usage of the acronym "SAP" defines it as "Sampling and Analysis Plan." This should be corrected.	Corrected. The document is now referred to as Sampling and Analysis Plan.
Comment 3: [Section 1.2.1, Proposed UST Removal and Confirmation Samples] It is stated that the Underground Storage Tank (UST) removal will be "per requirements of the local agency overseeing the UST removal (presumed to be the City of Emeryville Fire Department)." Relevant stakeholders need to be identified during the planning stages of the project, in order to ensure that their regulatory and/or fiduciary requirements are known and adequately met during project activities. They should be consulted in advance to ensure that their needs, in addition to EPA's, will be met by the currently planned site activity. The regulatory agency responsible for the UST removal needs to be identified. All relevant sections of the SAP should be revised to capture this information.	The following relevant stakeholders for this project were identified: the EPA, the City of Emeryville Fire Department, and the Alameda County Environmental Health Agency. The name, role and government agency they represent, together with their contact information, is presented in the Organizational Chart in Section 1.4 of the SAP.

Comment 4: [Section 1.4, Project Organization] In the Organizational Chart provided: • The USEPA Quality Assurance (QA) Manager is incorrectly identified as "Ms. Gail Jones." Eugenia McNaughton, Ph.D., is currently the USEPA Region 9 QA Manager. Her phone number is (415) 972-3411. • The USEPA Brownfields Project Manager is incorrectly identified as "Ms. Noemi Emeric." Susanne Perkins is currently the USEPA Brownfields Project Manager for this project. Her phone number is (415) 972-3208. • As discussed in Comment 3 above, it appears as though the City of Emeryville Fire Department may play a significant role in the current project related to the UST removal. If this is indeed the case, then a fire department point-of-contact should be included in the chart. • If the field team leader for the project is an individual other than the identified Kleinfelder Project Manager, then the field team leader should be identified in the chart.	The Organizational Chart presented in Section 1.4 of the SAP has been edited to correctly identify Eugenia McNaughton, Ph.D., as U.S. EPA Region IX Quality Assurance Manager, and Susanne Perkins as the USEPA Brownfields Project Manager for this project. The names and the contact information of the representatives of the City of Emeryville Fire Department and the Alameda County Environmental Health Agency, as well as Kleinfelder's team members were included to the Organizational Chart in Section 1.4.
Comment 5 [Section 2.3, Previous Investigations/Regulatory Involvement] The last two sentences of this section are redundant. One of the sentences should be removed.	One of the sentences was removed.
Comment 6A [Section 2.3.1, Soil Investigations] In the descriptions provided for several past soil investigations, it is stated that "At the time this SAP was prepared, information on the analysis methods and reporting limits used in this investigation were not available to Kleinfelder." Some of the past investigations were noted as not having detectable levels of the compounds of concern. Others noted and provided results for compounds of concern that were detectable. As the current project appears to be relying on	Kleinfelder reviewed available data on surface and subsurface analytical results of investigations performed at the Ambassador Laundry Site. Most of the available data is summarized in Clayton's May 28, 2003 Phase 1 Environmental Site Assessment (ESA) 1160-1168 36th Street and 3601 & 3623 Adeline Street Emeryville California. The ESA summarizes two Tank Removal Reports by SEMCO, December 1, 1994, and October 9,

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historical data for planning purposes, it is the reviewer's opinion that not knowing the reporting limits or analytical methods used to generate the historical data leaves open the possibility for the development of additional data gaps. It is unclear how the results are known, but the methods and reporting limits are not. Additional effort should be made to locate this information.	1995; as well as PES Engineering and Environmental Services (PES) Phase 1 ESA and Phase 2 Subsurface Investigation Report of September 21, 1999. The summary of the analytical results from the SEMCO reports, do not include information on the analytical methods or the detection limits used in the investigation. However, the detection limits of compounds detected in the subsurface investigation performed by PES are included in the report, and were incorporated into Sections 2.3.1 and 2.3.2 of the SAP. To confirm that the former underground storage tanks (UST) areas are not impacted with petroleum hydrocarbons, Kleinfelder has included the collection and analysis of soil and groundwater samples from both former UST location areas. These locations are referred to as the former gasoline UST (FUST-G) location and the former heating oil UST (FUST-HO) location (Plate 4).
Comment 6B In the paragraph describing the September 21, 1999 investigation conducted by PES Environmental, Inc., it is stated that three soil borings, SB-1, SB-2, and SB-3, were placed "near a recently discovered sump." However, when Plate 3, Previous Sampling Locations, was referenced by the reviewer the closest of the clustered borings, SB-3, appears to be over 30 feet away from the single sump identified on the plate. If the sump location and boring locations are correct, then it is not clear to the reviewer how useful this data will be to the current project. If there is a second sump that has not been identified on the plate in the area where the borings had been placed it needs to be added to the plate for reference	Kleinfelder has reviewed available information and has edited Plate 3 to clearly identify the location of the two sumps. One of them, now labeled as Sump-1 in Plate 3, was discovered and cleaned by PES in 1999. The other sump (Sump 2) was discovered and removed by Clayton in 2005.

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purposes. The existence of a second sump may impact the current project DQOs.	
Comment 6C In the paragraph describing the August 2005 structure demolition by Clayton, it was noted that "a sump containing oily sludge was discovered." Per the paragraph, the sump was removed. Is this a third sump? If so, it needs to be added to the plate for reference purposes. The existence of a third sump at the site may impact the current project DQOs.	Kleinfelder clarified in Section 2.3 that only two sumps have been discovered at the Site: one in 1999 by PES (Sump-1), and the other in 2005 by Clayton (Sump-2). The summary of the PES report suggests that Sump-1 was cleaned and left in place. Clayton's 2005 report indicates that Sump-2 was removed. The approximate location of the existing Sump (Sump 1) and the former sump (Sump 2) are presented in Plate 3.
Comment 7A [Section 2.3.2, Groundwater Investigations] In the first paragraph, it is stated that Kleinfelder installed a groundwater well in January 1996. However, later in the same paragraph, groundwater results are noted for a sample collected from that well on December 21, 1995. This inconsistency needs to be corrected.	Kleinfelder corrected the inconsistency in Section 2.3.2.
Comment 7B In the second paragraph, it is stated that a groundwater sample was analyzed for total petroleum hydrocarbon, diesel and kerosene, using EPA Method 3510. This citation is for an extraction procedure. The analytical method should be added to the reference in this paragraph.	Kleinfelder corrected the analytical method used to analyze for diesel and kerosene.
Comment 7C The last paragraph of this section describes 10 soil borings that were advanced in May 2003 by Clayton. Approximately 10 soil borings appear to be referenced on Plate 3, Previous Sampling Locations. However, according to the key provided for Plate 3, those soil borings were advanced by Kleinfelder in 1996 and PES Environmental in 1999. It is not clear to the reviewer if there are an additional 10 borings by Clayton that need to be	Kleinfelder has reviewed and corrected both the text on Section 2.3.2 and Plate 3.

added to the plate or if the borings currently represented are misidentified. This paragraph and the plate need to be reviewed and revised for consistency. (Also see Comment 25B)	
Comment 8 [Section 2.5, Environmental and/or Human Impact] In the first paragraph of this section it is stated that “The RWQCB [Regional Water Quality Control Board] and the government agencies overseeing these contamination cases [summarized in Section 2.3] have deemed these cases closed.” This statement appears to contradict the last paragraph of Section 2.3.2, Groundwater Investigations, where it is stated that two groundwater samples collected in 2003 by Clayton had concentrations that were above RWQCB environmental screening levels (ESLs). These two sections of the plan need to be reviewed and revised for consistency as appropriate.	Kleinfelder reviewed the State Water Quality Control Board (SWQCB) GeoTracker data base to confirm the status of any leaking underground fuel tank (LUFT) cases associated with the Site. Our review indicates that the San Francisco Bay Regional Water Quality Control Board (RWQCB) closed LUFT case number 01-2120 for the Owens Mortgage Investment property, located at 3623 Adeline Street in Emeryville, on February 13, 1997. Further review of the database did not indicate that any other LUFT cases have been associated with the Site.
Comment 9A [Section 3.2, Data Quality Objectives] The purpose for collecting samples for this project has not been adequately described in this section. A more thorough discussion of why the different types of samples are being collected across all matrices at all locations needs to be included. In addition, “if, then” statements are missing. See the “Sampling and Analysis Plan (SAP) Guidance and Template, Version 2, Private Analytical Services Used” (R9QA/002, March 2000) for additional information.	Sample types and their purposes are discussed in Sections 3.1 and 3.2. The following statements were added to Section 3.2: “Appendix A of this SAP presents the chemicals of concern for this investigation, their associated project required quantitation limits (PRQLs), and corresponding screening criteria. If any of the analytes of concern are found above the action levels listed in Appendix A, then adequate further investigation and or remedial actions for the Site will be evaluated.”

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Comment 9B This section is missing a discussion regarding groundwater samples. It is the reviewer understands that groundwater samples will be collected only if water is encountered while removing the underground storage tank. However, there still needs to be related discussion in the DQO description.	Discussions about the groundwater sample collection and analysis were added to Sections 3.1 and 3.2.
Comment 9C It is noted in this section that EPA Method 1664 will be used for the analysis of total extractable petroleum hydrocarbons (TEPH) in soils. While it is understood by the reviewer that performing TEPH analysis in soils by method 1664 is possible, the extraction efficiency of n-hexane in a soil matrix may not be optimum for a project such as this one. It is strongly recommended that the laboratory standard operating procedure (SOP) be closely reviewed to ensure that the laboratory will be capable of generating data of sufficient quality to meet project and regulatory agency needs.	EPA Method 8015B with Silica Gel clean up will be used for total extractable petroleum hydrocarbons (TEPH) analysis in soil and groundwater samples.
Comment 9D It is stated in this section that sample results will be compared to RWQCB Environmental Screening Levels (ESLs), DTSC California Human Health Screening Levels (CHHSLs), and EPA Region 9 Preliminary Remediation Goals (PRGs). Regulatory limits have not been provided in the plan. All regulatory limits (or action levels) for specific contaminants of concern (COC) that project data will be compared against should be summarized in tabular form in the revised plan. In addition, a column on the table should be provided that lists the specific laboratory reporting limits for each COC.	Appendix A presents the chemicals of concern for this investigation, their associated project required quantitation limits (PRQLs), and corresponding screening criteria. Appropriate reference was added to Section 3.2.

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Comment 10A [Section 3.3, Data Quality Indicators; Appendix B, Data Quality Indicators] The first paragraph of this section references a Table 2 as summarizing field and laboratory quality control samples. Table 2 in the current version of the SAP actually describes the soil sampling design. The citation should be reviewed and corrected as needed.	The following sentence was added to the first paragraph of Section 3.3: "Table 1 summarizes the types and frequency of collection of field QC samples and laboratory QC samples for this investigation."
Comment 10B In the discussion regarding the completeness data quality indicator, it is stated that the evaluation process is described in Section 3.4.3. There is no Section 3.4.3 in the current version of the plan. The citation should be reviewed and corrected as needed.	The last two sentences in the discussions regarding completeness (Section 3.3) were deleted.
Comment 10C In the discussion regarding the sensitivity (detection limit) data quality indicator, it is stated that "the detection limits of the analysis performed for this investigation will be below currently published screening levels for the compounds analyzed." As noted in Comment 9D above, regulatory limits and laboratory specific reporting limits have not been provided in the current version of the plan. Therefore, the reviewer was unable to evaluate the ability of the project laboratory to meet project sensitivity requirements.	The following statements were added to the discussion regarding the sensitivity (Section 3.3) "Appendix A of this SAP presents the chemicals of concern for this investigation, their associated project required quantitation limits (PRQL), and corresponding screening criteria. The analytical laboratories will attempt to achieve the PRQLs for the samples collected. If problems occur in achieving the PRQLs, the laboratory will contact the Project Chemist immediately, and other alternatives will be pursued to achieve project goals."

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Comment 10D Data Quality Indicator (DQI) tables are missing for metals and TEPH by fixed laboratory and volatile organic compounds by mobile, onsite laboratory. They need to be added to Appendix B. DQI Tables provided on the EPA website have been generated for the more commonly encountered analytical methods and for the convenience of plan preparers as a starting point for developing project specific tables. It is the responsibility of the plan preparer to develop project specific DQIs for inclusion in the plan. DQI Tables developed by plan preparers should provide an equivalent level of detail.	Appendix B contains a summary of the project specific data quality indicators and data evaluation criteria. This appendix now includes DQI information for metals and TEPH by the fixed laboratory (soil and water) and VOCs by mobile laboratory (soil vapor).
Comment 10E Methods cited on DQI tables provided in Appendix B for PCBs, polynuclear aromatic hydrocarbons, and volatile organic compounds in air, do not match the methods cited in other sections of the plan. DQI tables need to be provided that are consistent with the methods that the project laboratory will be using.	Appendix B contains a summary of the project specific data quality indicators and data evaluation criteria.
Comment 10F A DQI table for volatile organic compounds analysis by the EPA Contract Laboratory Program (CLP) is included in the Appendix. As the CLP is not going to be used for this project it is unclear to the reviewer why this DQI table is included. The table should be removed.	Appendix B contains a summary of the project specific data quality indicators and data evaluation criteria. The CLP information previously provided has been removed.
Comment 11 [Section 3.5, Data Management] This section makes reference to a “project chemist.” A project chemist is not referenced in the Organizational Chart provided earlier in the SAP. This individual should be added to the chart and referenced as appropriate in all other relevant sections of the SAP.	A project chemist was identified and added to the Organizational Chart provided in Section 1.4. The project chemist was also referenced in the SAP, as appropriate.

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Comment 12 [Section 3.6, Assessment Oversight] While it is understood that this is a relatively small project in size, the description provided for assessment oversight activities does not provide sufficient detail. Additional discussion of activities that the QA Manager will perform for the project needs to be added, e.g., audits, data review, etc. See the "Sampling and Analysis Plan (SAP) Guidance and Template, Version 2, Private Analytical Services Used" (R9QA/002, March 2000) for additional information and examples.	Information included in Section 3.6 was elaborated to include the requirements outlined in the "Sampling and Analysis Plan (SAP) Guidance and Template, Version 2, Private Analytical Services Used" (R9QA/002, March 2000).
Comment 13A [Section 4.1, Soil Sampling – UST Excavation Confirmation Samples; Section 6.2, Field Screening] In both sections field screening is briefly discussed. It is not clear to the reviewer exactly how the results of the field screenings will be used. Will the results be used to determine where samples that will be sent to the fixed laboratory for definitive analysis will be collected or will the results be used to determine if more samples will be collected, e.g., step-out sampling? Section 6.2 notes a screening criteria of 10ppm for the PID instrument. Clarification should be provided.	Kleinfelder has reviewed Section 4.1 and clarified how field screening results will be used.

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Comment 13B In this section, it is stated that "soil samples will be collected directly from the backhoe bucket." It is recommended that soil samples which will be submitted for volatiles analysis be collected in-situ, so as to minimize the potential for losses due to aeration of the soil during excavation with the backhoe bucket.	The expected excavation depth where confirmation samples are to be collected is approximately 10-feet to 12-feet below ground surface. Collecting a sample in Situ, as proposed by EPA, poses a potential health and safety hazard to the person assigned to collect the sample. Kleinfelder contacted Mr. Robert Weston at the Alameda County Environmental Health Agency, the local government agency overseeing tank pullouts, who confirmed that confirmation samples from underground storage tank excavations are collected from the backhoe bucket. To minimize the potential loss of volatiles through aeration, Kleinfelder will collect soil samples for volatiles analysis from soil close to the center of the backhoe bucket.
Comment 14A [Section 4.4.1, Soil Vapor; Plate 4, Proposed Sampling Locations] It is noted that a subcontractor will provide onsite mobile laboratory analysis of the soil vapor samples. If known, the subcontractor should be identified in the SAP.	Kleinfelder intends to retain the services of Trans-global Environmental Geochemistry (TEG) of northern California to perform soil vapor sampling and analysis; this information has been included in Section 4.4.1 of the SAP.
Comment 14B The rationale for collecting the two northern most soil vapor samples is not clear to the reviewer. The positioning of the other soil vapor samples is understood to be down gradient, south/south-west of former USTs. Clarification should be provided.	The purpose of collecting the proposed most north-western sample was for obtaining additional characterization of the Site; however, since no indication that petroleum hydrocarbons were handled or stored in this area, Kleinfelder has removed the proposed two northern most soil vapor sampling locations.
Comment 15A [Section 4.4.3, Subsurface Soil Sample – Former Hydraulic Elevator Area]	Kleinfelder has revised the proposed sampling plan and included the collection of a surface sample from the

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It is stated that one subsurface soil sample will be collected at a depth of approximately four feet at the site of the former hydraulic elevator. It is recommended that a soil sample also be collected at the surface level, since PCBs and TEPH do not readily migrate through the subsurface.	former hydraulic freight elevator (FHFE) location. Both samples, the surface sample and the four feet below ground surface sample, will be analyzed for PCBs and TEPH. This information was moved to Section 4.1.4.
Comment 15B The summary table of proposed sampling and analyses provided in this section incorrectly references Plate 3, Previous Sampling Locations. It should reference Plate 4, Proposed Sampling Locations. The table should be corrected. The table indicates that seven soil vapor samples are to be collected. However, Plate 4 shows eight soil vapor sampling locations. The number of sampling locations for the soil vapor portion of the project should be reviewed and made consistent in this section and throughout the SAP.	The summary table of proposed sampling and analyses originally provided in Section 4.4.3 has been removed. Instead, Table 2 presents the Soil Vapor, Soil, and Groundwater Sampling Design for this investigation. The areas of concern and the numbers of proposed samples listed in Table 2 are also referenced on Plate 4, Proposed Sampling Locations. The number of locations for the soil vapor portion of the project (five soil vapor locations) was reviewed and is consistent throughout the SAP.
Comment 16A [Section 5.0, Chemical Testing Program; Section 5.1, Analyses Narrative; Section 5.2, Analytical Laboratory] These sections of the plan are missing discussion about the mobile onsite laboratory that will be used for the soil vapor analyses. Discussion should be added.	Section 5.1 was revised to reference the Request for Analysis (RFA) Table 3 for the soil vapor analyses. Section 5.2 was revised to include the discussion about the mobile laboratory that will perform the soil vapor analyses.
Comment 16B The identities of the fixed and mobile laboratories have not been provided. If the laboratories to be used for this project are currently known, then they should be provided in the plan. If the laboratories are currently not known, then it should be stated in the plan.	Section 5.2 was revised to identify the fixed and the mobile laboratories that will be used for this project.
Comment 17A [Section 5.1, Analyses Narrative] This section incorrectly cross-references	The original Table 4 has been removed. Instead, RFA Tables 3, 4, and 5 for the soil vapor, soil, and

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Table 3. The relevant information is actually on Table 4. The reference should be revised.	groundwater sample analyses, respectively, were added to the SAP. Reference to these tables was added in Section 5.1.
Comment 17B Request for Analysis (RFA) Tables are provided in the end of the plan. Cross-references for Tables 5-1, 5-2, and another for the soil vapor analysis, which needs to be prepared and added to the plan, should be provided in this section.	RFA Tables 3, 4, and 5 for the soil vapor, soil, and groundwater sample analyses, respectively, were added to the SAP. Appropriate references were added to Section 5.1.
Comment 18 [Section 5.2, Analytical Laboratory] Since it appears as though the project will be defaulting to the data quality indicator (DQI) tables, downloaded from the EPA Region 9 website and provided in Appendix B, they need to be cross-referenced in this section. In addition, it should be documented in this section that the project laboratories are capable of meeting the requirements as set out in the DQI tables. If the project laboratories request any variances to the DQI tables, then the variances need to be documented in the plan. Typically, the requests for variance letter, along with the acceptance letter, are included as attachments and adequately meet the QA Office's documentation requirements.	Appendix B was updated to include project specific requirements. The text was added to Section 5.2 to indicate that the project requirements will be communicated with the laboratories prior the project start date to ensure adherence to the SAP protocols.
Comment 19 [Section 6.3.2, Soil Vapor Sampling] This section incorrectly cross-references Plate 3. The relevant information is actually on Plate 4. The reference should be revised.	Kleinfelder referenced Plate 4 in Section 6.3.4 (former Section 6.3.2).
Comment 20 [Section 7.1.1, UST Excavation Confirmation Samples] It is stated that metals have a hold time of six months. This is consistent with EPA's currently recommended hold times for all metals, except mercury. EPA's recommended hold time for mercury analysis is 28 days for soils. This	Kleinfelder added the correct holding time for mercury analysis to Section 7.1.1.

should be added to the narrative if mercury is a project contaminant of concern.	
Comment 21 [Section 10.0, Quality Control] Quality control (QC) sample acceptance criteria have not been provided and/or cross-referenced in this section. Acceptance criteria for all quality control samples (field and laboratory) need to be provided and discussed in this section (or appropriate subsections) of the plan.	The text was added to cross-reference QC sample acceptance criteria in Section 10.0. QC samples acceptance criteria were added to Appendix B.
Comment 22 [Section 10.1, Field Quality Control Samples] Per other references in the SAP, it appears as though equipment blanks (Table 1) and field blanks (Section 3.3) will be collected as part of field QC efforts. A discussion regarding equipment blanks and field blanks needs to be added to this part of the plan.	Kleinfelder completed the discussion about field QC samples in Section 10.1.
Comment 23A [Section 10.1.1, Field Duplicates; Table 1, Field and Laboratory QC Samples] Sampling locations where field duplicate samples will be collected need to be documented in this section of the plan.	Field duplicates will be collected for soil vapor and groundwater, if present, samples (Section 10.1.1). Field duplicates for soil samples were removed from the QC program (Section 10.1) due to the potentially large variability inherent in the soil matrix.
Comment 23B An additional field duplicate sample should be collected for PCB analysis either from the location of the former freight elevator or transformer area.	Field duplicates for soil samples were removed from the QC program (Section 10.1) due to the potentially large variability inherent in the soil matrix.
Comment 23C A field duplicate sample should also be collected for TEPH analysis.	Field duplicates for soil samples were removed from the QC program (Section 10.1) due to the potentially large variability inherent in the soil matrix.

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Comment 23D The actual number of field duplicate samples to be collected should be provided on Table 1.	The actual number of field duplicate samples was added to Table 1.
Comment 24A [Section 10.4, Laboratory Quality Control Samples; Table 1, Field and Laboratory QC Samples] The actual number of matrix spike and matrix spike duplicate samples to be collected needs to be discussed in this section and added to Table 1.	Kleinfelder designated three locations for MS/MSD samples. The actual number of MS/MSD samples was included in the footnotes of Table 1 and in Tables 4 and 5.
Comment 24B Table 1 needs to be cross-referenced in Section 10.4.	Kleinfelder added appropriate references to Table 1 in Section 10.0.
Comment 24C Specific sampling locations for all matrices where matrix spike and matrix spike duplicate samples will be collected need to be documented in this section of the plan.	Kleinfelder designated three locations for MS/MSD samples. The actual number of MS/MSD samples was also included in Section 10.0, in the footnotes of Table 1 and in Tables 4 and 5.and Table 1.
Comment 24D Discussion regarding soil vapor QC samples is missing. It should be discussed and the specifics added to Table 1.	Kleinfelder added the discussion about soil vapor QC samples in Section 10.0.
Comment 25A [Plate 3, Previous Sampling Locations] The symbols associated with sampling locations SB-1, SB-2, and SB-3 do not have a corresponding description in the plate legend. One should be added.	Kleinfelder has reviewed and corrected the information in Plate 3.
Comment 25B In previous sections of the plan, reference was made to ten soil borings advanced by Clayton in 2003. Those borings do not appear on the plate or to have a corresponding reference in the legend. The borings should be added to the plate and an entry made on the plate legend. (Also see Comment 7C)	Kleinfelder has reviewed and corrected both, the text of Section 2.3.2 and Plate 3.

