Subsurface Consultants, Inc.

LOP 6704

LETTER OF TRANSMITTAL

TO:	Susan Hugo Alameda County Health Care Services Agency	DATE:	November 2, 2000
FROM:	Glenn Young		
PROJECT:	Preservation Park 3		
SCI JOB NUMBER:	272.054		
OFFICE SENT FROM:	Lafayette		

WE ARE SENDING YOU: 1 copy(ies)

- ☐ final report
- ☐ draft report
- ☐ Service Agreement
- ☐ proposed scope of services
- ☐ specifications
- ☐ grading/foundation plans
- ☐ soil samples/groundwater samples
- ☐ executed contract

- ☐ if you have any questions, please call
- ☐ for your review and comment
- ☐ please return an executed copy
- ☐ with our comments
- ☒ for your use
- ☒ as requested
- ☐
- ☐

REMARKS:

Susan - As requested by Mark Gomez from the City of Oakland, please find attached three reports documenting previous investigation activities at the subject site located on MLK between 11th & 12 Streets (sometimes referred to as Preservation Park 3). These reports are fowarded to you to provide background information in support of the SCI draft report dated September 7, 2000, which was previously submitted to you. Please note that the draft SCI report dated June 17, 1991 was not finalized but is included here for completeness. Please call Mark Gomez or me if you have any questions.

cc:

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OAKLAND REDEVELOPMENT PROJECT

FINAL
PHASE II ENVIRONMENTAL SITE ASSESSMENT
SUMMARY REPORT
PRESERVATION PARK 3 SITE
OAKLAND, CALIFORNIA

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 9
Office of Waste Programs Enforcement
Washington, DC 20460

Work Assignment No.	:	R09814
EPA Region	:	9
Date Prepared	:	June 23, 2000
Contract No.	:	68-W-99-008
Site		Oakland, California
Prepared By	:	Tetra Tech EM Inc.
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June 23, 2000

Mr. Matthew Small
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street, (WST-8)
San Francisco, CA 94105-3901

Subject: **Transmittal of the Final Phase II Site Assessment Reports for the Intercity Rail and Preservation Park 3 Sites, Oakland, CA**
EPA Contract No. 68-W-99-008, Work Assignment No. R09814

Dear Mr. Small:

Tetra Tech EM Inc. (Tetra Tech) is pleased to submit two copies each of the final Phase II site assessment reports for the Intercity Rail and Preservation Park 3 sites in Oakland, California. Tetra Tech has addressed comments on the draft reports from you and City of Oakland representative Mark Gomez via e-mail on April 26, 2000. In addition, Tetra Tech has addressed concerns regarding issues discussed during a meeting with you and Mark Gomez on June 7, 2000. In particular, a concern was expressed regarding the accuracy of features on the map known as Figure 1 in the Intercity Rail site report, which showed the sampling locations. Mr. Gomez expressed concern that the map be accurate enough to allow finding the boring locations in the future. Mr. Gomez asked how the map was created, what information was used to position the borings on the map, and whether the map was to scale. In addition, some concern regarding the accuracy of features outside the site boundaries for the Intercity Rail site was discussed with particular emphasis on the area between the railroad tracks and the flood canal.

In following up on these issues, I have included an additional figure (Figure 2) in each of the reports for Global Positioning System survey points that were used to position the borings and other site features on maps for both sites. The Intercity Rail and Preservation Park 3 site were both surveyed using a Global Positioning System. Survey points were limited to areas within the site boundaries. The information gathering during the GPS survey was used to position the borings on maps for each of the respective sites. The maps in each respective report can be used to determine distances from site features to relocate all initial borings at both sites, with the exception of SB2 at the Intercity Rail site. This boring was not surveyed due to construction activities that occurred between the time the boring was drilled and the time Tetra Tech went to the site to perform surveying activities. The construction obliterated any signs of SB2, so it was positioned on Figure 1 approximate to boring SB3, which was surveyed.

The features outside the site boundaries are not to scale, and the maps indicate this fact. Tetra Tech did not GPS survey any points outside the respective site boundaries for either of the two sites. This would account for the lack of accuracy regarding the area between the railroad tracks and the flood canal, which was determined to be outside the site boundary.

CONTENTS (CONTINUED)

FIGURES

TABLES

ABBREVIATIONS AND ACRONYMS

ASTM	American Society for Testing Materials
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylene
EPA	U.S. Environmental Protection Agency
ESA	Environmental site assessment
GPS	Global Positioning System
MCL	Maximum concentration limit
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
MTBE	Methyl tertiary butyl ether
QAPP	Quality assurance project plan
RCRA	Resource Conservation Recovery Act
REPA	Resource Conservation and Recovery Act Enforcement, Permitting, and Assistance
RBCA	Risk-based corrective action
RBSL	Risk-based screening level
SAP	Sampling and analysis plan
SSTL	Site specific target levels
SVOC	Semivolatile organic compound
Tetra Tech	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
TOC	Total organic carbon
ULR	Urban-Land Redevelopment
UST	Underground storage tanks
VOC	Volatile organic compound
µg/L	Microgram per liter

EXECUTIVE SUMMARY

This phase II environmental site assessment (ESA) summary report presents information regarding the Preservation Park 3 site located on 12th Avenue and Martin Luther King, Jr. Way in Oakland, California. Tetra Tech EM Inc. (Tetra Tech), under Resource Conservation and Recovery Act Enforcement, Permitting, and Assistance Contract No. 68-W-99-008, was requested by the U. S. Environmental Protection Agency to conduct a phase II ESA at the Preservation Park 3 site and to prepare and submit a draft and final phase II ESA summary report.

Tetra Tech's investigations included soil and groundwater sample collection, data validation, completion of the City of Oakland's Risk-Based Corrective Action eligibility checklists, and preparation of this report. In preparing this report, Tetra Tech used the current American Society for Testing and Materials Standard E1527-97 as a guide only.

The City of Oakland owned Preservation Park 3 site, encompasses a rectangular lot with plan dimensions of about 150 feet by 200 feet. The site encompasses the eastern half of the block bound by 11th, 12th, and Castro Streets and Martin Luther King, Jr. Way and is currently vacant.

The site is situated within the Northern California Coast Ranges Geomorphic Province. Locally, the site is mapped as being underlain by the Merritt Sand Formation. This Quaternary age deposit consists primarily of fine-grained silty and clayey sand deposited by wind and water as beach and nearshore deposits. Groundwater was encountered at the site during the phase II ESA at depths from 24 to 29 feet below ground surface.

The primary sources of contamination at the site have been determined to be from the five underground storage tanks that were used while the site was a gasoline service station. Analytical results from the phase II ESA sampling efforts conducted in October 1998 concluded that benzene, toluene, and xylene in soils had been detected in soils above the City of Oakland risk-based screening levels (RBSL) and site-specific target levels (SSTL). Benzene ethylbenzene,toluene, and xylene were detected in groundwater above the RBSLs and SSTLs.

Based on the phase I site assessment and further sampling activities conducted during the phase II ESA, Tetra Tech concludes that residual contamination from former gasoline service station operations has locally affected soil and groundwater at the Preservation Park 3 site. Tetra Tech recommends additional

sampling to confirm the lateral and vertical extent of contamination and to establish whether contamination has extended beyond the boundaries of the site. A corrective action plan should be prepared to address confirmed contamination. However, further sampling and/or corrective action should be dependent on future reuse activities and should be approached with a risk-based methodology.

1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) received Work Assignment No. R09814 from the U.S. Environmental Protection Agency (EPA) under Resource Conservation and Recovery Act (RCRA) Enforcement, Permitting, and Assistance (REPA) Contract No. 68-W-99-008. Under this work assignment, Tetra Tech is providing EPA Region 9 with assistance in testing a prototype alternative to the traditional approach to setting cleanup standards. This prototype alternative, presented in a document entitled "Urban Land Redevelopment (ULR) Program: Guidance Document," was developed by the City of Oakland in conjunction with the EPA (City of Oakland 1999); the alternative involves streamlining the traditional phase II environmental site assessment (ESA) process. As part of the work assignment, phase II ESAs were conducted to test the streamlined process and were intended, in part, to identify any problems with the process. One of the sites selected for this test was the Preservation Park 3 site in Oakland, California (hereafter referred to as "the site"). The phase II ESA activities conducted by Tetra Tech included the collection of soil and groundwater samples from six borings at the site, and preparation of this report summarizing the ESA results.

This section discusses the purpose of this phase II ESA summary report, special terms and conditions pertaining to the preparation of the report, and the limiting conditions and methodology used.

1.1 PURPOSE

The main purpose of this phase II ESA summary report is to compare the soil and groundwater sample results to the risk-based corrective action (RBCA) criteria developed by the City of Oakland and the EPA for use in the prototype ULR Program. Analytical results were compared with the City of Oakland's Tier 1 risk-based screening levels (RBSL) and Tier 2 site-specific target levels (SSTL). The checklists presenting the results of the ULR Program RBCA process evaluation are included in Appendix A.

1.2 SPECIAL TERMS AND CONDITIONS

Tetra Tech used the American Society for Testing and Materials (ASTM) Standard E1527-97 guidance (ASTM 1997) in preparing this report; however, the four components required by ASTM to complete a phase II ESA were not included in Tetra Tech's statement of work. The four components required by the ASTM included (1) records review, (2) site reconnaissance, (3) interviews, and (4) a summary report. Tetra Tech did conduct an independent records review and a site reconnaissance during the phase I site assessment, but no interviews were conducted with current or former owners or operators of the site (Tetra Tech 1998a).

This phase II ESA is a component of the City of Oakland draft ULR Program RBCA process. The data gaps identified using the ULR Program RBCA process are the basis for the recommendations of further site assessment activities presented in this report.

1.3 LIMITING CONDITIONS AND METHODOLOGY USED

This report was compiled using information supplied by the EPA and other information that is in the public domain. The scope of the assignment was based on a limited records review; therefore, the conclusions and recommendations herein are based solely on the information Tetra Tech reviewed in compiling this report.

2.0 BACKGROUND

The following subsections describe the features, the physical setting, the site history, and the land use of adjacent property, and summarize the results of previous assessments of the Preservation Park 3 site.

2.1 SITE DESCRIPTION AND FEATURES

The City of Oakland owns the site, which encompasses a rectangular lot with plan dimensions of about 150 feet by 200 feet. It is undeveloped and the soil is exposed; no vegetation was observed on October 5, 1998, during site reconnaissance activities conducted during the phase I site assessment. The site encompasses the eastern half of the block bounded by 11th, 12th, and Castro Streets and Martin Luther King, Jr. Way (formerly Grove Street) in Oakland, California (Tetra Tech 1998a).

2.2 SITE HISTORY AND LAND USE

The block in which the site is located was occupied by residential developments from at least the late 1800s through 1931. The property was occupied by several homes and boarding facilities.

In 1940 a gasoline service station was constructed at 1125 Grove Street (now Martin Luther King, Jr. Way). The service station had at least five 500-gallon capacity underground storage tanks (UST), two gasoline dispenser islands, and an automobile lift hoist. It is assumed that the USTs were used to store gasoline, diesel fuel, and possibly motor oil. The service station was demolished in 1971, and the tanks were removed at that time.

In 1947, a single-story warehouse was constructed at the northwest corner of 11th and Grove Streets. The warehouse occupied approximately one-half of the site (15,000 square feet). The use of the building between 1947 and 1959 is unknown; however, in 1953, the owner of the building, Sun Electric Company, filed a building permit application to construct partition walls to separate shop, warehouse, and office areas. This information implies that the building may have been used by an electrical contractor or manufacturing business.

Alpha PhotoProducts, a wholesale and retail distributor of photochemicals and supplies, occupied the building from 1959 until 1974. According to the preliminary environmental assessment performed in 1991 by Subsurface Consultants Inc., a former employee of Alpha PhotoProducts said that photochemicals were not stored in tanks at the site. A lavatory was infrequently used as a darkroom, so it is likely that photochemicals were occasionally discharged to the sanitary sewer. The warehouse did not contain any known fuel storage tanks.

After Alpha PhotoProducts left the property, the City of Oakland Office of Community Development converted the warehouse to offices and occupied the building beginning in 1976. The building was demolished in 1985.

Past uses of the site include the storage of relocated Victorian houses slated for restoration and a partially complete construction project consisting of a concrete basement, including walls, foundations, and slabs. A 1985 aerial photo showed the property vacant, except for a residential structure that was relocated and stored on site as part of the City of Oakland Preservation Park development (Tetra Tech 1998a).

2.3 LAND USE OF ADJACENT PROPERTY

The land use surrounding the site is primarily commercial. Along the northeast section of 12th Street and Martin Luther King, Jr. Way is a City of Oakland-owned development that consists of renovated houses of Victorian-style architecture that are rented to nonprofit organizations. Directly across Martin Luther King Jr. Way from the site is a parking lot. Other developments in the area are of a commercial nature (Tetra Tech 1998a).

2.4 SUMMARY OF PREVIOUS ASSESSMENTS

Tetra Tech reviewed the following four documents that discuss previously conducted environmental reviews/ assessments of the Preservation Park 3 site:

- "Draft Oakland Redevelopment Project, Phase I Site Assessment for Preservation Park 3, Oakland, California," prepared by Tetra Tech EM Inc., October 13, 1998
- "Preliminary Environmental Assessment, 12th Street and Martin Luther King, Jr. Way, Oakland, California," prepared by Subsurface Consultants, Inc., June 19, 1991.
- "Soil Contamination Assessment, 12th Street and Martin Luther King, Jr. Way, Oakland, California," prepared by Subsurface Consultants, Inc., June 17, 1991.
- "Environmental Review of Property at 12th and Broadway," City of Oakland Memorandum, May 9, 1995.

The site assessments conducted in 1991 concluded that gasoline, oil and grease, 1,2-dichloroethane, chlorobenzene, and lead were present at the site. The results of limited groundwater sampling did not indicate contaminants above detection limits; however, the extent of groundwater contamination was not sufficiently characterized in any of the reports reviewed. The hydrocarbon and organic chemical contamination appears to be related to operations at the former gasoline station. The source of lead contamination is uncertain but may be related to air emissions from industrial activities and vehicles.

Previous investigations concluded that additional sampling should be conducted to delineate the vertical and horizontal extent of the contamination.

3.0 PHASE II ESA ACTIVITIES

The objective of the phase II ESA was to provide an independent assessment of environmental conditions at the site by addressing the phase I recommendations and areas of concern identified during the site visit conducted on October 5,1998. This section describes the scope of the phase II ESA, field activities, and sampling and chemical analyses and methods used.

3.1 SCOPE OF ASSESSMENT

As directed by the EPA, Tetra Tech performed a phase II ESA. The focus of the ESA was on collecting additional data and samples that Tetra Tech identified in the phase I site assessment report (Tetra Tech 1998a) as being (1) required to complete or improve the information in the Tier 1 qualification checklist and worksheets contained in the draft report or (2) needed to quantify and assess exposure hazards and risks to human health and the environment at the Preservation Park 3 site.

Under a previous REPA work assignment, R09035 (EPA contract number 68-W4-0004), Tetra Tech collected soil and groundwater samples from the site at six locations of suspected data gaps on December

7 and 9, 1998 (Tetra Tech 1998b, 1998c). The Geoprobe® direct push sampling device was used to collect the soil and groundwater samples. Table 1 lists the constituents of concern and analytical methods for the soil and groundwater samples that were collected. This phase II ESA summarizes the analytical data collected during the field effort implemented under REPA work assignment R09035.

3.1.1 Supplemental Records Review

A supplemental records review was not conducted as part of the scope of work for this assignment (Tetra Tech 1999a). An independent records review was conducted during preparation of the phase I site assessment report submitted by Tetra Tech on October 13, 1998 (Tetra Tech 1998a).

3.1.2 Conceptual Site Model

Gasoline, chlorinated hydrocarbons, diesel fuel, 1,2-dichloroethane, chlorobenzene, lead, and oil and grease have been detected at the site. Sources for the contaminants have been identified as former gasoline service station operations and USTs at the site that have leaked into the soil and groundwater. The source of lead is uncertain, but it may be related to air emissions from industrial activities and vehicles (Tetra Tech 1998a).

Previous assessments of the Preservation Park 3 site confirm subsurface soil contamination in the area of the former USTs (see Figure 1) and migration of contaminants through the subsurface soil to the groundwater interface in this area. Previous groundwater sampling results did not indicate contaminants above the detection limits; however, the extent of groundwater contamination has not been sufficiently characterized.

Potential pathways for exposure to chemical constituents include direct contact with surficial soil, ingestion of surficial soil, inhalation of outdoor air vapors from subsurface soil, and inhalation of outdoor air vapors from groundwater. The area surrounding the Preservation Park 3 site is primarily commercial. The site is vacant and fenced-off. Current receptors are limited to construction workers and City of Oakland employees with official business who may traverse the site. The site is not close to a body of water or ecological receptors. An ecological risk assessment has not been performed. The area around the site does not currently display signs of ecological receptors such as habitats like streams, lakes, or aquatic and terrestrial organisms.

Potential pathways for exposure are dependent on future land use scenarios. If the site is redeveloped as residential with yards or gardens, direct contact with surficial soil and ingestion of surficial soil may affect

human receptors. If the area is redeveloped as residential without accessible yards, but with subsurface parking or basements, inhalation of air vapors from subsurface soil may affect human receptors.

During future construction activities, construction workers would have the potential for exposure to surficial and subsurface soils through ingestion, direct contact, and inhalation of outdoor air vapors from subsurface soil.

3.1.3 Sampling Plan

To assess the current level of contamination at the site and further delineate the lateral and vertical extent of contamination, sampling of the soil and groundwater was proposed in the sampling and analysis plan (SAP) (Tetra Tech 1998b). In addition, establishing background levels of total organic carbon (TOC) and grain size at the site was proposed to support classifying soil types at the site for exposure assessment purposes.

The SAP called for a total of six boring locations to be sampled (see Figure 1). Samples from three of the soil borings would be to establish background levels of TOC and grain size. These three borings would be sampled with a hand auger at a maximum depth of 5 feet. The SAP called for soil and groundwater samples to be collected from three additional borings and analyzed for chemical constituents. In addition, three soil samples from the lithologic unit of highest known or suspected contamination would be collected and analyzed for grain size. Three soil samples would be collected for chemical analysis from each of the three borings at 10-foot intervals (10, 20, and 30 feet below ground surface [bgs]) or until groundwater was encountered (Tetra Tech 1998b). Three groundwater samples would be collected from the three soil borings being advanced for chemical analysis. All three groundwater samples would be analyzed for chemical constituents (listed in Section 3.1.4); one groundwater sample would also be analyzed for the additional analysis of VOC and SVOC.

3.1.4 Chemical Testing Plan

Based on historical operations of the site, the following potential contaminants were identified: benzene, toluene, ethylbenzene, xylenes, (BTEX), organic lead, methyl tertiary-butyl ether, (MTBE) total petroleum hydrocarbons as gasoline (TPH-purgeables), TPH as diesel (TPH-extractables), semivolatile organic compounds (SVOC) and volatile organic compounds (VOC). These constituents were proposed for analysis as part of the Preservation Park 3 phase II SAP (Table 1). In addition, soil samples were analyzed for TOC and grain size. More detailed information regarding the sampling can be found in the quality assurance project plan (QAPP)(Tetra Tech 1998c).

3.2 FIELD EXPLORATION ACTIVITIES AND METHODS

Field exploration activities for the phase II ESA included the advancement of six soil borings (SB1 through SB6) to assess subsurface conditions at the site. Three borings (SB1 through SB3) were advanced in the former USTs area, SB2 being placed in the location of the former USTs pit, and borings SB1 and SB3 being placed to the north and southwest of the USTs pit, respectively (Figure 1). SB1 through SB3 were advanced using a Geoprobe®, a van-mounted hydraulically-powered soil probe that pushes and uses percussive forces to advance soil and groundwater sampling tools into the subsurface. An additional three soil borings (SB4 through SB6) were advanced to 5 feet bgs using a hand auger in an area southwest of the former USTs pit. Soil boring logs for SB1 to SB6 are provided in Appendix B.

3.3 SAMPLING AND CHEMICAL ANALYSES AND METHODS

All samples collected under this phase II ESA were sent to Quanterra Laboratory, a state and federal government-approved certified laboratory that negotiated and competed in accordance with the Federal Acquisition Regulations and was awarded the Basic Ordering Agreement under the REPA contract. The agreement specifies the data quality objectives for all analyse. For more detailed information, see the REPA Generic QAPP for Region 9 (Tetra Tech 1998c) and the site-specific QAPP for the Preservation Park 3 site (Tetra Tech 1998c).

The analyses performed on the soil and water samples, the analytical methods employed for these analyses (see Table 1), and limitations in sampling are discussed in the following sections. All soil and groundwater sample data underwent 100 percent cursory validation and 20 percent full validation by Tetra Tech subcontractor Environmental Data Services, Inc.

3.3.1 Soil Sample Analyses

Thirteen soil samples, including one duplicate and one matrix spike/matrix spike duplicate, were collected from 6 borings (Figure 1) at the site and submitted for analyses by Quanterra Laboratory. Three soil samples from each of the borings SB1, SB2, and SB3 were collected at 9.5 to 10 feet bgs, 16.5 to 17.0 feet bgs, and 23.5 to 24.0 feet bgs and analyzed for BTEX, organic lead, MTBE, TPH-extractables, and TPH- purgeables.

Three soil samples from uncontaminated areas for background analysis of total organic carbon and grain size were collected from borings SB4, SB5 and SB6 at 3-4 feet bgs. In addition, three soil samples were collected from the lithologic unit of highest known contamination from boring SB3, from 10 to 11 feet

bgs, 17 to 18 feet bgs, and 23.5 to 24 feet bgs and submitted for grain size analysis. Soil boring logs are included in Appendix B. The particle-size analysis results of the soil samples collected are included in Appendix C.

The location of each boring was surveyed by Tetra Tech using a Global Positioning System (GPS) unit (see Figure 2). The locations of these borings are also noted on Figure 1.

3.3.2 Groundwater Sample Analyses

Three grab groundwater samples were collected from borings SB1, SB2, and SB3 and submitted to Quanterra for analyses. Each boring was screened from 36 to 40 feet bgs, and groundwater samples were collected using a peristaltic pump. Although groundwater was encountered at approximately 24 feet bgs in each boring, groundwater samples were collected from deeper into the upper aquifer to be able to obtain the proper volume necessary for each analysis. Each groundwater sample was analyzed for BTEX, MTBE, organic lead, TPH-d, and TPH-g. In addition, the groundwater sample from SB2 was also analyzed for SVOCs and VOCs to screen for the existence of these contaminants.

4.0 EVALUATION AND PRESENTATION OF RESULTS

The following sections describe the geological and hydrogeological conditions and the analytical results for soil and groundwater samples collected at the Preservation Park 3 site during the phase II ESA.

4.1 GEOLOGICAL AND HYDROGEOLOGICAL SETTING

The site is situated within the Northern California Coast Ranges Geomorphic Province. Locally, the site is mapped as being underlain by the Merritt Sand Formation. This Quaternary age deposit consists primarily of fine-grained silty and clayey sand deposited by wind and water as beach and nearshore deposits. The Merritt Sand Formation overlies the Alameda Formation, also deposited in Quaternary time. The Alameda Formation consists of continental and marine sediments deposited in the valley of San Francisco Bay (Tetra Tech 1998a).

During the phase II ESA, soil encountered in three of the soil borings consisted of a thin layer of artificial fill that was underlain by silty sand to clayey sand. Particle size analysis results indicate that the soils are composed predominantly sand (83 percent) with some fines (17 percent) (Appendix C). These soils extended to the depths explored (30 feet bgs) in this investigation. Previous investigations reported that dense sands and silty and clayey sands of the Merritt Sand Formation underlie the fill.

During the phase II investigation, groundwater was encountered at 24 feet bgs. Previous investigations reported that groundwater levels had been measured at depths of between 24 to 29 feet bgs immediately after drilling. These levels may not be truly representative of stabilized groundwater levels. Available data from this investigation and previous investigations indicate that groundwater flow is to the northwest.

4.2 ANALYTICAL DATA

The laboratory analytical results for the soil and water samples are summarized in Table 2. The complete analytical report for all samples analyzed by the laboratory was submitted to the EPA and the City of Oakland on March 6, 1999. The soil and water sample analytical results are specifically discussed in the following subsections.

4.2.1 Soil Sample Results

Three soil borings were advanced at the site to obtain nine soil samples for chemical analyses. Analytical results for all detected constituents are presented in Table 2. Analytical results for soil were compared to residential and industrial City of Oakland RBSLs and SSTLs to evaluate detected concentrations for analytes included in the RBSL and SSTL tables. These results are compared in Tables 3 and 4 and discussed below. Other detected analytes are also discussed below.

Results indicate that benzene was detected in soil at concentrations of 3.2 milligrams per kilogram (mg/kg) in boring SB1 (at 23.5 to 24 feet bgs) and at 1.9 mg/kg in soil boring SB2 (at 23.5 to 24 feet bgs). These levels were above the RBSLs and SSTLs for the residential land use scenario for the exposure pathways of inhalation of indoor air from subsurface soil and ingestion of groundwater containing leachate from soil at the carcinogenic risk of 0.68 mg/kg, hazard risk of 2.3 mg/kg and the carcinogenic and hazard risk of 0.01 mg/kg, respectively.

Toluene and xylene were detected in soil at concentrations of 26 mg/kg and 156 mg/kg, respectively, in SB1 (at 23.5 to 24 feet bgs) and at concentrations of 24 mg/kg and 89 mg/kg, respectively, in SB2 (at 23.5 to 24 feet bgs). These levels were above the RBSL and SSTLs for the residential land use scenario for the exposure pathway of ingestion of groundwater containing leachate from soil at the carcinogenic and hazard risk of 4.2 mg/kg for toluene and 64 mg/kg for xylene.

The results of the comparison to RBSLs and SSTLs for the industrial land use scenario are identical in exceeding the levels as those for the residential land use scenario for the above mentioned analytes with one exception: there is no industrial risk for the pathway of inhalation of indoor air.

Other analytes detected at concentrations greater than 100 mg/kg are TPH extractables and TPH purgeables at 9.5 to 10 feet bgs in soil boring SB1 at 480 mg/kg and 1,000 mg/kg, respectively. TPH extractables and TPH purgeables were detected at 23.5 to 24 feet bgs in SB1 at concentrations of 1,400 mg/kg and 1,800 mg/kg, respectively. TPH purgeables were detected in SB2 at 23.5 to 24 feet bgs at a concentration of 190 mg/kg. No RBSLs, SSTLs, or preliminary remediation goals exist for these analytes.

4.2.2 Groundwater Sample Results

Groundwater samples for chemical analyses were collected from soil borings SB1, SB2, and SB3. Analytical results for all detected constituents are presented in Table 2. Groundwater analytical results were compared to residential and industrial City of Oakland RBSLs and SSTLs. These results are compared for residential and commercial/industrial reuse in Tables 5 and 6. Other detected analytes are also discussed below.

Benzene, toluene, and xylene were detected in the groundwater sample collected from boring SB1 at concentration of 0.35 milligrams per liter (mg/L), 1.8 mg/L, and 4.7 mg/L, respectively. Benzene was detected in the groundwater sample collected from boring SB2 at 0.02 mg/L. These levels are above the RBSLs and SSTLs for the residential and commercial/industrial land use scenarios for the exposure pathway ~~of ingestion~~ of groundwater at the carcinogenic and hazard risk of 0.001 mg/L for benzene, 0.15 mg/L for toluene, and 1.8 mg/L for xylene.

TPH extractables and TPH purgeables were detected in the groundwater samples collected from borings SB1 and SB2. Concentrations of TPH extractables and TPH purgeables in SB1 were 17 mg/L and 33 mg/L, respectively. Concentrations of TPH extractables and TPH purgeables in SB2 were 0.09 mg/L and 0.11 mg/L, respectively. No RBSLs, SSTLs or preliminary remediation goals exist for these analytes.

No analytes were detected in the groundwater sample collected from boring SB3 except for lead at 0.04 mg/L. No RBSLs SSTLs or preliminary remediation goals for lead in groundwater exist. However, the EPA Region 9 preliminary remediation goals for lead in tap water is 0.004 mg/L (EPA 1998).

5.0 DISCUSSION OF FINDINGS AND CONCLUSIONS

The following sections present the findings and conclusions of the phase II ESA at the Preservation Park 3 site.

5.1 RECOGNIZED ENVIRONMENTAL CONDITIONS

Analytical data collected at the site were compared to the City of Oakland RBSLs and SSTLs. The following constituents were identified as exceeding the above mentioned criteria in the soils and groundwater at the site:

- Benzene
- Toluene
- Xylene

TPH extractables and TPH purgeables were detected at the site in both soil and groundwater at SB-1 and SB-2. TPH extractables were detected in soil at SB-3; however, there are no screening criteria for TPH. No other constituents were identified as exceeding the screening criteria at the site.

5.2 AFFECTED MEDIA

Based upon the findings of the phase I site assessment and the site visit conducted on October 5, 1998, affected media included subsurface soil, surficial soil, and groundwater impacted by former gasoline service station operations. The media identified during the phase I site assessment were located in the northeast portion of the site where USTs were formerly located and include surface soils across the site with lead contamination, shallow soils blanketing the site with motor oil and diesel fuel contamination, and locally impacted groundwater.

The findings of the phase II ESA were consistent with the findings of the phase I site assessment with regard to the affected media. However, the phase II ESA did not investigate surficial soils at depths from 0 to 9.5 feet bgs. Levels of lead contamination were found in soil at depths of 1 to 2 feet bgs during preliminary investigations at the site in 1991 (Subsurface Consultants 1991) and oils and grease were identified at depths above 2.5 feet bgs.

The affected media identified during the phase II ESA included subsurface soils and groundwater. Subsurface soils from 9.5 to 24 feet bgs were affected by benzene, toluene, and xylene at concentrations above RBSLs and SSTLs. Groundwater was also affected by benzene, toluene, and xylene at levels above the RBSLs and SSTLs.

5.3 EVALUATION OF MEDIA QUALITY

The data collected and reported for this phase II ESA provide information upon which to base conclusions and offer recommendations that will support the determination of clean-up efforts to be undertaken by the City of Oakland. Data were collected from specific areas of concern identified during the phase I ESA and site visit and, based on historical operations, from the areas of a suspected release such as the former location of USTs. Previous analytical data were also reviewed during the phase I ESA and were compared with the analytical data collected during this phase II ESA to determine if contamination was consistent with what has been found in the past. The data collected from the site during the phase II ESA confirms that the site environment has been affected by past industrial operations, most probably by the former gasoline service station operations.

6.0 RECOMMENDATIONS

Based on the phase I site assessment and further sampling activities conducted during the phase II ESA, Tetra Tech concludes that residual contamination from former gasoline service station operations has locally affected soil and groundwater at the Preservation Park 3 site. Tetra Tech recommends additional sampling to confirm the lateral and vertical extent of contamination and to establish whether contamination has extended beyond the boundaries of the site. A corrective action plan should be prepared to address confirmed contamination.

However, further sampling and/or corrective action should be dependent on future reuse activities and should be approached with a risk-based methodology. If the site is to be redeveloped as residential property, as indicated by City of Oakland representative Mark Gomez, then further site investigation activities should be dependent on the type of residential reuse structures to be constructed. The corrective action plan prepared to address contamination at the site could provide recommendations regarding engineering controls, institutional controls, and remediation of the site based on the reuse plans, as illustrated by the following examples:

- If single family dwellings are to be constructed at the site, implementing some type of containment that reduces exposure via direct contact with surface soils and inhalation of outdoor vapors is a viable option. This could include construction of a concrete pad on the surface of the site to prevent exposure to surface soils and volatilization of contaminants to the outdoor air. A vapor barrier could be constructed under building foundations, that would block volatilization of hydrocarbon contaminants in indoor air.

- If this area is to be redeveloped as residential property in the form of a high rise building encompassing the entire block with a subterranean parking garage, then the initial excavation of soils to drive the building pilings and construct the parking garage may

constitute soil remediation by removal of contaminated soils. Institutional controls could dictate that groundwater not be used as a drinking water source or for any non-potable uses such as irrigation. Instead, water can be supplied by the East Bay Municipal Water District in sufficient quantities.

Under these two scenarios, corrective action measures could be implemented in direct coordination with redevelopment activities.

In addition, the potential pathways for exposure to chemical constituents were determined using the City of Oakland's Tier 1 RBSLs and SSTLs. Performing a more detailed risk assessment for the inhalation of indoor air from subsurface soil pathway might eliminate this pathway. Further risk assessment activities could include using the City of Oakland's ULR Program RBCA process to perform a Tier 3 analysis whereby site-specific parameters are used to calculate risk. For example, the soil sample collected at SB1 from 23.5 to 24 feet bgs had detection levels above the RBSL and SSTL for the residential land use scenario pathway of inhalation of indoor air from subsurface soil. Using the default parameters under the RBSL and SSTL, the Oakland Tier 2 approach assumes a separation of approximately 3 feet between source and exposure point. A Tier 3 analysis in which the parameter "depth to subsurface soils" is changed to 23.5 feet would allow for a more detailed risk analysis using site specific data which could result in a more appropriate analysis of the risk.

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TABLES

TABLE 1
ANALYTICAL METHODS FOR SOIL AND GROUNDWATER SAMPLES

Constituent	Parameter	Method Number	Reference	Detection Technique	Extraction Technique
BTEX	Aromatic volatile organic compound	EPA 8021B	SW-846	GC/PID	Purge and trap
MTBE	Aromatic volatile organic compound	CLP	OLM03.1	GC/MS	Purge and trap
TPH-gasoline	TPH-purgeable	EPA 8015B	CA LUFT & SW-846	GC/FID	Purge and trap
TPH-diesel	TPH-extractable	EPA 8015B	CA LUFT & SW-846	GC/FID	Soil: sonication Water: liquid-liquid
Semivolatile organic compounds	Semivolatile organic compounds	CLP	OLM03.1	GC/MS	Soil: sonication and GPC Water: liquid-liquid
Volatile organic compounds	Volatile organic compounds	CLP	OLM03.1	GC/MS	Purge and trap
Total organic carbon	Total organic carbon	SMEWW 5310B	SMEWW	Oxidation/IR	Not applicable

Notes:

BTEX	Benzene, toluene, ethylbenzene, xylenes
CA LUFT	State of California 1989
CLP	Contract Laboratory Program
EPA	U.S. Environmental Protection Agency
FID	Flame ionization detector
GC	Gas chromatography
GPC	Gel permeation chromatography
MS	Mass spectroscopy
MTBE	Methyl tertiary-butyl ether
OLM03.1	EPA 1994
PID	Photoionization detector
SMEWW	American Public Health Association 1992
SW-846	EPA 1996
TPH	Total petroleum hydrocarbons

TABLE 2
ANALYTES DETECTED IN SOIL AND GROUNDWATER SAMPLES
PRESERVATION PARK 3 SITE, OAKLAND, CALIFORNIA

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9850N001	SB2	Lead	Soil	9.5 - 10.0	2.9	mg/kg
		Percent moisture	Soil	9.5 - 10.0	9.8	%mst
9850N002	SB2	Ethylbenzene	Soil	16.5 - 17.0	0.01	mg/kg
		Lead	Soil	16.5 - 17.0	78.6	mg/kg
		Percent moisture	Soil	16.5 - 17.0	8.1	%mst
		Xylene	Soil	16.5 - 17.0	0.03	mg/kg
9850N003	SB2	Benzene	Soil	23.5 - 24.0	1.9	mg/kg
		Ethylbenzene	Soil	23.5 - 24.0	14.0	mg/kg
		Lead	Soil	23.5 - 24.0	2.3	mg/kg
		Percent moisture	Soil	23.5 - 24.0	17.9	%mst
		Toluene	Soil	23.5 - 24.0	24.0	mg/kg
		TPH extractables	Soil	23.5 - 24.0	4.6	mg/kg
		TPH purgeables	Soil	23.5 - 24.0	190.0	mg/kg
		Xylene	Soil	23.5 - 24.0	89.0	mg/kg
9850N004	SB4	Organic carbon, total	Soil	0.0 - 4.0	762.0	mg/kg
9850N005	SB5	Organic carbon, total	Soil	0.0 - 4.0	860.0	mg/kg
9850N006	SB6	Organic carbon, total	Soil	0.0 - 4.0	1,300.0	mg/kg
9850N007	SB1	Benzene	Soil	9.5 - 10.0	0.021	mg/kg
		Ethylbenzene	Soil	9.5 - 10.0	2.9	mg/kg
		Lead	Soil	9.5 - 10.0	6.6	mg/kg
		Percent moisture	Soil	9.5 - 10.0	10.5	%mst
		Toluene	Soil	9.5 - 10.0	0.96	mg/kg
		TPH extractables	Soil	9.5 - 10.0	480.0	mg/kg
		TPH purgeables	Soil	9.5 - 10.0	1,000.0	mg/kg
		Xylene	Soil	9.5 - 10.0	12.8	mg/kg
9850N008	SB1	Ethylbenzene	Soil	16.5 - 17.0	0.12	mg/kg
		Lead	Soil	16.5 - 17.0	27.4	mg/kg
		Percent moisture	Soil	16.5 - 17.0	10.7	%mst
		Toluene	Soil	16.5 - 17.0	0.03	mg/kg
		TPH extractables	Soil	16.5 - 17.0	53.0	mg/kg
		TPH purgeables	Soil	16.5 - 17.0	38.0	mg/kg
		Xylene	Soil	16.5 - 17.0	1.0	mg/kg
9850N009	SB1	Benzene	Soil	23.5 - 24.0	3.2	mg/kg
		Ethylbenzene	Soil	23.5 - 24.0	19.0	mg/kg
		Lead	Soil	23.5 - 24.0	4.9	mg/kg
		Organic lead	Soil	23.5 - 24.0	0.53	mg/kg
		Percent moisture	Soil	23.5 - 24.0	14.8	%mst
		Toluene	Soil	23.5 - 24.0	26.0	mg/kg
		TPH extractables	Soil	23.5 - 24.0	1,400.0	mg/kg
		TPH purgeables	Soil	23.5 - 24.0	1,800.0	mg/kg
		Xylene	Soil	23.5 - 24.0	156.0	mg/kg
9850N017	SB3	Lead	Soil	9.0 - 10.0	2.4	mg/kg
		Percent moisture	Soil	9.0 - 10.0	10.2	%mst

TABLE 2
ANALYTES DETECTED IN SOIL AND GROUNDWATER SAMPLES
PRESERVATION PARK 3 SITE, OAKLAND, CALIFORNIA

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9850N018 duplicate	SB3	Lead	Soil	16.5 - 17.0	2.8	mg/kg
		Percent moisture	Soil	16.5 - 17.0	14.7	%mst
9850N019	SB3	Lead	Soil	16.0 - 16.5	2.3	mg/kg
		Percent moisture	Soil	16.0 - 16.5	13.4	%mst
9850N020	SB3	Lead	Soil	23.5 - 24.0	0.88	mg/kg
		Percent moisture	Soil	23.5 - 24.0	17.3	%mst
		TPH extractables	Soil	23.5 - 24.0	29.0	mg/kg
9850N010	SB1	Benzene	Water	36.0 - 40.0	0.35	mg/L
		Ethylbenzene	Water	36.0 - 40.0	0.64	mg/L
		Lead	Water	36.0 - 40.0	0.43	mg/L
		Toluene	Water	36.0 - 40.0	1.8	mg/L
		TPH extractables	Water	36.0 - 40.0	17.0	mg/L
		TPH purgeables	Water	36.0 - 40.0	33.0	mg/L
		Xylene	Water	36.0 - 40.0	4.7	mg/L
9850N013	SB2	1,2,4-Trimethylbenzene	Water	36.0 - 40.0	0.0056	mg/L
		1,2-Dichloroethane	Water	36.0 - 40.0	0.0014	mg/L
		1,3,5-Trimethylbenzene	Water	36.0 - 40.0	0.0017	mg/L
		Benzene	Water	36.0 - 40.0	0.02	mg/L
		Ethylbenzene	Water	36.0 - 40.0	0.0031	mg/L
		Lead	Water	36.0 - 40.0	0.18	mg/L
		Naphthalene	Water	36.0 - 40.0	0.0014	mg/L
		Toluene	Water	36.0 - 40.0	.026	mg/L
		TPH extractables	Water	36.0 - 40.0	0.09	mg/L
		TPH purgeables	Water	36.0 - 40.0	0.11	mg/L
		Xylene	Water	36.0 - 40.0	0.02	mg/L
9850N015	SB3	Lead	Water	36.0 - 40.0	0.04	mg/L

Notes:

mg/kg	Milligram per kilogram
%mst	Percent moisutre
mg/L	Milligram per liter
TPH	Total petroleum hydrocarbons
bgs	below ground surface

TABLE 3
SOIL CONTAMINANT CONCENTRATIONS THAT EXCEED MERRITT SAND RISK-BASED SCREENING LEVELS AND SITE-SPECIFIC TARGET LEVELS AND TOTAL PETROLEUM HYDROCARBON SOIL CONTAMINANT CONCENTRATIONS
PRESERVATION PARK 3 SITE, OAKLAND, CALIFORNIA
(Residential Land Use)

Sample ID	Boring ID	Analyte	Concentration Detected	RBSL and SSTL Criteria for Surficial Soil (Ingestion/Dermal)	RBSL and SSTL Criteria for Subsurface Soil (Inhalation of Outdoor Air)	RBSL and SSTL Criteria for Subsurface Soil (Inhalation of Indoor Air)	RBSL and SSTL Criteria for Subsurface Soil (Leachate to Groundwater Ingestion)
9850N003	SB2 (23.5 to 24 feet bgs)	Benzene	1.90 mg/kg	C: 37 mg/kg H: 99 mg/kg	C: 3.9 mg/kg H: 16.0 mg/kg	**C: 0.68 mg/kg** H: 2.3 mg/kg	**C & H: 0.01 mg/kg**
		Toluene	24.00 mg/kg	C: None Established H: 11,000 mg/kg	C: None Established H: SAT	C: None Established H: 350 mg/kg	**C & H: 4.20 mg/kg**
		TPH Extractables	4.60 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	190.00 mg/kg	None Established	None Established	None Established	None Established
		Xylene	89.00 mg/kg	C: None Established H: 60,000 mg/kg	C: None Established H: SAT	C: None Established H: SAT	**C & H: 64.0 mg/kg**
9850N007	SB1 (9.5 to 10 feet bgs)	Benzene	2.10 mg/kg	C: 150 mg/kg H: 920 mg/kg	C: 15.00 mg/kg H: 91.00 mg/kg	C: 11.00 mg/kg H: 65.00 mg/kg	**C & H: 0.01 mg/kg**
		TPH Extractables	480.00 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	1,000.00 mg/kg	None Established	None Established	None Established	None Established
9850N008	SB1 (16.5 to 17 feet bgs)	TPH Extractables	53.00 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	38.00 mg/kg	None Established	None Established	None Established	None Established
9850N009	SB1 (23.5 to 24 feet bgs)	Benzene	3.2 mg/kg	C: 37 mg/kg H: 99 mg/kg	C: 3.9 mg/kg H: 16.0 mg/kg	**C: 0.68 mg/kg H: 2.3 mg/kg**	**C & H: 0.01 mg/kg**
		Toluene	26.00 mg/kg	C: None Established H: 11,000 mg/kg	C: None Established H: SAT	C: None Established H: 350 mg/kg	**C & H: 4.20 mg/kg**
		TPH Extractable	1,400.00 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	1,800.00 mg/kg	None Established	None Established	None Established	None Established
		Xylene	156.00 mg/kg	C: None Established H: 60,000 mg/kg	C: None Established H: SAT	C: None Established H: SAT	**C & H: 64.0 mg/kg**
9850N020	SB3 (23.5 to 24 feet bgs)	TPH Extractables	29.00 mg/kg	None Established	None Established	None Established	None Established

Notes:

C	Carcinogenic	mg/kg	Milligrams per kilogram	SAT	Saturation
H	Hazard	RBSL	Risk-based screening level	SSTL	Site-specific target levels

Bold indicates analyte was above the screening levels

Source: RBSLs and SSTLs taken from the City of Oakland 1999.