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Comment 26A [Tables] Summary tables are provided for soil sampling design (Table 2) and groundwater sampling design (Table 3); however a table summarizing the soil vapor sampling design is missing. A table describing the soil vapor sampling design should be added.	Table 2 combines the sampling design information for the soil vapor, soil, and groundwater samples.
Comment 26B A Request for Analytical Services table for soil vapor samples has not been provided. Since it appears that sample specific information is not being provided in Section 5.1, information for soil vapor samples should be provided for each specific sample in a table similar to Tables 5-1 and 5-2. Identifiers should be included for field duplicates, field blanks, equipment blanks, matrix spikes, matrix spike duplicates, etc.	Kleinfelder added the Request for Analysis for the soil vapor samples (Table 3).
Comment 27A [Table 4, Sample Container, Holding Time, and Preservative Requirements] Per Section 3.2, TEPH is going to be analyzed by EPA Method 1664, not EPA Method 8015. This inconsistency should be corrected.	Kleinfelder has removed Table 4 and included appropriate information for soil vapor, soil, and groundwater samples in Tables 3, 4, and 5, respectively.
Comment 27B The table is missing information related to soil vapor samples. This should be added to the table.	Kleinfelder added the Request for Analysis for the soil vapor samples (Table 3).
Comment 27C The holding time criteria for TEPH in soil samples is missing. This should be added to the table.	Kleinfelder has removed Table 4 and included appropriate information for soil vapor, soil, and groundwater samples in Tables 3, 4, and 5, respectively.
Comment 27D The holding time criteria for volatiles and TPH-G in groundwater samples is missing. They should be added to the table	Kleinfelder added the holding time criteria for VOCs and TPH-g in groundwater to Table 5.

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Comment 27E The holding time listed for metals is 180 days. If mercury is to be analyzed in support of this project, then the holding time of 28 days should be added to the table for mercury.	Kleinfelder added the holding time of 28 days to Tables 4 and 5.
Comment 28 [Table 5-1, Request for Analytical Services, Matrix = Soil; Table 5-2, Request for Analytical Services, Matrix = Groundwater] Tables 5-1 and 5-2 have not been filled out. Since it appears that sample specific information is not being provided in Section 5.1, the requested information should be provided for each specific sample in Tables 5-1 and 5-2, including identifiers for field duplicates, field blanks, equipment blanks, matrix spikes, matrix spike duplicates, etc.	Kleinfelder updated Tables 3, 4, and 5 to include the sample specific information.
Comment 29 [Appendix A, Soil Vapor Survey Methodology] The two page description of the soil vapor survey lacks sufficient detail to adequately document and describe the process. The subcontractor's standard operating procedure should be provided for review.	Appendix C provides TEG's standard operating procedures.

Response to Comments on the Sampling and Analysis Plan Ambassador Laundry Site, 1160 – 1168 36th Street and 3601 and 3623 Adeline Street, Emeryville, California (*Continued*)

Additional Discussions

1. [Section 1.0] The following additional activities were proposed in the SAP: the collection and analysis of soil samples from the former gasoline UST location (FUST-GO, Plate 4); the collection and analysis of soil samples from the former heating oil UST location (FUST-HO, Plate 4); and the collection and analysis of soil samples from the former Sump-1 location (Plate 4).

2. [Section 1.2.1] The Alameda County Environmental Health Agency's (ACEHA). Minimum Verification Requirements and Sampling Analysis (MVRSA) guidelines will be followed during the assessment of the potential impacts of the UST's content to the Site's conditions.

3. [Section 10.1] Field Duplicates for soil samples were removed from the QC program. Due to the potentially large variability inherent in the soil matrix, these samples cannot be used to assess sampling precision. Further, it is not practical to set QC limits for the RPD of such samples, which precludes the use of these samples for QC purposes.

4. [Section 10.1] Equipment blanks were removed from the QC program, because disposable equipment will be used.

5. Original Table 2 (Soil Sampling Design) and Table 3 (Sample Container, Holding Time, and Preservation Requirements) were replaced with the following tables: Table 2 summarizes the soil vapor, soil, and groundwater sampling design; Tables 3, 4, and 5 include the Requests for Analytical Services for soil vapor, soil, and groundwater samples, respectively.

A Report Prepared for:

City of Emeryville
1333 Park Avenue
Emeryville, California

SAMPLING AND ANALYSIS PLAN
AMBASSADOR LAUNDRY SITE
EMERYVILLE, CALIFORNIA

Project No. 73943/PWENV

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May 2, 2007

Sampling and Analysis Plan for:

Ambassador Laundry Site—City of Emeryville

Kleinfelder, Inc.

Date May 2, 2007

Kleinfelder Project Manager: Joel Kushins P.E.

Kleinfelder QA Manager: Ms. Lynne Srinivasan

For USEPA use:

Approved by USEPA Project Manager: Date:

Expedited Review? ☐ Yes ☐ No

Received by QA Office: Date:

Reviewed by: Date:

Approved: Date:

Region 9 Quality Assurance Manager

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APPENDICES

1.0 INTRODUCTION

The City of Emeryville is facilitating the redevelopment of several parcels along 36th Street, between Adeline Street and Peralta Street. The subject parcels (hereafter referred to as the Site) are located at 1160-1168 36th Street and 3601 and 3623 Adeline Street, in Emeryville, Alameda County, California (Plate 1). Portions of the Site were formerly occupied by the Ambassador Laundry facilities. In the 1980s, the parcels were used for various industrial/commercial activities that included a commercial sign operation, art studios, a bronze foundry, a metal contractor, and vehicle maintenance. Several environmental investigations and remediation activities have been conducted at the Site, including Phase I Environmental Site Assessments (ESA), the removal of two underground storage tanks (UST), the removal of a sump, and the chemical analyses of subsurface soil and groundwater samples.

In 2005, during the removal of a wastewater sump (Sump-2) near the former location of a UST used for diesel storage, Clayton Group Services Inc. (Clayton) discovered a previously undocumented UST. The tank was encountered within the sump excavation area, at about 9 feet below ground surface (bgs). The UST was left in place for future removal.

Kleinfelder was retained by the City of Emeryville to prepare this Sampling and Analysis Plan (SAP) to evaluate the potential impacts to the subsurface associated with the existing UST (EUST), and to perform a Site-wide assessment of the subsurface. The City of Emeryville provided Kleinfelder with previous environmental investigation reports. Review of the reports indicated the presence of the two former USTs, an 8,000-gallon former UST for gasoline (FUST-G) and a 2,500-gallon former UST for heating oil (FUST-HO); a former hydraulic freight elevator (FHFE), and three existing electrical transformers (EET). In addition, the reports indicated the current presence of a sump (Sump-1) east of center of the Site (Clayton, 2003a).

Kleinfelder understands that the City of Emeryville intends to redevelop the Site, and that the removal of the EUST and the requested investigation are being performed as part of the required due diligence. Therefore, as part of this SAP, Kleinfelder has also included the removal of Sump-1. Kleinfelder understands that the City of Emeryville intends to use the United States Environmental Protection Agency (USEPA) Brownfields Assessment Grant funds to pay for the EUST removal and environmental assessment services at the Site.

To guide field, laboratory, and data reporting efforts associated with this investigation, Kleinfelder prepared this SAP, which includes the basic elements of a Quality Assurance Project Plan (QAPP). This SAP proposes the following activities:

(1) Performing a geophysical survey of the Site to: (a) establish the location of the EUST proposed for removal and any associated piping; (b) establish the location of the sump proposed for removal (Sump-1) and any associated piping; and c) assess for the presence of any possible and not previously identified subsurface structures;
(2) Removing the EUST and associated piping, located in the approximate center of the Site, and collecting and analyzing confirmation samples from the excavation;
(3) Removing Sump-1 located north east of the Site center, and collecting and analyzing confirmation samples from the excavation;
(4) Collecting and analyzing a surface soil sample in the vicinity of three EETs;
(5) Collecting and analyzing surface and subsurface samples from the FHFE area;
(6) Collecting and analyzing soil and groundwater samples from the location of the FUST-G;
(7) Collecting and analyzing soil and groundwater samples from the location of the FUST-HO; and
(8) Collecting and analyzing soil-vapor samples within the Site, in the general down-gradient direction from areas where groundwater had previously been identified as impacted with total petroleum hydrocarbons (TPH).

Sections 1.1 through 1.4 discuss the Site's location, provide an overview of the sampling area, identify the responsible government agency, and present the names of the project contact persons.

1.1 SITE NAME OR SAMPLING AREA

The Site is commonly referred to as the former Ambassador Laundry Site.

1.2 SITE OR SAMPLING AREA LOCATION

Four parcels with APN 049-481-07, 049-481-08, 049-481-16, and 049-481-17, comprise the Site, located at 1160-1168 36th Street and 3601–3623 Adeline Street in Emeryville, California.

The following sections summarize the proposed sampling at the Site. A Site Plan, showing the locations of former and current features of interest at the Site is presented on Plate 2.

1.2.1 Geophysical Survey

The information gathered during an electromagnetic geophysical survey of the Site will be used to: a) locate the EUST proposed for removal and its associated piping system, b) locate Sump-1 proposed for removal and associated piping system, and c) assess the presence of any possible and not previously identified subsurface structures, such as piping associated with the FUST-G.

1.2.2 Proposed Existing UST Removal and Confirmation Samples

Based on information provided by Clayton (2005), Kleinfelder understands that the EUST proposed for removal is located approximately 100 feet east of Peralta Street and 100 feet north of 36th Street. To assess the potential impacts of the EUST's contents to the subsurface, upon removal of the EUST, confirmation soil samples will be collected from the excavation, following the Minimum Verification Requirements and Sampling Analysis (MVRSA) guidelines put forth by the Alameda County Environmental Health Agency (ACEHA).

If groundwater is encountered in the EUST excavation pit, a groundwater sample will also be collected and analyzed. Analytical methods and data quality objectives for this investigation are presented in Section 3.0, and the soil and groundwater sampling and analysis rationale are described in Section 4.0 of this SAP.

1.2.3 Proposed Sump-1 Removal and Confirmation Samples

Based on information provided by Clayton in the Phase I Environmental Site Assessment (Clayton 2003a) prepared for the Site, Kleinfelder understands that Sump-1 located northeast of the center of the Site, approximately 120-feet west of Adeline Street and 180-feet north of 36th Street, was cleaned by PES Engineering and Environmental Inc (PES). Kleinfelder will remove Sump-1 and, to assess the potential impacts of the Sump's contents to the subsurface, confirmation soil samples will be collected from the excavation, following the MVRSA guidelines put forth by the ACEHA.

If groundwater is encountered in the sump's excavation pit, a groundwater sample will also be collected and analyzed. Analytical methods and data quality objectives for this investigation are presented in Section 3.0, and the soil and groundwater sampling and analysis rationale are described in Section 4.0 of this SAP.

1.2.4 Proposed Additional Soil Samples

Clayton's Phase I ESA (Clayton 2003a) documents the presence the three EETs, the FHFE, and the two former USTs, (FUST-G and FUST-HO) (Plate 2).

To check for the potential presence of chemicals of potential concern associated with these features, additional soil sampling will be performed at the Site. Analytical methods and data quality objectives for this investigation are presented in Section 3.0, and the soil and groundwater sampling and analysis rationale are described in Section 4.0 of this SAP.

1.2.5 Proposed Soil Vapor Samples

To check for the possible presence of volatile organic compounds (VOCs) in the soil-vapor phase within the unsaturated (vadose) zone beneath the site, soil-vapor samples will be collected from five onsite locations and analyzed for VOCs. The rationale for the proposed locations of these samples is discussed in Section 4.0.

1.3 RESPONSIBLE GOVERNMENT AGENCY

The ACEHA – Environmental Cleanup Oversight is the responsible government agency for overseeing the removal of the UST and the associated subsurface investigation. The Emeryville Fire Department will oversee that Fire Codes are enforced during the removal of the UST. If subsurface contamination at the Site is confirmed, the Regional Water Quality Control Board (RWQCB) may establish the Site as a Leaking Underground Fuel Tank (LUFT) case or as a Spills Leaks and Investigation Case (SLIC) (non-UST release site). Kleinfelder understands that USEPA will review and approve project work-plans and reports under its responsibilities associated with the Brownfields Grant funding.

1.4 PROJECT ORGANIZATION

Kleinfelder has identified the relevant stakeholders for the project; including the EPA, the City of Emeryville, and the ACEHA's representatives. The name, role and government agency they represent, together with their contact information, is offered the Organizational Chart presented below. Kleinfelder's team members involved in this project are also listed in the Organizational Chart presented below.

Title/Responsibility	Name	Phone Number
USEPA Brownfields Project Manager	Ms. Susanne Perkins	(415) 972-3208
USEPA Region IX Quality Assurance Manager	Ms. Eugenia McNaughton	(415) 972-3411
City of Emeryville Project Manager	Mr. Ignacio Dayrit	(510) 596-4356
Alameda County Environmental Health Agency	Mr. Robert Weston	(510) 567-6781
City of Emeryville Fire Department	Mr. George Orego	(510) 596-3750
Kleinfelder Project Manager	Mr. Joel Kushins	(510) 628-9000
Kleinfelder QA Manager	Ms. Lynne Srinivasan	(510) 628-9000
Kleinfelder Project Chemist	Ms. Nadia Borisova	(510) 628-9000
Kleinfelder Field Team Leader	TBD	(510) 628-9000

2.0 BACKGROUND

Sections 2.1 through 2.5 provide an overview of the Site's location and operational history, a summary of previous environmental investigations, known information on the geology and hydrogeology of the Site's vicinity, and a summary of potential environmental and human impacts associated with the Site and sampling areas.

2.1 SITE AND SAMPLING AREA DESCRIPTION

The Site occupies approximately 34,136 square feet (0.78-acres) in a mixed, residential/light industrial, land-use area of the City of Emeryville. Plate 1 shows the geographical location of the site. On the north, the site is bordered by residences, on the west by Peralta Street, on the south by 36th Street, and on the east by Adeline Street. The sampling area coordinates are, approximately: 37° 49' 39.62" North, 122° 16' 49.13" West. A Site Plan, showing the locations of former and current features of interest is presented on Plate 2.

Kleinfelder understands that the Site formerly consisted of three building structures that included a two-story masonry building (1168 36th Street) with several additions towards the east, a residential building with a single car garage (1160 36th Street), and a residential structure (3601 Adeline Street). The eastern portion of the Site (3623 Adeline Street) was an open paved yard associated with two garage/shops that were attached to the main buildings. Onsite structures were apparently demolished in August 2005. Currently, the Site is a vacant lot.

2.2 OPERATIONAL HISTORY

In 1910, the New Method Laundry was established at the Site, which operated an industrial laundry facility between 1910 and the 1980s. Although the laundry facility was not identified as a dry cleaner, the facility may have stored and handled regulated substances, such as solvents, spot removers, and other unknown products. Records indicate that two former USTs, an 8,000-gallon gasoline tank and a 2,500-gallon heating oil tank, which are designated as FUST-G and FUST-HO in this SAP, operated at the Site. Both the gasoline and heating oil USTs were removed in 1994 and 1995, respectively.

In the mid 1980s, the land use at the Site changed to a multi-tenant mixed residential/commercial use. Businesses operating at the Site included a spa assembly, a commercial sign company, art studios, a bronze art foundry, a metal contractor, vehicle maintenance, and other commercial uses.

2.3 PREVIOUS INVESTIGATIONS/REGULATORY INVOLVEMENT

Kleinfelder obtained copies of available environmental investigation reports on the Ambassador Laundry Site from the City of Emeryville and reviewed them to prepare this SAP. Most of the available investigation reports are summarized in Clayton's Phase 1 ESA (Clayton 2003a), including the removal of two USTs (FUST-G and FUST-HO), soil and groundwater investigations, a Phase I ESA, and a sump cleanup. Other investigations performed at the Site, and reviewed for preparing this SAP, include a report summarizing a subsurface investigation performed by (Kleinfelder, 1996a), a groundwater sampling and request for closure report (Kleinfelder, 1996b), a soil and groundwater sampling investigation (Clayton 2003b), and a sump closure report (Clayton 2005). Sections 2.3.1 and 2.3.2 summarize the results of previous environmental investigations performed at the Site. Based on our review of available reports, previous sampling locations are show in Plate 3.

2.3.1 Soil Investigations

On December 1, 1994, SEMCO reported removing an 8,000-gallon FUST-G and its associated dispenser system from the northeastern section of the Site. This UST was removed on November 1, 1994. The Alameda County Health Care Services Agency (ACHCSA) performed the regulatory oversight during the UST removal. Confirmation soil samples collected from underneath FUST-G did not contain detectable concentrations of total petroleum hydrocarbon as gasoline (TPH-g), benzene, toluene, ethylbenzene and xylene (BTEX). Neither the location of the confirmation samples nor the analytical methods or reporting limits used in the investigation were provided in the document available for Kleinfelder's review.

On October 9, 1995, SEMCO reported removing a 2,500-gallon FUST-HO from the Site. This UST was removed on August 31, 1995. The ACHCSA performed the regulatory oversight of the tank removal. A hole was observed in the north end of the tank, and the soil associated with the tank was visibly impacted with fuel. On September 5, 1995, approximately 54 tons of impacted soil was removed. Confirmation soil samples collected at 7 to 9 feet bgs contained concentrations of TPH as diesel (TPH-d) at up to 21,000 milligrams per kilogram (mg/Kg), and benzene at up to 0.081 mg/Kg. At the time this SAP was prepared, information on the analytical methods and reporting limits used in this investigation was not available to Kleinfelder.

In November 1995, Kleinfelder was retained to perform a soil and groundwater investigation at the Site, consisting of advancing six soil borings (KB1 through KB6) to a depth of 20 feet bgs and installing a groundwater-monitoring well (MW-1/EW-1) approximately 10 feet west of the FUST-HO removed by SEMCO in September 1995. MW-1/EW-1 was advanced to a total depth of 25 feet bgs. Soil samples were collected at 5 foot intervals (5 feet, 10 feet, and 15 feet bgs). Grab groundwater samples were also collected from each of the borings. Soil and groundwater samples were analyzed for TPH-d and TPH-oil using USEPA Method 8015M, and for BTEX using USEPA Method 8020.

Analytical results of soil samples indicated the presence of TPH-d, TPH-oil and BTEX at concentrations up to 56 mg/Kg, 55 mg/Kg, 27 micrograms per Kilogram (μg/Kg), 400 μg/Kg, 360 μg/Kg, and 1,300 μg/Kg, respectively. These concentrations were detected at 15 feet bgs in the boring for well MW-1/EW-1. The analytical results of soil samples from the other borings indicated that the chemicals analyzed were at concentrations below the detection limits and/or at concentrations below environmental screening parameters.

The analyses of the grab groundwater samples indicated the presence of TPH-d and BTEX at concentrations up to 15,000 microgram per Liter (μg/L), 28 μg/L, 20 μg/L, 65 μg/L, and 20 μg/L, respectively.

On December 21, 1995, after purging groundwater from well MW-1/EW-1, a groundwater sample was collected and analyzed for of TPH-d, TPH-oil, and TPH as kerosene (TPH-k), using USEPA Method 8015M, and for BTEX, using USEPA Method 8260. The analytical results indicated the presence of TPH-d and BTEX at concentrations up to 4,000 μg/L, 0.7 μg/L, 9.2 μg/L, 0.8 μg/L, and 3.8 μg/L, respectively.

On September 21, 1999, PES Engineering and Environmental Inc. (PES) reported advancing three soil borings (SB-1 through SB-3) near a recently discovered sump (Sump-1) containing oily sludge (Plate 3). The borings were advanced to depths ranging from 21 feet to 24 feet. Soil samples from the three borings were collected from 3 feet and 6 feet bgs, and analyzed for TPH, polychlorinated biphenyls (PCB) and VOCs. Except for TPH-d, detected in one sample at 38 mg/Kg, no other constituent was detected above the laboratory's reporting limit of 1 mg/Kg.

On May 1 and 2, 2003, Clayton reported advancing 10 borings at the Site to depths ranging from 15 feet to 20 feet bgs (B-1 through B-10, Plate 3). A total of 21 soil samples were collected from the 10 borings at depths ranging from 3 to 5 feet bgs, 7 to 8 feet bgs, and 14 feet to 15 feet bgs. The soil samples were analyzed for the following constituents:

- TPH-g, TPH-d, and TPH-mo using USEPA Method 8015 (USEPA, 1996);
- VOCs using USEPA Method 8260 (USEPA, 1996); and
- Title 22 Metals, using USEPA Method 6000/7000 series (USEPA, 1996).

VOCs were found to be below the laboratory's reporting limits. TPH-g, TPH-d, and TPH-mo were detected at concentrations above the laboratory's reporting limit in two samples. In the soil sample collected from B-4, at 7.5 - 8 feet bgs, TPH-g, TPH-d, and TPH-mo were reported at 3.2 mg/Kg, 140 mg/Kg, and 210 mg/Kg, respectively. In the soil sample collected from B-6, at 7 to 7.5 feet bgs, TPH-d and TPH-mo were reported at 2.5 mg/Kg and 8.3 mg/Kg, respectively.

In November 2005, Clayton reported that on August 2005, during the demolition of onsite structures in the vicinity of FUST-HO that was removed in 1995, a sump (Sump 2) containing oily sludge was discovered. During follow up work to remove the sump, a riveted-steel UST, believed to be approximately 4 feet in diameter, along with two metal pipes apparently associated with the tank, were encountered. The UST was found at approximately 9 feet bgs. Clayton completed the sump removal and backfilled the excavation pit. Under the City of Emeryville directives, the UST was left in place for future removal (i.e., the proposed work included in this SAP). The actual size of the tank was not indicated in Clayton's report; however, based on the reported diameter, Kleinfelder estimates the UST has a capacity of approximately 1,000-gallons.

Before the sump excavation was backfilled with clean imported fill, four confirmation soil samples were collected at 13 feet to 14 feet bgs from the excavation sidewalls; and one from the center bottom of the excavation, at approximately 14 feet bgs. The location of the samples was not indicated in the report available for review. The soil samples were analyzed for the following constituents:

- TPH-g, TPH-d, and TPH-mo, using USEPA Method 8015 (USEPA, 1996);
- VOCs using USEPA Method 8260B (USEPA, 1996);
- PCBs using USEPA Method 8082 (USEPA, 1996).

The analytical results of the soil samples indicated the presence of TPH-g, TPH-d and TPH-mo at concentrations of 13 mg/Kg, 290 mg/Kg, and 360 mg/Kg, respectively. VOCs were below the laboratory's reporting limit of 0.005 mg/Kg.

2.3.2 Groundwater Investigations

Kleinfelder was retained by a prospective purchaser of the site to advance six soil borings to a depth of 20 feet bgs (KB-1 through KB-6), and to install a groundwater monitoring-well (MW-1/EW-1), approximately 10 feet west of the former UST for heating oil. The boring for the well was advanced to a depth of 25 feet bgs. The well was completed on December 6 and developed on December 18, 1995. Grab groundwater samples were collected from each boring and analyzed for TPH-d, TPH-mo, and TPH-k using USEPA Method 8015, and for TPH-g and BTEX using USEPA Method 8020. Analytical results of the grab groundwater samples collected from the six borings indicated the presence of TPH-d and benzene at concentrations of 15,000 µg/L and 28 µg/L, respectively. Analytical results of the groundwater sample collected from well MW-1/EW-1 on December 21, 1995, indicated the presence of TPH-d and BTEX at concentrations of 4,000 µg/L, 0.7 µg/L, 9.2 µg/L, 0.8 µg/L, and 3.8 µg/L, respectively.

On March 8, 1996, Kleinfelder collected a groundwater sample from well MW-1/EW-1. The groundwater sample was analyzed for TPH-d and TPH-k using USEPA Method 8015, for TPH-g and BTEX using USEPA Method 8020, and for polynuclear aromatic hydrocarbons (PAH) using USEPA Method 8270. Analytical results indicated the presence of TPH-g, TPH-d, and TPH-k at 1,000 µg/L, 2,800 µg/L, and 600 µg/L, respectively. Benzene was below 0.5 µg/L, and toluene, ethylbenzene and xylenes were detected at concentrations of 7.2 µg/L, 0.6 µg/L, and 2.4 µg/L, respectively. PAHs were below the laboratory's reporting limit of 10 µg/L. Based on the reduction in concentration of the chemicals of concern, Kleinfelder concluded that removing the 2,500-gallon UST for heating oil eliminated the contamination source. No further actions were deemed necessary.

During the September 21, 1999 PES investigation, grab-groundwater samples were collected from the three borings (SB-1 through SB-3) and analyzed for TPH-g, TPH-d, TPH-mo, VOCs, and PCBs. The analytical results indicated the presence of TPH-g at concentrations ranging from 490 µg/L to 780 µg/L. TPH-d and TPH-mo were detected in one of the samples at concentrations of 1,100 µg/L and 1,400 µg/L, respectively. Concentrations of VOCs, including trichloroethylene (TCE) detected at a maximum concentration of 0.85 µg/L, were below current action levels in the three samples.

On May 1 and 2, 2003, Clayton (Clayton 2003b) reports advancing 10 borings at the Site, to depths ranging from 15 feet to 20 feet bgs. Grab groundwater samples were collected from 8 of the 10 borings, and analyzed for TPH-g, TPH-d, and TPH-mo using USEPA Method 8015, and for VOCs using USEPA Method 8260. In two of the eight groundwater samples, TPH-g, TPH-d, and TPH-mo were detected at concentrations of 2,200 µg/L, 4,700 µg/L, and 4,500 µg/L, respectively. These concentrations are above current environmental screening levels (ESL) developed by the California RWQCB San Francisco Region. In addition, low levels of VOCs, including benzene and methyl tert-butyl ether (MTBE), were detected in groundwater at concentrations below their current respective ESLs.

2.4 GEOLOGICAL INFORMATION

The Site is located within the East Bay Plain Physiographic Region of the San Francisco Bay Area. Depositional fans of sediments sloping towards the southwest, originating from the Diablo Range, characterize the East Bay Plain region. The Hayward Fault is located approximately 2.6 miles northeast of the Site. Shallow sediments in the vicinity of the Site have been mapped as older and younger alluvium; typically consisting of unconsolidated to poorly consolidated clay, silt, sand and gravel, with generally low groundwater yield rates. The general groundwater flow in the region is towards the west / southwest (Clayton. 2003a).

2.5 ENVIRONMENTAL AND/OR HUMAN IMPACT

Previous environmental investigations performed at the Site (summarized in Section 2.3) documented localized soil and groundwater impacts of TPH-g, TPH-d, TPH-mo, and VOCs.

Review of the State Water Resource Control Board (SWRCB) GeoTracker system indicates that a LUFT case was opened for the property located at 3623 Adeline Street in Emeryville, California. The case was registered as the Owens Mortgage Investment, and the San Francisco Bay Regional Water Quality Control Board (RWQCB) LUFT case number is 01-2120. GeoTracker records indicate the case was closed on February 13, 1997.

The area surrounding the EUST proposed for removal has the potential to be impacted by TPH-g, TPH-d, TPH-mo, VOCs, and metals. Removal of the EUST will eliminate a potential source of contamination to soil and groundwater from the Site. The collection and analysis of confirmation samples will serve to assess the need for further subsurface investigation and or remediation efforts of the area associated with the EUST area.

The collection and analysis of soil vapor samples from five onsite locations will serve to assess potential concerns associated with vapor intrusion issues for future site uses. The collection and analysis of a surface soil sample from underneath the former location of the three transformers on the northwest corner of the Site will serve to check whether PCBs may have been released to soil in this area; and the subsurface sample from the former hydraulic freight location will serve to check for chemicals of potential concern (total extractable petroleum hydrocarbons [TEPH] and PCBs) in soil beneath that area.

Finally, the proposed geophysical survey of the Site will serve to check for indications of other undocumented USTs or subsurface structures onsite.

This SAP serves as a guide to evaluate the presence or absence of chemicals of potential concern (COPCs), beneath the Site. The analytical results obtained from this SAP will aid in subsequent decision-making steps regarding the need for further investigation and/or cleanup requirements.

3.0 PROJECT DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements developed by data users to specify the quality and quantity of data needed from a particular data collection activity to support specific decisions. DQOs are developed in general accordance with the *Guidance for the Data Quality Objectives Process*, USEPA QA/G-4 (USEPA, 2000). For this project, DQOs are designed to obtain Data Quality Indicators (DQIs) for each field procedure and analytical method. DQIs include the precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) parameters.

Sections 3.1 through 3.6 discuss the project task and definition; DQOs; DQIs; data review, verification, and validation protocols; data management; and assessment oversight procedures.

3.1 PROJECT TASK AND PROJECT DEFINITION

Because the EUST was likely used to store fuel, TPH, VOCs, SVOCs, and metals are possible COPCs in soil and/or groundwater beneath or near the EUST area. In addition, since previous investigations at the Site documented the presence of three EETs and one FHFE, and groundwater impacted with TPH-g and TPH-d was documented in the vicinity of the two previously removed USTs (FUST-G and FUST-HO), the above-listed COPCs may also be present beneath other areas of the Site. In addition, PCBs may also be present in the EET area and FHFE area (Plates 2 and 3).

Project objectives and associated field activities were identified as follows:

- To establish the locations of the EUST and Sump-1 proposed for removal and any associated piping, and to assess for the presence of possible and not previously identified subsurface structures at the Site, a geophysical survey will be performed;
- To confirm that contamination associated with the presence of TPH, VOCs, SVOCs, and metals in soil is removed, soil confirmation samples will be collected from the EUST excavation;

- To evaluate the potential presence of TPH, VOCs, SVOCs, and metals in groundwater, groundwater samples will be collected if water is encountered during the EUST removal activities;
- To confirm that contamination associated with the presence of TPH, VOCs , SVOCs, and metals in soil is removed, soil confirmation samples will be collected from the Sump-1 excavation;
- To evaluate the potential presence of TPH, VOCs, SVOCs, and metals in groundwater, groundwater samples will be collected if water is encountered during the Sump-1 removal activities;
- To assess the potential presence of PCBs and TEPH from the three EETs and the FHFE, soil samples will be collected from those areas;
- To assess the potential presence of TPH, VOCs, and metals in the vicinity of the FUST-G and FUST-HO, soil samples will be collected from these locations;
- To evaluate the potential presence of TPH, VOCs, and metals in groundwater in the vicinity of the FUST-G and FUST-HO, groundwater samples will be collected if water is encountered during the sampling activities at these locations;
- To evaluate the possible presence of VOC gases in soil vapor within the unsaturated (vadose) zone beneath the Site, soil-vapor samples will be collected.

Soil vapor, soil, and groundwater sampling and analysis rationale is described in Section 4.0 of this SAP. Soil vapor, soil, and groundwater sampling design is presented in Table 2. The information gathered during this investigation will be used to evaluate the need for further subsurface investigations and/or environmental cleanup.

3.2 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQO) are necessary in obtaining sufficient data of known defensible quality for the purposes of the data user. The DQO process will assist in determining the appropriate quantitation, detection, and reporting limits, analytical methods, and sample handling procedures.

The following analytical methods will be used for soil vapor analyses:

- VOCs by USEPA Method 8260 (USEPA 1996).

The soil vapor survey will be conducted in accordance with California Regional Water Quality Control Board – Los Angeles Region (LARWQCB) and DTSC Advisory – Active Soil Gas Investigations (LARWQCB and DTSC 2003).

The following analytical methods will be used for soil sample analyses:

- VOCs using USEPA Method 8260 and USEPA Method 5035 (USEPA 1996);
- SVOCs (including PAHs) using USEPA Method 8270 (USEPA 1996);
- TPH-g using USEPA Method 8015M and USEPA Method 5035 (USEPA 1996);
- TEPH using USEPA Method 8015M with Silica Gel clean up (USEPA 1996);
- PCBs using USEPA Method 8082 (USEPA 1996);
- Metals using USEPA Method 6010/7000 series (USEPA 1996).

The following analytical methods will be used for groundwater (if present) sample analyses:

- VOCs using USEPA Method 8260 (USEPA 1996);
- SVOCs (including PAHs) using USEPA Method 8270 with selective ion monitoring (USEPA 1996);
- TPH-g using USEPA Method 8015M (USEPA 1996);
- TEPH using USEPA Method 8015M with Silica Gel clean up (USEPA 1996);
- Metals using USEPA Method 6010/7000 series (USEPA 1996).

The above referenced analytical methods were selected to achieve the DQOs for this project. To establish the need for further investigation and or remedial actions, the analytical results will be compared to current ESLs developed by the RWQCB (RWQCB 2005), to the California Human Health Screening Levels (CCHSLs) developed by the Department of Toxic Substance Control (DTSC) (USEPA 2005), USEPA Maximum Contaminant Levels (MCL) (California Department of Environmental Health Services 2007), and USEPA Region IX preliminary remediation goals (PRGs) (USEPA 2004a). Appendix A of this SAP presents the COPCs for this investigation, their associated project required quantitation limits (PRQLs), and corresponding screening criteria. If any of the analytes of concern are found above the action levels listed in Appendix A, then adequate further investigation and or remedial actions for the Site will be evaluated.

Kleinfelder anticipates that the EUST removal excavation will not exceed dimensions greater than 8 feet by 10 feet, and a depth of 12-feet bgs. If field observations, such as stains, odors, and/or high photo-ionization detector (PID) readings (greater than 50 parts per million [ppm]), suggest that contamination extends further than the anticipated excavation extent, impacted soil will be removed from the excavation. The maximum excavation area is not to exceed 10-feet by 12-feet, and a depth not greater than 14 feet bgs. If field observations suggest the presence of impacted soils when the maximum area excavation extent is reached, the City of Emeryville will be notified and asked for directives on furthering the extent of the excavation. Excavation efforts may be temporarily ceased so that options can be evaluated. If excavation activities are temporarily suspended, access barriers to the excavation will be installed.

Confirmation samples will be collected from the sidewalls and bottom of the EUST excavation showing PID readings not greater than 50 ppm. If directed by the City of Emeryville, samples from the apparently impacted sidewall(s) will also be collected. The laboratory will be requested to analyze the confirmation samples in a 24 to 48 hour turn-around-time. The City of Emeryville and the ACEHA will be notified of the laboratory analytical results. The need to further the excavation pit will be assessed based on the analytical results for the confirmation samples.

The size of the Sump-1 excavation is anticipated to have similar dimensions as the excavation for the EUST, and the same approach for removing potentially impacted soil will be followed.

The sampling schedule proposed in this SAP is for a one-time event. The USEPA has acknowledged that projects and their sampling programs for properties such as the Site are relatively small, and that defining action levels and DQIs for the field and laboratory measurements used on these projects, as described herein, sufficiently addresses the applicable DQOs.

3.3 DATA QUALITY INDICATORS

The effectiveness of a QA program is measured by the quality of the data generated by the laboratory. The procedures described below are designed to obtain DQIs for each field procedure and analytical method. Data quality indicators include the PARCCS parameters (USEPA, 2001). Of these PARCCS parameters, precision and accuracy will be evaluated quantitatively by collecting and analyzing quality control (QC) samples. Table 1summarizes the types and frequency of collection of field QC samples and laboratory QC samples for this investigation. Appendix B includes DQIs for this investigation. The PARCCS parameters are discussed in the following paragraphs.

Precision – Precision is defined as a measure of agreement between a set of replicate results among themselves without assumption, of any prior information, as to the true result. Precision is assessed through the use of sample and duplicate (split) or matrix spike (MS) and matrix spike duplicate (MSD) results. MS/MSDs are used more often with organic analytes; inorganic analytes are generally run as a true duplicate and a single MS. Precision limits are expressed in terms of relative percent difference (RPD) as shown below:

$$RPD = \frac{|C_1 - C_2|}{(C_1 + C_2)/2} \times 100$$

Where:

C_1 = concentration of sample or matrix spike (MS)

C_2 = concentration of duplicate or matrix spike duplicate (MSD)

Accuracy – Accuracy is defined as the nearness of a result or the mean of set of results to the true, known, or reference value. The assessment of accuracy is conducted through the analysis of MS, laboratory control samples (LCS), and surrogate spike data. For the assessment of accuracy associated with MS, LCS, and surrogate spike data, the following equation for percent recovery (%R) is used:

$$\textit{Percent Recovery} = \frac{\textit{measured concentration}}{\textit{actual concentration}} \; x\,100\%$$

For the assessment of analytical accuracy using MS, the following equation is used:

$$\text{Percent Recovery} = \frac{S - U}{C_{sa}} \; x\,100\%$$

Where:

S = measured concentration of spiked aliquot

U = measured concentration of unspiked aliquot
C_{sa} = concentration of spike added

Representativeness – Representativeness expresses the degree to which the data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental condition that they are intended to represent. Representativeness of data will be ensured through the consistent application of established field and laboratory procedures.

Representativeness of field sampling will be controlled by use of properly trained sampling crew and use of field blank samples. Field blank samples will be evaluated to assess the potential for cross contamination in the field. Blank contamination indicates the potential for false positive results at low concentrations and the potential for a high bias in detected results. Potential for false-negative results will be reduced through proper sample preservation, use of proper sample containers, and analyses within prescribed holding times. Field blank samples for this investigation are listed in Table 1, and are discussed in Section 10.0.

Laboratory procedures will be examined, including anomalies reported by the laboratory, either on receipt of the samples at the laboratory or during analytical processes; adherence to recommended holding times of samples before analysis; calibration of laboratory instruments; adherence to analytical methods; quantitation limits used for samples; and completeness of data package documentation. Method blanks or preparation blanks will be prepared with each parameter analyzed. The method blank is used to evaluate whether or not contaminants are present in the laboratory that could have an impact on the samples associated with the method blank. The presence of laboratory contaminants in the method blank results demonstrates the possibility of false-positive results.

Completeness – Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected under correct normal conditions. In order for the data set to be considered complete, it must contain all analytical results and data specified for the project. In addition, to determine whether specifications were met, the data are compared to project requirements outlined in this SAP.

Due to a variety of circumstances, the complete set of samples scheduled for collection may not be collected, or the data from the samples cannot be used (for example, samples lost, bottles broken, instrument failures, laboratory mistakes, etc.). Completeness is evaluated by comparing the project objectives to the quality and quantity of the data collected. The acceptable minimum percentage of completed analyses depends on how much information is needed for decision-making. Percent completeness is defined as:

$$Percent\ Complete = \frac{V}{T} \times 100$$

Where:
V = number of valid (not rejected) measurements over a given time
T = total number of measurements over a given time

Generally, completeness goals in the 75-95 percent range are typical. Completeness goals increase when a lesser number of samples per event are taken, or when the data are critical for decision-making. A completeness goal of 90 percent has been set for this project. This goal will be achieved through adherence to the sampling and documentation requirements described in this SAP.

<u>Comparability</u> – Comparability is a qualitative parameter expressing the confidence in which one data set can be compared with another. Comparability will be achieved through the use of USEPA procedures and methods for collecting and analyzing representative samples, and reporting analytical results in similar units as in the guidelines or reference documents.

Sensitivity – Detection limits are usually expressed as the method's detection limits (MDLs) or Practical Quantitation Limits (PQLs) for a given analysis. Because the need for additional site assessment or remediation will be based on comparing analytical results to screening levels, the detection limits of the analysis performed for this investigation will be below currently published screening levels for the compounds analyzed.

Appendix A of this SAP presents the individual chemicals of concern for this investigation, their associated PRQLs, and corresponding screening criteria. The analytical laboratories will attempt to achieve the PRQLs for the samples collected. If problems occur in achieving the PRQLs, the laboratory will contact the Project Chemist immediately, and other alternatives will be pursued to achieve project goals.

3.4 DATA REVIEW, VERIFICATION, AND VALIDATION

Field and laboratory data will be reviewed, verified, and validated to ensure the acquisition of defensible data of acceptable quality. The field personnel will be responsible for following the sampling and documentation procedures described in this SAP such that defensible and justifiable data are obtained for this project. Field data will be reviewed and verified by the project team. Any issues will be resolved in a timely manner by seeking clarification from the field staff responsible for data collection.

Field staff will identify any outliers before reporting the data. Outliers are extreme observations that have a low probability of belonging to a specified data population, and can result from improper sampling or measurement methodology, data transcription errors, calculation errors, or natural causes. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in sampling, measurement, transcription, or calculation will be clearly identified in project reports.

Laboratory personnel will follow procedures outlined in standard analytical methods used for this project. Analytical data will be verified at the time of analysis and reporting and through subsequent reviews of the raw data for any non-conformances to the requirements of the analytical method. Laboratory personnel will identify any outliers before reporting the data. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in analysis, transcription, or calculation will be clearly identified in the case narrative section of the analytical data report.

Laboratory data validation will be performed to ensure that the quality of the data set is adequate for the intended use. An independent third-party chemist will perform data validation for this project. The chemist assigned to this task will be a Kleinfelder employee that is not associated with the collection and analysis of samples, interpretation of sample data, or with any decision-making process within the scope of the investigation. According to USEPA guidelines, this is acceptable for projects similar to this one.

For this project, 100 percent of the data will undergo cursory data validation. The data validation will be performed using an "Internal Data Review" checklist, and in accordance with current USEPA National Functional Guidelines for Organic and Inorganic Data Review

(USEPA 1999, 2004b) and the project specific DQIs (Appendix B). PARCCS parameters will be assessed by completing the following tasks:

(1) Reviewing the precision and accuracy of field and laboratory QC data.
(2) Reviewing the overall analytical process, including holding times, equipment calibration, analytical or matrix performance, and analyte identification and quantitation.
(3) Assigning qualifiers to affected data when QA/QC criteria were not achieved.
(4) Reviewing and summarizing implications of the frequency and severity of qualifiers in the validated data.

At each stage of the validation, qualifiers will be assigned to the data in accordance with the USEPA guidelines (USEPA 1999, 2004b) and the associated analytical methods. Data qualified as estimated (J) or non-detected estimated (UJ) will be considered valid and usable. Data qualified as rejected (R) will be considered unusable.

3.5 DATA MANAGEMENT

Efficient data management processes ensure efficient data access and evaluation. Data generated during field activities include field notes and chain-of-custody protocols. The field notes and chain-of-custody protocols are discussed in details in Section 9.0. The field staff reviews the field notes and chain-of-custody protocols for completeness and accuracy before sample shipping.

Records of data generated during laboratory analysis will be kept in hard copy and in electronic format files. The laboratory will send hard copy and electronic data records to the project chemist, who will review the data for completeness, accuracy, and format. The project chemist will also crosscheck the field notes and chain-of-custody forms to each other and to laboratory results to assure conformity of sample identification numbers. This information will be compared to results of duplicate and blank samples, and to information on field conditions at the time of sample collection in order to qualify the sample analytical results.

After the validation process (Section 3.4) is completed, the Project Chemist will review the data for accuracy. Field and laboratory data will be stored electronically and in hard copies as part of the project file.

3.6 ASSESSMENT OVERSIGHT

The following sections discuss Kleinfelder's QA program and responsible personnel, the assessments, and corrective actions that may be implemented in response to assessment results.

3.6.1 QA PROGRAM AND RESPONSIBILITY

Kleinfelder's QA program is designed to provide reliable data that meet with our clients' objectives and expectations, and which are usable for the intended purposes. The QA Manager will be responsible for implementing a three-phase quality control system consisting of the following:

- Preparatory phase, performed prior to beginning work on each task or assignment;
- Initial phase, performed at the beginning of each task or assignment;
- Follow-up phase, performed to check continuing compliance with contract requirements until completion of the task or assignment.

This process will be completed for each definable feature of work. Additional preparatory and initial phases may be conducted on the same definable feature of work if the quality of ongoing work is unacceptable, if there are changes in staff, if work is resumed after a substantial period of inactivity, or if other problems develop. Any significant deviations from the QA program and the SAP and the explanations for the deviations will be approved by the USEPA Project Manager prior to implementation.

3.6.2 FIELD AND LABORATORY ASSESSMENTS

Kleinfelder will oversee data generation for this project by using the assessment and audit activities. During the field assessments the assessor will conduct personnel interviews, direct observations, and reviews of project-specific documentation to evaluate and document whether procedures specified in the approved SAP are being implemented. Kleinfelder's appropriate personnel independent of the activity evaluated will be assigned by Kleinfelder's QA Manager to conduct assessments activities. Any significant deficiencies will be verbally communicated to the field staff and require immediate corrective action to ensure that the problems are eliminated. These and other observations and comments will be documented in an audit report and submitted to the Project Manager and Kleinfelder's QA Manger. Laboratory assessment may include reviews of laboratory certifications, use of performance evaluation samples, and laboratory audits.

3.6.3 CORRECTIVE ACTION PROCEDURES

Deficiencies found during the assessment will be identified in an audit report and will require corrective action. The project team will respond to an audit report by proposing corrective action, identifying the individuals responsible for its implementation, and the completion dates for each corrective action. Kleinfelder's QA Manager is responsible for reviewing proposed corrective actions and verifying that they have been effectively implemented.

Laboratory procedures for corrective action and descriptions of out-of-control situations that require corrective action are contained in the laboratory QA plans. At a minimum, corrective action will be implemented if control limits are exceeded, method QC requirements are not met, or holding times are exceeded. The laboratory will report out-of-control situations to Kleinfelder's Project Chemist within 2 working days after they are identified, submit a corrective action report containing a description of the out-of-control situation and the steps that the laboratory has taken to rectify it.

4.0 SAMPLING RATIONALE

To assess the presence of adverse environmental conditions at the Site, representative samples, including groundwater, soil or soil vapor samples, will be collected from potentially impacted areas. Sections 4.1 through 4.4 discuss the sampling rationale for each area that will be investigated. Soil vapor, soil, and groundwater sampling design is presented in Table 2. Plate 4 presents the approximate location of the proposed soil vapor and soil boring sampling points, as well as the approximate locations of the EUST and Sump-1 proposed for removal, and the locations of the FET, FHFE, FUST-GO, and FUST-HO.