TABLE 4
SOIL CONTAMINANT CONCENTRATIONS THAT EXCEED MERRITT SAND RISK-BASED SCREENING LEVELS AND SITE-SPECIFIC TARGET LEVELS AND TOTAL PETROLEUM HYDROCARBON SOIL CONTAMINANT CONCENTRATIONS
PRESERVATION PARK 3 SITE, OAKLAND, CALIFORNIA
(Commercial/Industrial Land Use)

Sample ID	Boring ID	Analyte	Concentration Detected	RBSL and SSTL Criteria for Surficial Soil (Ingestion/Dermal)	RBSL and SSTL Criteria for Subsurface Soil (Inhalation of Outdoor Air)	RBSL and SSTL Criteria for Subsurface Soil (Inhalation of Indoor Air)	RBSL and SSTL Criteria for Subsurface Soil (Leachate to Groundwater Ingestion)
9850N003	SB2 (23.5 to 24 feet bgs)	Benzene	1.90 mg/kg	C: 150 mg/kg H: 920 mg/kg	C: 15.00 mg/kg H: 91.00 mg/kg	C: 11.00 mg/kg H: 65.00 mg/kg	**C & H: 0.01 mg/kg**
		Toluene	24.00 mg/kg	C: None Established H: 94,000 mg/kg	C: None Established H: SAT	C: None Established H: SAT	**C & H: 4.20 mg/kg**
		TPH Extractables	4.60 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	190.00 mg/kg	None Established	None Established	None Established	None Established
		Xylene	89.00 mg/kg	C: None Established H: 380,000 mg/kg	C: None Established H: SAT	C: None Established H: SAT	**C & H: 64.0 mg/kg**
9850N007	SB1 (9.5 to 10 feet bgs)	Benzene	2.10 mg/kg	C: 150 mg/kg H: 920 mg/kg	C: 15.00 mg/kg H: 91.00 mg/kg	C: 11.00 mg/kg H: 65.00 mg/kg	**C & H: 0.01 mg/kg**
		TPH Extractables	480.00 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	1,000.00 mg/kg	None Established	None Established	None Established	None Established
9850N008	SB1 (16.5 to 17 feet bgs)	TPH Extractables	53.00 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	38.00 mg/kg	None Established	None Established	None Established	None Established
9850N009	SB1 (23.5 to 24 feet bgs)	Benzene	3.2 mg/kg	C: 150 mg/kg H: 920 mg/kg	C: 15.00 mg/kg H: 91.00 mg/kg	C: 11.00 mg/kg H: 65.00 mg/kg	**C & H: 0.01 mg/kg**
		Toluene	26.00 mg/kg	H: 94,000 mg/kg	C: None Established H: SAT	C: None Established H: SAT	**C & H: 4.20 mg/kg**
		TPH Extractable	1,400.00 mg/kg	None Established	None Established	None Established	None Established
		TPH Purgeables	1,800.00 mg/kg	None Established	None Established	None Established	None Established
		Xylene	156.00 mg/kg	C: None Established H: 380,000 mg/kg	C: None Established H: SAT	C: None Established H: SAT	**C & H: 64.0 mg/kg**
9850N020	SB3 (23.5 to 24 feet bgs)	TPH Extractables	29.00 mg/kg	None Established	None Established	None Established	None Established

Notes:

C	Carcinogenic	mg/kg	Milligrams per kilogram	SAT	Saturation
H	Hazard	RBSL	Risk-based screening level	SSTL	Site-specific target levels

Bold indicates analyte was above the screening levels

Source: RBSLs and SSTLs taken from the City of Oakland 1999.

TABLE 5
GROUNDWATER CONTAMINANT CONCENTRATIONS THAT EXCEED MERRITT SAND RISK-BASED SCREENING LEVELS AND SITE-SPECIFIC TARGET LEVELS AND TOTAL PETROLEUM HYDROCARBON GROUNDWATER CONTAMINANT CONCENTRATIONS
PRESERVATION PARK 3 SITE, OAKLAND, CALIFORNIA
(Residential Land Use)

Sample ID	Boring ID	Analyte	Concentration Detected	RBSL and SSTL Criteria for Ingestion of Groundwater	RBSL and SSTL Criteria for Groundwater (Inhalation of Indoor Air)	RBSL and SSTL Criteria for Groundwater (Inhalation of Outdoor Air)
9850N010	SB-1	Benzene	0.35 mg/L	**C & H: 0.001 mg/L**	C: 1.4 mg/L H: 4.6 mg/L	C: 180 mg/L H: 720 mg/L
		Ethylbenzene	0.64 mg/L	C & H: 0.70 mg/L	C: None Established H: SOL	C: None Established H: SOL
		Toluene	1.80 mg/L	**C & H: 0.15 mg/L**	C: None Established H: 280 mg/L	C: None Established H: SOL
		TPH Extractables	17.00 mg/L	None Established	None Established	None Established
		TPH Purgeables	33.00 mg/L	None Established	None Established	None Established
		Xylene	4.70 mg/L	**C & H: 1.8 mg/L**	C: None Established H: SOL	C: None Established H: SOL
9850N013	SB-2	Benzene	0.02 mg/L	**C & H: 0.001 mg/L**	C: 1.4 mg/L H: 4.6 mg/L	C: 180 mg/L H: 720 mg/L
		TPH Extractables	0.09 mg/L	None Established	None Established	None Established
		TPH Purgeables	0.11 mg/L	None Established	None Established	None Established

Notes:

C	Carcinogenic	H	Hazard
mg/L	Milligrams per liter	RBSL	Risk-based screening levels
SSTL	Site-specific target levels	SOL	Solubility

Bold indicates analyte was above the screening levels

Source: RBSLs and SSTLs taken from City of Oakland 1999.

TABLE 6
GROUNDWATER CONTAMINANT CONCENTRATIONS THAT EXCEED MERRITT SAND RISK-BASED SCREENING LEVELS AND SITE-SPECIFIC TARGET LEVELS AND TOTAL PETROLEUM HYDROCARBON GROUNDWATER CONTAMINANT CONCENTRATIONS
PRESERVATION PARK 3 SITE, OAKLAND, CALIFORNIA
(Commercial/Industrial Land Use)

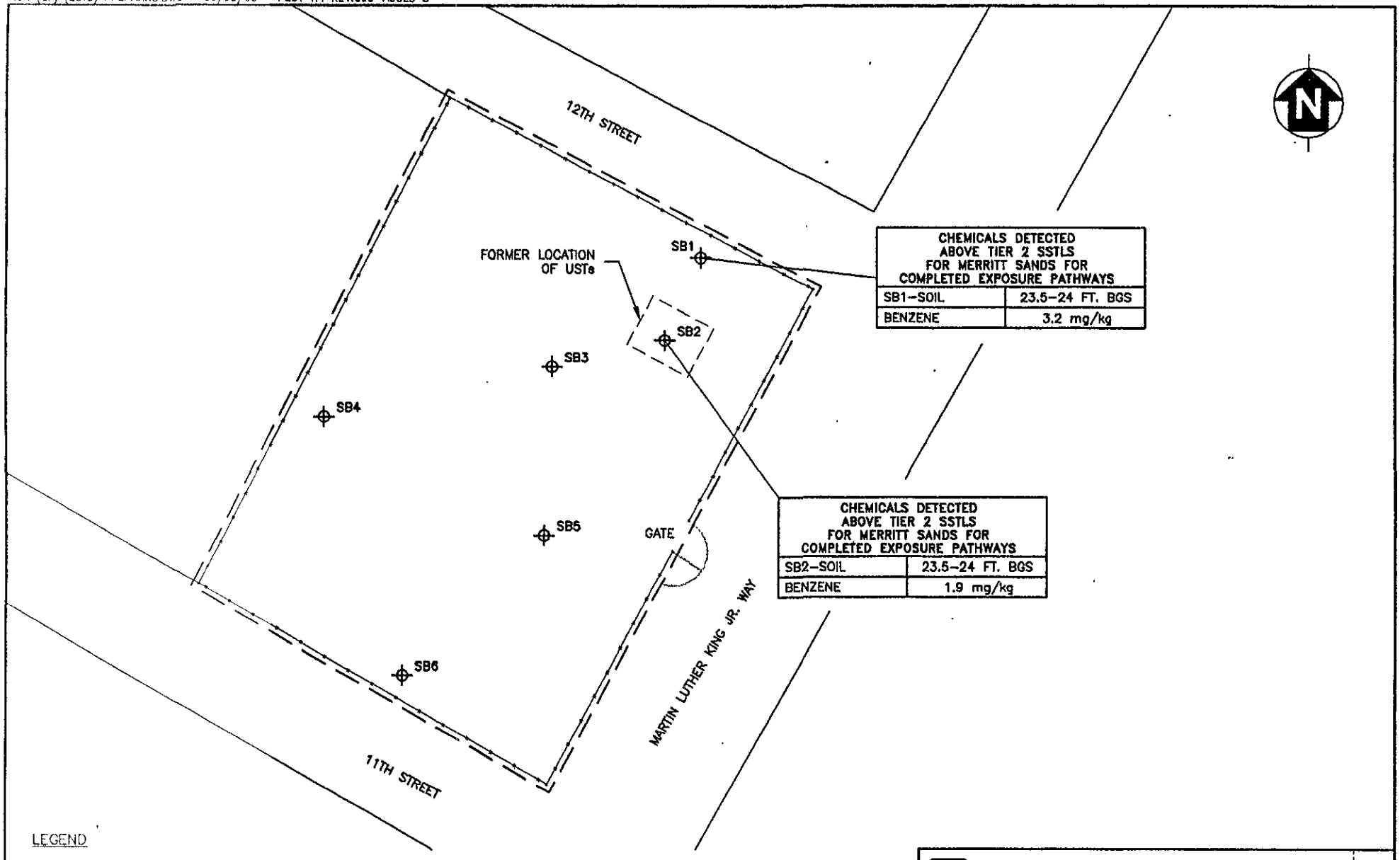
Sample ID	Boring ID	Analyte	Concentration Detected	RBSL and SSTL Criteria for Ingestion of Groundwater	RBSL and SSTL Criteria for Groundwater (Inhalation of Indoor Air)	RBSL and SSTL Criteria for Groundwater (Inhalation of Outdoor Air)
9850N010	SB-1	Benzene	0.35 mg/L	**C & H: 0.001 mg/L**	C: 22 mg/L H: 130 mg/L	C: 690 mg/L H: SOL
		Ethylbenzene	0.64 mg/L	C & H: 0.70 mg/L	C: None Established H: SOL	C: None Established H: SOL
		Toluene	1.80 mg/L	**C & H: 0.15 mg/L**	C: None Established H: SOL	C: None Established H: SOL
		TPH Extractables	17.00 mg/L	None Established	None Established	None Established
		TPH Purgeables	33.00 mg/L	None Established	None Established	None Established
		Xylene	4.70 mg/L	**C & H: 1.8 mg/L**	C: None Established H: SOL	C: None Established H: SOL
9850N013	SB-2	Benzene	0.02 mg/L	**C & H: 0.001 mg/L**	C: 22 mg/L H: 130 mg/L	C: 690 mg/L H: SOL
		TPH Extractables	0.09 mg/L	None Established	None Established	None Established
		TPH Purgeables	0.11 mg/L	None Established	None Established	None Established

Notes:

C Carcinogenic
H Hazard
mg/L Milligrams per liter
RBSL Risk-based screening levels
SSTL Site-specifi target levels SOL Solubility
Bold indicates analyte was above the screening levels

Source: RBSLs and SSTLs taken from City of Oakland 1999.

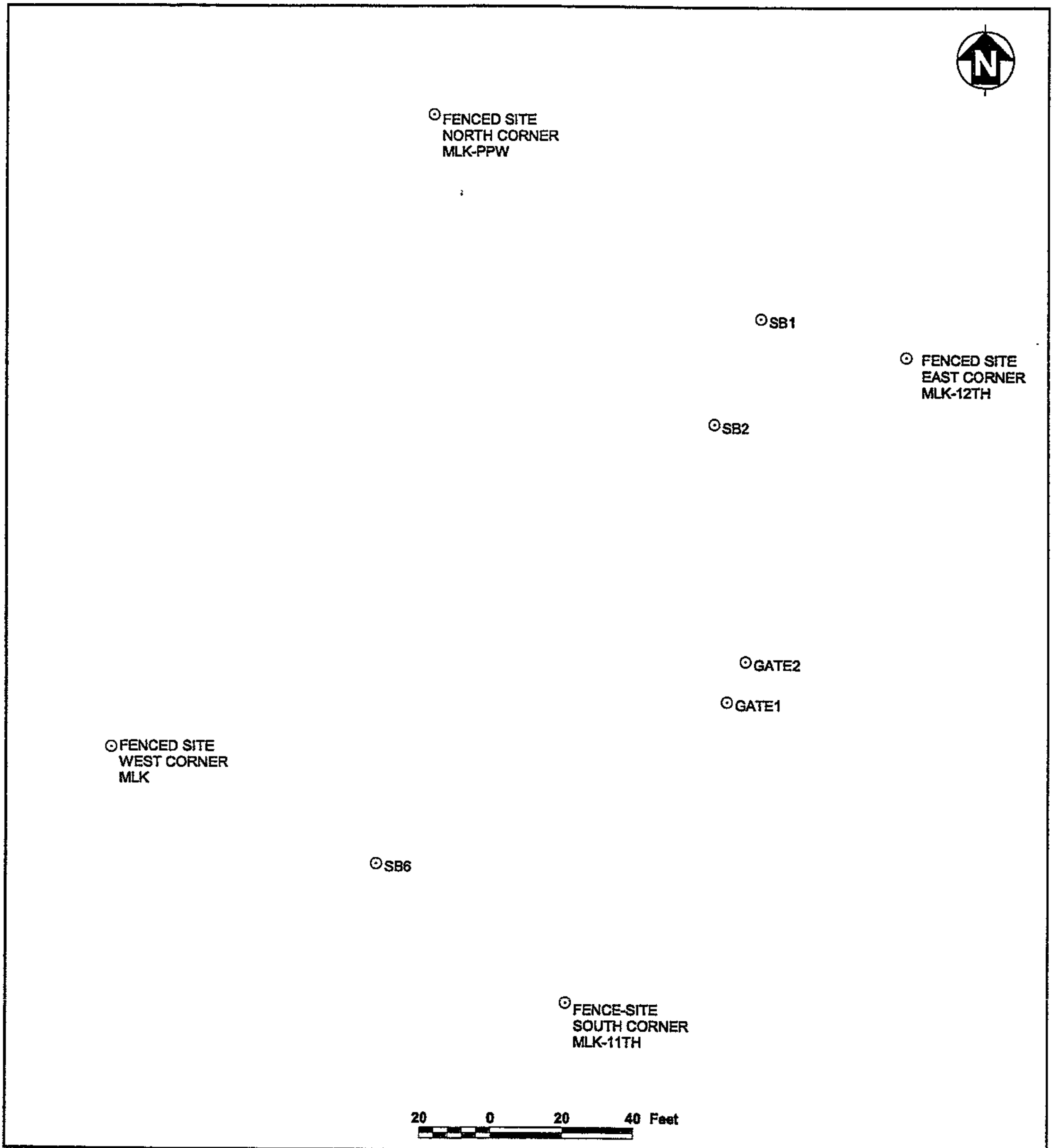
FIGURE

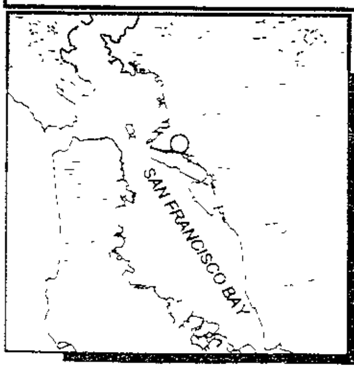


Tetra Tech EM Inc.

Figure 1

Preservation Park 3
Oakland, California





⊙ GPS SURVEY POINTS

Tetra Tech EM Inc

PRESERVATION PARK 3 SITE
OAKLAND, CALIFORNIA

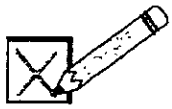
FIGURE 2

GLOBAL POSITIONING SYSTEM SURVEY POINTS

APPENDIX A

URBAN LAND REDEVELOPMENT RISK-BASED CORRECTIVE ACTION PROCESS CHECKLIST

Oakland RBCA Eligibility Checklist



The Oakland Tier 1 RBSLs and Tier 2 SSTLs are intended to address human health and environmental concerns at the majority of small to medium-sized sites in Oakland where commonly-found contaminants are present. Large and/or complicated sites—especially those with continuing releases, special ecological concerns or unusual subsurface conditions—will likely require a Tier 3 analysis. The following checklist is designed to assist you in determining your site's eligibility for the Oakland RBCA levels.

CRITERIA	YES	NO
Source:		
Is there a continuing, *primary* source of a chemical of concern, such as a leaking container, tank or pipe? (This does *not* include secondary/residual sources.)	☐	☒
Is there any mobile or potentially-mobile free product?	☐	☒
Are there more than five chemicals of concern at the site, each of which is at a concentration greater than the lowest applicable Oakland RBCA level?	☐	☒
Pathways:		
Are there any preferential vapor migration pathways—such as gravel channels or utility corridors—that are potential conduits for the migration, on-site or off-site, of a volatilized chemical of concern?	☐	☒
Is there a chemical of concern at the site within 20 feet of a surface water body?	☐	☒
If groundwater ingestion is *not* an exposure pathway of concern, does groundwater at the site both (a) exist at depths less than 10 feet *and* (b) contain volatile chemicals of concern? (If groundwater ingestion *is* an exposure pathway of concern, this criterion may be disregarded because the Oakland RBCA levels will be protective for all potential groundwater-related exposure scenarios.)	☐	☒
Are there any existing on-site or off-site structures intended for future use that are adjacent to a volatile chemical of concern and possess at least one of the following? (a) A slab-on-grade foundation that is less than 15 cm (6 inches) thick (i.e., that does not meet Uniform Building Code standards) (b) An enclosed, below-grade space (e.g., a basement) that has floors or walls less than 15 cm (6 inches) thick (c) A crawl space that is not ventilated	☐	☒
Receptors:		
Are there any immediate health risks to humans associated with contamination at the site (i.e., explosive levels of a chemical or vapor concentrations that could cause acute health effects)?	☐	☒
Are there any complete pathways to nearby ecological receptors, such as endangered species, wildlife refuge areas, wetlands or other protected areas?	☐	☒

If you answer "no" to all questions, your site is eligible for the Oakland RBCA levels. If you answer "yes" to any of the questions, your site is *not* eligible for the Oakland RBCA levels.

OAKLAND RBCA TIER 1 CHECKLIST EVALUATION
12th STREET AND MARTIN LUTHER KING, JR. WAY

Source

Question: Is there a continuing *primary* source of a chemical of concern, such as a leaking container, tank or pipe? (This does *not* include secondary/residual sources.)

Answer: No, all five underground storage tanks were removed from the site in 1971.

Question: Is there any mobile or potentially-mobile free product?

Answer: No. Groundwater sampling conducted during the phase II ESA did not reveal any free product or sheen on groundwater. In addition, the concentrations of petroleum hydrocarbons detected in samples are not indicative of the presence of mobile free product.

Question: Are there more than five chemicals of concern at the site, each of which is at a concentration greater than the lowest applicable Oakland RBCA level?

Answer: No. Please see Tables 3 through 6 which present the contaminants in soil and groundwater that are above the lowest applicable Oakland RBSL and SSTL levels. Benzene, toluene, and xylene were detected in soil above the RBSLs and SSTLs. Benzene, ethylbenzene, toluene, and xylene were detected in groundwater above the RBSLs and SSTLs.