4.1 SOIL SAMPLING

The following sections discuss the soil confirmation samples that will be collected during this investigation. Sample collection methods and sample handling protocols are presented in Sections 6.0 and 7.0, respectively.

4.1.1 Existing UST Excavation Confirmation Samples

Soil samples from the EUST excavation will be collected to evaluate the subsurface conditions associated with the removed UST. Kleinfelder estimates that the EUST proposed for removal has an approximate capacity of 1,000-gallons, and thus the final length of the excavation is not expected to exceed 10 feet. The EUST excavation pit is expected to have final dimensions of approximately 8 feet by 10 feet, and a depth of 12 feet bgs.

Because the extent of the excavation is expected to be relatively small, only one sample from each sidewall and two from the bottom of the excavation will be collected. Excavation sidewall samples will be collected from approximately the center of each wall, at approximately 1 to 2 feet above the excavation bottom. Bottom excavation samples will be collected from each end of the excavation. To minimize the potential loss of volatiles through aeration from the soil samples, the samples will be collected using EnCore® sampling devices.

The laboratory will be requested to perform the analyses within a 24-hour turn-around-time. If any of the analytes of concern are found above the action levels listed in Appendix

A, the City of Emeryville and the ACEHA will be contacted, and the analytical data used to agree on the required steps to follow.

If the geophysical survey indicates the presence of pipes associated with the EUST, the piping will be removed. The potential impact to soil along the location of the piping will be assessed by collecting and analyzing soil samples from the bottom of the piping excavation trench. Samples will be collected from underneath the pipe's joining points. Additional samples may be collected from areas where field observations, such as petroleum odor, soil discoloration, or PID readings (greater than 50 ppm) are noted.

If additional impacted soil is excavated after the EUST is removed, confirmation samples from the further excavated area will also be collected and sent for analyses. If groundwater is encountered in the bottom of the excavation, confirmation soil samples from the excavation bottom will not be collected and a grab groundwater sample will be collected instead.

Excavated soil will be stockpiled onsite. At a minimum, the stockpiles will be covered at the end of each workday with plastic sheeting. The stockpiles will be covered immediately in the event of rain, nuisance odors, or if visible dust is being generated from the stockpiles. Plastic sheeting used to cover the stockpiled materials will be secured in place through the use of weighted objects (e.g. sand bags) and, if necessary, ropes.

4.1.2 Sump-1 Excavation Confirmation Samples

Soil samples from the Sump-1 excavation will be collected to evaluate the subsurface conditions associated with its removal. The exact dimensions of Sump-1 are unknown, but the excavation is not expected to exceed dimensions greater than 8 feet by 10 feet, and a depth of 12 feet bgs.

Because the extent of the excavation is expected to be relatively small, only one sample from each sidewall and two from the bottom of the excavation will be collected. Excavation sidewall samples will be collected from approximately the center of each wall, at approximately 1 to 2 feet above the excavation bottom. Bottom excavation samples will be collected from each end of the excavation. To minimize the potential loss of volatiles through aeration from the soil samples, the samples will be collected using EnCore® sampling devices.

If the geophysical survey indicates the presence of pipes associated with Sump-1, the piping will be removed. The potential impact to soil along the location of the piping will be assessed by collecting and analyzing soil samples from the bottom of the piping excavation trench. Samples will be collected from underneath the pipe's joining points. Additional samples may be collected from areas where field observations, such as petroleum odor, soil discoloration, or elevated PID readings (greater than 50 ppm) are noted.

If additional impacted soil is excavated after the Sump-1 removal, confirmation samples from the further excavated area will also be collected and sent for analyses. Confirmation samples will be collected from the backhoe bucket. If groundwater is encountered in the bottom of the excavation, confirmation soil samples from the excavation bottom will not be collected and a grab groundwater sample will be collected instead.

Excavated soil will be stockpiled onsite. At a minimum, the stockpiles will be covered at the end of each workday with plastic sheeting. The stockpiles will be covered immediately in the event of rain, nuisance odors, or if visible dust is being generated from the stockpiles. Plastic sheeting used to cover the stockpiled materials will be secured in place through the use of weighted objects (e.g. sand bags) and, if necessary, ropes.

4.1.3 Existing Electric Transformer Verification Sampling

Clayton's Phase I ESA (Clayton 2003a) for the Site documented the presence of three EETs on the northwest corner of the Site. To check whether PCBs may have been released from these EETs, one surface soil sample will be collected at the EET location.

4.1.4 Former Hydraulic Freight Elevator Verification Sampling

Clayton's Phase I ESA (Clayton 2003a) for the Site documented the presence of the FHFE to the west of center of the Site. To confirm that neither PCBs nor TEPH were released to the subsurface, one subsurface soil sample (approximately 4 feet bgs) will be collected from the general vicinity of the FHFE. In addition, one surface soil sample will be collected at the FHFE area for PCBs and TEPH analyses.

4.1.5 Former UST for Gasoline Verification Sampling

A soil boring at the FUST-G location will be advanced to a depth of 15 feet bgs or until groundwater is encountered. A total of three soil samples will be collected at 5, 10 and 15 feet bgs, or just above the capillary fringe, whichever is shallower. If groundwater is encountered, a grab groundwater sample will be collected.

4.1.6 Former UST for Heating Oil Verification Sampling

A soil boring at the FUST-HO location will be advanced to a depth of 15 feet bgs or until groundwater is encountered. A total of three soil samples will be collected at 5, 10 and 15 feet bgs, or just above the capillary fringe, whichever is shallower. If groundwater is encountered, a grab groundwater sample will be collected.

4.2 SEDIMENT SAMPLING

Not Applicable

4.3 WATER SAMPLING

If groundwater is encountered during the EUST or Sump-1 removal, a single grab groundwater sample will be collected with a disposable bailer and stored in laboratory-supplied containers. If groundwater floods the excavation bottom, the groundwater in the pit will be vacuumed by a vacuum excavation subcontractor, allowed to recharge, and two groundwater samples, one from each end of the excavation, will be collected with a disposable bailer. Similarly, if groundwater is encountered in the borings advanced at the FUST-G and FUST-HO locations, grab groundwater samples will be collected with a disposable bailer and placed in appropriate laboratory-supplied containers.

4.4 OTHER SAMPLING

Other sampling includes soil vapor samples and the samples from the stockpiled soil and groundwater that may be vacuumed from the excavations. These samples are discussed in the following sections.

4.4.1 Soil Vapor Samples

To check for the presence of VOCs in the vadose zone, soil vapor samples will be collected from five onsite locations. The proposed sampling locations were selected based on groundwater contamination data obtained during previous investigations. Soil vapor samples will be collected from approximately five feet bgs. Kleinfelder will retain Trans-global Environmental Geochemistry (TEG) of northern California to perform the collection and analysis of the soil vapor samples.

4.4.2 Samples for Disposal Characterization

Soil removed from the excavation pits associated with the EUST and Sump-1 will be stockpiled separately onto Visqueen tarps onsite. If field observations such as soil staining, petroleum odors, and/or elevated PID readings indicate, soils will be again separated into potentially impacted and clearly impacted piles (i.e., two stockpiles may be associated with soil from the EUST excavation and two stockpiles may be associated with the Sump-1 excavation). To characterize the stockpiled soil for disposal, one four-point composite sample will be collected from each stockpile (maximum of 4 samples). For each four-point composite sample, four sample containers will be filled, one each from four separate areas of the stockpile. These four sample containers will be submitted to the laboratory under one sample ID and the laboratory will be instructed to composite these four containers for analysis. Analytical parameters for the stockpile samples are presented on Table 2.

The laboratory will analyze the stockpile samples for VOCs using USEPA Method 8260, TPHs using USEPA Method 8015M, SVOCs using USEPA Method 8270, and for Title 22 metals using USEPA Method 6010/7000 series (USEPA 1996). Analytical results for metals will be compared to their total threshold limit concentration (TTLC) for hazardousness characterization. If any metal concentration exceeds its respective TTLC value, the concentration will be compared to 10 times the metal's soluble threshold limit concentration (STLC). If the metal concentration exceeds 10 times the metal's STLC, the laboratory will be requested to perform the waste extraction test (WET) for the metals exceeding 10 times their STLC to determine the type of waste management facility the soil needs to be disposed at. WET will be performed as prescribed in the California Code of Regulations, Title 22, Division 4, Environmental Health, 66261.126, dated July 1991. Glass or Teflon tumblers will be used for the extraction of inorganic analytes.

5.0 CHEMICAL TESTING PROGRAM

The following sections discuss the proposed chemical testing program and the analytical laboratories that will be used for this investigation.

5.1 ANALYSES NARRATIVE

Sample analytical protocols are presented in Section 3.2. Sample volume, type of sample container, preservation, and holding time requirements for each analytical method are specified in the Request for Analysis (RFA) Tables 3, 4, and 5 for the soil vapor, soil, and groundwater samples, respectively.

5.2 ANALYTICAL LABORATORY

Soil vapor sampling and analysis will be performed by TEG of Rancho Cordova, California. The soil vapor survey will be conducted in accordance with the LARWQCB and DTSC Advisory – Active Soil Gas Investigations (LARWQCB and DTSC 2003). Soil vapor sampling and analysis protocols are presented as Appendix C.

Analyses for soil and groundwater samples collected during this investigation will be performed by Curtis and Tompkins (C&T) laboratory located in Berkeley, California. Both TEG and C&T are certified in the State of California for the requested analyses. Unless otherwise requested by the client and/or the regulatory agency overseeing this project, the samples will be analyzed under a standard turn around time (STAT) of seven (7) days. TEG and C&T are capable of meeting the project specific requirements presented in Appendix A.

The Project Chemist will contact the laboratories prior the project start date to discuss the analytical and QA/QC requirements and project schedule as well as to assess the laboratories ability to meet the requirements outlined in this SAP. The laboratory will follow all requirements of the analytical methods for this project, including QC samples and associated control limits, calibration requirements; and miscellaneous method performance requirements outlined in Appendix B, unless noted otherwise in this SAP.

6.0 FIELD METHODS AND PROCEDURES

Field sampling methods and procedures are described in Sections 6.1 through 6.6.

6.1 FIELD EQUIPMENT

This section describes the required equipment to perform soil and groundwater sampling. Proposed methods and protocols for soil vapor sample collection are presented in Appendix C.

6.1.1 List of Equipment Needed

Soil sampling:

- Custody seals
- Disposable Nitrile gloves
- EnCore® or Soil Core Samplers
- Labels
- PID
- Stainless Steel Liners and plastic caps
- Teflon tape
- Zip-lock bags

Groundwater sampling:

- 1-L Amber bottle
- 40-ml VOA vessels
- Bubble wrap
- Custody Seals
- Disposable Bailer
- Disposable Nitrile gloves
- Labels
- Zip-Lock bags

Sample Field Storage

- Chains of Custody
- Cooler
- Custody Seals
- Ice

6.1.2 Calibration of Field Equipment

Field equipment will be field calibrated at the beginning of each sampling day. Instrument calibration logs will be filled out by the field personnel and will be submitted with the field notes for Kleinfelder Field Team Leader's review.

6.2 FIELD SCREENING

Screening of subsurface soil samples to check for indications of volatile chemicals will be performed during site sampling work. Screening data will be obtained in the field with a PID, and will be performed on grab soil samples taken during collection of samples in each of the subsurface areas being investigated. If the instrument indicates the possible presence of volatile chemicals at levels greater than 25 ppm on the PID instrument, a soil sample may be collected, following protocols described in Section 4.0. Field records will include depth and location of the soil where contamination signs are observed, as well as the PID readings.

6.3 SAMPLING

The proposed investigation consists of collecting and analyzing soil, soil-vapor, and groundwater, if encountered, at the Site. Plate 4 presents the approximate location of the proposed soil vapor and soil boring sampling points, as well as the approximate locations of the EUST and Sump-1 proposed for removal, and the locations of the EET, FHFE, FUST-GO, and FUST-HO. Sections 6.3.1 through 6.3.4 describe the proposed sampling procedures. Sample container, preservation, and storage protocols are presented in Section 7.0.

6.3.1 Existing UST Removal Confirmation Samples

To reduce the potential loss of volatiles to the atmosphere, samples to be analyzed for VOCs and TPH-g will be collected in triplicate, using 5-gram EnCore® sampling devices, as independent discrete samples. The samples will be collected from the backhoe bucket, pushing by hand the EnCore® sampling devices into the soil in the bucket. Once the samples are collected and a self adhesive custody seal placed over each cap, the EnCore® sampling devices will be placed in a plastic zip-lock bag, labeled and stored in a cooler with ice, pending delivery to the analytical laboratory under chain of custody protocols.

Soil samples for TEPH, SVOCs, and metals will be collected in clean 2-inch by 6-inch stainless steel liners (SS-liners). The samples will be collected by hand-pushing the device into soil contained in either the backhoe bucket or directly from the direct-push polyethylene liner. The soil packed liners will be covered with Teflon tape and their corresponding plastic caps. To assure the integrity of the samples, a custody seal will be placed at each end of the liner, covering portions of both, the cap and the liner. The samples will be labeled, placed in a plastic zip-lock bag, and stored in a cooler with ice, pending delivery to the analytical laboratory under chain of custody protocols.

6.3.2 Sump-1 Removal Confirmation Samples

To reduce the potential loss of volatiles to the atmosphere, samples to be analyzed for VOCs and TPH-g will be collected in triplicate, using 5-gram EnCore® sampling devices, as independent discrete samples. The samples will be collected from the backhoe bucket, pushing by hand the EnCore® sampling devices into the soil in the bucket. Once the samples are collected and a self adhesive custody seal placed over each cap, the EnCore® sampling devices will be placed in a plastic zip-lock bag, labeled and stored in a cooler with ice, pending delivery to the analytical laboratory under chain of custody protocols.

Soil samples for TEPH, SVOCs, and metals will be collected in clean 2-inch by 6-inch SS-liners. The samples will be collected by hand-pushing the device into soil contained in either the backhoe bucket or directly from the direct-push polyethylene liner. The soil packed liners will be covered with Teflon tape and their corresponding plastic caps. To assure the integrity of the samples, a custody seal will be placed at each end of the liner, covering portions of both, the cap and the liner. The samples will be labeled, placed in a plastic zip-lock bag, and stored in a cooler with ice, pending delivery to the analytical laboratory under chain of custody protocols.

6.3.3 Soil Boring Sampling

Soil borings will be advanced to approximately 15 feet bgs, or until groundwater is encountered, in the FUST-G and FUST-HO locations. Soil samples from these locations will be collected at approximately 5, 10, and 15 feet bgs. If field observations, such as stained soil, strong hydrocarbon odors, and/or elevated (< 50 ppm) PID readings, suggest the presence of impacted soil, additional samples will be collected and submitted for analyses. An additional soil boring will be advanced to a depth of approximately 4 feet bgs in the FHFE area. A sample from this soil boring will be collected at approximately 3.5 to 4.0 feet bgs.

Once the sample is collected, the ends of the liner will be covered with Teflon tape and subsequently capped with their corresponding plastic caps. The sample will be labeled and a self-adhesive custody seal will be placed over the plastic caps and liner. Subsequently, the sample will be placed in a plastic zip-lock bag and inside a cooler with ice, pending delivery to the laboratory for analysis.

6.3.4 Soil Vapor Sampling

Five soil vapor samples will be collected from directly above the vadose zone, at approximately 5 feet bgs (Plate 4). Kleinfelder will contract with a subcontractor to perform the soil-vapor sampling and analysis with direct-push sampling equipment and a mobile laboratory. Soil vapor samples will be collected in accordance with the LARWQCB and DTSC Advisory – Active Soil Gas Investigations (LARWQCB and DTSC 2003). The proposed soil vapor survey methodology, including sampling and analytical methodologies, collection and analysis of blanks and duplicates is presented in Appendix C.

6.3.5 Surface Soil Sampling

A surface soil sample will be collected from the northwestern corner of the property, within the location of the three EETs (Plate 4). A surface soil sample will also be collected at the FHFE area (Plate 4). The samples will be collected from the top six inches of soil in a SS-liner with the aid of a sampling hammer. Once the samples are collected, the ends of the liner will be covered with Teflon tape and subsequently capped with their corresponding plastic caps. The samples will be labeled and a self-adhesive custody seal will be placed over the plastic caps and liner. Subsequently, the samples will be placed in a plastic zip-lock bag and inside a cooler with ice, pending delivery to the laboratory for analysis.

6.4 WATER SAMPLING

This section describes the collection of groundwater samples that will be obtained if groundwater is encountered in (1) the excavation during the EUST or Sump-1 removal; and (2) in the borings advanced at the FUST-G and FUST-HO locations.

6.4.1 Surface Water Sampling

Not Applicable

6.4.2 Groundwater Sampling

If groundwater is encountered during the removal of the EUST or the removal of the Sump-1, a grab sample will be collected with disposable bailers. If groundwater enters the excavation, and groundwater depth reaches 2 inches or more, a grab groundwater sample will be collected. Similarly, if groundwater is encountered in the borings advanced at the FUST-G and FUST-HO locations, grab groundwater samples will be collected with a disposable bailer and placed in appropriate laboratory-supplied containers.

Groundwater containers will be filled completely, ensuring that no air space is left between the water meniscus and the vials' cap. Volatile organic analysis (VOA) vials will be filled first to minimize the potential loss of volatiles to the atmosphere. A self-adhesive custody seal will be placed over the caps of the vials containing the groundwater samples. The vials will be labeled, wrapped in bubble paper or other protective material, placed in a zip-lock bag, and subsequently in a pre-chilled cooler with ice, pending delivery to the laboratory for analysis.

6.4.2.1 Water-Level Measurements

Not Applicable

6.4.2.2 Purging

Not Applicable

6.4.2.3 Well Sampling

Not Applicable

6.5 OTHER

Not Applicable

6.6 DECONTAMINATION PROCEDURES

The driller will steam clean the probes for advancing the soil borings before each use. At the end of the work day, the waste water generated during decontamination procedures will be contained in 50-gallon drums.

Because samples from the EUST excavation and Sump-1 removal will be collected directly with the sample container or with the aid of disposable equipment, only minimal equipment decontamination will be required. Soil samples from the EUST excavation will be collected directly from the backhoe bucket with clean sampling devices, either 5-gram EnCore® samplers or SS-liners. Samples will be collected by pushing the sampling device into the soil contained in the backhoe, eliminating the use of supplemental sampling equipment, and thus, the need for decontamination. Similarly, groundwater samples will be collected with disposable bailer(s) and decanted directly into the laboratory-supplied vials. For direct-push sampling operations or use of other hand-sampling tools to aid sample collection, down hole sampling equipment will be decontaminated by steam-cleaning or washing the equipment with non-phosphate detergent solutions, followed by deionized water rinses.

To minimize the potential for cross contamination, safety gloves will be discarded after each soil or groundwater sample is collected. Disposable equipment intended for one-time use will be packaged for appropriate disposal.

7.0 SAMPLE CONTAINERS, PRESERVATION AND STORAGE

Sections 7.1 through 7.4 describe the type of soil and groundwater-sampling containers proposed for use in this investigation; the use of chemicals, if any, to preserve the integrity of the compounds to be analyzed in the sample; and the proposed sample storage procedures. The RFAs for soil vapor, soil, and groundwater samples are presented in Tables 3, 4, and 5, respectively.

7.1 SOIL SAMPLES

The following sections describe the type of soil sample containers and the preservation and storage protocols for these samples.

7.1.1 Existing UST and Sump-1 Excavation Confirmation Samples

Soil confirmation samples for VOCs and TPH-g analyses will be sampled and stored in sealed EnCore® samplers. Samples for TEPH, SVOCs, and metals analyses will be collected in SS-liners. The samples will be preserved in a chilled, approximately 4°C, cooler upon collection.

Samples will be delivered to the analyzing laboratory at the end of the workday. If circumstances preclude sample delivery to the laboratory at the end of the workday, samples will be kept at 4°C for no more than two days prior to analysis. If EnCore® sampler samples are frozen, they will be stored for no more than 4 days prior to analysis. If samples are preserved by injecting methanol or sodium bisulfate solution, the holding time is not longer than two weeks. The holding time for petroleum hydrocarbons analyses is seven days. Soil samples collected for metals analysis will be retained in their original stainless steel sleeves. Samples will not be frozen. The holding time for metals analyses is six months, except for mercury analysis, which has a holding time of 28 days.

7.1.2 Samples from Soil Borings

Samples from soil borings will be collected from both, the FUST-G and FUST-HO locations; as well as from the FHFE area (Plate 4). Samples will be collected in polyethylene liners advanced with a probe. The samples will be preserved in a chilled, approximately 4°C, cooler upon collection. Samples will be delivered to the analyzing laboratory at the end of the workday. If circumstances preclude sample delivery to the laboratory at the end of the workday, samples will be kept at 4°C for no more than two days prior to analysis. If EnCore® sampling device samples are frozen, they will be stored for no more than 4 days prior to analysis. If samples are preserved by injecting methanol or sodium bisulfate solution, the holding time is not longer than two weeks. The holding time for petroleum hydrocarbons analyses is seven days. Soil samples collected for metals analysis will be retained in their original stainless steel sleeves. Samples will not be frozen. The holding time for metals analyses is six months, except for mercury analysis, which has a holding time of 28 days.

7.1.3 Surface Soil Samples

Surface soil sample from the EET location and the FHFE location will be collected in SS-liners. The sample will be preserved in a chilled, approximately 4°C, cooler upon collection. The holding time for PCBs and TEPH analyses is fourteen days from sample collection to extraction and 40 days from sample extraction to analysis.

7.2 SEDIMENT SAMPLES

Not Applicable

7.3 WATER SAMPLES

If groundwater is encountered in the EUST excavation, groundwater samples will be collected and stored in laboratory-supplied containers, including 40-ml VOA vials and 1-L Amber bottles. The samples for VOC and TPH-g analyses will be preserved with hydrochloric acid to maintain pH less than 2. The holding time for VOCs and TPH-g analyses is 7 days. The samples for metals analysis will be preserved with nitric acid to maintain pH less than 2. The holding time for metals analyses is six months, except for mercury analysis, which has holding time of 28 days. The holding time for SVOC and TEPH analyses is seven days from sample collection to extraction and 40 days from sample extraction to analysis. The samples will be chilled to 4°C immediately upon collection. If enough groundwater is encountered, a duplicate groundwater sample will be collected for delivery to the laboratory.

7.4 OTHER SAMPLES

Soil vapor samples will be collected and analyzed by a subcontractor. The proposed soil vapor survey methodology, which includes sampling and analytical methodologies, collection and analysis of blanks and duplicates, is presented in Appendix C. Disposal characterization samples will be stored and preserved in accordance to the procedures presented in Sections 7.1 and 7.3 above.