Pathways

Question: Are there any preferential vapor migration pathways – such as gravel channels or utility corridors-that are potential conduits for the migration, on-site or off-site, of a volatilized chemical of concern?

Answer: No. There are no structures on site that provide for a vapor migration pathway. Soil boring logs completed during the phase II ESA did not indicate any gravel channels. In addition, nothing in the available information reviewed indicates the existence of utility corridors.

Question: Is there a chemical of concern at the site within 20 feet of a surface water body?

Answer: No. Based on a general knowledge of the area, the site is not believe to be within 20 feet of a surface water body.

Question: If groundwater ingestion is *not* an exposure pathway of concern, does groundwater at the site both (a) exist at depths less than 10 feet *and* (b) contain volatile chemicals of concern? (If groundwater ingestion *is* an exposure pathway of concern, this criterion may be disregarded because the Oakland RBCA levels will be protective for all potential groundwater-related exposure scenarios.)

Answer: No. According to lithologic logging conducted at three borings at the site by Tetra Tech, depths to groundwater at the site are at approximately 24 feet below ground surface.

Question: Are there any existing on-site or off-site structures intended for future use that are adjacent to a volatile chemical of concern and possess at least one of the following?

(a) A slab-on grade foundation that is less than 15 cm (6 inches) thick (i.e., that does not meet Uniform Building Code standards)

(b) An enclosed, below-grade space (e.g., a basement) that has floors or walls less than 15 cm (6 inches) thick

(c) A crawl space that is not ventilated

Answer: No. No structures are currently on the site.

Receptors

Question: Are there any immediate health risks to humans associated with contamination at the site (i.e., explosive levels of a chemical or vapor concentrations that could cause acute health effects)?

Answer: No. Laboratory data results for sampling that was conducted at the site as part of the phase II ESA indicate that none of the contaminant levels are sufficiently high to present an immediate human health impact.

Question: Are there any complete pathways to nearby ecological receptors, such as endangered species, wildlife refuge areas, wetlands or protected areas?

Answer: No. Based on visual observation of the site October 5, 1998, no ecological receptors were identified. A more detailed ecological assessment is recommended to confirm this determination. This could include researching information on the local habitats of endangered species and identification of all wildlife refuge areas, wetlands or other protected areas within Alameda County.

DETERMINATION OF TIER 1 AND TIER 2 RBCA STANDARDS

Tetra Tech has followed the Oakland Urban Land Redevelopment (URL) Program procedures provided by the EPA to establish criteria to evaluate the Preservation Park 3 site. The process laid out in Section 2.3 of the ULR Program guidance document requires that the following parameters be established to determine the Tier 1 cleanup levels:

1. Source characterization
2. Identification of potential exposure pathways and receptors
3. Land-use scenario
4. Soil characterization

Determination of Contaminants of Concern

Soil and groundwater analytical results collected from the Preservation Park 3 site during the preliminary assessment conducted by Subsurface Consultants in 1991 revealed that the following contaminants were detected in soil at the site: total extractable hydrocarbons, total volatile hydrocarbons, oil and grease, 1,2-dichloroethane, chlorobenzene, and lead. Analytical results from the phase II ESA sampling efforts conducted in October 1998 revealed benzene, toluene, and xylene in soils above the RBSLs and SSTLs. Benzene, ethylbenzene, toluene, and xylene were detected in groundwater above the RBSLs and SSTLs.

Determination of Exposure Pathways and Potential Receptors

Tetra Tech followed the exposure assessment worksheet in Appendix D of the URL Program Guidance Document, for determining the exposure pathways and potential receptors.

The primary sources of contamination have been determined to be from the five underground storage tanks (UST) that were used while the site was a gasoline service station. These USTs were removed from the site in 1971. Secondary sources have been identified as impacted surficial and subsurface soils. Secondary sources do not include dissolved groundwater plume or free-phase liquid plume.

Transport mechanisms have been identified as (1) atmospheric dispersion volatilization and direct contact with soil, (2) volatilization and atmospheric dispersion from subsurface soil, and (3) volatilization and enclosed-space accumulation from subsurface soil.

Exposure pathways have been identified as (1) soil ingestion, dermal contact, inhalation of particulates from surficial soil, (2) inhalation of outdoor air vapors from subsurface soil, and (3) inhalation of indoor air vapors from subsurface soil.

Receptor characterization for all exposure pathways have been identified as residential and commercial/industrial land use.

Land Use Scenario

City of Oakland representative Mark Gomez reported that residential land use is the proposed future land use scenario. Tetra Tech evaluated the site using residential land use RBSLs and SSTLs.

Determination of Soil Category

The URL defines three distinct soil types in the City of Oakland for determining Tier 1 cleanup values: 1) sandy, 2) mixed sediments, and 3) clayey. The soil category determination for this site has been established as sandy and of the Merritt Sand formation. Field boring logs and geophysical analysis for site soils supports this conclusion (see Appendix B and C).

Determination of Tier 1 and 2 Cleanup Levels

Tetra Tech used Oakland RBSLs provided by EPA to determine eligibility for the Tier 1 checklist for each of the contaminants. Please consult Tables 3 through 6 in the Tetra Tech phase II environmental site assessment report for soil and groundwater contaminant concentrations and RBSLs.

Tetra Tech used Table E-1, SSTLs for Merritt Sands, provided by the EPA to determine Tier 2 cleanup levels for each of the contaminants. Please consult Tables 3 through 6 in the Tetra Tech phase II environmental site assessment for soil and groundwater contamination concentrations and corresponding Merritt Sand SSTLs.

APPENDIX B

SOIL BORING LOGS

Tt Tetra Tech EM Inc.

LOG OF BORING SB01

Sample ID	Sample Time	Drive Interval	Recovered Interval	Depth (ft)	Sample Interval	Graphic Log	USCS Code	MATERIALS DESCRIPTION
				1–5			SM	Well-graded FILL: SILTY SAND: very dark grayish brown (10YR 3/2); damp; loose; subangular, medium sand; with some fine gravel and miscellaneous debris
				6–8			SP	Poorly graded SAND: yellowish brown (10YR 5/4); damp; medium dense; subangular, medium sand
07		6	6	9–10	☒		SM	Poorly graded SILTY SAND: olive gray (5Y 5/2); damp; dense; subangular, medium sand; slight hydrocarbon odor
				11–16				Poorly graded SILTY SAND: mottled olive gray (5Y 5/2) with dark yellowish brown (10YR 4/4); damp; dense; subangular, medium sand; hydrocarbon odor present
08		6	6	17	☒			
				18–21			SC	Poorly graded CLAYEY SAND: brown (10YR 4/3); damp; dense; subangular, medium sand; hydrocarbon odor present
				22–23			SM	Poorly graded SILTY SAND: grayish brown (2.5Y 5/2); wet; dense; subangular, medium sand; hydrocarbon odor present
09		6	6	24	☒			Saturated from 24 feet
				25–35				Total Depth of Boring = 28 Feet Groundwater Screened from 36 to 40 Feet

▼ Water Table

☒ Lab Sample

PROJECT	Oakland Redevelopment Project	SAMPLING METHOD	
LOCATION	Preservation Park	GROUND ELEVATION	NA
JOB NUMBER	0R0981403SR	TOC ELEVATION	NA
LOGGED BY	Roy Glenn	BORING DIAMETER	2.25 Inches
DATE DRILLED	12/07/98	TOTAL DEPTH OF HOLE	28 Feet bgs
DRILLER	Fast Tek	WATER LEVEL	21.5 Feet bgs
DRILL METHOD	Geoprobe	WELL INSTALLED? (Y/N)	N

Tt Tetra Tech EM Inc.

LOG OF BORING SB02

Sample ID	Sample Time	Drive Interval	Recovered Interval	Depth (ft)	Sample Interval	Graphic Log	USCS Code	MATERIALS DESCRIPTION
				1–5			SM	FILL: well-graded SILTY SAND; grayish brown (10YR 3/2); damp; loose; subangular, medium sand; with some fine gravel
				6–8			SP	Poorly graded SAND: yellowish brown (10YR 5/4); damo; medium dense; *subangular, medium sand*
01		6	6	9–10	☒			
				11–16			SM	Poorly graded SILTY SAND: mottled olive gray (5Y 5/2) with dark yellowish brown (10YR 4/4); damp; dense; subangular, medium sand; hydrocarbon odor present at 12 feet
02		6	6	17	☒			
				18–21			SC	Poorly graded CLAYEY SAND: brown (10YR 4/3); damp; dense; subangular, medium sand; hydrocarbon odor present throughout soil
				22–23			SM	Poorly graded SILTY SAND: grayish brown (2.5Y 5/2); wet; dense; subangular, *medium sand*
03		6	6	24	☒			Saturated below 24 feet; extreme hydrocarbon odor at 24 feet
				25–30				
				31–35				Total Depth of Boring = 30 Feet Groundwater Screened from 36 to 40 Feet

▼ Water Table

☒ Lab Sample

PROJECT Oakland Redevelopment Project
LOCATION Preservation Park
JOB NUMBER 0R0981403SR
LOGGED BY Roy Glenn
DATE DRILLED 12/07/98
DRILLER East Tek
DRILL METHOD Geoprobe

SAMPLING METHOD
GROUND ELEVATION NA
TOC ELEVATION NA
BORING DIAMETER 2.25 Inches
TOTAL DEPTH OF HOLE 30 Feet bgs
WATER LEVEL 22 Feet bgs
WELL INSTALLED? (Y/N) N

Tt Tetra Tech EM Inc.

LOG OF BORING SB03

Sample ID	Sample Time	Drive Interval	Recovered Interval	Depth (ft)	Sample Interval	Graphic Log	USCS Code	MATERIALS DESCRIPTION
				1–2			SM	Well-graded SILTY SAND: dark brown; damp; loose; subangular, medium sand
				3–4			SP	Poorly graded SAND: light brown (10YR 5/5); saturated (perched water zone); loose; subangular, medium sand
				5–6			SC	Well-graded CLAYEY SAND: reddish brown; damp; dense; subrounded, fine sand
				7–8			SP	Poorly graded SAND: yellowish brown (10YR 5/4); damp; loose; subangular, medium sand
17		6 6 12	6 6 12	9–10	⊠			
				11–12				
				13–14			SM	Poorly graded SILTY SAND: mottled olive gray (5Y 5/2) with dark yellowish brown (10YR 4/4); damp; dense; subangular, medium sand
				15				
19 18		6 6 12	6 6 12	16–17	⊠			
				18–19				
				20–21				
				22–23				
20		6 12	6 12	24–25	⊠			Poorly graded SILTY SAND: grayish brown (2.5Y 5/2); wet; dense; subangular, medium sand Saturated below 25 feet
				26–27				
				28–29				
				30–31				Total Depth of Boring = 30 Feet Groundwater Screened from 25 to 29 Feet
				32–33				
				34–35				

▼ Water Table

⊠ Lab Sample

PROJECT	Oakland Redevelopment Project	SAMPLING METHOD	
LOCATION	Preservation Park	GROUND ELEVATION	NA
JOB NUMBER	0R0981403SR	TOC ELEVATION	NA
LOGGED BY	Roy Glenn	BORING DIAMETER	2.25 Inches
DATE DRILLED	12/09/98	TOTAL DEPTH OF HOLE	30 Feet bgs
DRILLER	Fast Tek	WATER LEVEL	23.5 Feet bgs
DRILL METHOD	Geoprobe	WELL INSTALLED? (Y/N)	N

Tt Tetra Tech EM Inc.

LOG OF BORING SB04

Sample ID	Sample Time	Drive Interval	Recovered Interval	Depth (ft)	Sample Interval	Graphic Log	USCS Code	MATERIALS DESCRIPTION
4		6	6	1–35	☒		SM	FILL: Well-graded SILTY SAND; very dark grayish brown (10YR 3/3); damp; loose; subangular, medium sand; with some fine gravel
								Total Depth of Boring = 5 Feet

▼ Water Table

☒ Lab Sample

PROJECT Oakland Redevelopment Project
LOCATION Preservation Park
JOB NUMBER 0R0981403SR
LOGGED BY Roy Glenn
DATE DRILLED 12/07/98
DRILLER Fast Tek
DRILL METHOD Geoprobe

SAMPLING METHOD
GROUND ELEVATION NA
TOC ELEVATION NA
BORING DIAMETER 2.25 Inches
TOTAL DEPTH OF HOLE 5 Feet bgs
WATER LEVEL None Encountered
WELL INSTALLED? (Y/N) N

Tt Tetra Tech EM Inc.

LOG OF BORING SB05

Sample ID	Sample Time	Drive Interval	Recovered Interval	Depth (ft)	Sample Interval	Graphic Log	USCS Code	MATERIALS DESCRIPTION
5		12	12	1–35	☒		SM	FILL: Well-graded SILTY SAND; very dark grayish brown (10YR 3/2); damp; loose; subangular, medium sand, with some fine gravel
								Total Depth of Boring = 5 Feet

▽ Water Table

☒ Lab Sample

PROJECT Oakland Redevelopment Project
LOCATION Preservation Park
JOB NUMBER OR0981403SR
LOGGED BY Roy Glenn
DATE DRILLED 12/17/98
DRILLER East Tek
DRILL METHOD Geoprobe

SAMPLING METHOD
GROUND ELEVATION NA
TOC ELEVATION NA
BORING DIAMETER 2.25 Inches
TOTAL DEPTH OF HOLE 5 Feet bgs
WATER LEVEL None Encountered
WELL INSTALLED? (Y/N) N

Tt Tetra Tech EM Inc.

LOG OF BORING SB06

Sample ID	Sample Time	Drive Interval	Recovered Interval	Depth (ft)	Sample Interval	Graphic Log	USCS Code	MATERIALS DESCRIPTION
6		12	12	1–35	X		SM	FILL: Well-graded SILTY SAND; very dark grayish brown (10YR 3/2); damp; loose; subangular, medium sand; with some fine gravel
								Total Depth of Boring = 5 Feet

▼ Water Table

☒ Lab Sample

PROJECT Oakland Redevelopment Project
LOCATION Preservation Park
JOB NUMBER 0R0981403SR
LOGGED BY Roy Glenn
DATE DRILLED 12/07/98
DRILLER Fast Tet
DRILL METHOD Geoprobe

SAMPLING METHOD
GROUND ELEVATION NA
TOC ELEVATION NA
BORING DIAMETER 2.25 Inches
TOTAL DEPTH OF HOLE 5 Feet bgs
WATER LEVEL None Encountered
WELL INSTALLED? (Y/N) N

APPENDIX C

PARTICLE-SIZE ANALYSIS RESULTS

Soil grain size

TERATEST LABS, INC.
Premier Geotechnical Testing

21 Alton Parkway, Suite 110
Irvine, California 92606
(949) 724-1776 FAX (949) 724-1557
www.teratest.com

PP3

December 17, 1998

Quanterra Environmental Services
880 Riverside Parkway
West Sacramento, CA 95605

Attention: Jon Gildersleeve

Subject: **Report/Laboratory Testing Results**
Project Name: Tetra Tech
LAB ID Prefix: 303082
Project No.: N/A
TERATEST No.: 987070-001

Dear Mr. Gildersleeve:

Enclosed please find laboratory testing results for the soil samples from the Tetra Tech project. The analysis performed on the samples from the above project was conducted in essential accordance with the standard testing procedure listed below.

TYPE OF TEST	TEST PROCEDURE
Particle-Size Analysis of Soils	ASTM D 422

Test results are presented in Table 1 and the attached Data Sheets.

ASTM: American Society for Testing and Materials, Annual Book of ASTM Standards, Section 4 Construction, Volume 4.08, Soil and Rock (I), 1998.

Thank you for selecting Teratest Labs, Inc. to provide laboratory testing services to Quanterra Environmental Services. Please feel free to contact us if you should have any questions concerning these results.

Very truly yours,

TERATEST LABS, INC.
Laboratory Testing Services

Lester Fruth

Lester Fruth, Ph.D.
Manager, Geotechnical Laboratory

Enclosures

1964

2121 Alton Parkway, Suite 110, Irvine, CA 92606 Tel. No. (949)724-1776 Fax. No. (949)724-1557

PROJECT NAME: TETRA TECH **Teratest No.:** 987070-001

LAB ID Prefix: 303082 **Summarized By:** LF

CLIENT: QUANTERRA ENVIRONMENTAL SERVICES **Date:** 12/17/98

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

LAB ID	SAMPLE DESCRIPTION	Particle-Size Distribution ASTM D 422 GR:SA:FI[1] (%)	Soil Identification ASTM D 2487 (group symbol)
303082-0004 SA	9850N004	1:83:16	SM
303082-0005 SA	9850N005	0:83:17	SM
303082-0006 SA	9850N006	0:84:16	SM

[1] GR:SA:FI = Gravel:Sand:Fines (Percent Passing #200 Sieve)

1964

TERATEST LABS, INC.

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM D 422

Project Name: Tetra Tech
Project No. : N/A
Boring No.: N/A
LAB ID: 303082-0004 SA
Visual Sample Description: Yellowish brown silty sand (SM)

Tested By : VJ Date: 12/15/98
Checked By : LF Date: 12/17/98
Depth (ft.) : N/A

		Moisture Content of Soil	
Container No.	533	Wt.of Wet Soil + Cont. (gm.)	221.11
Wt.of Dry Soil + Cont. (gm.)	208.27	Dry Wt. of Soil + Cont. (gm.)	208.27
Wt. of Container (gm.)	77.10	Wt. of Container No. 533 (gm.)	77.10
Dry Wt. of Soil (gm.)	131.17	Moisture Content (%)	9.79

AFTER WET SIEVE	Container No.	533
	Dry Wt. of Soil + Cont. (gm.)	187.54
	Wt. of Container (gm.)	77.10
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	110.44

U.S. SIEVE SIZE		CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
	(mm)		
6 "	(152.4)	0.00	100.0
3 "	(76.2)	0.00	100.0
1½ "	(38.1)	0.00	100.0
3/4 "	(19.0)	0.00	100.0
3/8 "	(9.5)	0.00	100.0
NO. 4	(4.75)	1.67	98.7
NO. 10	(2.00)	2.31	98.2
NO. 20	(0.850)	2.39	98.2
NO. 40	(0.425)	3.97	97.0
NO. 60	(0.250)	39.65	69.8
NO.100	(0.150)	93.16	29.0
NO.200	(0.075)	110.31	15.9
PAN			

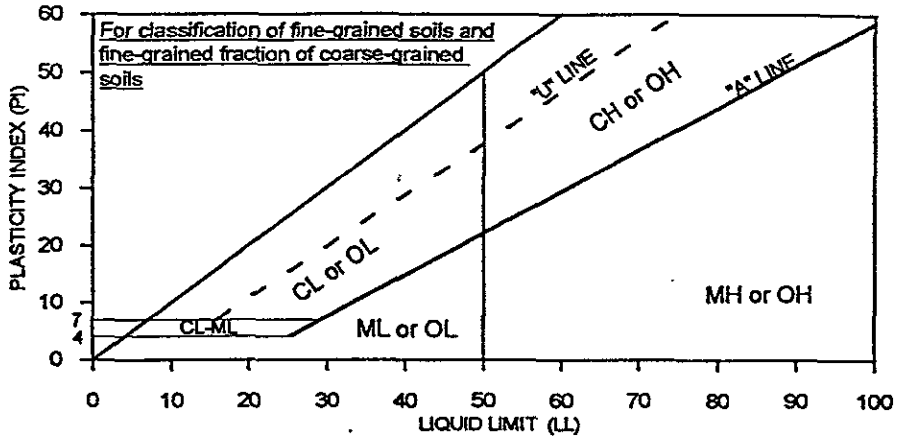
Cu = D60/D10 = N/A Cc= $(D30)^2/(D10 \times D60)$ = N/A

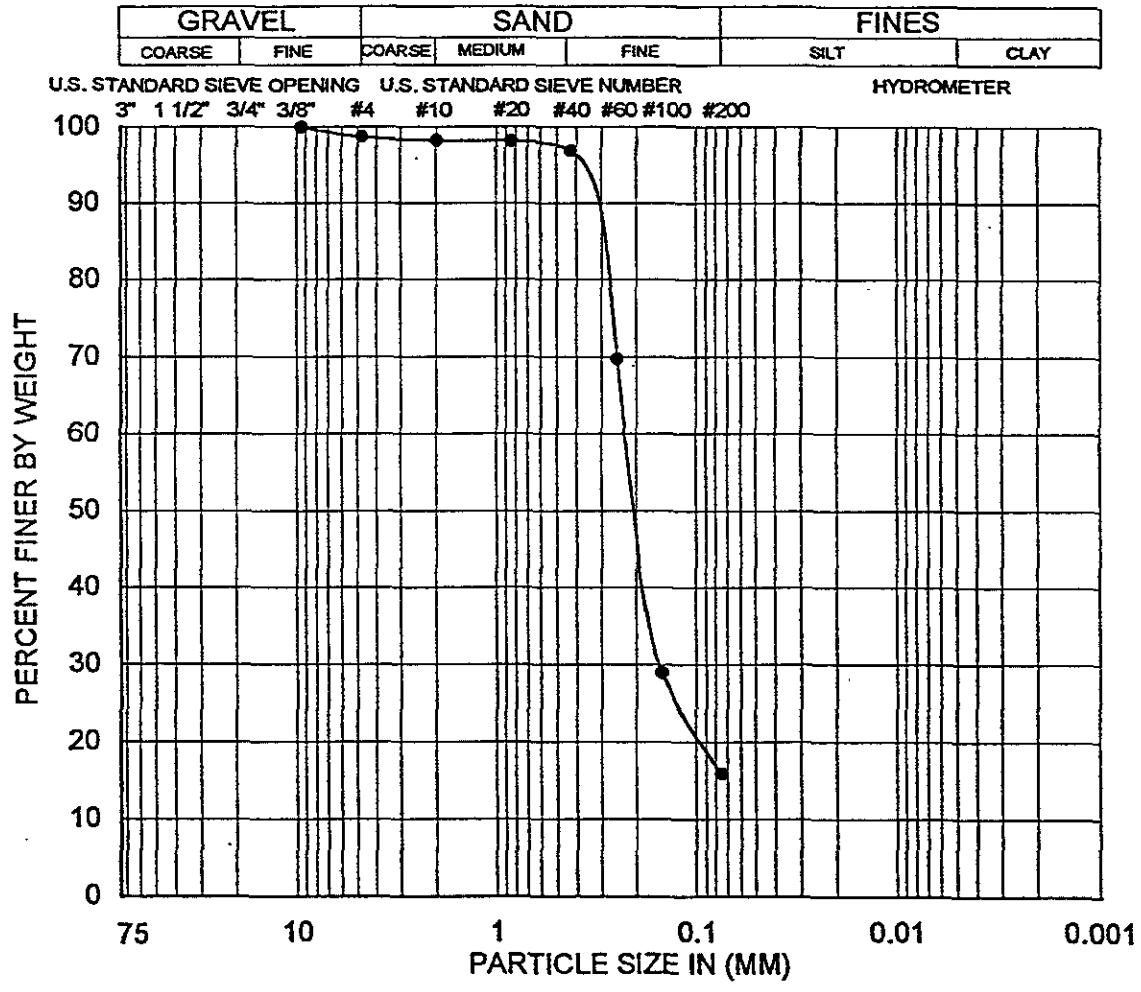
Remarks : Total available sample mass was insufficient to meet the ASTM specification for this analysis.

1965

GROUP SYMBOL: SM
GRAVEL: 1 %
SAND: 83 %
FINES: 16 %

L-004 10/93





LAB ID	SAMPLE DESCRIPTION	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
303082-0004 SA	9850N004	SM	1:83:16	N/A

Soil Description: Yellowish brown silty sand (SM)

TERRATEST LABS, INC.

LAB ID Prefix 303082

Tetra Tech

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

1966

12-98

TERATEST LABS, INC.

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM D 422

Project Name: Tetra Tech
Project No. : N/A
Boring No.: N/A
LAB ID: 303082-0005 SA
Visual Sample Description: Yellowish brown silty sand (SM)

Tested By : VJ Date: 12/15/98
Checked By : LF Date: 12/17/98
Depth (ft.) : N/A

		Moisture Content of Soil	
Container No.	539	Wt.of Wet Soil + Cont. (gm.)	242.36
Wt.of Dry Soil + Cont. (gm.)	226.31	Dry Wt. of Soil + Cont. (gm.)	226.31
Wt. of Container (gm.)	77.78	Wt. of Container No. 539 (gm.)	77.78
Dry Wt. of Soil (gm.)	148.53	Moisture Content (%)	10.81

AFTER WET SIEVE	Container No.	539
	Dry Wt. of Soil + Cont. (gm.)	200.59
	Wt. of Container (gm.)	77.78
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	122.81

U.S. SIEVE SIZE		CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
	(mm)		
6 "	(152.4)	0.00	100.0
3 "	(76.2)	0.00	100.0
1½ "	(38.1)	0.00	100.0
3/4 "	(19.0)	0.00	100.0
3/8 "	(9.5)	0.00	100.0
NO. 4	(4.75)	0.16	99.9
NO. 10	(2.00)	0.50	99.7
NO. 20	(0.850)	0.56	99.6
NO. 40	(0.425)	2.74	98.2
NO. 60	(0.250)	46.49	68.7
NO.100	(0.150)	103.69	30.2
NO.200	(0.075)	122.73	17.4
PAN			

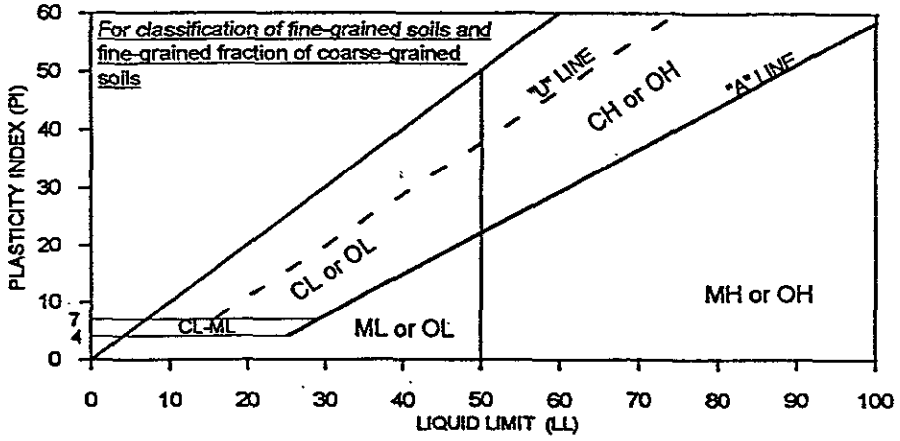
Cu = D60/D10 = N/A Cc= $(D30)^2/(D10 \times D60)$ = N/A

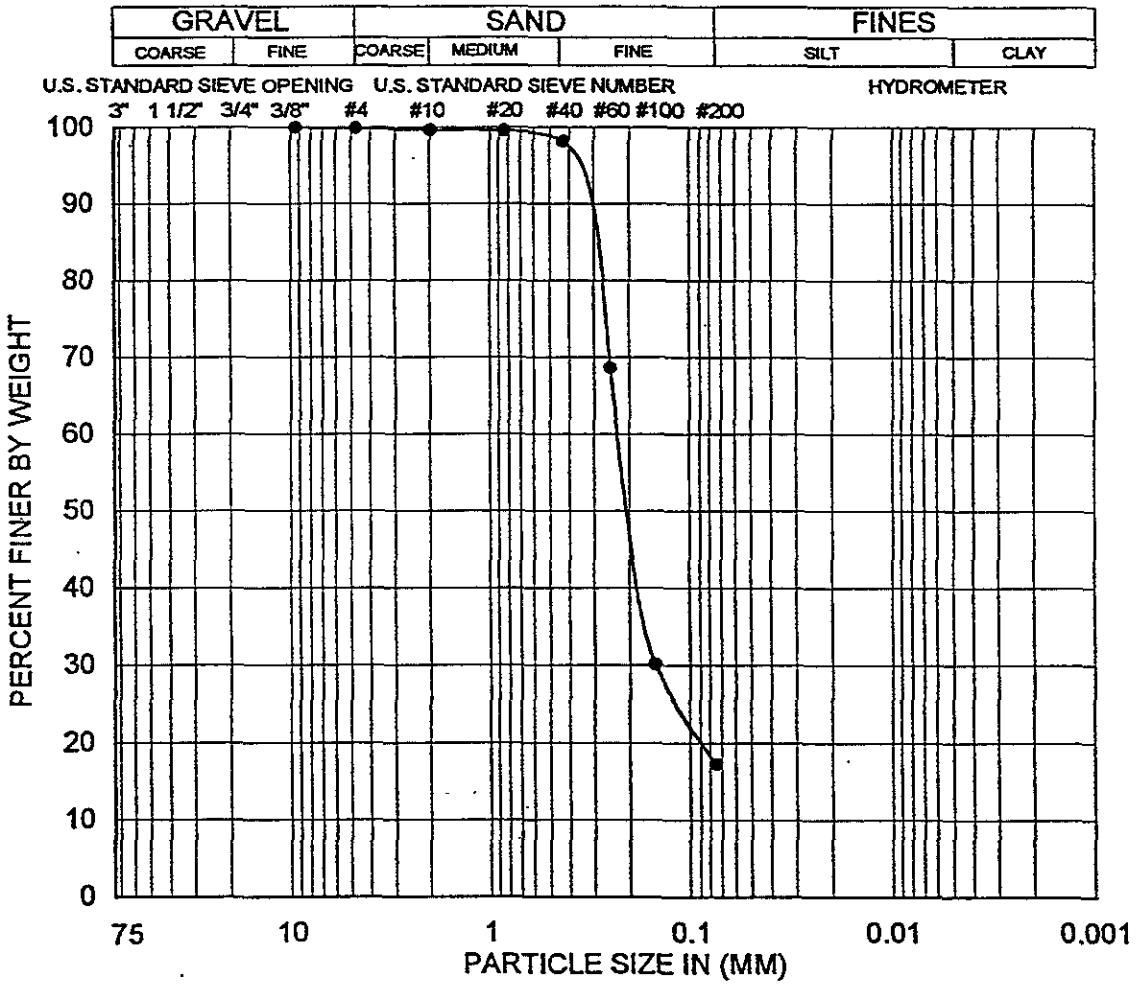
Remarks : Total available sample mass was insufficient to meet the ASTM specification for this analysis

GROUP SYMBOL: SM
GRAVEL: 0 %
SAND: 83 %
FINES: 17 %

L-004 10/93

1967





LAB ID	SAMPLE DESCRIPTION	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
303082-0005 SA	9850N005	SM	0:83:17	N/A

Soil Description. Yellowish brown silty sand (SM)

TERRACON LABS, INC.

LAB ID Prefix 303082

Tetra Tech

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

1968

12-98

TERATEST LABS, INC.

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM D 422

Project Name: Tetra Tech
Project No. : N/A
Boring No.: N/A
LAB ID: 303082-0006 SA
Visual Sample Description: Yellowish brown silty sand (SM)

Tested By : VJ Date: 12/15/98
Checked By : LF Date: 12/17/98
Depth (ft.) : N/A

		Moisture Content of Soil	
Container No.	548	Wt.of Wet Soil + Cont. (gm.)	232.25
Wt.of Dry Soil + Cont. (gm.)	218.26	Dry Wt. of Soil + Cont. (gm.)	218.26
Wt. of Container (gm.)	82.37	Wt. of Container No. 548 (gm.)	82.37
Dry Wt. of Soil (gm.)	135.89	Moisture Content (%)	10.30

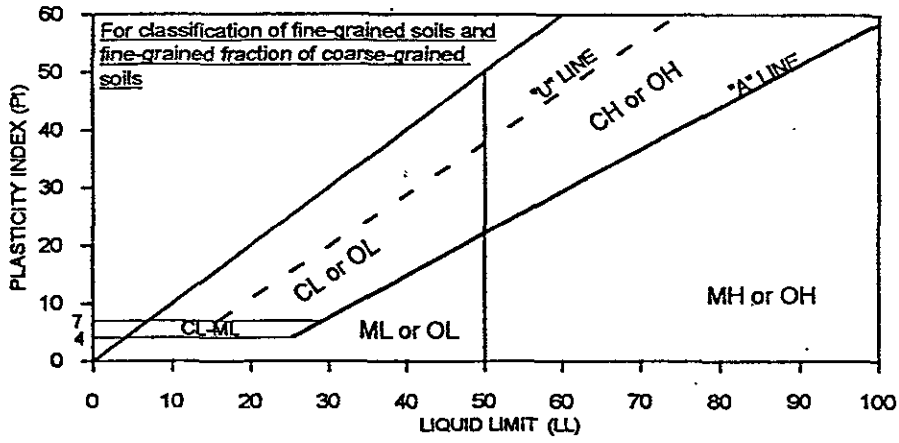
AFTER WET SIEVE	Container No.	548
	Dry Wt. of Soil + Cont. (gm.)	196.81
	Wt. of Container (gm.)	82.37
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	114.44

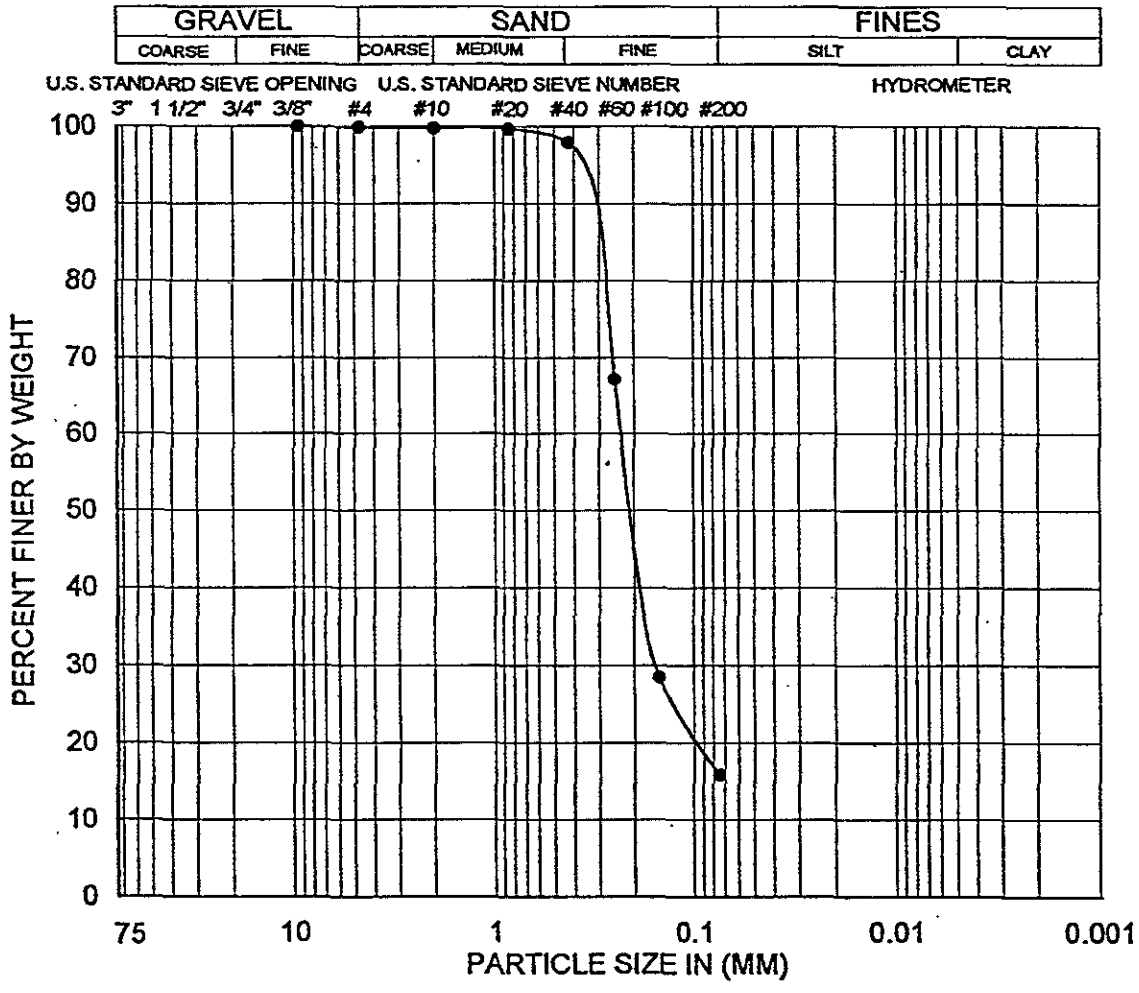
U.S. SIEVE SIZE		CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
	(mm)		
6 "	(152.4)	0.00	100.0
3 "	(76.2)	0.00	100.0
1½ "	(38.1)	0.00	100.0
3/4 "	(19.0)	0.00	100.0
3/8 "	(9.5)	0.00	100.0
NO. 4	(4.75)	0.15	99.9
NO. 10	(2.00)	0.28	99.8
NO. 20	(0.850)	0.40	99.7
NO. 40	(0.425)	2.76	98.0
NO. 60	(0.250)	44.54	67.2
NO.100	(0.150)	97.19	28.5
NO.200	(0.075)	114.34	15.9
PAN			

Cu = D60/D10 = N/A Cc= $(D30)^2/(D10 \times D60)$ = N/A

Remarks : Total available sample mass was insufficient to meet the ASTM specification for this analysis

GROUP SYMBOL: SM
GRAVEL: 0 %
SAND: 84 %
FINES: 16 %





LAB ID	SAMPLE DESCRIPTION	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
303082-0006 SA	9850N006	SM	0:84:16	N/A

Soil Description: Yellowish brown silty sand (SM)

TERRATEST LABS, INC.

LAB ID Prefix 303082

Tetra Tech

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-98

TEKTEST LABS, INC

PARTICLE - SIZE ANALYSIS of SOILS

ASTM D 422

Project Name: TETRA TECH Tested By: KJ Date: 12-15-98

Project No.: N/A Checked By: ZF Date: 12-17-98

Boring No.: N/A

Sample No.: 303082-4 Depth (ft.): N/A

Visual Sample Description: yel. BRN med. to fine sand

		Moisture Content of Total Air-Dry Soils	
Container No.	533	Wt.of Air-Dry Soil + Cont. (gm.)	221.11
Wt.of Air-Dry Soil + Cont. (gm.)	221.11	Dry Wt. of Soil + Cont. (gm.)	208.27
Wt. of Container 533 (gm.)	77.10	Wt. of Container No. 533 (gm.)	77.10
Dry Wt. of Soil (gm.)	131.17	Moisture Content (%)	9.79

AFTER WET SIEVE	Container No.	533
	Dry Wt. of Soil + Cont. (gm.)	187.54
	Wt. of Container (gm.)	77.10
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	110.44

U.S. SIEVE SIZE	(mm)	CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
6"	(152.4)		
3"	(76.2)		
1½"	(38.1)		
3/4"	(19.0)		
3/8"	(9.5)		
NO. 4	(4.75)	1.67	
NO. 10	(2.00)	2.31	
NO. 20	(0.85)	2.39	
NO. 40	(0.425)	3.97	
NO. 60	(0.25)	39.65	
NO.100	(0.15)	93.16	
NO.200	(0.075)	110.31	
PAN			

GRAVEL: N/A % Cc= (D30)²/(D10 x D60) = N/A

SAND: N/A % Cu = D60/D10 = N/A

FINES: N/A %

GRP SYMBOL: N/A

Remarks: Insufficient sample mass

1971

TERRATEST LABS, INC

PARTICLE - SIZE ANALYSIS of SOILS

ASTM D 422

Project Name: TETRA TECH Tested By: VF Date: 12-15-98

Project No.: N/A Checked By: LF Date: 12-17-98

Boring No.: N/A

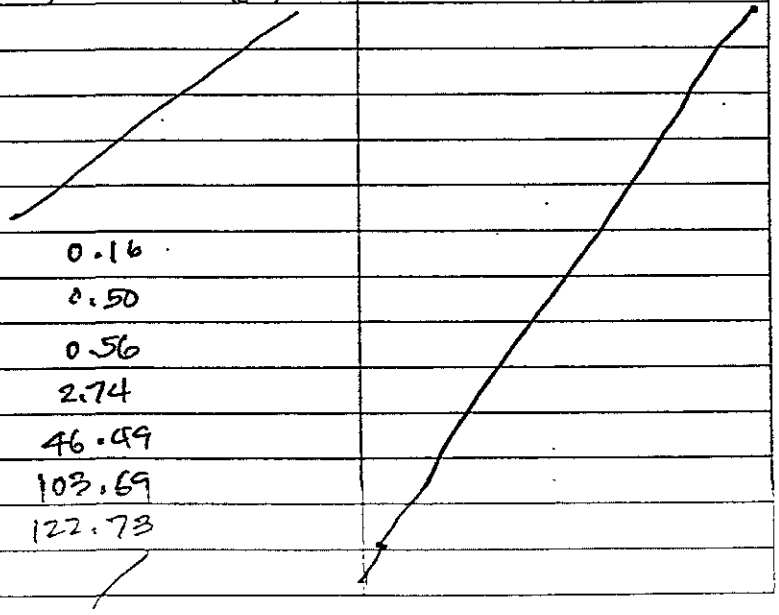
Sample No.: 303082-5 Depth (ft.): N/A

Visual Sample Description: yel. BRN rsnd. to fine sand

		Moisture Content of Total Air-Dry Soils	
Container No.	539	Wt.of Air-Dry Soil + Cont. (gm.)	242.36
Wt.of Air-Dry Soil + Cont. (gm.)	242.36	Dry Wt. of Soil + Cont. (gm.)	226.31
Wt. of Container 539 (gm.)	77.78	Wt. of Container No. 539 (gm.)	77.78
Dry Wt. of Soil (gm.)	148.54	Moisture Content (%)	10.80

AFTER WET SIEVE		
	Container No.	539
	Dry Wt. of Soil + Cont. (gm.)	200.59
	Wt. of Container (gm.)	77.78
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	122.81

U.S. SIEVE SIZE	(mm)	CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
6 "	(152.4)		
3 "	(76.2)		
1½ "	(38.1)		
3/4 "	(19.0)		
3/8 "	(9.5)		
NO. 4	(4.75)	0.16	
NO. 10	(2.00)	0.50	
NO. 20	(0.85)	0.56	
NO. 40	(0.425)	2.74	
NO. 60	(0.25)	46.49	
NO.100	(0.15)	103.69	
NO.200	(0.075)	122.73	
PAN			



GRAVEL: N/A % Cc= $(D30)^2/(D10 \times D60)$ = N/A

SAND: N/A % Cu = D60/D10 = N/A

FINES: N/A %

GRP SYMBOL: N/A

Remarks: Not enough sample

1972

TESTEST LABS, INC

PARTICLE - SIZE ANALYSIS of SOILS

ASTM D 422

Project Name: TETRA TECH Tested By: VJ Date: 12-15-98

Project No.: N/A Checked By: ZF Date: 12-17-98

Boring No.: N/A

Sample No.: 303082-6 Depth (ft.): N/A

Visual Sample Description: yel Brn med. to fine sand

		Moisture Content of Total Air-Dry Soils	
Container No.	548	Wt.of Air-Dry Soil + Cont. (gm.)	232.25
Wt.of Air-Dry Soil + Cont. (gm.)	232.25	Dry Wt. of Soil + Cont. (gm.)	218.26
Wt. of Container 548 (gm.)	82.37	Wt. of Container No. 548 (gm.)	82.37
Dry Wt. of Soil (gm.)	137.88	Moisture Content (%)	10.30

AFTER WET SIEVE		
	Container No.	548
	Dry Wt. of Soil + Cont. (gm.)	196.81
	Wt. of Container (gm.)	82.37
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	114.44

U.S. SIEVE SIZE	(mm)	CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
6"	(152.4)		
3"	(76.2)		
1½"	(38.1)		
3/4"	(19.0)		
3/8"	(9.5)		
NO. 4	(4.75)	0.15	
NO. 10	(2.00)	0.28	
NO. 20	(0.85)	0.40	
NO. 40	(0.425)	2.76	
NO. 60	(0.25)	44.54	
NO.100	(0.15)	97.19	
NO.200	(0.075)	114.34	
PAN			

GRAVEL: N/A % Cc= (D30)²/(D10 x D60) = N/A

SAND: N/A % Cu = D60/D10 = N/A

FINES: N/A %

GRP SYMBOL: N/A

Remarks: Not enough sample

1973

TERATEST LABS, INC.
Premier Geotechnical Testing

2121 Alton Parkway, Suite 110
Irvine, California 92606
(949) 724-1776 FAX (949) 724-1557
www.teratest.com

PP3

December 17, 1998

Quanterra Environmental Services
880 Riverside Parkway
West Sacramento, CA 95605

Attention: Jon Gildersleeve

Subject: **Report/Laboratory Testing Results**
Project Name: Tetra Tech
LAB ID Prefix: 303115
Project No.: N/A
TERATEST No.: 987069-001

Dear Mr. Gildersleeve:

Enclosed please find laboratory testing results for the soil samples from the Tetra Tech project. The analysis performed on the samples from the above project was conducted in essential accordance with the standard testing procedure listed below.