8.0 DISPOSAL OF RESIDUAL MATERIALS

In the process of collecting environmental samples during the site investigation (SI) at the Ambassador Laundry Site, the following potentially contaminated investigation-derived wastes (IDW) will be generated:

- Used personal protective equipment (PPE);
- Disposable sampling equipment (e.g., bailer(s))
- Decontamination fluids.
- Waste water generated from steam cleaning the soil boring probes

The USEPA's National Contingency Plan (NCP) requires that, to a practicable extent, management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs). The sampling plan will follow the *Office of Emergency and Remedial Response (OERR) Directive 9345.3-02* (May 1991), which provides guidance for management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered, such as:

- Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. PPE and disposable equipment that is to be disposed of and can still be reused will be rendered inoperable before disposal in the refuse dumpster.
- Soil removed during the EUST removal will be stockpiled on Site, characterized for disposal and disposed in an appropriate landfill (Section 4.4.2).
- Waste water generated from steam cleaning the soil boring probes will be contained in Department of Transportation (DOT) approved 55-gallon drums, and stored on Site until characterized for disposal and disposed of.

IDW generated during investigation activities will be disposed properly at offsite-licensed facilities, in accordance with the City of Emeryville's directives.

9.0 SAMPLE DOCUMENTATION AND SHIPMENT

This section describes the documentation of field activities and sample shipment protocols.

9.1 FIELD NOTES

Field notes documenting where, when, how, and from whom any vital project information was obtained, will be recorded with indelible ink on a pre-designated field notebook. Field notes will be written in consecutively numbered pages, and will include the current date, the names of personnel at the Site, and the times when relevant activities occur. Field notes will be complete and accurate enough to permit reconstruction of field activities. If any change/edition is required, it will consist of a single line strike, and will be initialed and dated by the person making the change.

During each day the Site investigation is performed, the following information will be recorded in the field logbook:

- Kleinfelder team members name and responsibilities;
- Date and time of arrival/entry on Site and time of Site departure;
- Names of other personnel on Site;
- Summary of any meetings or discussions with contractor, client, or government agency personnel;
- Deviations from sampling plans, Site safety plans, or QA procedures;
- Any changes in personnel and/or responsibilities, including reasons for changes;
- Required levels of safety protection;
- Screening equipment model and serial number used in the field;
- Readings of field instruments.

During collection of each sample, the following information will be recorded:

- Sampler's name(s);
- Date and time of sample collection;
- Sample location;
- Sample matrix (soil or water);
- Sample identification;
- Sampling equipment used;
- Field instrument (PID) readings:
- Field observations and details related to analysis or integrity of samples (noticeable odors, colors, etc.).

9.2 PHOTOGRAPHS

Photographs documenting conditions at sampling locations and other areas of interest will be taken and will serve to verify information entered in the field logbook. The following information will be included in the logbook for each photograph taken:

- Name of person taking the photograph;
- Time and date;
- Description of the location of the area photographed;
- Description of the subject photographed;
- Weather conditions.

9.3 LABELING

All samples collected will be clearly labeled in the field for proper identification and for tracking in the laboratory. The field team will use pre-assigned and unique sample identifications (ID) included in Tables 3, 4, and 5. In addition to the sample ID, at a minimum, sample labels will contain the following information:

- Sample location;
- Date and time of collection;
- Parameter(s) to be analyzed.

9.4 SAMPLE CHAIN-OF-CUSTODY FORMS AND CUSTODY SEALS

Samples will be delivered to the analytical laboratories under chain-of-custody protocols and will serve to maintain the custodial integrity of the samples. The chain-of-custody form will include the date and time each sample was collected, identify the matrix of each sample, and indicate the type and method of analysis to be performed on each sample. The chain-of-custody will also include the name of the person collecting the samples. The sampling team leader, or designee, will sign the chain-of-custody form in the "relinquished by" box. The date and time of delivery will be noted in the chain-of-custody. The custody of the samples will be under Kleinfelder's responsibility until they are delivered to the laboratory. Kleinfelder will retain a copy of the chain-of-custody for the project's file.

The cooler where samples are stored will be under constant supervision of the Kleinfelder sampling team. In case the cooler containing the samples is to be unsupervised, the cooler will be sealed with signed and dated self-adhesive custody seals.

9.5 PACKAGING AND SHIPMENT

Sample containers will be placed in a sturdy plastic cooler with ice. The following outline(s) the packaging procedures that will be followed for soil and water samples:

- Labeled soil and groundwater samples will be placed in individual zip-lock bags and subsequently in a sturdy plastic cooler. The sample identification will be written with indelible ink on the outside of the bags;
- Vials containing groundwater samples will be checked to ensure tightness and absence of air bubbles. If air bubbles are observed, the volume level of the container will be marked with indelible ink;
- Glass sample containers will be wrapped in bubble-wrap or other protective material to prevent breakage during storage and transport;
- The cooler will contain sufficient ice to preserve the inside temperature at 4°C or less.

Kleinfelder's Project Chemist will maintain records of the following information:

- Kleinfelder project number, and name and location of the Site;
- The total number samples and matrix of samples shipped to the laboratory;

- A copy of the sample delivery protocol;
- Information on sample delivery date and date received by the laboratory;
- Irregularities or anticipated problems associated with the samples;
- Whether additional samples will be shipped.

10.0 QUALITY CONTROL

Kleinfelder will assess the quality of field data through regular collection and analysis of field QC samples. Laboratory QC samples will be analyzed in accordance with referenced analytical method protocols to verify that laboratory procedures are conducted properly and that the quality of the data is known. Project-specific method precision and accuracy goals are presented in Appendix B. Table 1 summarizes the types and frequency of collection of field and laboratory QC samples.

The following sections discuss the types and purposes of field and laboratory QC samples that will be collected for this investigation.

10.1 FIELD QUALITY CONTROL SAMPLES

The type and number of samples used for quality control during this investigation, including field duplicates, trip, and temperature blanks, are discussed below.

10.1.1 Field Duplicates

Field duplicates are additional samples of the same matrix, collected at the same location and time (to the extent possible), with an assumed level of overall homogeneity. Analysis of field duplicates provides a quantitative measure of the precision of the overall sampling and analysis process as the sum of contributions from sample heterogeneity, the precision of the sampling process, and the analytical method(s). The identity of these samples is held "blind" to all laboratory personnel.

USEPA generally requires that during a sampling event at least 10 percent of the samples collected be field duplicates. One field duplicate sample will be collected at one of the five soil vapor sampling locations shown on Plate 4 (Table 3). Field duplicates for groundwater samples, if present, will be collected at frequency 10 percent (Table 1). Due to the potentially large variability inherent in the soil matrix, no field duplicates will be collected for soil samples. Field duplicate samples will be identified with a unique numeric designation. The same sampling techniques and analytical methods are performed on both the primary and duplicate sample.

10.1.2 Trip Blanks

Contamination of samples introduced by sampling and shipping activities can be detected by means of analyzing a trip blank. Trip blanks are laboratory prepared samples, transported with all primary samples to be analyzed for volatile constituents. A sample container (40 ml VOA vial) of de-ionized water obtained from the analytical laboratory should be labeled as a trip blank and included in each applicable shipment and recorded on the chain-of-custody form. The trip blank should be handled in the same manner as other samples so that it is representative of the samples in that shipment. One trip blank sample will accompany each cooler containing groundwater samples for VOCs and TPH-g that is shipped to the laboratory.

10.1.3 Temperature Blanks

A temperature blank consists of a 40 ml VOA vial containing reagent grade water. The temperature blanks are prepared by the laboratory and are used to measure the soil and water sample temperature upon arrival at the laboratory. This temperature reading will be used to assess whether the samples were stored under the appropriate thermal conditions in accordance with the requested EPA methods. No additional analyses are performed on temperature blank.

10.2 BACKGROUND SAMPLES

Not Applicable

10.3 FIELD SCREENING AND CONFIRMATION SAMPLES

Discussion of field screening and collection of confirmation samples was presented in previous sections.

10.4 FIXED LABORATORY QUALITY CONTROL SAMPLES

The types of QC spike samples to be employed by the project laboratories include laboratory control samples (LCS), matrix spike/matrix spike duplicate (MS/MSD), and surrogates (Table 1). An LCS is a clean matrix (i.e., same used for a method blank) spiked with known concentration(s) of target analyte(s) that is carried through the entire analytical procedure to assess the overall accuracy of the method. An MS is an aliquot of a project sample spiked with target analyte(s) of known concentration(s) prior to sample preparation. The impact of sample matrix on target analyte recovery (i.e., accuracy) and precision is assessed by MS, MSD, and unspiked matrix duplicate (MD) QC samples.

A total of three MS/MSD samples will be collected during this investigation: (1) MS/MSD sample for soil will be collected at one of the locations at the existing UST excavation area (Table 4); (2) MS/MSD sample for groundwater, if present, will be collected at the existing UST excavation area (Table 5); and (3) MS/MSD soil sample will be collected in the FHFE area (Table 4). MS/MSD samples for water matrices require collection of an additional volume of material for laboratory spiking and analysis; for soil matrices, additional sample volume is generally not required.

A surrogate is a non-target analyte spiked at known concentration prior to sample preparation. Surrogate analyses are used to monitor method performance on a matrix-specific/sample-specific basis. Method blanks will be prepared at the frequency prescribed in the individual analytical method or at a rate of five percent of the total samples if a frequency is not prescribed in the method.

10.5 MOBILE LABORATORY QUALITY CONTROL SAMPLES

Blanks are analyzed at the start of each day and more often as appropriate depending upon the measured concentrations. Additional blanks are performed more often as appropriate depending upon the measured concentrations, at a minimum 1 every 20 samples (Table 1). If a blank shows a measurable amount of any target compound, the on-site chemist will investigate and determine the source, and resolve the contamination problem prior to analyzing any samples.

Laboratory duplicate analysis of a sample is performed when inconsistent data are observed, but at least one every 20 samples (Table 1). Daily continuing calibration is performed at the start of each day by injecting and analyzing a mid-range calibration standard. Dilution procedure duplicates are analyzed each day (at least one sample) when dilution with ambient air is required for samples with high concentrations of analytes (Table 1).

A MS detector is used for absolute compound identification for VOCs. Also, a surrogate compound is added to each sample during analysis to confirm that the chromatographic retention times have not shifted during the course of the day. LCSs are prepared at the midpoint concentration from a standard purchased from a source different than the calibration standards and are analyzed at the end of each day, but at least one every 20 samples (Table 1).

11.0 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to the sampling as presented in this plan. When appropriate, the QA Manager will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

12.0 FIELD HEALTH AND SAFETY PROCEDURES

The following sections describe the health and safety procedures that will be followed during work activities at the Site.

12.1 HEALTH AND SAFETY PLAN

Kleinfelder will prepare a health and safety plan for Site activities. The health and safety plan will indicate the potential risks associated with the work, what chemicals are potentially present at the Site and a brief description of the symptoms associated with exposure (dermal, ingestion, or inhalation), the level of PPE required for the job, instructions of what to do in case of an accident, and directions to the closest hospital. A health and safety meeting will be held in the morning prior to starting each day of work activities, and if new staff enter the Site during ongoing Site work.

12.2 PERSONAL PROTECTION EQUIPMENT

Personnel on site will be required to wear steel-toed footwear, hard-hat and safety glasses. Personnel performing sampling activities are required to use disposable nitrile gloves when sampling. Personnel performing the sampling will be required to change nitrile gloves between sample collections. Site conditions will be monitored using the PID and by field observations to check whether upgrading or addition of other PPE may be necessary during Site activities.

13.0 REFERENCES

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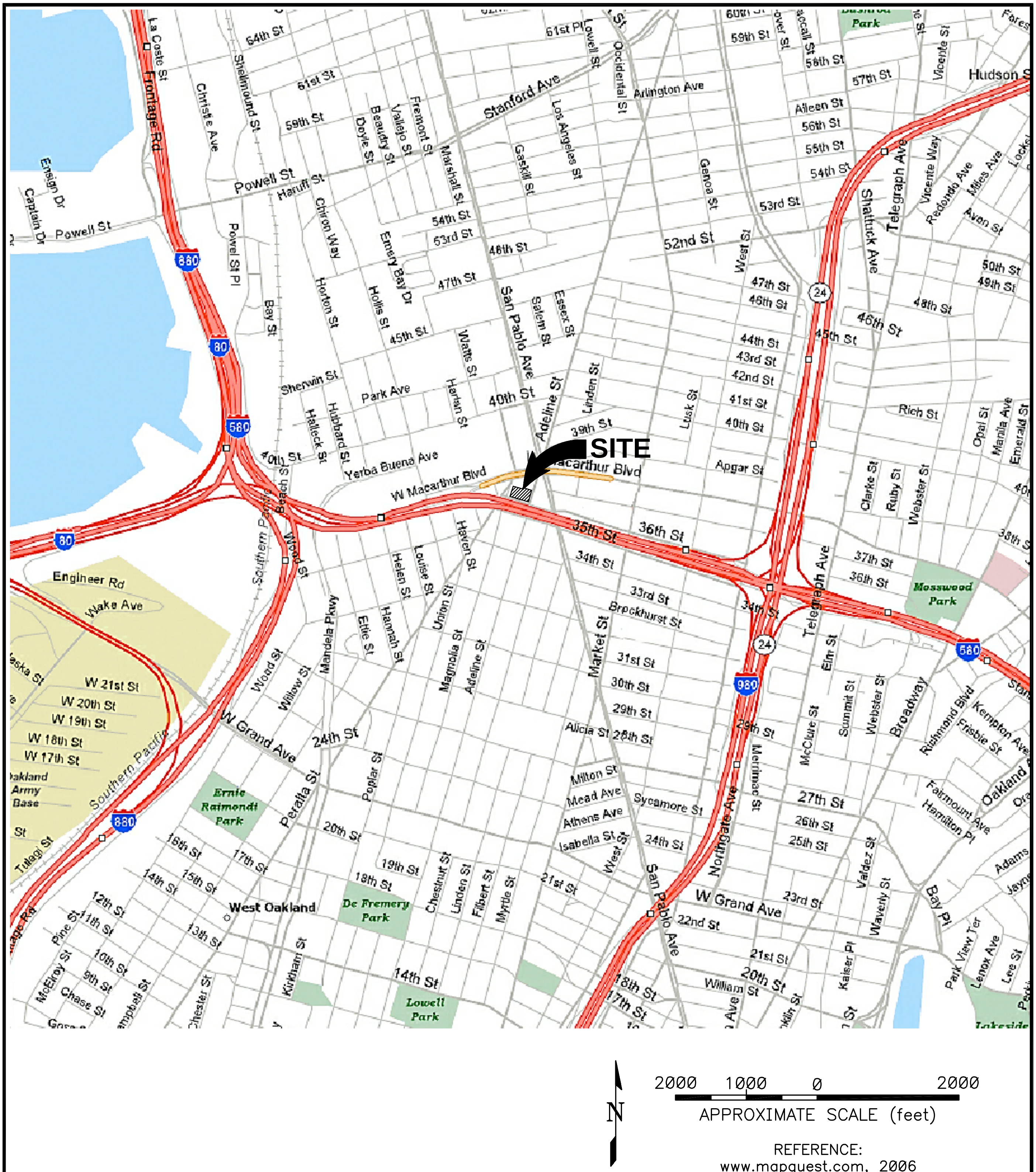
PLATES



REFERENCE:
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DRAWN: NOV 2006
APPROVED BY:

SITE VICINITY MAP

AMBASSADOR LAUNDRY
1160-1168 36TH STREET AND
3601/3623 ADELINE STREET
EMERYVILLE, CALIFORNIA

PROJECT NO. 73943
FILE NAME: VIC-PLAN.dwg

DRAWN BY: L. Sue
REVISED BY:
CHECKED BY: A. Dominguez
PLATE
1

ATTACHED IMAGES: Images: SITE-VIC.jpg Images: siteplan.jpg
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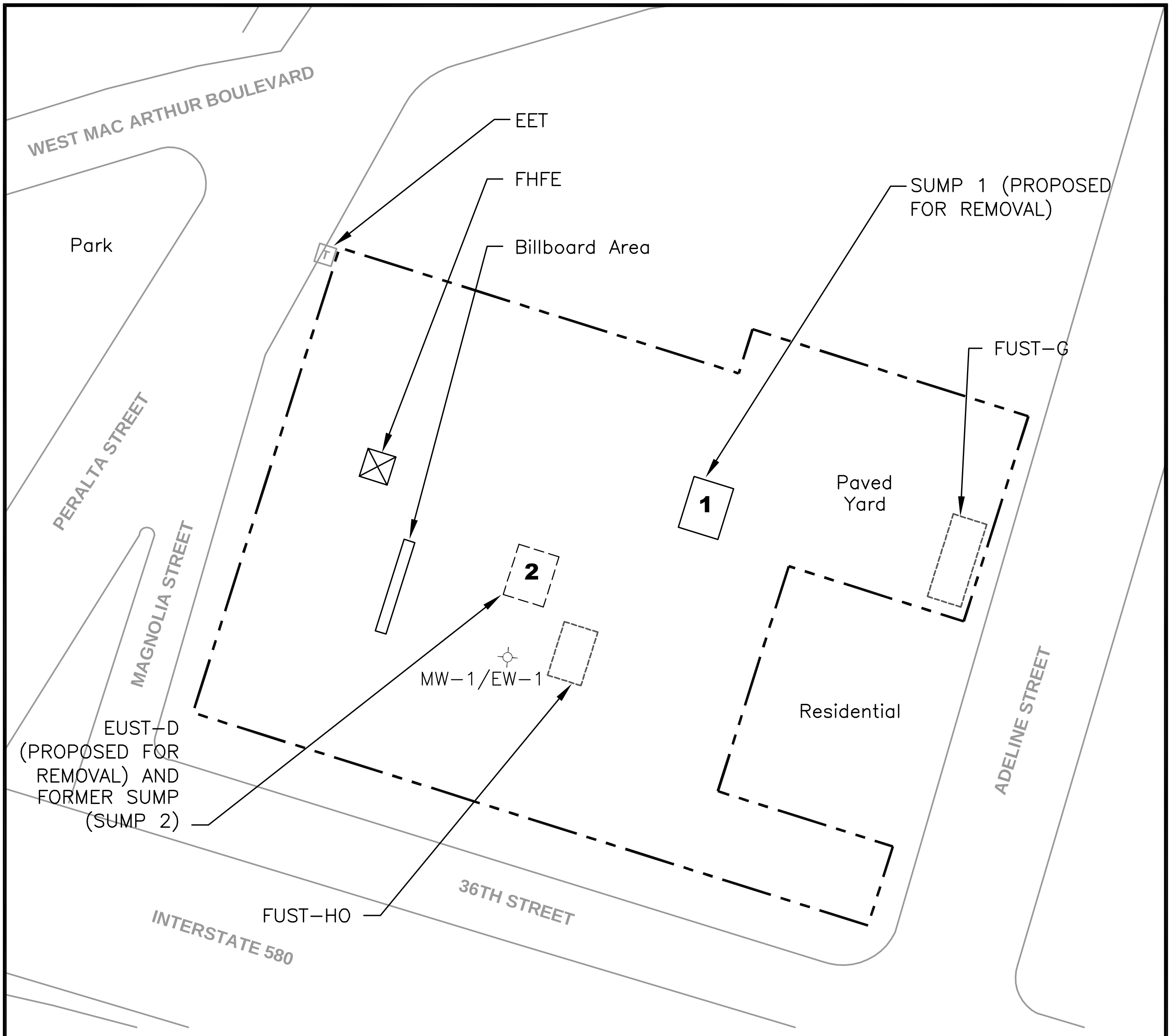
Ple-L:\2006\06PROJ CAD FILE: D:_PROJECTS\73943 LAYOUT: SITE-VIC



LEGEND

— - - —	APPROXIMATE PROPERTY LINE
⌖	MONITORING WELL (Kleinfelder, 1996)
EET	EXISTING ELECTRICAL TRANSFORMER
EUST–D	EXISTING UST DIESEL
FHFE	FORMER HYDRAULIC FREIGHT ELEVATOR AREA
FUST–G	FORMER UST GASOLINE
FUST–HO	FORMER UST HEATING OIL
UST	UNDERGROUND STORAGE TANK

NOTE: Locations are approximate.

N

60 30 0 60
APPROXIMATE SCALE (feet)

REFERENCE:
PES Environmental 1999 /
Clayton 2003a

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SITE PLAN

AMBASSADOR LAUNDRY
1160-1168 36TH STREET AND
3601/3623 ADELINE STREET
EMERYVILLE, CALIFORNIA

DRAWN BY: L. Sue
REVISED BY:
CHECKED BY: A. Dominguez
PLATE 2

DRAWN: APRIL 2007
APPROVED BY:
PROJECT NO. 73943
FILE NAME: VIC-PLAN.dwg

ATTACHED IMAGES: Images: SITE-VIC.jpg Images: siteplan.jpg
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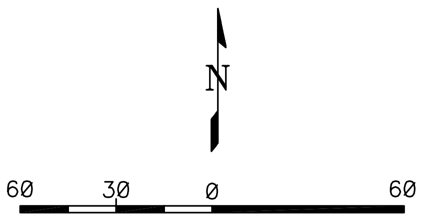
LEGEND

— - - —	APPROXIMATE PROPERTY LINE
⌖	MONTORING WELL (Kleinfelder, 1996)
⊙	SOIL BORING (Kleinfelder, 1996)
◈	SOIL BORING (Clayton, 2003b)
▲	SOIL BORING (PES Environmental, 1999)
1	ASSUMED LOCATION OF SUMP CLEANED (PES Environmental, 1999)
2	LOCATION OF SUMP REMOVED BY CLAYTON 2005 & LOCATION OF UNIDENTIFIED UST
EET	EXISTING ELECTRICAL TRANSFORMER
EUST–D	EXISTING UST DIESEL
FHFE	FORMER HYDRAULIC FREIGHT ELEVATOR AREA
FUST–G	FORMER UST GASOLINE
FUST–HO	FORMER UST HEATING OIL
UST	UNDERGROUND STORAGE TANK

NOTE: Locations are approximate.