TYPE OF TEST	TEST PROCEDURE
Particle-Size Analysis of Soils	ASTM D 422

Test results are presented in Table 1 and the attached Data Sheets.

ASTM: American Society for Testing and Materials, Annual Book of ASTM Standards, Section 4 Construction, Volume 4.08, Soil and Rock (I), 1998.

Thank you for selecting Teratest Labs, Inc. to provide laboratory testing services to Quanterra Environmental Services. Please feel free to contact us if you should have any questions concerning these results.

Very truly yours,

TERATEST LABS, INC.
Laboratory Testing Services

Lester Fruth

Lester Fruth, Ph.D.
Manager, Geotechnical Laboratory

Enclosures

2121 Alton Parkway, Suite 110, Irvine, CA 92606 Tel. No. (949)724-1776 Fax. No. (949)724-1557

PROJECT NAME: TETRA TECH Teratest No.: 987069-001

LAB ID Prefix: 303115 Summarized By: LF

CLIENT: QUANTERRA ENVIRONMENTAL SERVICES Date: 12/17/98

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

LAB ID	SAMPLE DESCRIPTION	Particle-Size Distribution ASTM D 422 GR:SA:FI[1] (%)	Soil Identification ASTM D 2487 (group symbol)
303115-0006 SA	9850N017	0:83:17	SM
303115-0007 SA	9850N018	0:82:18	SM
303115-0009 SA	9850N020	0:82:18	SM

[1] GR:SA:FI = Gravel:Sand:Fines (Percent Passing #200 Sieve)

TERATEST LABS, INC.

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM D 422

Project Name: Tetra Tech
Project No. : N/A
Boring No.: N/A
LAB ID: 303115-0006 SA
Visual Sample Description: Yellowish brown silty sand (SM)

Tested By : VJ
Checked By : ZF

Depth (ft.) : N/A

Date: 12/15/98
Date: 12/17/98

		Moisture Content of Soil	
Container No.	C-108	Wt.of Wet Soil + Cont. (gm.)	227.82
Wt.of Dry Soil + Cont. (gm.)	211.96	Dry Wt. of Soil + Cont. (gm.)	211.96
Wt. of Container (gm.)	74.36	Wt. of Container No. C-108 (gm.	74.36
Dry Wt. of Soil (gm.)	137.60	Moisture Content (%)	11.53

AFTER WET SIEVE	Container No.	C-108
	Dry Wt. of Soil + Cont. (gm.)	188.64
	Wt. of Container (gm.)	74.36
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	114.28

U.S. SIEVE SIZE		CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
	(mm)		
6 "	(152.4)	0.00	100.0
3 "	(76.2)	0.00	100.0
1½ "	(38.1)	0.00	100.0
3/4 "	(19.0)	0.00	100.0
3/8 "	(9.5)	0.00	100.0
NO. 4	(4.75)	0.00	100.0
NO. 10	(2.00)	0.00	100.0
NO. 20	(0.850)	0.03	100.0
NO. 40	(0.425)	1.59	98.8
NO. 60	(0.250)	45.28	67.1
NO.100	(0.150)	100.24	27.2
NO.200	(0.075)	114.14	17.0
PAN			

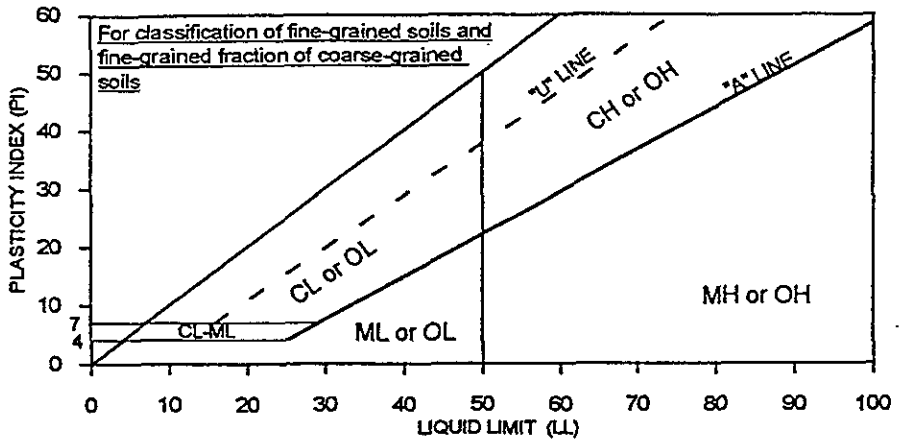
Cu = D60/D10 = N/A Cc= $(D30)^2/(D10 \times D60)$ = N/A

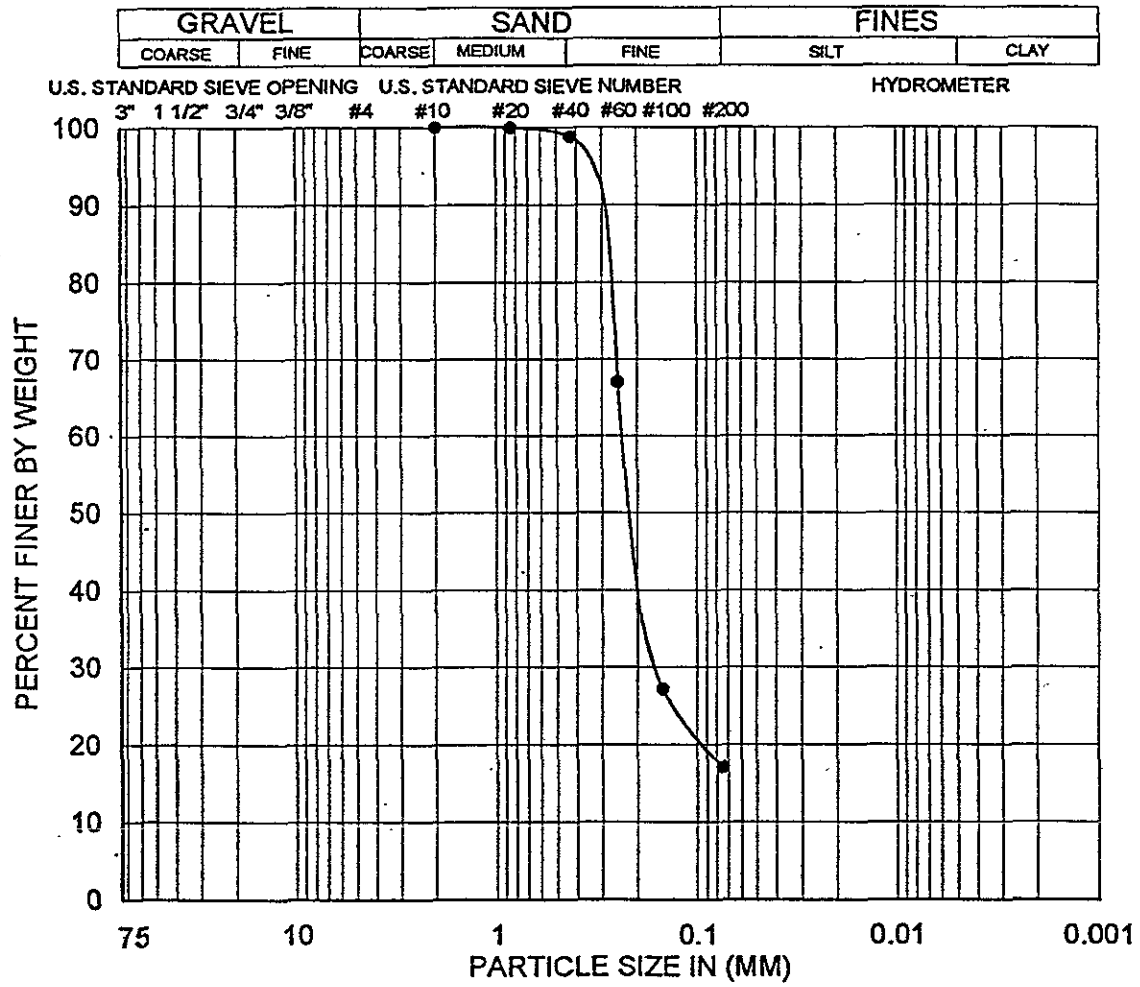
Remarks : NONE

1646

GROUP SYMBOL: SM
GRAVEL: 0 %
SAND: 83 %
FINES: 17 %

L-004 10/93





LAB ID	SAMPLE DESCRIPTION	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
303115-0006 SA	9850N017	SM	0:83:17	N/A

Soil Description: Yellowish brown silty sand (SM)

TERRATEST LABS, INC

LAB ID Prefix 303115

Tetra Tech

1647

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-98

TERATEST LABS, INC.

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM D 422

Project Name: Tetra Tech
Project No. : N/A
Boring No.: N/A
LAB ID: 303115-0007 SA
Visual Sample Description: Yellowish brown silty sand (SM)

Tested By : VJ Date: 12/15/98
Checked By : LF Date: 12/17/98

Depth (ft.) : N/A

		Moisture Content of Soil	
Container No.	526	Wt.of Wet Soil + Cont. (gm.)	228.72
Wt.of Dry Soil + Cont. (gm.)	207.35	Dry Wt. of Soil + Cont. (gm.)	207.35
Wt. of Container (gm.)	76.87	Wt. of Container No. 526 (gm.)	76.87
Dry Wt. of Soil (gm.)	130.48	Moisture Content (%)	16.38

AFTER WET SIEVE	Container No.	526
	Dry Wt. of Soil + Cont. (gm.)	184.53
	Wt. of Container (gm.)	76.87
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	107.66

U.S. SIEVE SIZE		CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
	(mm)		
6 "	(152.4)	0.00	100.0
3 "	(76.2)	0.00	100.0
1½ "	(38.1)	0.00	100.0
3/4 "	(19.0)	0.00	100.0
3/8 "	(9.5)	0.00	100.0
NO. 4	(4.75)	0.00	100.0
NO. 10	(2.00)	0.00	100.0
NO. 20	(0.850)	0.00	100.0
NO. 40	(0.425)	4.96	96.2
NO. 60	(0.250)	64.86	50.3
NO.100	(0.150)	97.42	25.3
NO.200	(0.075)	107.64	17.5
PAN			

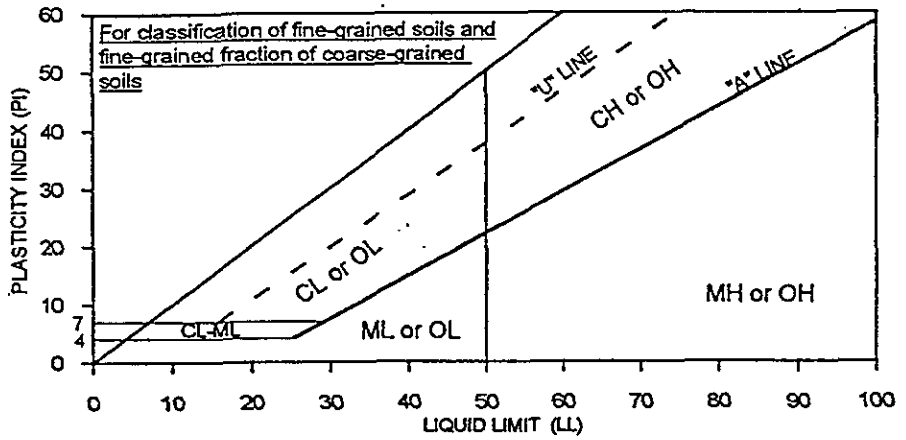
Cu = D60/D10 = N/A Cc= $(D30)^2/(D10 \times D60)$ = N/A

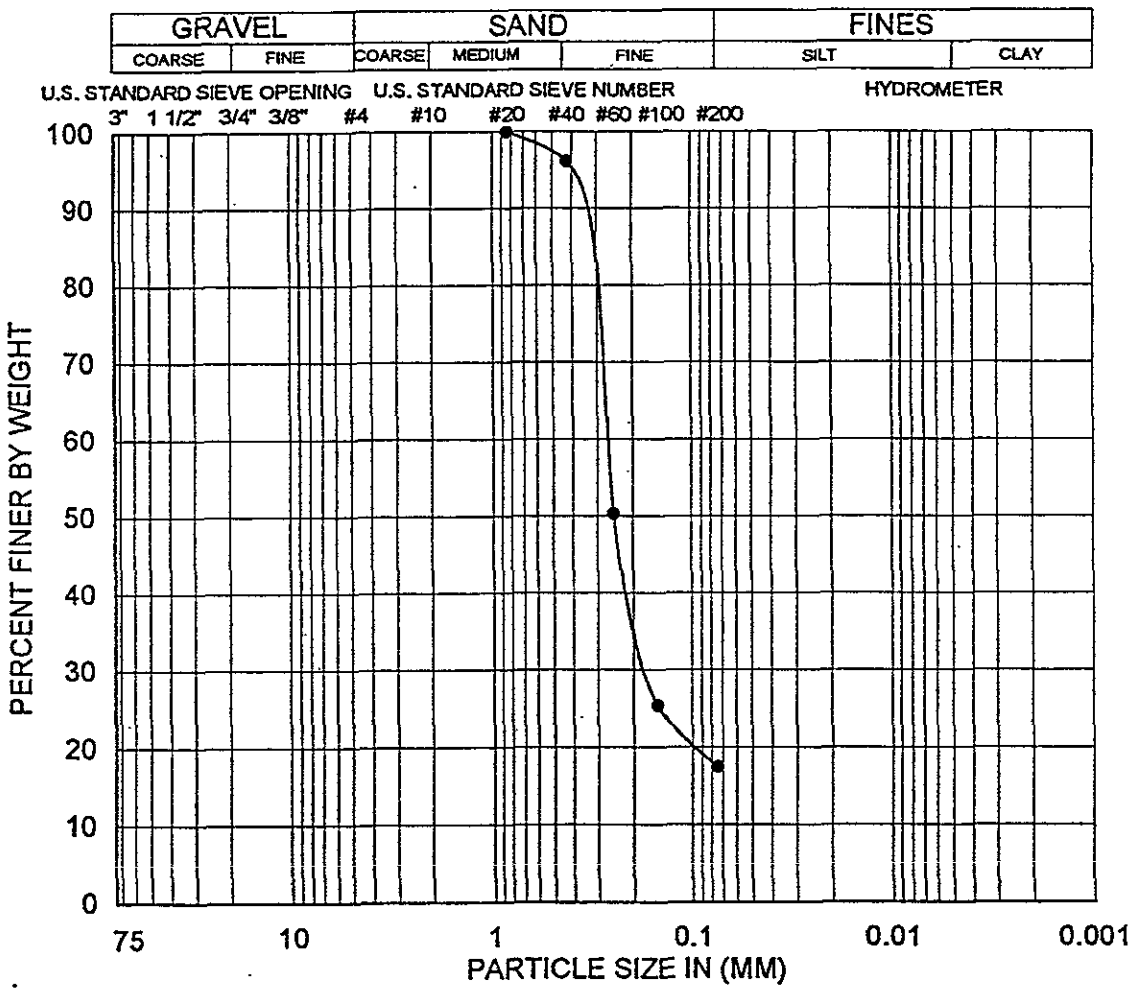
1648

Remarks : NONE

GROUP SYMBOL: SM
GRAVEL: 0 %
SAND: 82 %
FINES: 18 %

L-004 10/93





LAB ID	SAMPLE DESCRIPTION	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
303115-0007 SA	9850N018	SM	0:82:18	N/A

Soil Description: Yellowish brown silty sand (SM)

TERRATEST LABS, INC.

LAB ID Prefix 303115

Tetra Tech

1649

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-98

TERATEST LABS, INC.

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D 422

Project Name: Tetra Tech
Project No. : N/A
Boring No.: N/A
LAB ID: 303115-0009 SA
Visual Sample Description: Yellowish brown silty sand (SM)

Tested By : VJ Date: 12/15/98
Checked By : LF Date: 12/17/98

Depth (ft.) : N/A

		Moisture Content of Soil	
Container No.	754	Wt.of Wet Soil + Cont. (gm.)	230.82
Wt.of Dry Soil + Cont. (gm.)	206.42	Dry Wt. of Soil + Cont. (gm.)	206.42
Wt. of Container (gm.)	75.31	Wt. of Container No. 754 (gm.)	75.31
Dry Wt. of Soil (gm.)	131.11	Moisture Content (%)	18.61

AFTER WET SIEVE	Container No.	754
	Dry Wt. of Soil + Cont. (gm.)	182.67
	Wt. of Container (gm.)	75.31
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	107.36

U.S. SIEVE SIZE (mm)	CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
6 " (152.4)	0.00	100.0
3 " (76.2)	0.00	100.0
1½ " (38.1)	0.00	100.0
3/4 " (19.0)	0.00	100.0
3/8 " (9.5)	0.00	100.0
NO. 4 (4.75)	0.00	100.0
NO. 10 (2.00)	0.20	99.8
NO. 20 (0.850)	0.54	99.6
NO. 40 (0.425)	4.23	96.8
NO. 60 (0.250)	45.38	65.4
NO.100 (0.150)	93.26	28.9
NO.200 (0.075)	107.33	18.1
PAN		

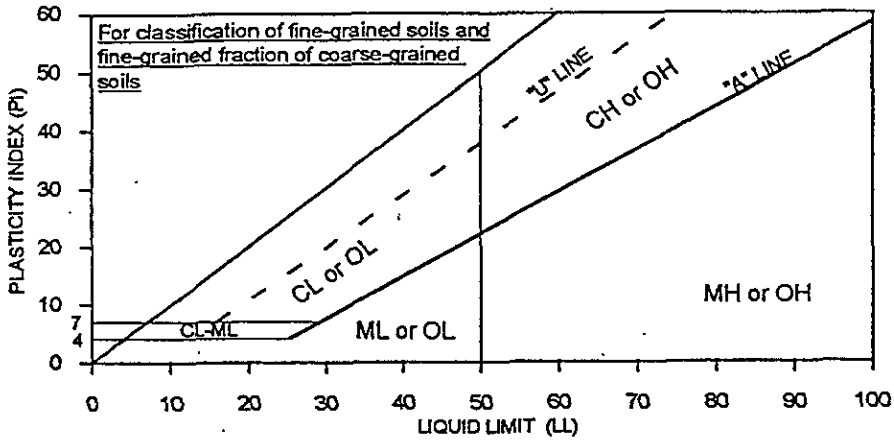
Cu = D60/D10 = N/A Cc= $(D30)^2/(D10 \times D60)$ = N/A