APPROXIMATE SCALE (feet)

REFERENCE:
PES Environmental 1999 / Clayton 2003a
/ Kleinfelder 1996

DRAWN BY: J. Sala	**PREVIOUS SAMPLING LOCATIONS**	**KLEINFELDER**	**PLATE**
REVISED BY:		**1970 Broadway, Suite 710** **Oakland, CA 94612-2212** **PH: (510) 628-9000 FAX: (510) 628-9009** **www.kleinfelder.com**	**3**
CHECKED BY: A. Dominguez	**AMBASSADOR LAUNDRY** **1160-1168 36TH STREET AND** **3601/3623 ADELINE STREET** **EMERYVILLE, CALIFORNIA**		
DATE: APRIL 2007 / **APPROVED BY:**	**PROJECT NO. 73943** / **FILE NAME: VIC-PLAN.dwg**		

PLOTTED: 24 Apr 2007, 6:21pm, jsala

Ⓒ by Kleinfelder Inc., 2007

ATTACHED IMAGES: Images: SITE-VIC.jpg Images: siteplan.jpg
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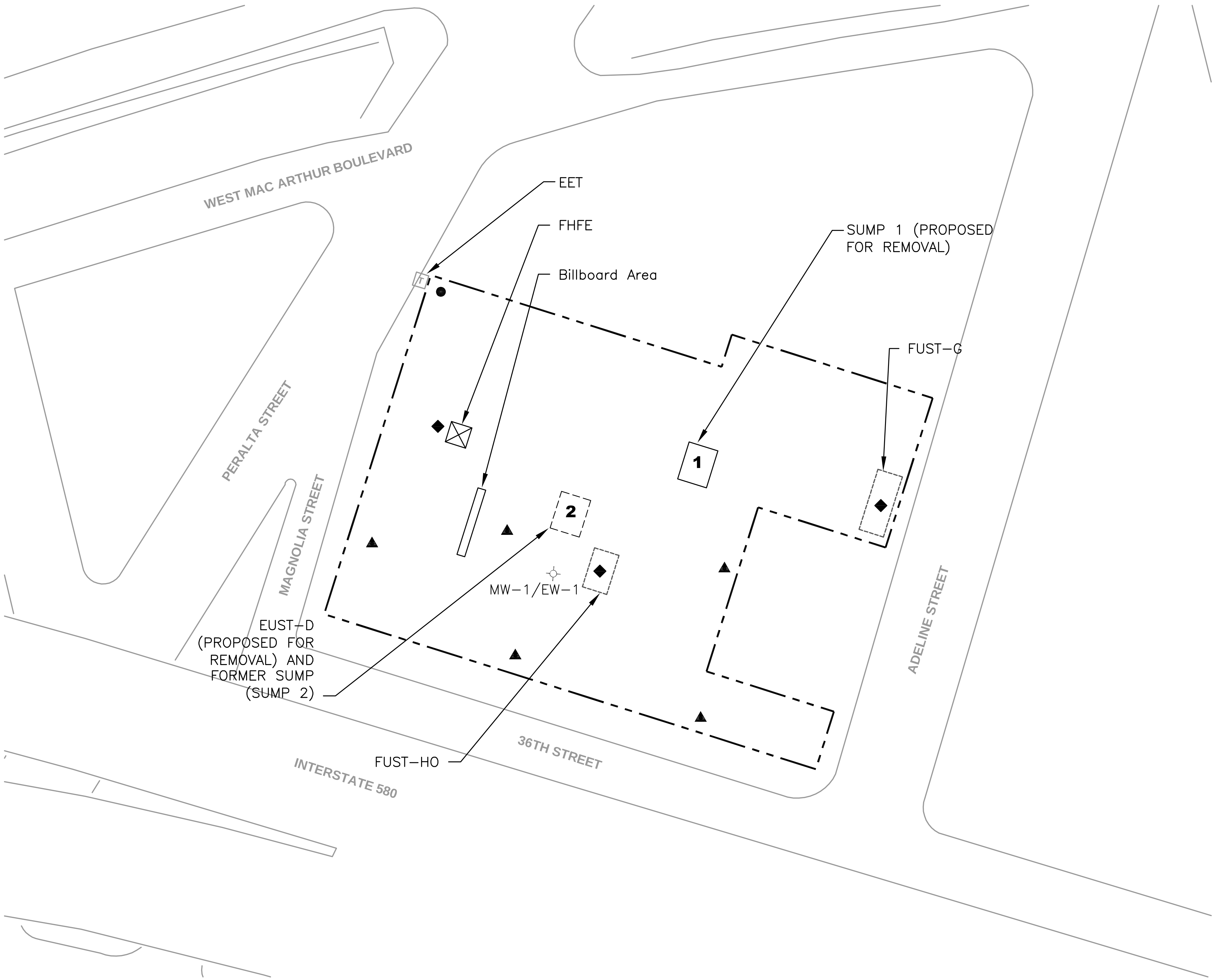

LEGEND

— - - —	APPROXIMATE PROPERTY LINE
⌖	MONITORING WELL (Kleinfelder, 1996)
●	PROPOSED SOIL SAMPLE LOCATION FOR PCB ANALYSIS
▲	PROPOSED SOIL VAPOR SAMPLE LOCATION FOR VOC ANALYSIS
◆	PROPOSED SOIL BORING
1	ASSUMED LOCATION OF SUMP CLEANED (PES Environmental, 1999)
2	LOCATION OF SUMP REMOVED BY CLAYTON 2005 & LOCATION OF UNIDENTIFIED UST
EET	EXISTING ELECTRICAL TRANSFORMER
EUST–D	EXISTING UST DIESEL
FHFE	FORMER HYDRAULIC FREIGHT ELEVATOR AREA
FUST–G	FORMER UST GASOLINE
FUST–HO	FORMER UST HEATING OIL
UST	UNDERGROUND STORAGE TANK

NOTE: Locations are approximate.

N

60 30 0 60

APPROXIMATE SCALE (feet)

REFERENCE:
PES Environmental 1999 /
Clayton 2003a

PROPOSED SAMPLING LOCATIONS

DRAWN BY: J. Sala
REVISED BY:
CHECKED BY: A. Dominguez
DATE: APRIL 2007
APPROVED BY:

AMBASSADOR LAUNDRY
1160-1168 36TH STREET AND
3601/3623 ADELINE STREET
EMERYVILLE, CALIFORNIA

PROJECT NO. 73943
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PLATE
4

PLOTTED: 24 Apr 2007, 6:21pm, jsala

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TABLES

TABLE 1

FIELD AND LABORATORY QC SAMPLES
MATRIX = SOIL VAPOR, SOIL, AND GROUNDWATER

QC Type	Frequency
Field QC	
Field Duplicates[a]	1/10 samples
Trip Blanks[b]	1/ transport container containing samples for VOCs and TPH-g
Temperature Blanks	1/ transport container
Laboratory QC	
Method blanks	1/20 samples
Laboratory Duplicates	1/20 samples
MS/MSD [c]	3 samples [c]
LCS or blank spikes	1/20 samples
Dilution procedure duplicates	1 sample/day when dilution with ambient air is used for soil vapor samples with high results
Surrogate standards	Every sample for organic analysis by GC
Internal standards	Every sample for organic analysis by GC

Notes:

[a] One field duplicate will be collected for soil vapor samples (Table 3). One field duplicate will be collected for groundwater samples, if applicable (Table 5). Due to the potentially large variability inherent in the soil matrix, no field duplicates will be collected for soil samples.

[b] Trip blanks will be obtained from the laboratory.

[c] A total of three MS/MSD samples will be collected during this investigation: (1) MS/MSD sample for soil will be collected at one of the locations at the existing UST excavation area; (2) MS/MSD sample for groundwater, if present, will be collected at the existing UST excavation area; and (3) MS/MSD sample for soil will be collected in the former hydraulic freight elevator area. Specific sample locations are indicated in Table 4.

GC: Gas chromatography

LCS: Laboratory control sample

MS/MSD: Matrix Spike/Matrix Spike Duplicate

TPH-g: Total Petroleum Hydrocarbons as gasoline

QC: Quality control

Sources:

EPA. 1996 “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Update III.” OSWER. Washington, DC. December.

EPA. 1999 “National Functional Guidelines for Organic Data Review.” EPA-540/R-99-008. Office of Emergency and Remedial Response, Washington, DC. October.

California Regional Water Quality Control Board – Los Angeles Regions (LARQWCB) and Department of Toxic Substances Control (DTSC), 2003. Advisory – Active Soil Gas Investigations. January 28.

TABLE 2

SOIL VAPOR, SOIL, AND GROUNDWATER SAMPLING DESIGN

Area of Concern	Matrix	Analytes	Number of Proposed Samples	Proposed Sample Depth
Selected locations (Plate 4)	Soil Vapor	VOCs	5	Approximately 5 feet bgs
EUST excavation (Plate 4)	Soil	TPH-g, TEPH, VOCs, SVOCs, Metals	4 sidewall samples and 2 bottom samples	Sidewall samples approximately 1 to 2 feet above the excavation bottom. Bottom samples at approximately 10 to 12 feet bgs (unless groundwater is encountered).
Existing UST excavation (Plate 4)	Groundwater (if present)	TPH-g, TEPH, VOCs, SVOCs, Metals	1 or 2 depending on groundwater availability	Standing water in excavation bottom
Sump 1 (Plate 4)	Soil	TPH-g, TEPH, VOCs, SVOCs, Metals	4 sidewall samples and 2 bottom samples	Sidewall samples approximately 1 to 2 feet above the excavation bottom Bottom samples at approximately 10 to 12 feet bgs (unless groundwater is encountered)
Sump 1 (Plate 4)	Groundwater (if present)	TPH-g, TEPH, VOCs, SVOCs, Metals	1 or 2 depending on groundwater availability	Standing water in excavation bottom
Former Electric Transformers Area (Plate 4)	Soil	PCBs	1	0 to 6 inches bgs

Area of Concern	Matrix	Analytes	Number of Proposed Samples	Proposed Sample Depth
Former Hydraulic Freight Elevator Area (Plate 4)	Soil	TEPH, PCBs	2	0 to 6 inches bgs and 3.5 feet to 4 feet bgs
Former UST for gasoline (Plate 4)	Soil	TPH-g, VOCs, Metals	3	Approximately at 5, 10 and 15 feet bgs (or above water table)
Former UST for gasoline (Plate 4)	Groundwater (if present)	TPH-g, VOCs, Metals	1	If encountered at a maximum depth of 15 feet bgs
Former UST for heating oil (Plate 4)	Soil	TEPH, VOCs, Metals	3	Approximately at 5, 10 and 15 feet and 15 feet bgs (or above water table)
Former UST for heating oil (Plate 4)	Groundwater (if present)	TEPH, VOCs, Metals	1	If encountered at a maximum depth of 15 feet bgs
Stockpile Samples	Soil	TPH-g, TEPH, VOCs, SVOCs, Metals	Maximum four samples for 4:1 composite	NA

Notes:

EUST: Existing Underground Storage Tank
NA: Not available
PCB: Polychlorinated Biphenyls
TEPH: Total Extractable Petroleum Hydrocarbons
TPH-g: Total Petroleum Hydrocarbons as gasoline
SVOC: Semivolatile Organic Compounds
UST: Underground Storage Tank
VOC: Volatile Organic Compounds

TABLE 3

REQUEST FOR ANALYTICAL SERVICES
MATRIX - SOIL VAPOR

ANALYSES REQUESTED					Organic
SPECIFIC ANALYSES REQUESTED					VOCs by USEPA Method 8260
PRESERVATIVE					None
ANALYTICAL HOLDING TIME(S)					30 minutes
CONTRACT HOLDING TIME(S)					30 minutes
TYPE OF CONTAINER					100-ml gas-tight Syringes
Sample Number	Sample Location	Sample Depth	Sampling Date	Special Designation	No. of Containers per sample
SV-1	SV-1	5 feet bgs			1
SV-2	SV-2	5 feet bgs			1
SV-3	SV-3	5 feet bgs			1
SV-4	SV-4	5 feet bgs			1
SV-5	SV-5	5 feet bgs			1
SV-5A	SV-5	5 feet bgs		Field duplicate	1

Notes:

bgs: below ground surface
ml: milliliter
SV: Soil vapor
USEPA: United States Environmental Protection Agency
VOC: Volatile organic compounds

Sources:

EPA. 1996 “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Update III.” OSWER. Washington, DC. December.

California Regional Water Quality Control Board – Los Angeles Regions (LARQWCB) and Department of Toxic Substances Control (DTSC), 2003. Advisory – Active Soil Gas Investigations. January 28.” and “State of California, California Regional Water Quality Control Board Los Angeles Region, Interim Guidance for Active Soil Gas Investigation” February 27, 2003

TABLE 4

REQUEST FOR ANALYTICAL SERVICES
MATRIX - SOIL

ANALYSES REQUESTED					ORGANIC				INORGANIC	
SPECIFIC ANALYSES REQUESTED					VOCs (USEPA 5035/8260) and TPH-g (USEPA 5035/8015)	TEPH (USEPA 8015)	SVOCs (USEPA 8270)	PCBs (USEPA 8082)	Metals (USEPA 6010/7000 series)	WET[b]
PRESERVATIVES					Chill to 4 ^{o}C ± 2ºC	Chill to 4 ^{o}C± 2ºC	Chill to 4 ^{o}C± 2ºC	Chill to 4 ^{o}C± 2ºC	Chill to 4^{o}C ± 2ºC	Chill to 4^{o}C ± 2ºC
ANALYTICAL HOLDING TIME(S)					Hold for less than 2 days or if frozen for less than1 4 days	Up to 14 days prior to extraction, 40 days after extraction	Up to 14 days prior to extraction, 40 days after extraction	Up to14 days prior to extraction, 40 days after extraction	Up to 180 days (28 days for Hg)	Up to 180 days (28 days for Hg)
CONTRACT HOLDING TIMES(S)					Hold <2 days <14 days frozen	Hold <10 days prior to extraction, 40 days after extraction	Hold <10 days prior to extraction, 40 days after extraction	Hold <10 days prior to extraction, 40 days after extraction	Hold to 35 days (26 days for Hg)	Hold to 35 days (26 days for Hg)
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS					No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	
Sample Number	Sample Location	Sample Depth	Sampling Date	Special Design-ation	3 x EnCore® Samplers	Stainless Steel liners	Stainless Steel liners	Stainless Steel liners	Stainless Steel liners	
EUST-N [a]	EUST-N	1 to 2 feet bgs			6	1	1	---	1	
EUST-E	EUST-E	1 to 2 feet bgs			6	1	1	---	1	
EUST-S	EUST-S	1 to 2 feet bgs			6	1	1	---	1	
EUST-W	EUST-W	1 to 2 feet bgs			6	1	1	---	1	
EUST-B1	EUST-B1	10 to 12 feet bgs			6	1	1	---	1	

EUST-B2	EUST-B2	10 to 12 feet bgs			6	1	1	---	1
FET-1	FET	0 to 6 inches			---	---	---	1	---
FHFE-1 [a]	FHFE	3.5 to 4 feet bgs			---	1	---	1	---
FUST-G-1-5	FUST-G-1	5 feet bgs			6	---	---	---	1
FUST-G-1-10	FUST-G-1	10 feet bgs			6	---	---	---	1
FUST-G-1-15	FUST-G-1	15 feet bgs			6	---	---	---	1
FUST-HO-1-5	FUST-HO-1	5 feet bgs			6	---	---	---	1
FUST-HO-1-10	FUST-HO-1	10 feet bgs			6	---	---	---	1
FUST-HO-1-15	FUST-HO-1	15 feet bgs			6	---	---	---	1
Sump1-N	Sump1-N	1 to 2 feet bgs			6	1	1	1	1
Sump1-E	Sump1-E	1 to 2 feet bgs			6	1	1	1	1
Sump1-S	Sump1-S	1 to 2 feet bgs			6	1	1	1	1
Sump1-W	Sump1-W	1 to 2 feet bgs			6	1	1	1	1
Sump1-B1	Sump1-B1	10 to 12 feet bgs			6	1	1	1	1
Sump1-B2	Sump1-B2	10 to 12 feet bgs			6	1	1	1	1
TOTAL					108	13	12	8	18

Notes:

[a] MS/MSD sample location

[b] Samples for disposal characterization

bgs: below ground surface
EPA: United States Environmental Protection Agency
EUST: Existing underground storage tank
FET: Former electric transformers
FHFE: Former hydraulic freight elevator
FUST-G: Former underground storage tank for gasoline
FUST-HO: Former underground storage tank for heating oil
Hg: Mercury
PCB: Polychlorinated Biphenyls
SVOC: Semi-volatile Organic Compounds
TEPH: Total extractable petroleum hydrocarbons
TPH-g: Total petroleum hydrocarbons as gasoline

TABLE 5

REQUEST FOR ANALYTICAL SERVICES
MATRIX - GROUNDWATER

ANALYSES REQUESTED				CONTRACT LABORATORY PROGRAM ANALYTICAL SERVICES (CLPAS)			REGIONAL ANALYTICAL PROGRAM (RAP)
CHEMISTRY TYPE				ORGANICS			INORGANICS
SPECIFIC ANALYSES REQUESTED				VOCs (USEPA 8260) and TPH-g (USEPA 8015)	TEPH (USEPA 8015)	SVOCs (USEPA 8270)	Metals (USEPA 6010/7000 series)
PRESERVATIVES				HCl to pH <2 Chill 4 °C± 2ºC	Chill to 4 °C ± 2ºC	Chill to 4 °C ± 2ºC	HNO_3; pH l<2; and cool 4 ± 2ºC
ANALYTICAL HOLDING TIME(S)				Up to 7 days	Less than 7 days before extraction, and up to 40 days between extraction and analysis	Less than 7 days before extraction, and up to 40 days between extraction and analysis	Up to 180 days (28 days for Hg)
CONTRACT HOLDING TIMES(S) 2 x 1 liter amber glass jar				Up to 5 days	Less than 5 days before extraction, and up to 40 days between extraction and analysis	Less than 5 days before extraction, and up to 40 days between extraction and analysis	Hold to 35 days (26 days for Hg)
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS				No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis	No. of Containers per Analysis
Sample Number	Sample Location	Special Design-ation	Sampling Date	3 x VOA vials	2 x 1 liter amber glass jar	2 x 1 liter amber glass jar	One 1-L polyethylene container
EUST-1[a]	EUST-1						
EUST-2	EUST-2						
FUST-G-1	FUST-G-1						
FUST-HO-1	FUST-HO-1						
Sump1-1	Sump1-1						
Sump1-2	Sump1-2						

Notes:
[a] MS/MSD sample location
Field duplicates for groundwater samples, if applicable, will be collected at frequency of 10 percent
EPA: United States Environmental Protection Agency
EUST: Existing underground storage tank
FUST-G: Former underground storage tank for gasoline
FUST-HO: Former underground storage tank for heating oil
HCl: Hydrochloric acid
Hg: Mercury
HNO3: Nitric acid
L: Liter
ml: milliliter
MS/MSD: Matrix spike/matrix spike duplicate
SVOC: Semi-volatile Organic Compounds
TEPH: Total extractable petroleum hydrocarbons
TPH-g: Total petroleum hydrocarbons as gasoline
VOA: Volatile organic analysis

APPENDIX A

COMPARISON OF THE PROJECT REQUIRED QUANTITATION LIMITS AND SCREENING CRITERIA

TABLE - A1
Comparison of Project-Required Quantitation Limits and Screening Criteria for Groundwater

				SFBRWQCB ESL Groundwater Criteria		
Analyte	**PRQLs[a] (ug/L)**	**PRGs Tap Water (ug/L)**	**MCLs (ug/L)**	**NON drinking water <3m (ug/L)**	**NON drinking water >3m (ug/L)**	**PRQL Below Screening Criteria[b]**
Volatile Organic Compounds (USEPA Method 8260B)						
Acetone	10	5,500	NE	1,500	1,500	Yes
Benzene	0.5	0.35	1.0	46	46	**No**
Bromobenzene	0.5	20	NE	NE	NE	Yes
Bromochloromethane	0.5	NE	NE	NE	NE	NA
Bromodichloromethane	0.5	0.18	NE	166	166	**No**
Bromoform	1.0	8.5	NE	3,200	3,200	Yes
Bromomethane	1.0	8.7	NE	160	160	Yes
2-Butanone	10	NE	NE	NE	NE	NA
n-Butylbenzene	0.5	240	NE	NE	NE	Yes
sec-Butylbenzene	0.5	240	NE	NE	NE	Yes
tert-Butylbenzene	0.5	240	NE	NE	NE	Yes
Carbon disulfide	0.5	1,000	NE	NE	NE	Yes
Carbon tetrachloride	0.5	0.17	0.5	9.3	9.3	**No**
Chlorobenzene	0.5	110	70	25	25	Yes
Chloroethane	1.0	4.64	NE	12	12	Yes
Chloroform	0.5	0.17	100	332	332	**No**
Chloromethane	1.0	160	NE	41	41	Yes
2-Chlorotoluene	0.5	120	NE	NE	NE	Yes
4-Chlorotoluene	0.5	NE	NE	NE	NE	NA
Dibromochloromethane	0.5	0.13	NE	169	169	**No**
1,2-Dibromo-3-chloropropane	2.0	0.0016*	0.2	0.20	0.20	**No**
1,2-Dibromoethane (EDB)	0.5	0.0056	NE	152	152	**No**
Dibromomethane	0.5	NE	NE	NE	NE	NA
1,2-Dichlorobenzene	0.5	370	600	14	14	Yes
1,3-Dichlorobenzene	0.5	180	NE	65	65	Yes
1,4-Dichlorobenzene	0.5	0.50	5.0	15	15	Yes
1,1-Dichloroethane	0.5	1.97*	5.0	47	47	Yes
1,2-Dichloroethane	0.5	0.12	0.50	204	204	**No**
1,1-Dichloroethene	0.5	340	6.0	25	25	Yes
cis-1,2-Dichloroethene	0.5	61	6.0	590	590	Yes
trans-1,2-Dichloroethene	0.5	120	10	590	590	Yes
1,2-Dichloropropane	0.5	0.16	5.0	100	100	**No**
1,3-Dichloropropane	0.5	120*	NE	NE	NE	Yes
2,2-Dichloropropane	0.5	NE	NE	NE	NE	NA
1,1-Dichloropropene	0.5	NE	NE	NE	NE	NA
cis-1,3-Dichloropropene	0.5	0.40	0.5	NE	NE	**No**
trans-1,3-Dichloropropene	0.5	0.40	NE	NE	NE	**No**
Ethylbenzene	0.5	1,300	700	290	290	Yes
Dichlorodifluoromethane (Freon 12)	1.0	390	NE	NE	NE	Yes
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	0.5	59,000	NE	NE	NE	Yes
Hexachlorobutadiene	0.5	0.86	NE	4.7	4.7	Yes
2-Hexanone	10	NE	NE	NE	NE	NA
Isopropylbenzene	0.5	NE	NE	NE	NE	NA
p-Isopropyl toluene	0.5	NE	NE	NE	NE	NA
Methylene chloride	10	4.3	5.0	2,200	2,200	**No**
4-Methyl-2-pentanone	10	NE	NE	NE	NE	NA
Methyl tert butyl ether (MTBE)	0.5	11	NE	1,800	1,800	Yes
Naphthalene	2.0	0.093*	NE	24	24	**No**
Propylbenzene	0.5	NE	NE	NE	NE	NA
Styrene	0.5	1,600	NE	100	100	Yes
1,1,1,2-Tetrachloroethane	0.5	0.43	NE	932	932	**No**
1,1,2,2-Tetrachloroethane	0.5	0.055	1.0	190	190	**No**
Tetrachloroethene	0.5	0.10	5.0	120	120	**No**
Toluene	0.5	720	0.005	130	130	**No**
1,2,3-Trichlorobenzene	0.5	NE	1.0	NE	NE	Yes
1,2,4-Trichlorobenzene	0.5	7.2	70	25	25	Yes
1,1,1-Trichloroethane	0.5	3,200	200	62	62	Yes
1,1,2-Trichloroethane	0.5	0.2	5.0	346	346	**No**
Trichloroethene	0.5	1.4*	5.0	360	360	Yes
Trichlorofluoromethane	1.0	1,300	NE	NE	NE	Yes
1,2,3-Trichloropropane	0.5	0.0056	0.005	NE	NE	**No**
1,2,4-Trimethylbenzene	0.5	12	NE	NE	NE	Yes
1,3,5-Trimethylbenzene	0.5	12	NE	NE	NE	Yes
Vinyl acetate	10	410	NE	NE	NE	Yes
Vinyl chloride	0.5	0.02[c]	0.5	3.8	3.8	**No**
Xylenes (total)	0.5	210	NE	100	100	Yes
Semi-Volatile Organic Compounds (USEPA Method 8270C)						
Acenaphthene	10	370	NE	23	23	Yes
Acenaphthylene	10	NE	NE	30	30	Yes
Anthracene	10	1,800	NE	0.73	0.73	**No**
Azobenzene	10	0.61	NE	NE	NE	**No**
Benzo(a)anthracene	10	0.092	NE	0.03	0.03	**No**
Benzo(a)pyrene	10	0.009	0.2	NE	NE	**No**
Benzo(b)fluoranthene	10	0.092	NE	0.03	0.03	**No**
Benzo(k)fluoranthene	10	0.056*	NE	0.40	0.40	**No**
Benzo(g,h,i)perylene	10	NE	NE	0.10	0.10	**No**
Benzoic acid	50	150,000	NE	NE	NE	Yes

TABLE - A1
Comparison of Project-Required Quantitation Limits and Screening Criteria for Groundwater

Analyte	PRQLs[a] (ug/L)	PRGs Tap Water (ug/L)	MCLs (ug/L)	SFBRWQCB ESL Groundwater Criteria		PRQL Below Screening Criteria[b]
				NON drinking water <3m (ug/L)	NON drinking water >3m (ug/L)	
Benzyl alcohol	10	11,000	NE	NE	NE	Yes
Bis(2-chloroethoxy)methane	10	NE	NE	NE	NE	NA
Bis(2-chloroethyl)ether	10	0.010	NE	61	61	**No**
Bis(2-chloroisopropyl)ether	10	0.27	NE	61	61	**No**
Bis(2-ethylhexyl)phthalate	10	4.8	4.0	32	32	**No**
4-Bromophenyl-phenylether	10	NE	NE	NE	NE	NA
Butyl benzyl phthalate	10	7,300	NE	NE	NE	Yes
4-Chloroaniline	10	150	NE	NE	NE	Yes
4-Chloro-3-methylpheno	10	NE	NE	NE	NE	Yes
2-Chloronaphthalene	10	490	NE	NE	NE	Yes
2-Chlorophenol	10	30	NE	1.8	1.8	**No**
4-Chlorophenyl-phenylether	10	NE	NE	NE	NE	NA
Chrysene	10	0.56*	NE	0.35	0.35	**No**
Dibenz(a,h)anthracene	10	0.0092	NE	0.25	0.25	**No**
Dibenzofuran	10	12	NE	NE	NE	**No**
3,3'-Dichlorobenzidine	20	0.15	NE	250	250	**No**
2,4-Dichlorophenol	10	110	NE	3.0	3.0	**No**
Diethyl phthalate	10	29,000	NE	1.5	1.5	**No**
2,4-Dimethylphenol	10	730	NE	110	110	Yes
Dimethyl phthalate	10	360,000	NE	1.5	1.5	**No**
Di-n-butyl phthalate	10	NE	NE	NE	NE	NA
4,6-Dinitro-2-methylpheno	20	NE	NE	NE	NE	NA
2,4-Dinitrophenol	20	73	NE	75	75	Yes
2,4-Dinitrotoluene	10	73	NE	115	115	Yes
2,6-Dinitrotoluene	10	36	NE	NE	NE	Yes
Di-n-Octyl phthalate	10	1,500	NE	NE	NE	Yes
Fluoranthene	10	1,500	NE	8.0	8.0	**No**
Fluorene	10	240	NE	3.9	3.9	**No**
Hexachlorobenzene	10	0.042	NE	3.7	3.7	**No**
Hexachlorobutadiene	10	0.86	NE	4.7	4.7	**No**
Hexachlorocyclopentadiene	20	220	NE	NE	NE	Yes
Hexachloroethane	10	4.8	NE	12	12	**No**
Indeno(1,2,3-cd)pyrene	10	0.092	NE	0.029	0.029	**No**
Isophorone	10	71	NE	NE	NE	Yes
2-Methylnaphthalene	10	NE	NE	2,100	2.1	Yes
2-Methylphenol	10	1,800	NE	NE	NE	Yes
4-Methylphenol	10	180	NE	NE	NE	Yes
2-Nitroaniline	20	110	NE	NE	NE	Yes
3-Nitroaniline	20	3.2	NE	NE	NE	**No**
4-Nitroaniline	20	3.2	NE	NE	NE	**No**
2-Nitrophenol	20	NE	NE	NE	NE	Yes
4-Nitrophenol	20	NE	NE	NE	NE	Yes
N-Nitroso-di-n-propylamine	10	0.0096	NE	NE	NE	**No**
N-Nitrosodimethylamine	10	0.0013	NE	NE	NE	**No**
N-Nitrosodiphenylamine	10	14	NE	NE	NE	Yes
Naphthalene	10	0.093*	NE	24	24	**No**
Nitrobenzene	10	3.4	NE	NE	NE	**No**
Pentachlorophenol	20	0.56	7.9	7.9	7.9	**No**
Phenanthrene	10	NE	NE	4.6	4.6	**No**
Phenol	10	11,000	NE	1,280	1,280	Yes
Pyrene	10	180	NE	2.0	2.0	**No**
2,4,5-Trichlorophenol	10	3,600	NE	11	11	Yes
2,4,6-Trichlorophenol	10	0.96*	NE	485	485	**No**
TPH (USEPA Method 8015)						
TPH as gasoline	50	NE	NE	500	500	Yes
TPH as diesel	50	NE	NE	640	640	Yes
TPH as motor oil	300	NE	NE	640	640	Yes
PCBs (USEPA Method 8082)						
Aroclor-1016	0.5	0.96	NE	NE	NE	**No**
Aroclor-1221	1.0	NE	NE	NE	NE	**No**
Aroclor-1232	0.5	NE	NE	NE	NE	**No**
Aroclor-1242	0.5	NE	NE	NE	NE	**No**
Aroclor-1248	0.5	NE	0.5	NE	NE	**No**
Aroclor-1254	0.5	0.034	0.5	NE	NE	**No**
Aroclor-1260	0.5	NE	0.5	NE	NE	**No**
Metals (USEPA Method 6010B/7000 Series)						
Antimony	10	15	6.0	30	30	**No**
Arsenic	5.0	0.007*	50	36	36	**No**
Barium	5.0	2,600	1000	1000	1000	Yes
Beryllium	2.0	73	4.0	2.7	2.7	Yes
Cadmium	5.0	18	5.0	1.1	1.1	**No**
Chromium (total)	5.0	NE	50	180	180	Yes
Chromium III	5.0	54,000	NE	180	180	Yes
Chromium VI	0.001	110	NE	11	11	Yes
Cobalt	5.0	730	NE	3.0	3.0	**No**
Copper	5.0	1,500	1,300	3.1	3.1	Yes
Lead (total)	3.0	NE	15	2.5	2.5	**No**
Mercury (methyl)	0.2	11	2.0	0.012	0.012	Yes
Molybdenum	5.0	180	NE	240	240	Yes

TABLE - A1
Comparison of Project-Required Quantitation Limits and Screening Criteria for Groundwater

Analyte	PRQLs[a] (ug/L)	PRGs Tap Water (ug/L)	MCLs (ug/L)	SFBRWQCB ESL Groundwater Criteria NON drinking water <3m (ug/L)	SFBRWQCB ESL Groundwater Criteria NON drinking water >3m (ug/L)	PRQL Below Screening Criteria[b]
Nickel	5.0	730	100	8.20	8.20	Yes
Selenium	10	180	50	5.0	5.0	Yes
Silver	5.0	180	100	0.19	0.19	Yes
Thallium	10	2.4	2.0	20	20	**No**
Vanadium	5.0	36	NE	19	19	Yes
Zinc	20	11,000	NE	81	81	Yes

Notes:

a - PRQL listed for soil analysis have been provided by a Kleinfelder-approved laboratory for the project and are based on wet weight. The PRQLs reported by the laboratory for soil calculated on dry-weight basis will be higher. When a laboratory is selected for this project, Kleinfelder will ensure that laboratory's RQL can meet the project screening criteria.

b -The listed PRQL reflects the best available technology for USEPA-approved analytical methods. The listed PRQL will be used as the project screening criteria unless reasonable grounds are established for pursuing nonroutine methods.

c - PRG value is for child/adult

***** - California-modified PRG

PRQL - Project-required quantitation limits

PRGs - Preliminary remediation goals (USEPA Region 9, October 2004)

MCLs - Maximum contaminant levels (California Department of Environmental Health Services, February 2007)

SFBRWQCB ESL - San Fransisco Bay Regional Water Quality Control Board Environmental Screening Level (February 2005)

ug/L - microgram per liter

USEPA - United States Enviornmental Protection Agency

TPH - total petroleum hydrocarbons

PCBs - polychlorinated biphenyls

m - meter

NE - Not established

TABLE A-2
Comparison of Project-Required Quantitation Limits and Screening Criteria for Soil

Analyte	PRQLs[a] (mg/kg)	PRGs Residential (mg/kg)	SFBRWQCB ESL Soil Criteria				CHSSLs Residential (mg/kg)	PRQL Below Screening Criteria[b]
			Residential <3m (mg/kg)	Commercial <3m (mg/kg)	Residential >3m (mg/kg)	Commercial >3m (mg/kg)		
Volatile Organic Compounds (USEPA Method 8260B)								
Acetone	0.020	14,000	0.50	0.50	0.50	0.50	NE	Yes
Benzene	0.005	0.64	0.18	0.38	0.18	0.51	NE	Yes
Bromobenzene	0.005	28	NE	NE	NE	NE	NE	Yes
Bromochloromethane	0.010	NE	NE	NE	NE	NE	NE	Yes
Bromodichloromethane	0.005	0.82	0.01	0.04	0.01	0.04	NE	Yes
Bromoform	0.005	62	61	69	69	69	NE	Yes
Bromomethane	0.010	3.9	0.22	0.51	0.22	0.51	NE	Yes
2-Butanone	0.010	NE	NE	NE	NE	NE	NE	Yes
n-Butylbenzene	0.005	240	NE	NE	NE	NE	NE	Yes
sec-Butylbenzene	0.005	220	NE	NE	NE	NE	NE	Yes
tert-Butylbenzene	0.005	390	NE	NE	NE	NE	NE	Yes
Carbon disulfide	0.005	360	NE	NE	NE	NE	NE	Yes
Carbon tetrachloride	0.005	0.25	0.01	0.03	0.01	0.03	NE	Yes
Chlorobenzene	0.005	150	1.5	1.5	1.5	1.5	NE	Yes
Chloroethane	0.010	3.0	0.63	0.85	0.63	0.85	NE	Yes
Chloroform	0.005	0.94*	0.10	0.27	0.10	0.27	NE	Yes
Chloromethane	0.010	47	0.07	0.20	0.07	0.20	NE	Yes
2-Chlorotoluene	0.005	160	NE	NE	NE	NE	NE	Yes
4-Chlorotoluene	0.005	NE	NE	NE	NE	NE	NE	Yes
Dibromochloromethane	0.005	1.11	0.02	0.05	0.02	0.05	NE	Yes
1,2-Dibromo-3-chloropropane	0.005	0.03*	0.0045	0.0045	0.0045	0.0045	NE	No
1,2-Dibromoethane (EDB)	0.005	0.032	0.01	0.02	0.01	0.02	NE	Yes
Dibromomethane	0.005	NE					NE	Yes
1,2-Dichlorobenzene	0.005	600	1.6	1.6	1.6	1.6	NE	Yes
1,3-Dichlorobenzene	0.005	530	7.4	7.4	7.4	7.4	NE	Yes
1,4-Dichlorobenzene	0.005	3.4	0.05	0.13	0.05	0.13	NE	Yes
Dichlorodifluoromethane (Freon 12)	0.010	94	NE	NE	NE	NE	NE	Yes
1,1-Dichloroethane	0.005	2.8*	0.32	0.89	0.32	0.89	NE	Yes
1,2-Dichloroethane	0.005	0.28	0.03	0.07	0.03	0.07	NE	Yes
1,1-Dichloroethene	0.005	120	4.29	4.29	4.29	4.29	NE	Yes
cis-1,2-Dichloroethene	0.005	43	1.56	3.64	1.56	3.64	NE	Yes
trans-1,2-Dichloroethene	0.005	69	3.12	7.28	3.12	7.28	NE	Yes
1,2-Dichloropropane	0.005	0.34	0.05	0.14	0.05	0.14	NE	Yes
1,3-Dichloropropane	0.005	100	NE	NE	NE	NE	NE	Yes

TABLE A-2
Comparison of Project-Required Quantitation Limits and Screening Criteria for Soil

Analyte	PRQLs[a] (mg/kg)	PRGs Residential (mg/kg)	SFBRWQCB ESL Soil Criteria				CHSSLs Residential (mg/kg)	PRQL Below Screening Criteria[b]
			Residential <3m (mg/kg)	Commercial <3m (mg/kg)	Residential >3m (mg/kg)	Commercial >3m (mg/kg)		
2,2-Dichloropropane	0.005	NE	NE	NE	NE	NE	NE	Yes
1,1-Dichloropropene	0.005	NE	NE	NE	0.03	0.09	NE	Yes
cis-1,3-Dichloropropene	0.005	0.78	NE	NE	NE	NE	NE	Yes
trans-1,3-Dichloropropene	0.005	0.78	NE	NE	NE	NE	NE	Yes
Ethylbenzene	0.005	400	32	32	32	32	NE	Yes
Hexachlorobutadiene	0.005	6.2	3.7	22	23	23	NE	Yes
2-Hexanone	0.010	NE	NE	NE	NE	NE	NE	Yes
Isopropylbenzene	0.005	NE	NE	NE	NE	NE	NE	Yes
p-Isopropyl toluene	0.005	NE	NE	NE	NE	NE	NE	Yes
Methylene chloride	0.020	9.1	0.52	1.50	0.52	1.50	NE	Yes
4-Methyl-2-pentanone	0.010	NE	NE	NE	NE	NE	NE	Yes
Methyl tert butyl ether (MTBE)	0.005	32	2.00	5.60	2.00	5.60	NE	Yes
Naphthalene	0.005	1.7*	0.46	1.50	0.46	1.50	NE	Yes
Propylbenzene	0.005	240	NE	NE	NE	NE	NE	Yes
Styrene	0.005	1,700	15	15	15	15	NE	Yes
1,1,1,2-Tetrachloroethane	0.005	3.2	3.0	6.9	16	16	NE	Yes
1,1,2,2-Tetrachloroethane	0.005	0.41	0.01	0.03	0.01	0.03	NE	Yes
Tetrachloroethene	0.005	0.48	0.09	0.24	0.09	0.24	NE	Yes
Toluene	0.005	520	9.3	9.3	9.3	9.3	NE	Yes
1,2,3-Trichlorobenzene	0.005	NE					NE	Yes
1,2,4-Trichlorobenzene	0.005	62	0.38	1.00	0.38	1.00	NE	Yes
1,1,1-Trichloroethane	0.005	1,200	7.8	7.8	7.8	7.8	NE	Yes
1,1,2-Trichloroethane	0.005	0.73	0.03	0.09	0.03	0.09	NE	Yes
Trichloroethene	0.005	2.9*	0.26	0.73	0.26	0.73	NE	Yes
Trichlorofluoromethane	0.005	390	NE	NE	NE	NE	NE	Yes
1,2,3-Trichloropropane	0.005	0.034	NE	NE	NE	NE	NE	Yes
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	0.005	5,600	NE	NE	NE	NE	NE	Yes
1,2,4-Trimethylbenzene	0.005	52	NE	NE	NE	NE	NE	Yes
1,3,5-Trimethylbenzene	0.005	21	NE	NE	NE	NE	NE	Yes
Vinyl acetate	0.050	430	NE	NE	NE	NE	NE	Yes
Vinyl chloride	0.010	0.079[c]	0.01	0.02	0.007	0.02	NE	Yes
Xylenes	0.005	270	11	11	11	11	NE	Yes
Semi-Volatile Organic Compounds (USEPA Method 8270C)								
Acenaphthene	0.067	3,700	19	19	19	19	NE	Yes

TABLE A-2
Comparison of Project-Required Quantitation Limits and Screening Criteria for Soil

Analyte	PRQLs[a] (mg/kg)	PRGs Residential (mg/kg)	SFBRWQCB ESL Soil Criteria				CHSSLs Residential (mg/kg)	PRQL Below Screening Criteria[b]
			Residential <3m (mg/kg)	Commercial <3m (mg/kg)	Residential >3m (mg/kg)	Commercial >3m (mg/kg)		
Acenaphthylene	0.067	NE	13	13	13	13	NE	Yes
Anthracene	0.067	22,000	2.80	2.80	2.80	2.80	NE	Yes
Azobenzene	0.330	4.4	NE	NE	NE	NE	NE	Yes
Benzo(a)anthracene	0.067	0.62	0.38	1.3	12	12	NE	Yes
Benzo(a)pyrene	0.067	0.062	0.04	0.13	1.5	1.5	0.04	**No**
Benzo(b)fluoranthene	0.067	0.62	0.38	1.3	15	15	NE	Yes
Benzo(k)fluoranthene	0.067	0.38*	0.38	1.3	15	15	NE	Yes
Benzo(g,h,i)perylene	0.067	NE	27	27	27	27	NE	Yes
Benzoic acid	1.700	100,000	NE	NE	NE	NE	NE	Yes
Benzyl alcohol	0.330	18,000	NE	NE	NE	NE	NE	Yes
Bis(2-chloroethoxy)methane	0.330	NE	NE	NE	NE	NE	NE	Yes
Bis(2-chloroethyl)ether	0.330	0.22	0.004	0.01	0.004	0.01	NE	**No**
Bis(2-chloroisopropyl)ether	0.330	2.9	0.66	0.66	0.66	0.66	NE	Yes
Bis(2-ethylhexyl)phthalate	0.330	35	160	530	530	530	NE	Yes
4-Bromophenyl-phenylether	0.330	NE	NE	NE	NE	NE	NE	Yes
Butyl benzyl phthalate	0.330	12,000	NE	NE	NE	NE	NE	Yes
4-Chloroaniline	0.330	240	NE	NE	NE	NE	NE	Yes
4-Chloro-3-methylphenol	0.330	NE	NE	NE	NE	NE	NE	Yes
2-Chloronaphthalene	0.330	4,900	NE	NE	NE	NE	NE	Yes
2-Chlorophenol	0.330	63	0.12	0.12	0.12	0.12	NE	Yes
4-Chlorophenyl-phenylether	0.330	NE	NE	NE	NE	NE	NE	Yes
Chrysene	0.067	3.8*	3.8	13	23	23	NE	Yes
Dibenz(a,h)anthracene	0.067	0.062	0.11	0.38	4.3	4.3	NE	**No**
Dibenzofuran	0.330	150					NE	Yes
1,2-Dichlorobenzene	0.330	600	1.6	1.6	1.6	1.6	NE	Yes
1,3-Dichlorobenzene	0.330	530	7.4	7.4	7.4	7.4	NE	Yes
1,4-Dichlorobenzene	0.330	3.4	0.05	0.13	0.05	0.13	NE	Yes
3,3'-Dichlorobenzidine	0.670	1.1	0.40	1.4	17	17	NE	Yes
2,4-Dichlorophenol	0.330	180	3.0	3.0	3.0	3.0	NE	Yes
Diethyl phthalate	0.330	49,000	0.04	0.04	0.04	0.04	NE	Yes
2,4-Dimethylphenol	0.330	1,200	0.74	0.74	0.74	0.74	NE	Yes
Dimethyl phthalate	0.330	100,000	0.04	0.04	0.04	0.04	NE	Yes
Di-n-butyl phthalate	0.330	NE	NE	NE	NE	NE	NE	Yes
4,6-Dinitro-2-methylphenol	0.670	NE	NE	NE	NE	NE	NE	Yes
2,4-Dinitrophenol	0.670	120	0.21	0.21	0.21	0.21	NE	Yes

TABLE A-2
Comparison of Project-Required Quantitation Limits and Screening Criteria for Soil

Analyte	PRQLs[a] (mg/kg)	PRGs Residential (mg/kg)	SFBRWQCB ESL Soil Criteria				CHSSLs Residential (mg/kg)	PRQL Below Screening Criteria[b]
			Residential <3m (mg/kg)	Commercial <3m (mg/kg)	Residential >3m (mg/kg)	Commercial >3m (mg/kg)		
2,4-Dinitrotoluene	0.330	120	0.86	0.86	0.86	0.86	NE	Yes
2,6-Dinitrotoluene	0.330	61	NE	NE	NE	NE	NE	Yes
Di-n-octyl phthalate	0.330	2,400	NE	NE	NE	NE	NE	Yes
Fluoranthene	0.067	2,300	40	40	60	60	NE	Yes
Fluorene	0.067	2,700	8.9	8.9	8.9	8.9	NE	Yes
Hexachlorobenzene	0.330	0.30	0.27	0.96	11.00	11.00	NE	Yes
Hexachlorobutadiene	0.330	6.2	3.7	22	23	23	NE	Yes
Hexachlorocyclopentadiene	0.670	370	NE	NE	NE	NE	NE	Yes
Hexachloroethane	0.330	35	12	41	41	41	NE	Yes
Indeno(1,2,3-cd)pyrene	0.067	0.62	0.38	1.3	7.7	7.7	NE	Yes
Isophorone	0.330	510	NE	NE	NE	NE	NE	Yes
2-Methylnaphthalene	0.067	NE	NE	NE	NE	NE	NE	Yes
2-Methylphenol	0.330	3,100	NE	NE	NE	NE	NE	Yes
4-Methylphenol	0.330	310	NE	NE	NE	NE	NE	Yes
2-Nitroaniline	0.670	180	NE	NE	NE	NE	NE	Yes
3-Nitroaniline	0.670	18	NE	NE	NE	NE	NE	Yes
4-Nitroaniline	0.670	23	NE	NE	NE	NE	NE	Yes
2-Nitrophenol	0.670	NE	NE	NE	NE	NE	NE	Yes
4-Nitrophenol	0.670	NE	NE	NE	NE	NE	NE	Yes
N-Nitroso-di-n-propylamine	0.330	0.069	NE	NE	NE	NE	NE	**No**
N-Nitrosodimethylamine	0.330	0.0095	NE	NE	NE	NE	NE	**No**
N-Nitrosodiphenylamine	0.330	99	NE	NE	NE	NE	NE	Yes
Naphthalene	0.067	1.7*	0.46	1.5	0.46	1.5	NE	Yes
Nitrobenzene	0.330	20	NE	NE	NE	NE	NE	Yes
Pentachlorophenol	0.670	3.0	4.4	5.0	42	42	4.4	Yes
Phenanthrene	0.067	NE	11	11	11	11	NE	Yes
Phenol	0.330	18,000	19	19	19	19	NE	Yes
Pyrene	0.067	2,300	85	85	85	85	NE	Yes
1,2,4-Trichlorobenzene	0.330	62	0.38	1.0	0.38	1.0	NE	Yes
2,4,5-Trichlorophenol	0.330	6,100	0.18	0.18	0.18	0.18	NE	Yes
2,4,6-Trichlorophenol	0.330	6.9	6.9	10	160	160	NE	Yes
TPH (USEPA Method 8015)								
TPH as gasoline	0.001	NE	100	400	400	400	NE	Yes
TPH as diesel	0.001	NE	100	500	500	500	NE	Yes
TPH as motor oil	0.005	NE	500	1,000	1,000	1,000	NE	Yes

TABLE A-2
Comparison of Project-Required Quantitation Limits and Screening Criteria for Soil