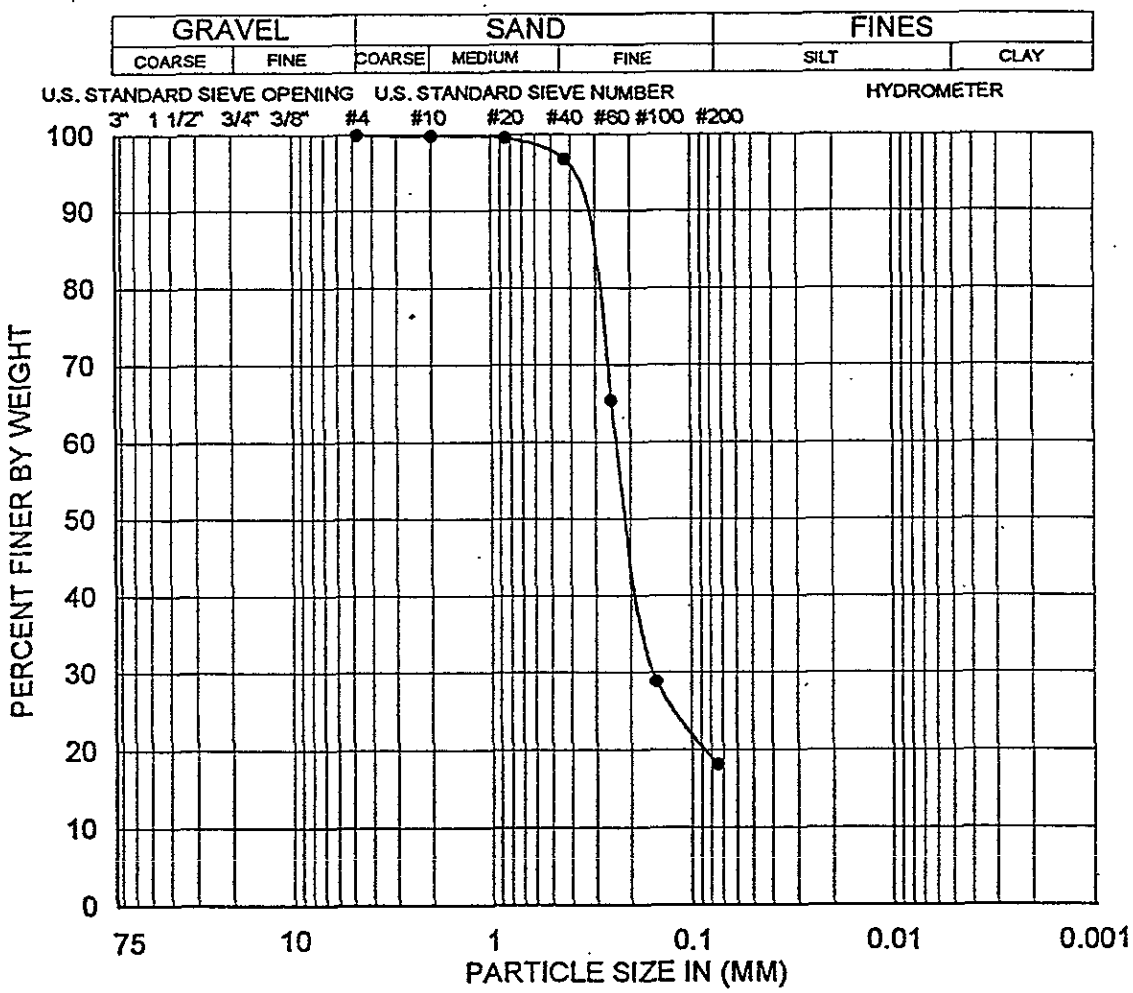
Remarks : NONE

1650

GROUP SYMBOL: SM
GRAVEL: 0 %
SAND: 82 %
FINES: 18 %

L-004 10/93





LAB ID	SAMPLE DESCRIPTION	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
303115-0009 SA	9850N020	SM	0:82:18	N/A

Soil Description: Yellowish brown silty sand (SM)

TERRATEST LABS, INC.

LAB ID Prefix 303115

Tetra Tech

1651

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-98

TERRATEST LABS, INC

PARTICLE - SIZE ANALYSIS of SOILS

ASTM D 422

Project Name: TETRA TECH Tested By: VT Date: 12-15-98

Project No.: N/A Checked By: ZF Date: 12-17-98

Boring No.: N/A

Sample No.: 303115-6 Depth (ft.):

Visual Sample Description: yer. BRN. rnd. to fine sand

		Moisture Content of Total Air-Dry Soils	
Container No.	C-108	Wt.of Air-Dry Soil + Cont. (gm.)	227.82
Wt.of Air-Dry Soil + Cont. (gm.)	227.82	Dry Wt. of Soil + Cont. (gm.)	211.96
Wt. of Container C-108 (gm.)	74.36	Wt. of Container No.C-108(gm.)	74.36
Dry Wt. of Soil (gm.)	137.60	Moisture Content (%)	11.53

AFTER WET SIEVE		
	Container No.	C-108
	Dry Wt. of Soil + Cont. (gm.)	188.64
	Wt. of Container (gm.)	74.36
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	

U.S. SIEVE SIZE		CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
6 "	(152.4)		
3 "	(76.2)		
1½ "	(38.1)		
3/4 "	(19.0)		
3/8 "	(9.5)		
NO. 4	(4.75)		
NO. 10	(2.00)		
NO. 20	(0.85)	0.03	
NO. 40	(0.425)	1.59	
NO. 60	(0.25)	45.28	
NO.100	(0.15)	100.24	
NO.200	(0.075)	114.14	
PAN			

GRAVEL: N/A % Cc= (D30)²/(D10 x D60) = N/A

SAND. N/A % Cu = D60/D10 = N/A

FINES: N/A %

GRP SYMBOL: N/A

Remarks: None

1652

TERRACON LABS, INC

PARTICLE - SIZE ANALYSIS of SOILS

ASTM D 422

Project Name: TETRA TECH Tested By: VJ Date: 12-15-98

Project No.: N/A Checked By: LF Date: 12-17-98

Boring No.: N/A

Sample No.: 303115-7 Depth (ft.): N/A

Visual Sample Description: Yel Brn med. to fine sand

		Moisture Content of Total Air-Dry Soils	
Container No.	526	Wt.of Air-Dry Soil + Cont. (gm.)	228.72
Wt.of Air-Dry Soil + Cont. (gm.)	228.72	Dry Wt. of Soil + Cont. (gm.)	207.35
Wt. of Container 726 (gm.)	76.87	Wt. of Container No. 526 (gm.)	76.87
Dry Wt. of Soil (gm.)	130.48	Moisture Content (%)	16.38

AFTER WET SIEVE		
	Container No.	526
	Dry Wt. of Soil + Cont. (gm.)	184.53
	Wt. of Container (gm.)	76.87
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	107.66

U.S. SIEVE SIZE	(mm)	CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
6"	(152.4)		
3"	(76.2)		
1½"	(38.1)		
3/4"	(19.0)		
3/8"	(9.5)		
NO. 4	(4.75)		
NO. 10	(2.00)		
NO. 20	(0.85)		
NO. 40	(0.425)	84.96	
NO. 60	(0.25)	64.86	
NO.100	(0.15)	97.92	
NO.200	(0.075)	107.66	
PAN			

GRAVEL: N/A % Cc= $(D30)^2/(D10 \times D60)$ = N/A

SAND: N/A % Cu = D60/D10 = N/A

FINES: N/A %

GRP SYMBOL: N/A

Remarks: None

1653

TERRATEST LABS, INC

PARTICLE - SIZE ANALYSIS of SOILS

ASTM D 422

Project Name: TETRA TECH Tested By: VT Date: 12-15-98

Project No.: N/A Checked By: LF Date: 12-17-98

Boring No.: N/A

Sample No.: 303115-9 Depth (ft.): N/A

Visual Sample Description: yel. tan mud to fine sand

		Moisture Content of Total Air-Dry Soils	
Container No.	754	Wt.of Air-Dry Soil + Cont. (gm.)	230.82
Wt.of Air-Dry Soil + Cont. (gm.)	230.82	Dry Wt. of Soil + Cont. (gm.)	206.42
Wt. of Container 754 (gm.)	75.31	Wt. of Container No. 754 (gm.)	75.31
Dry Wt. of Soil (gm.)	131.11	Moisture Content (%)	18.61

AFTER WET SIEVE		
	Container No.	754
	Dry Wt. of Soil + Cont. (gm.)	182.67
	Wt. of Container (gm.)	75.31
	Dry Wt. of Soil Retained # 200 Sieve (gm.)	107.36

U.S. SIEVE SIZE	(mm)	CUMULATIVE WEIGHT Dry Soil Retained (gm)	PERCENT PASSING
6 "	(152.4)		
3 "	(76.2)		
1½ "	(38.1)		
3/4 "	(19.0)		
3/8 "	(9.5)		
NO. 4	(4.75)		
NO. 10	(2.00)	0.20	
NO. 20	(0.85)	0.54	
NO. 40	(0.425)	4.23	
NO. 60	(0.25)	45.38	
NO.100	(0.15)	93.26	
NO.200	(0.075)	107.33	
PAN		/	

GRAVEL: N/A %

SAND: N/A %

FINES: N/A %

GRP SYMBOL: N/A

Cc= (D30)²/(D10 x D60) = N/A

Cu = D60/D10 = N/A

Remarks: None

1654

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N001	SB-1	Aluminum	Water	—	245	mg/L
		Arsenic	Water	—	0.095	mg/L
		Barium	Water	—	24.6	mg/L
		Beryllium	Water	—	0.0056	mg/L
		Cadmium	Water	—	0.0085	mg/L
		Calcium	Water	—	68.1	mg/L
		Chromium	Water	—	0.69	mg/L
		Cobalt	Water	—	0.19	mg/L
		Copper	Water	—	0.50	mg/L
		Iron	Water	—	376	mg/L
		Lead	Water	—	0.29	mg/L
		Magnesium	Water	—	121	mg/L
		Manganese	Water	—	10.5	mg/L
		Mercury	Water	—	0.0022	mg/L
		Molybdenum	Water	—	0.014	mg/L
		Nickel	Water	—	0.89	mg/L
		Potassium	Water	—	24.8	mg/L
		Sodium	Water	—	555	mg/L
		Vanadium	Water	—	0.65	mg/L
		Zinc	Water	—	1.3	mg/L
		Naphthalene	Water	—	3.3	µg/L
		1,2,3-Trichlorobenzene	Water	—	3.5	µg/L
		cis-1,2-Dichloroethene	Water	—	670	µg/L
		Tetrachloroethene	Water	—	570	µg/L
		Toluene	Water	—	3.2	µg/L
		trans-1,2-Dichloroethene	Water	—	34	µg/L
		Trichloroethene	Water	—	730	µg/L
		Trichlorofluoromethane	Water	—	4.0	µg/L
		Vinyl chloride	Water	—	12	µg/L
		Aroclor-1254	Water	—	5.8	µg/L
		Unknown hydrocarbon	Water	—	650	µg/L
9852N002	SB-2	Aluminum	Water	—	114	mg/L
		Arsenic	Water	—	0.041	mg/L
		Barium	Water	—	2.6	mg/L
		Beryllium	Water	—	0.0020	mg/L
		Cadmium	Water	—	0.011	mg/L
		Calcium	Water	—	38.2	mg/L
		Chromium	Water	—	0.44	mg/L
		Cobalt	Water	—	0.20	mg/L
		Copper	Water	—	0.23	mg/L
		Iron	Water	—	172	mg/L
		Lead	Water	—	0.18	mg/L
		Magnesium	Water	—	76.5	mg/L
		Manganese	Water	—	4.8	mg/L
		Mercury	Water	—	0.0021	mg/L
		Molybdenum	Water	—	0.011	mg/L
		Nickel	Water	—	0.40	mg/L
		Potassium	Water	—	37.5	mg/L
		Sodium	Water	—	973	mg/L
		Vanadium	Water	—	0.32	mg/L
		Zinc	Water	—	0.70	mg/L
		Unknown hydrocarbon	Water	—	2,400.00	µg/L
		cis-1,2-Dichloroethene	Water	—	390	µg/L
		Tetrachloroethene	Water	—	6,300.00	µg/L
		Trichloroethene	Water	—	1,600.00	µg/L
		Aroclor 1254	Water	—	8.2	µg/L
9852N003	SB-3	Aluminum	Water	—	78.1	mg/L
		Arsenic	Water	—	0.033	mg/L
		Barium	Water	—	1.3	mg/L
		Beryllium	Water	—	0.00098	mg/L
		Calcium	Water	—	54.7	mg/L

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N003 (cont.)	SB-3 (cont.)	Chromium	Water	—	0.22	mg/L
		Cobalt	Water	—	0.065	mg/L
		Copper	Water	—	0.14	mg/L
		Iron	Water	—	109	mg/L
		Lead	Water	—	0.067	mg/L
		Magnesium	Water	—	111	mg/L
		Manganese	Water	—	3.8	mg/L
		Mercury	Water	—	0.0020	mg/L
		Nickel	Water	—	0.28	mg/L
		Potassium	Water	—	18.5	mg/L
		Silver	Water	—	0.0066	mg/L
		Sodium	Water	—	1,920.00	mg/L
		Vanadium	Water	—	0.24	mg/L
		Zinc	Water	—	0.32	mg/L
		2-Methylnaphthalene	Water	—	2.1	µg/L
		di-n-butylphthalate	Water	—	33	µg/L
		cis-1,2-Dichloroethene	Water	—	18,000.00	µg/L
		Tetrachloroethene	Water	—	150,000.00	µg/L
		Trichloroethene	Water	—	21,000.00	µg/L
		Unknown hydrocarbon	Water	—	390,000.00	µg/L
9852N004	SB-4	Aluminum	Water	—	45.6	mg/L
		Arsenic	Water	—	0.019	mg/L
		Barium	Water	—	0.64	mg/L
		Calcium	Water	—	34.5	mg/L
		Chromium	Water	—	0.13	mg/L
		Cobalt	Water	—	0.030	mg/L
		Copper	Water	—	0.12	mg/L
		Iron	Water	—	69.6	mg/L
		Lead	Water	—	0.10	mg/L
		Magnesium	Water	—	32.9	mg/L
		Manganese	Water	—	1.5	mg/L
		Molybdenum	Water	—	0.022	mg/L
		Nickel	Water	—	0.16	mg/L
		Potassium	Water	—	6.3	mg/L
		Sodium	Water	—	605	mg/L
		Vanadium	Water	—	0.14	mg/L
		Zinc	Water	—	0.40	mg/L
		Tetrachloroethene	Water	—	1.2	µg/L
		Aroclor-1254	Water	—	0.66	µg/L
9852N005	SB-5	Aluminum	Water	—	206	mg/L
		Arsenic	Water	—	0.080	mg/L
		Barium	Water	—	3.0	mg/L
		Beryllium	Water	—	0.0044	mg/L
		Cadmium	Water	—	0.0064	mg/L
		Calcium	Water	—	61.6	mg/L
		Chromium	Water	—	0.46	mg/L
		Cobalt	Water	—	0.14	mg/L
		Copper	Water	—	0.28	mg/L
		Iron	Water	—	261	mg/L
		Lead	Water	—	0.088	mg/L
		Magnesium	Water	—	83.9	mg/L
		Manganese	Water	—	10.8	mg/L
		Mercury	Water	—	0.00052	mg/L
		Molybdenum	Water	—	0.016	mg/L
		Nickel	Water	—	0.83	mg/L
		Potassium	Water	—	22.1	mg/L
		Sodium	Water	—	520	mg/L
		Vanadium	Water	—	0.40	mg/L
		Zinc	Water	—	0.63	mg/L
		cis-1,2-Dichloroethene	Water	—	57	µg/L
		Tetrachloroethene	Water	—	59	µg/L