Analyte	PRQLs[a] (mg/kg)	PRGs Residential (mg/kg)	SFBRWQCB ESL Soil Criteria				CHSSLs Residential (mg/kg)	PRQL Below Screening Criteria[b]
			Residential <3m (mg/kg)	Commercial <3m (mg/kg)	Residential >3m (mg/kg)	Commercial >3m (mg/kg)		
PCBs (USEPA Method 8082)								
Aroclor-1016	0.012	3.9	0.22	0.74	6.34	6.34	0.089	Yes
Aroclor-1221	0.024	NE	0.22	0.74	6.34	6.34	0.089	Yes
Aroclor-1232	0.012	NE	0.22	0.74	6.34	6.34	0.089	Yes
Aroclor-1242	0.012	NE	0.22	0.74	6.34	6.34	0.089	Yes
Aroclor-1248	0.012	NE	0.22	0.74	6.34	6.34	0.089	Yes
Aroclor-1254	0.012	0.22	0.22	0.74	6.34	6.34	0.089	Yes
Aroclor-1260	0.012	NE	0.22	0.74	6.34	6.34	0.089	Yes
Metals (USEPA Method 6010B/7000 Series)								
Antimony	3.0	31	6.1	40	280	280	30	Yes
Arsenic	0.25	0.062*	5.5	5.5	5.5	5.5	0.07	**No**
Barium	0.50	5,400	750	1,500	2,500	2,500	5,200	Yes
Beryllium	0.10	150	4.0	8.0	36	36	150	Yes
Cadmium	0.25	37	1.7	7.4	38	38	1.7	Yes
Chromium (total)	0.50	210	58	58	2,500	5,000	NE	Yes
Chromium VI	0.01	30	1.8	1.8	1.8	1.8	17	Yes
Cobalt	1.0	903	10	10	10	10	660	Yes
Copper	0.50	3,100	230	230	2,500	5,000	3,000	Yes
Lead (total)	0.15	150*	150	750	750	750	150	Yes
Mercury (total)	0.02	23	3.7	10	98	98	18	Yes
Molybdenum	1.0	390	40	40	2,500	3,600	380	Yes
Nickel	1.0	1,600	150	150	1,000	1,000	1,600	Yes
Selenium	0.25	390	10	10	2,500	3,400	380	Yes
Silver	0.25	390	20	40	2,500	3,600	380	Yes
Thallium	0.25	5.2	1.0	13	47	47	5.0	Yes
Vanadium	0.50	78	110	200	2,500	5,000	530	Yes
Zinc	1.0	23,000	600	600	2,500	5,000	23,000	Yes

Notes:

a - PRQL listed for soil analysis have been provided by a Kleinfelder-approved laboratory for the project and are based on wet weight. The PRQLs reported by the laboratory for soil calculated on dry-weight basis will be higher. When a laboratory is selected for this project, Kleinfelder will ensure that laboratory's RQL can meet the project screening criteria.

b - The listed PRQL reflects the best available technology for USEPA-approved analytical methods. The listed PRQL will be used as the project screening criteria unless reasonable grounds are established for pursuing nonroutine methods.

c - PRG value is for child/adult

***** - California-modified PRG

TABLE A-2
Comparison of Project-Required Quantitation Limits and Screening Criteria for Soil

Analyte	PRQLs[a] (mg/kg)	PRGs Residential (mg/kg)	SFBRWQCB ESL Soil Criteria				CHSSLs Residential (mg/kg)	PRQL Below Screening Criteria[b]
			Residential <3m (mg/kg)	Commercial <3m (mg/kg)	Residential >3m (mg/kg)	Commercial >3m (mg/kg)		

PRQL -Project-required quantitation limits

PRG - Preliminary remediation goals (USEPA Region 9, October 2004)

SFBRWQCB ESL - San Fransisco Bay Regional Water Quality Control Board Environmental Screening Levels (February 2005)

CHHSL - California Human Health Screening Levels, California Environmental Protection Agency, January 2005)

TPH - total petroleum hydrocarbons

PCBs - polychlorinated biphenyls

m - meter

ug/kg - microgram per kilogram

mgkg - milligram per kilogram

NE - Not established

USEPA - United States Enviornmental Protection Agency

TABLE A-3
Comparison of Project-Required Quantitation Limits and CHHSL Screening Criteria for Indoor Air and Soil Vapor

Analyte	CHHSL Criteria[a] Shallow Soil Gas for Human Health Screening Levels (Vapor Intrusion) - Commercial/Industrial (ug/m^3)
Volatile Organic Compounds by USEPA Method TO-14/15	
Acetone	-
Benzene	122
Bromobenzene	-
Bromochloromethane	-
Bromodichloromethane	-
Bromoform	-
Bromomethane	-
2-Butanone	-
n-Butylbenzene	-
sec-Butylbenzene	-
tert-Butylbenzene	-
Carbon disulfide	-
Carbon tetrachloride	84.6
Chlorobenzene	-
Chloroethane	-
Chloroform	-
Chloromethane	-
2-Chlorotoluene	-
4-Chlorotoluene	-
Dibromochloromethane	-
1,2-Dibromo-3-chloropropane	-
1,2-Dibromoethane (EDB)	-
Dibromomethane	-
1,2-Dichlorobenzene	-
1,3-Dichlorobenzene	-
1,4-Dichlorobenzene	-
1,1-Dichloroethene	-
cis-1,2-Dichloroethene	4,440
Trans-1,3-Dichloropropene	-
Ethylbenzene	-
Freon 12	-
Freon 113	-
Hexachlorobutadiene	-
2-Hexanone	-
Isopropylbenzene	-
Para-Isopropyl toluene	-
Methylene chloride	-
4-Methyl-2-pentanone	-
Methyl t-butyl ether (MTBE)	13,400
Naphthalene	106
Propylbenzene	-
Styrene	-
1,1,1,2-Tetrachloroethane	-
1,1,2,2-Tetrachloroethene	-
Tetrachloroethene	603
Toluene	378,000
1,2,3-Trichlorobenzene	-
1,2,4-Trichlorobenzene	-
1,1,1-Trichloroethane	2,790,000
1,1,2-Trichloroethane	-
Trichloroethene	1,770
Trichlorofluoromethane	-
1,2,3-Trichloropropane	-
1,2,4-Trimethylbenzene	-
1,3,5-Trimethylbenzene	-
Vinyl acetate	-
Vinyl chloride	44.8
m,p-Xylenes	887,000
o-Xylenes	879,000

Notes:

a The reporting limits for the analytes range from 0.1 to 1 ug/L, which corresponds to 100 to 1000 ug/m3; It is assumed that the reporting limits will be less than the screening criteria. When a laboratory is selected for this project, Kleinfelder will ensure that laboratory's reporting limits can meet the project screening criteria.

ug/m^3 - microgram per cubic meter

CHHSL - California Human Health Screening Levels (California Environmental Protection Agency, January 2005)

USEPA - United States Environmental Protection Agency

APPENDIX B

DATA QUALITY INDICATORS

APPENDIX B

DATA QUALITY INDICATORS

Analysis	Description
Holding Time Criteria	
VOC[a,e] (Soil: USEPA 5035/8260; Soil Vapor: USEPA 8260; Water: USEPA 8260)	Soil Vapor: Estimated (J/UJ) if HT exceeded by ≤ 1 hour Soil Vapor: Rejected (R) if HT exceeded by > 1 hour Soil: Estimated (J/UJ) if HT exceeded by ≤ 96 hours unpreserved/28 days preserved Rejected (R) if HT exceeded by > 96 hours unpreserved/28 days preserved Water: J/UJ if HT exceeded by ≤ 28 days preserved R if HT exceeded by > 28 days preserved
SVOC (USEPA 8270), PCBs (USEPA 8082), TEPH (USEPA 8015)[a,b,d]	Soil: J/UJ if HT exceeded by ≤ 28 days preserved/80 days* R if HT exceeded by > 28 days preserved/80 days* Water: J/UJ if HT exceeded by ≤ 14 days preserved/80 days* R if HT exceeded by > 14 days preserved/80 days*
Metals (USEPA 6010/7000)[c]	Soil: J/UJ if HT exceeded by ≤ 180 days; Hg ≤ 56 days R if HT exceeded by > 180 days; Hg > 56 days Water: J/UJ if HT exceeded by ≤ 180 days; Hg ≤ 56 days R if HT exceeded by > 180 days; Hg > 56 days
TPH-gasoline (Soil: USEPA 5035/8015; Water: USEPA 8015) [b,d]	Soil: J/UJ if HT exceeded by ≤ 96 hours unpreserved/28 days preserved R if HT exceeded by > 96 hours unpreserved/28 days preserved Water: J/UJ if HT exceeded by ≤ 28 days preserved R if HT exceeded by > 28 days preserved
Blank Contamination Criteria	
Calibration Blank	The purpose is to evaluate analytical instruments for possible laboratory contamination.
Method and Preparation Blank	The purpose is to evaluate extraction or preparation procedures for possible laboratory contamination.
Trip Blank	The purpose is to evaluate whether handling and shipping introduced contamination to samples for volatile analyses.
All analyses[a,c,e]	Positive results are reported if the sample concentration exceeds the concentration in any associated blank by 10 times for analytes recognized as common laboratory contaminants or by 5 times for other analytes. For soil vapor samples, assess the source and resolve any laboratory contamination issues prior to analyzing any samples if the blank shows a measurable amount (≤ 1 ug/L) of the target compound.
Laboratory Duplicate Sample Criteria	
VOC[e](Soil: USEPA 5035/8260; Soil Vapor: USEPA 8260; Water: USEPA 8260)	Soil Vapor: Laboratory duplicates within ± 50%
Inorganics[c]	Soil Water Analytes > 5 × CRDL RPD ± 35% RPD ± 20% Analytes < 5 × CRDL RPD ± 2 × CRDL RPD ± CRDL
Surrogate Recovery Criteria	
VOC[a] (Water: USEPA 8260; Soil: USEPA 5035/8260)	Soil % Recovery Limits Water % Recovery Limits 1,2-Dichloroethane-d4 70-125 75-115

Analysis	Description				
	Bromofluorobenzene	70-125	85-115		
	Toluene-d8	70-125	85-115		
	Dibromofluoromethane	70-125	85-115		
VOC[e] (Soil Vapor USEPA 8260)	Surrogate recovery must not exceed ±25% difference from the true concentration of of the surrogate.				
SVOC[a] (USEPA 8270)		Soil % Recovery Limits	Water % Recovery Limits		
	1,2-Dichlorobenzene-d4	20-130	16-110		
	2-Chlorophenol-d4	20-130	33-110		
	2-Flurobiphenyl	30-115	46-116		
	2-Fluorophenol	25-121	21-100		
	2,4,6-Tribromophenol	19-122	10-123		
	Nitrobenzene-d5	23-120	35-114		
	Phenol-d6	24-113	10-110		
	Terphenyl-d14	18-137	33-141		
PCBs[a] (USEPA 8082)		Soil % Recovery Limits	Water % Recovery Limits		
	Tetrachloro-m-xylene	60-150	60-150		
	Decachlorobiphenyl	60-150	60-150		
TEPH[b,d] (USEPA 8015)		Soil % Recovery Limits	Water % Recovery Limits		
	Bromobenzene	60-125	75-125		
	Hexacosane	60-125	75-125		
TPH-gasoline [b.d] (Soil: USEPA 5035/8015; Water: USEPA 8015)		Soil % Recovery Limits	Water % Recovery Limits		
	Bromofluorobenzene	60-125	75-125		
	1,1,1-trifluorotoluene	60-125	75-125		
Spike Recovery Criteria					
VOC[a,e](Soil: USEPA 5035/8260; Soil Vapor: USEPA 8260; Water: USEPA 8260)	LCS recovery limits: 65-135 (Soil) and 70-130 (Water) MS/MSD recovery and RPD limits: 50-150/50 (Soil) and 65-135/30 (Water) LCS recovery for each compound must be at least 50% (Soil Vapor). If it is < 50%, all nondetected values become questionable (J/UJ)				
SVOC[a] (USEPA 8270)		Soil Limits		Water Limits	
		%Recovery	RPD	%Recovery	/RPD
	1,2,4-Trichlorobenzene	38-107	23	39-98	28
	1,4-Dichlorobenzene	28-104	27	36-97	28
	2-Chlorophenol	25-102	50	27-123	40
	2,4-Dinitrotoluene	28-89	47	24-96	38
	4-Chloro-3-methylphenol	26-103	33	23-97	42
	4-Nitrophenol	11-114	50	10-80	50
	Acenaphthene	31-137	19	46-118	31
	N-Nitroso-di-n-propylamine	41-126	38	41-116	38
	Pentachlorophenol	17-109	47	9-103	50
	Phenol	26-90	35	12-110	42
	Pyrene	35-142	36	26-127	31

Analysis	Description
PCBs[a] (USEPA 8082)	MS/MSD % recovery and RPD limits: 50-135/30
TEPH[b,d] (USEPA 8015)	LCS % recovery limits: 60-140 MS/MSD % recovery and RPD limits: 50-150/50
TPH-gasoline [b,d](Soil: USEPA 5035/8015; Water: USEPA 8015)	LCS % recovery limits: 75-125 MS/MSD % recovery and RPD limits: 70-130/30
Inorganics[c]	LCS % recovery limits: 80-120 MS % recovery limits: 75-125 (does not apply if the sample concentration exceeds the spike concentration by 4 times or more)
Calibration Criteria	
VOC(Soil: USEPA 5035/8260; Water: USEPA 8260), SVOC[a] (USEPA 8270)	Initial Calibration (1) RRFs ≥ 0.05 (2) % RSD ≤ 30 Continuing Calibration (1) RRFs ≥ 0.05 (2) %D ≤ 25
VOC[e] (Soil Vapor USEPA 8260)	%RDS for each target compound ≤20, except for Freon 11, Freon 12, Freon 113, Chloroethane, and Vinyl Chloride, which must not exceed 30%, RF ± 15% from initial calibration except for Freon 11, Freon 12, Freon 113, Chloroethane, and Vinyl Chloride, which must be within ± 25% difference from the initial calibration.
PCBs[a] (USEPA 8082)	Initial Calibration (1) %RSDs ≤ 20 (2) Resolution ≥ 60% (3) Absolute RT are within the appropriate RT windows Continuing Calibration %D ≤ 25
TEPH (USEPA 8015), TPH-gasoline [b,d](Soil: USEPA 5035/8015; Water: USEPA 8015;)	Initial Calibration %RSDs ≤ 20 or correlation coefficient (r) ≥ 0.995. Continuing Calibration %Ds ≤ 15
Inorganics[c]	Initial Calibration A blank and at least one standard must be used to establish the calibration. Correlation coefficient (r) ≥ 0.995. Initial and Continuing Calibration Verification % Recovery limits are 90 to 110 %, Hg: 80-120%
Instrument Performance Criteria	
VOC[a](Water: USEPA 8260; Soil: USEPA 5035/8260)	Tuning with BFB, the following ion abundances should be obtained: m/z = 50 8-40% of m/z = 95 m/z = 75 30-66% of m/z = 95 m/z = 95 base peak, 100% relative abundance m/z = 96 5-9% of m/z = 95 m/z = 173 <2% of m/z = 174 m/z = 174 50-120% of m/z = 95 m/z = 175 4-9% of m/z = 174 m/z = 176 93-101% of m/z = 174

Analysis	Description	
	m/z = 177	5-9% of m/z = 176
SVOC[a] (USEPA 8270)	Tuning with DFTPP, the following ion abundances should be obtained:	
	m/z = 51	30-80% of m/z = 198
	m/z = 68	<2% of m/z = 69
	m/z = 70	<2% of m/z = 69
	m/z = 127	25-75%of m/z = 198
	m/z = 197	<1% of m/z = 198
	m/z = 198	base peak, 100% relative abundance
	m/z = 199	5-9% of m/z = 198
	m/z = 275	10-30% of m/z = 198
	m/z = 365	>0.75% of m/z = 198
	m/z = 441	present, but <m/z = 443
	m/z = 442	40-110% of m/z = 198
	m/z – 443	15-24% of m/z = 442
PCBs[a] (USEPA 8082)	(1) 4,4'-DDT retention time ≥ 12 minutes (2) Total percent breakdown for 4,4'-DDT and Endrin ≤ 30	
Internal Standards Criteria		
VOC(Water: USEPA 8260; Soil: USEPA 5035/8260), SVOC[a] (USEPA 8270)	(1) All sample internal standard area counts must be within - 50 to + 100 percent of the area counts in the associated calibration standard. (2) All sample internal standard retention times must not vary more than + or - 30 seconds from the retention time of the associated calibration standard.	
Serial Dilution Criteria		
Inorganics[c]	Analysis of a 5-fold dilution must agree within 10 percent with the analysis of the undiluted sample for all analytes whose concentrations in the undiluted sample are greater than 50 times the IDL.	
ICP Interference Check Sample Criteria		
Inorganics[c]	(1) Recoveries for the analytes present in solution AB must be within 80-120 %. (2) Analytes not present in solution A should be observed with an absolute value ≤ the IDL.	

Notes:

a Criteria from EPA's "National Functional Guidelines for Organic Data Review," October 1999.

b Criteria from EPA's *Test Methods for Evaluating Solid Waste, SW-846,* Third Edition, December 1996.

c Criteria from EPA's "National Functional Guidelines for Inorganic Data Review," October 2004.

d Criteria from State of California's LUFT Task Force *Leaking Underground Fuel Tank Manual: Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure,* October 1989.

e Criteria from: "California Regional Water Quality Control Board – Los Angeles Regions (LARQWCB) and Department of Toxic Substances Control (DTSC), 2003. Advisory – Active Soil Gas Investigations. January 28." and " State of California, California Regional Water Quality Control Board Los Angeles Region, Interim Guidance for Active Soil Gas Investigation" February 27, 2003.

* "x" days/"y" days refers to the maximum number of days from sampling to extraction and the maximum number of days from extraction to analysis

%D	Percent difference
%RSD	Percent relative standard deviation
CRDL	Contract-required detection limit
EPA	U.S. Environmental Protection Agency
ICP	Inductively coupled plasma emission spectroscopy
IDL	Instrument detection limit
LCS	Laboratory control sample
LUFT	Leaking underground fuel tank

MS	Matrix spike
MSD	Matrix spike duplicate
m/z	mass-to-charge ratio
NA	Not Available
PCBs	Polychlorinated biphenyls
RPD	Relative percent difference
RRF	Relative response factor
RT	Retention time
SVOC	Semivolatile organic compound
TEPH	Total extractable petroleum hydrocarbons
VOC	Volatile organic compound

APPENDIX C

SOIL VAPOR SURVEY METHODOLOGY

SOIL VAPOR SURVEY METHODOLOGY

DTSC Protocols

Active Soil Vapor Sampling System

TEG's low-dead volume soil vapor sampling system has been inspected, endorsed, and is favored by all regulatory agencies who have seen it, including the EPA and CA DTSC. The design eliminates the risk of air leakage down the soil vapor probe, ensures sample collection from the tip, and greatly facilitates decontamination procedures.

Probe Construction

TEG's soil vapor probes are constructed of 1 inch outer diameter chrom-moly steel, equipped with a steel drop off tip. The Strataprobe can use a larger diameter probe if needed. Nominal lengths are 4 feet and additional lengths may be added to one another to achieve the required sampling depth. An inert 1/8 inch tube runs through the center of the probe and is attached to the sampling port with a stainless steel post run fitting.

Probe Insertion

The probe is driven into the ground with an electric rotary hammer, or with the Strataprobe. After inserted to the desired depth, the probe is retracted slightly, which opens the tip and exposes the vapor sampling port. This design prevents clogging of the sampling port and cross-contamination from soils during insertion. Once the probe rod is placed, the sample can be collected after waiting twenty minutes for equilibration.

Soil Gas Sampling

Soil vapor is withdrawn from the inert tubing using a calibrated syringe connected via an on-off valve. A purge volume test is conducted by sampling at the first soil vapor location three times after sequentially collecting and discarding one, three, and seven dead volumes of soil vapor gas to flush the sample tubing and fill it with in-situ soil vapor. The purge volume used prior to the sample yielding the highest analytical value is used for all subsequent sampling. After purging, the next 20cc to 50cc of soil vapor are withdrawn in the syringe, plugged, and immediately transferred to the mobile lab for analysis within the required holding time. During sampling, a leak check gas is used to confirm that the sample train and probe rod is tight and leak free. Additional soil vapor may be collected and stored in gas-tight containers (e.g. Summa canisters) as desired.

Flushing & Decontamination Procedures

To minimize the potential for cross-contamination between sites, all external probe parts are cleaned of excess dirt and moisture prior to insertion. The internal inert tubing and sampling syringes are flushed with large volumes of ambient air between samples or discarded as required. If water, dirt, or any material is observed in the tubing, the tubing is discarded and replaced with fresh tubing.

DTSC Protocols

Analytical Methodology

Soil vapor samples collected from each probe will be transferred directly to the on-site mobile laboratory and analyzed immediately. There will be minimal lag time between sample collection and analysis, ensuring that the integrity of the sample is maintained.

Samples will be analyzed on a gas chromatograph equipped with capillary columns and a combination of mass spectrometer (GC/MS), TCD, and FID detectors as needed. This combination of columns and detectors ensures compound separation, recognition, and detection at the required levels.

These detectors enable on-site analysis for petroleum hydrocarbons, volatile aromatics (BTEX), and volatile organic compounds (e.g. DCE, TCE, PCE, vinyl chloride) using EPA approved analytical methodology outlined in methods 8260B and 8015m. Output signals from each detector are processed by computer chromatography software and the results entered into a laboratory computer for on-site processing.

Daily instrument Calibration

Daily continuing calibration is performed at the start of each day by injecting and analyzing a mid-range calibration standard. Acceptable continuing calibration agreement: +/- 15% to 25% to the calibration curve, depending on the compound.

Blanks & Duplicates

Blanks are analyzed at the start of each day and more often as appropriate depending upon the measured concentrations. Typically, when high sample values are encountered, additional blanks may be analyzed. Duplicate samples are analyzed as needed or as requested by the client or regulatory agency.

Compound Confirmation

A MS (mass spectrometer) detector is used for absolute compound identification of VOCs. Also, a surrogate compound is added to each sample during analysis to confirm that the chromatographic retention times have not shifted during the course of the day and that surrogate recovery is adequate showing proper instrument operation and integrity.

Health and Safety - Training and Medical Monitoring Programs

In order to reduce potential employee exposure to hazardous materials and reduce the risk of injury incurred during the normal performance of work, TEG maintains active participation of personnel in a Injury and Illness Prevention Program (IIPP). Each TEG employee that performs work in a laboratory or in the field, is required to have completed a 40-hour training session in accordance with 29 CFR 1910.120. The Health and Safety Officer coordinates all aspects of training and maintaining the Injury and Illness Prevention program, including, but not limited to:

-- annual physical examination of field personnel (including an initial baseline exam upon hiring)
-- health, safety and hazardous material training
-- first aid and Cardio-Pulmonary Resuscitation (CPR) training
-- safety equipment inventory and purchasing
-- review of health and safety procedures, exposure limits, and plans for each project.

Work procedures and required safety conditions are determined on the basis of anticipated work, environmental conditions and levels of toxic chemicals at a given site. Consultation with client safety personnel or representatives is undertaken to determine potential health hazards to workers at that site. Each TEG employee participates in all pre-job safety meetings at each job site.