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N005 (cont.)	SB-5 (cont.)	Toluene	Water	—	1.0	µg/L
		trans-1,2-Dichloroethene	Water	—	2.0	µg/L
		Trichloroethene	Water	—	190	µg/L
		Vinyl Chloride	Water	—	9.5	µg/L
9852N006	SB-5 (duplicate)	Aluminum	Water	—	223	mg/L
		Arsenic	Water	—	0.084	mg/L
		Barium	Water	—	3.1	mg/L
		Beryllium	Water	—	0.0042	mg/L
		Cadmium	Water	—	0.0072	mg/L
		Calcium	Water	—	67.3	mg/L
		Chromium	Water	—	0.50	mg/L
		Cobalt	Water	—	0.13	mg/L
		Copper	Water	—	0.30	mg/L
		Iron	Water	—	279	mg/L
		Lead	Water	—	0.097	mg/L
		Magnesium	Water	—	90.7	mg/L
		Manganese	Water	—	11.6	mg/L
		Mercury	Water	—	0.00055	mg/L
		Molybdenum	Water	—	0.017	mg/L
		Nickel	Water	—	0.86	mg/L
		Potassium	Water	—	23.4	mg/L
		Sodium	Water	—	541	mg/L
		Vanadium	Water	—	0.43	mg/L
		Zinc	Water	—	0.67	mg/L
		cis-1,2-Dichloroethene	Water	—	56	µg/L
		Tetrachloroethene	Water	—	53	µg/L
		Toluene	Water	—	0.72	µg/L
		trans-1,2-Dichloroethene	Water	—	1.8	µg/L
		Trichloroethene	Water	—	180	µg/L
		Vinyl Chloride	Water	—	8.7	µg/L
9852N007	SB-6	Aluminum	Water	—	47.8	mg/L
		Arsenic	Water	—	0.024	mg/L
		Barium	Water	—	1.8	mg/L
		Cadmium	Water	—	0.0041	mg/L
		Calcium	Water	—	155	mg/L
		Chromium	Water	—	0.13	mg/L
		Cobalt	Water	—	0.040	mg/L
		Copper	Water	—	0.12	mg/L
		Iron	Water	—	69.9	mg/L
		Lead	Water	—	0.069	mg/L
		Magnesium	Water	—	123	mg/L
		Manganese	Water	—	10.4	mg/L
		Mercury	Water	—	0.00031	mg/L
		Molybdenum	Water	—	0.012	mg/L
		Nickel	Water	—	0.32	mg/L
		Potassium	Water	—	9.6	mg/L
		Sodium	Water	—	652	mg/L
		Vanadium	Water	—	0.13	mg/L
		Zinc	Water	—	0.22	mg/L
		cis-1,2-Dichloroethene	Water	—	77	µg/L
		Tetrachloroethene	Water	—	75	µg/L
		Toluene	Water	—	0.77	µg/L
		trans-1,2-Dichloroethene	Water	—	2.8	µg/L
		Trichloroethene	Water	—	170	µg/L
		Trichlorofluoromethane	Water	—	1.9	µg/L
		Vinyl Chloride	Water	—	3.3	µg/L
		Unknown hydrocarbon	Water	—	360	µg/L
9852N008	SB-1	Aluminum	Soil	2.0 to 2.5	12,800.00	mg/kg
		Arsenic	Soil	2.0 to 2.5	7.1	mg/kg
		Barium	Soil	2.0 to 2.5	290	mg/kg
		Beryllium	Soil	2.0 to 2.5	0.43	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N008 (cont.)	SB-1 (cont.)	Cadmium	Soil	2.0 to 2.5	0.55	mg/kg
		Calcium	Soil	2.0 to 2.5	4,460 00	mg/kg
		Chromium	Soil	2.0 to 2.5	49.5	mg/kg
		Cobalt	Soil	2.0 to 2.5	14.8	mg/kg
		Copper	Soil	2.0 to 2.5	37.4	mg/kg
		Iron	Soil	2.0 to 2.5	26,600.00	mg/kg
		Lead	Soil	2.0 to 2.5	31.6	mg/kg
		Magnesium	Soil	2.0 to 2.5	5600	mg/kg
		Manganese	Soil	2.0 to 2.5	587	mg/kg
		Mercury	Soil	2.0 to 2.5	0.25	mg/kg
		Nickel	Soil	2.0 to 2.5	49.7	mg/kg
		Potassium	Soil	2.0 to 2.5	1,470.00	mg/kg
		Silver	Soil	2.0 to 2.5	0.29	mg/kg
		Sodium	Soil	2.0 to 2.5	215	mg/kg
		Vanadium	Soil	2.0 to 2.5	57.7	mg/kg
		Zinc	Soil	2.0 to 2.5	102	mg/kg
		Percent water	Soil	2.0 to 2.5	14.7	%mst
		Phenol	Soil	2.0 to 2.5	82	µg/kg
		1,2-Dichloroethene (total)	Soil	2.0 to 2.5	7.4	µg/kg
		Tetrachloroethene	Soil	2.0 to 2.5	150	µg/kg
		Toluene	Soil	2.0 to 2.5	1.6	µg/kg
		Trichloroethene	Soil	2.0 to 2.5	25	µg/kg
		Aroclor-1254	Soil	2.0 to 2.5	160	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	8.3	mg/kg
9852N009	SB-1	Aluminum	Soil	10.0 to 10.5	16,100.00	mg/kg
		Arsenic	Soil	10.0 to 10.5	4.7	mg/kg
		Barium	Soil	10.0 to 10.5	217	mg/kg
		Beryllium	Soil	10.0 to 10.5	0.50	mg/kg
		Calcium	Soil	10.0 to 10.5	3,370.00	mg/kg
		Chromium	Soil	10.0 to 10.5	61.0	mg/kg
		Cobalt	Soil	10.0 to 10.5	13.6	mg/kg
		Copper	Soil	10.0 to 10.5	34.5	mg/kg
		Iron	Soil	10.0 to 10.5	33,200.00	mg/kg
		Lead	Soil	10.0 to 10.5	5.5	mg/kg
		Magnesium	Soil	10.0 to 10.5	6,410.00	mg/kg
		Manganese	Soil	10.0 to 10.5	174	mg/kg
		Nickel	Soil	10.0 to 10.5	62.7	mg/kg
		Potassium	Soil	10.0 to 10.5	770	mg/kg
		Selenium	Soil	10.0 to 10.5	0.54	mg/kg
		Sodium	Soil	10.0 to 10.5	1,750.00	mg/kg
		Vanadium	Soil	10.0 to 10.5	68.2	mg/kg
		Zinc	Soil	10.0 to 10.5	56.0	mg/kg
		Phenol	Soil	10.0 to 10.5	820	µg/kg
		1,2-Dichloroethene (total)	Soil	10.0 to 10.5	55	µg/kg
		Tetrachloroethene	Soil	10.0 to 10.5	240	µg/kg
		Trichloroethene	Soil	10.0 to 10.5	76	µg/kg
		Aroclor-1254	Soil	10.0 to 10.5	48	µg/kg
		Unknown hydrocarbon	Soil	10.0 to 10.5	30	mg/kg
		Percent water	Soil	10.0 to 10.5	14.5	%mst
9852N010	SB-2	Aluminum	Soil	1.5 to 2.0	14,800.00	mg/kg
		Arsenic	Soil	1.5 to 2.0	6.4	mg/kg
		Barium	Soil	1.5 to 2.0	207	mg/kg
		Beryllium	Soil	1.5 to 2.0	0.53	mg/kg
		Cadmium	Soil	1.5 to 2.0	1.0	mg/kg
		Calcium	Soil	1.5 to 2.0	3,710.00	mg/kg
		Chromium	Soil	1.5 to 2.0	58.1	mg/kg
		Cobalt	Soil	1.5 to 2.0	15.5	mg/kg
		Copper	Soil	1.5 to 2.0	33.8	mg/kg
		Iron	Soil	1.5 to 2.0	27,700.00	mg/kg
		Lead	Soil	1.5 to 2.0	16.6	mg/kg
		Magnesium	Soil	1.5 to 2.0	6,080.00	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N010 (cont.)	SB-2 (cont.)	Manganese	Soil	1.5 to 2.0	617	mg/kg
		Mercury	Soil	1.5 to 2.0	0.12	mg/kg
		Nickel	Soil	1.5 to 2.0	53.9	mg/kg
		Potassium	Soil	1.5 to 2.0	1,330.00	mg/kg
		Sodium	Soil	1.5 to 2.0	171	mg/kg
		Vanadium	Soil	1.5 to 2.0	60.0	mg/kg
		Zinc	Soil	1.5 to 2.0	71.4	mg/kg
		1,2-Dichloroethene (total)	Soil	1.5 to 2.0	5.9	µg/kg
		Tetrachloroethene	Soil	1.5 to 2.0	200	µg/kg
		Toluene	Soil	1.5 to 2.0	0.95	µg/kg
		Trichloroethene	Soil	1.5 to 2.0	40	µg/kg
		Aroclor-1254	Soil	1.5 to 2.0	380	µg/kg
		Unknown hydrocarbon	Soil	1.5 to 2.0	33	mg/kg
		Percent water	Soil	1.5 to 2.0	13.6	%mst
9852N011	SB-2	Aluminum	Soil	10.0 to 10.5	16,300.00	mg/kg
		Arsenic	Soil	10.0 to 10.5	3.9	mg/kg
		Barium	Soil	10.0 to 10.5	161	mg/kg
		Beryllium	Soil	10.0 to 10.5	0.60	mg/kg
		Cadmium	Soil	10.0 to 10.5	0.55	mg/kg
		Calcium	Soil	10.0 to 10.5	3,000.00	mg/kg
		Chromium	Soil	10.0 to 10.5	58.8	mg/kg
		Cobalt	Soil	10.0 to 10.5	16.5	mg/kg
		Copper	Soil	10.0 to 10.5	42.6	mg/kg
		Iron	Soil	10.0 to 10.5	32,700.00	mg/kg
		Lead	Soil	10.0 to 10.5	6.4	mg/kg
		Magnesium	Soil	10.0 to 10.5	7,170.00	mg/kg
		Manganese	Soil	10.0 to 10.5	221	mg/kg
		Mercury	Soil	10.0 to 10.5	0.14	mg/kg
		Nickel	Soil	10.0 to 10.5	79.8	mg/kg
		Potassium	Soil	10.0 to 10.5	1,150.00	mg/kg
		Selenium	Soil	10.0 to 10.5	0.58	mg/kg
		Sodium	Soil	10.0 to 10.5	1,690.00	mg/kg
		Vanadium	Soil	10.0 to 10.5	70.8	mg/kg
		Zinc	Soil	10.0 to 10.5	61.9	mg/kg
		1,2-Dichloroethene (total)	Soil	10.0 to 10.5	16	µg/kg
		Tetrachloroethene	Soil	10.0 to 10.5	760	µg/kg
		Trichloroethene	Soil	10.0 to 10.5	150	µg/kg
		Percent water	Soil	10.0 to 10.5	17.2	%mst
9852N013	SB-3	Aluminum	Soil	2.0 to 2.5	13,600.00	mg/kg
		Arsenic	Soil	2.0 to 2.5	6.9	mg/kg
		Barium	Soil	2.0 to 2.5	243	mg/kg
		Beryllium	Soil	2.0 to 2.5	0.52	mg/kg
		Cadmium	Soil	2.0 to 2.5	1.2	mg/kg
		Calcium	Soil	2.0 to 2.5	5,400.00	mg/kg
		Chromium	Soil	2.0 to 2.5	52.4	mg/kg
		Cobalt	Soil	2.0 to 2.5	16.1	mg/kg
		Copper	Soil	2.0 to 2.5	43.3	mg/kg
		Iron	Soil	2.0 to 2.5	27,500.00	mg/kg
		Lead	Soil	2.0 to 2.5	59.6	mg/kg
		Magnesium	Soil	2.0 to 2.5	5,940.00	mg/kg
		Manganese	Soil	2.0 to 2.5	707	mg/kg
		Mercury	Soil	2.0 to 2.5	0.18	mg/kg
		Nickel	Soil	2.0 to 2.5	48.9	mg/kg
		Potassium	Soil	2.0 to 2.5	1,540.00	mg/kg
		Silver	Soil	2.0 to 2.5	0.28	mg/kg
		Sodium	Soil	2.0 to 2.5	337	mg/kg
		Vanadium	Soil	2.0 to 2.5	54.1	mg/kg
		Zinc	Soil	2.0 to 2.5	107	mg/kg
		2-Methylnaphthalene	Soil	2.0 to 2.5	470	µg/kg
		Di-N-Butylphthalate	Soil	2.0 to 2.5	6,600.00	µg/kg
		Naphthalene	Soil	2.0 to 2.5	530	µg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N013 (cont.)	SB-3 (cont.)	Tetrachloroethene	Soil	2.0 to 2.5	6,400,000.00	µg/kg
		Trichloroethene	Soil	2.0 to 2.5	740,000.00	µg/kg
		Aroclor-1254	Soil	2.0 to 2.5	3,800.00	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	7,700.00	mg/kg
			Soil	2.0 to 2.5	900,000.00	µg/kg
		Percent water	Soil	2.0 to 2.5	12.2	%mst
			Soil	**2.0 to 2.5**	**12.2**	**%mst**
9852N014	**SB-3**	Aluminum	Soil	10.5 to 11.0	17,600.00	mg/kg
		Arsenic	Soil	10.5 to 11.0	2.5	mg/kg
		Barium	Soil	10.5 to 11.0	146	mg/kg
		Beryllium	Soil	10.5 to 11.0	0.76	mg/kg
		Calcium	Soil	10.5 to 11.0	2,670.00	mg/kg
		Chromium	Soil	10.5 to 11.0	57.8	mg/kg
		Cobalt	Soil	10.5 to 11.0	10.9	mg/kg
		Copper	Soil	10.5 to 11.0	35.6	mg/kg
		Iron	Soil	10.5 to 11.0	28,100.00	mg/kg
		Lead	Soil	10.5 to 11.0	6.6	mg/kg
		Magnesium	Soil	10.5 to 11.0	6,970.00	mg/kg
		Manganese	Soil	10.5 to 11.0	151	mg/kg
		Nickel	Soil	10.5 to 11.0	76.2	mg/kg
		Potassium	Soil	10.5 to 11.0	833	mg/kg
		Sodium	Soil	10.5 to 11.0	2,410.00	mg/kg
		Vanadium	Soil	10.5 to 11.0	59.2	mg/kg
		Zinc	Soil	10.5 to 11.0	49.7	mg/kg
		Percent water	Soil	10.5 to 11.0	24.2	%mst
		Phenol	Soil	10.5 to 11.0	630	µg/kg
		Tetrachloroethene	Soil	10.5 to 11.0	1,100,000.00	µg/kg
		Trichloroethene	Soil	10.5 to 11.0	50,000.00	µg/kg
		Aroclor-1254	Soil	10.5 to 11.0	210	µg/kg
		Unknown hydrocarbon	Soil	10.5 to 11.0	490	mg/kg
			Soil	10.5 to 11.0	100,000.00	µg/kg
9852N016	SB-4	Aluminum	Soil	2.0 to 2.5	9,090.00	mg/kg
		Antimony	Soil	2.0 to 2.5	2.5	mg/kg
		Arsenic	Soil	2.0 to 2.5	10.7	mg/kg
		Barium	Soil	2.0 to 2.5	369	mg/kg
		Beryllium	Soil	2.0 to 2.5	0.63	mg/kg
		Cadmium	Soil	2.0 to 2.5	5.4	mg/kg
		Calcium	Soil	2.0 to 2.5	39,100.00	mg/kg
		Chromium	Soil	2.0 to 2.5	84.2	mg/kg
		Cobalt	Soil	2.0 to 2.5	8.2	mg/kg
		Copper	Soil	2.0 to 2.5	166	mg/kg
		Iron	Soil	2.0 to 2.5	58,000.00	mg/kg
		Lead	Soil	2.0 to 2.5	388	mg/kg
		Magnesium	Soil	2.0 to 2.5	4,440.00	mg/kg
		Manganese	Soil	2.0 to 2.5	2,650.00	mg/kg
		Mercury	Soil	2.0 to 2.5	0.67	mg/kg
		Molybdenum	Soil	2.0 to 2.5	2.2	mg/kg
		Nickel	Soil	2.0 to 2.5	57.7	mg/kg
		Potassium	Soil	2.0 to 2.5	903	mg/kg
		Selenium	Soil	2.0 to 2.5	6.4	mg/kg
		Silver	Soil	2.0 to 2.5	0.34	mg/kg
		Sodium	Soil	2.0 to 2.5	569	mg/kg
		Vanadium	Soil	2.0 to 2.5	36.0	mg/kg
		Zinc	Soil	2.0 to 2.5	1,290.00	mg/kg
		Acenaphthene	Soil	2.0 to 2.5	150	µg/kg
		Anthracene	Soil	2.0 to 2.5	240	µg/kg
		Benzo(a)anthracene	Soil	2.0 to 2.5	570	µg/kg
		Benzo(a)pyrene	Soil	2.0 to 2.5	620	µg/kg
		Benzo(b)fluoranthene	Soil	2.0 to 2.5	450	µg/kg
		Benzo(g,h,i)perylene	Soil	2.0 to 2.5	310	µg/kg
		Benzo(k)fluoranthene	Soil	2.0 to 2.5	620	µg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N016 (cont.)	SB-4 (cont.)	Chrysene	Soil	2.0 to 2.5	740	µg/kg
		Fluoranthene	Soil	2.0 to 2.5	1,200.00	µg/kg
		Indeno(1,2,3-cd)pyrene	Soil	2.0 to 2.5	370	µg/kg
		Phenanthrene	Soil	2.0 to 2.5	1,000.00	µg/kg
		Pyrene	Soil	2.0 to 2.5	1,300.00	µg/kg
		m-Xylene	Soil	2.0 to 2.5	1.7	µg/kg
		p-Xylene	Soil	2.0 to 2.5	1.70	µg/kg
		o-Xylene	Soil	2.0 to 2.5	0.93	µg/kg
		Tetrachloroethene	Soil	2.0 to 2.5	270	µg/kg
		Trichloroethene	Soil	2.0 to 2.5	28	µg/kg
		4,4'-DDD	Soil	2.0 to 2.5	5.0	µg/kg
		4,4'-DDT	Soil	2.0 to 2.5	7.4	µg/kg
		alpha-Chlordane	Soil	2.0 to 2.5	1.8	µg/kg
		gamma-Chlordane	Soil	2.0 to 2.5	1.6	µg/kg
		Aroclor-1260	Soil	2.0 to 2.5	58	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	320	mg/kg
		Percent water	Soil	2.0 to 2.5	10.9	%mst
9852N017	SB-4	Aluminum	Soil	10.5 to 11.0	16,400.00	mg/kg
		Arsenic	Soil	10.5 to 11.0	6.3	mg/kg
		Barium	Soil	10.5 to 11.0	182	mg/kg
		Beryllium	Soil	10.5 to 11.0	0.54	mg/kg
		Calcium	Soil	10.5 to 11.0	2,230.00	mg/kg
		Chromium	Soil	10.5 to 11.0	49.0	mg/kg
		Cobalt	Soil	10.5 to 11.0	15.9	mg/kg
		Copper	Soil	10.5 to 11.0	36.0	mg/kg
		Iron	Soil	10.5 to 11.0	30,900.00	mg/kg
		Lead	Soil	10.5 to 11.0	6.2	mg/kg
		Magnesium	Soil	10.5 to 11.0	6,380.00	mg/kg
		Manganese	Soil	10.5 to 11.0	432	mg/kg
		Molybdenum	Soil	10.5 to 11.0	0.62	mg/kg
		Nickel	Soil	10.5 to 11.0	66.0	mg/kg
		Potassium	Soil	10.5 to 11.0	1,130.00	mg/kg
		Sodium	Soil	10.5 to 11.0	1,990.00	mg/kg
		Vanadium	Soil	10.5 to 11.0	61.4	mg/kg
		Zinc	Soil	10.5 to 11.0	66.4	mg/kg
		Tetrachloroethene	Soil	10.5 to 11.0	1.7	µg/kg
		Percent water	Soil	10.5 to 11.0	15.6	%mst
9852N018	SB-5	Aluminum	Soil	2.0 to 2.5	16,700.00	mg/kg
		Arsenic	Soil	2.0 to 2.5	10.3	mg/kg
		Barium	Soil	2.0 to 2.5	302	mg/kg
		Beryllium	Soil	2.0 to 2.5	0.58	mg/kg
		Calcium	Soil	2.0 to 2.5	4,560.00	mg/kg
		Chromium	Soil	2.0 to 2.5	59.5	mg/kg
		Cobalt	Soil	2.0 to 2.5	13.3	mg/kg
		Copper	Soil	2.0 to 2.5	44.5	mg/kg
		Iron	Soil	2.0 to 2.5	27,700.00	mg/kg
		Lead	Soil	2.0 to 2.5	27.7	mg/kg
		Magnesium	Soil	2.0 to 2.5	6,570.00	mg/kg
		Manganese	Soil	2.0 to 2.5	434	mg/kg
		Nickel	Soil	2.0 to 2.5	51.4	mg/kg
		Potassium	Soil	2.0 to 2.5	2,730.00	mg/kg
		Selenium	Soil	2.0 to 2.5	0.41	mg/kg
		Silver	Soil	2.0 to 2.5	0.25	mg/kg
		Sodium	Soil	2.0 to 2.5	376	mg/kg
		Vanadium	Soil	2.0 to 2.5	61.9	mg/kg
		Zinc	Soil	2.0 to 2.5	82.9	mg/kg
		Benzene	Soil	2.0 to 2.5	0.43	µg/kg
		Tetrachloroethene	Soil	2.0 to 2.5	290	µg/kg
		Trichloroethene	Soil	2.0 to 2.5	18	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	31	mg/kg
		Percent water	Soil	2.0 to 2.5	21.8	%mst

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N019	SB-5	Aluminum	Soil	10 0 to 10.5	11,900 00	mg/kg
		Arsenic	Soil	10.0 to 10.5	4 0	mg/kg
		Barium	Soil	10.0 to 10.5	150	mg/kg
		Beryllium	Soil	10.0 to 10.5	0.45	mg/kg
		Calcium	Soil	10.0 to 10.5	3,000.00	mg/kg
		Chromium	Soil	10.0 to 10.5	44.5	mg/kg
		Cobalt	Soil	10.0 to 10.5	6.8	mg/kg
		Copper	Soil	10.0 to 10.5	21.2	mg/kg
		Iron	Soil	10.0 to 10.5	19,500.00	mg/kg
		Lead	Soil	10.0 to 10.5	6.9	mg/kg
		Magnesium	Soil	10.0 to 10.5	5,510.00	mg/kg
		Manganese	Soil	10.0 to 10.5	189	mg/kg
		Nickel	Soil	10.0 to 10.5	50.9	mg/kg
		Potassium	Soil	10.0 to 10.5	912	mg/kg
		Sodium	Soil	10.0 to 10.5	1,850.00	mg/kg
		Vanadium	Soil	10.0 to 10.5	33.4	mg/kg
		Zinc	Soil	10.0 to 10.5	43.2	mg/kg
		Percent water	Soil	10.0 to 10.5	13.9	%mst
9852N021	SB-3	Aluminum	Soil	7 to 7.5	19,700.00	mg/kg
		Arsenic	Soil	7 to 7.5	2.5	mg/kg
		Barium	Soil	7 to 7.5	343	mg/kg
		Beryllium	Soil	7 to 7.5	0.80	mg/kg
		Calcium	Soil	7 to 7.5	4,320.00	mg/kg
		Chromium	Soil	7 to 7.5	62.5	mg/kg
		Cobalt	Soil	7 to 7.5	10.5	mg/kg
		Copper	Soil	7 to 7.5	36.3	mg/kg
		Iron	Soil	7 to 7.5	26,700.00	mg/kg
		Lead	Soil	7 to 7.5	8.8	mg/kg
		Magnesium	Soil	7 to 7.5	6,230.00	mg/kg
		Manganese	Soil	7 to 7.5	905	mg/kg
		Nickel	Soil	7 to 7.5	66.7	mg/kg
		Potassium	Soil	7 to 7.5	1,520.00	mg/kg
		Silver	Soil	7 to 7.5	0.27	mg/kg
		Sodium	Soil	7 to 7.5	3,170.00	mg/kg
		Vanadium	Soil	7 to 7.5	33.2	mg/kg
		Zinc	Soil	7 to 7.5	56.6	mg/kg
		Aroclor-1254	Soil	7 to 7.5	5,200.00	µg/kg
		di-N-Butylphthalate	Soil	7 to 7.5	610	µg/kg
		Tetrachloroethene	Soil	7 to 7.5	2,700,000.00	µg/kg
		Trichloroethene	Soil	7 to 7.5	180,000.00	µg/kg
		Unknown hydrocarbon	Soil	7 to 7.5	970	mg/kg
			Soil	7 to 7.5	410,000.00	µg/kg
		Percent water	Soil	7 to 7.5	23.1	%mst
			Soil	7 to 7.5	23.1	%mst
9852N022	SB-6	Aluminum	Soil	1.5 to 2.0	18,400.00	mg/kg
		Arsenic	Soil	1.5 to 2.0	7.0	mg/kg
		Barium	Soil	1.5 to 2.0	227	mg/kg
		Beryllium	Soil	1.5 to 2.0	0.58	mg/kg
		Calcium	Soil	1.5 to 2.0	4,670.00	mg/kg
		Chromium	Soil	1.5 to 2.0	68.3	mg/kg
		Cobalt	Soil	1.5 to 2.0	14.6	mg/kg
		Copper	Soil	1.5 to 2.0	39.8	mg/kg
		Iron	Soil	1.5 to 2.0	31,500.00	mg/kg
		Lead	Soil	1.5 to 2.0	13.4	mg/kg
		Magnesium	Soil	1.5 to 2.0	7,200.00	mg/kg
		Manganese	Soil	1.5 to 2.0	482	mg/kg
		Nickel	Soil	1.5 to 2.0	57.4	mg/kg
		Potassium	Soil	1.5 to 2.0	1,830.00	mg/kg
		Selenium	Soil	1.5 to 2.0	0.59	mg/kg
		Sodium	Soil	1.5 to 2.0	456	mg/kg
		Vanadium	Soil	1.5 to 2.0	67.7	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N022 (cont.)	SB-6 (cont.)	Zinc	Soil	1.5 to 2.0	67.4	mg/kg
		Percent water	Soil	1.5 to 2.0	21.7	%mst
9852N023	SB-6	Aluminum	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	16,600.00	mg/kg
		Arsenic	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	3.6	mg/kg
		Barium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	210	mg/kg
		Beryllium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	0.69	mg/kg
		Cadmium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	0.68	mg/kg
		Calcium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	4,780.00	mg/kg
		Chromium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	59.9	mg/kg
		Cobalt	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	17.0	mg/kg
		Copper	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	25.5	mg/kg
		Iron	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	26,900.00	mg/kg
		Lead	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	8.3	mg/kg
		Magnesium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	8,750.00	mg/kg
		Manganese	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	699	mg/kg
		Nickel	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	79.4	mg/kg
		Potassium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	2,130.00	mg/kg
		Silver	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	0.26	mg/kg
		Sodium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	882	mg/kg
		Vanadium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	35.5	mg/kg
		Zinc	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	74.2	mg/kg
		Phenol	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	450	µg/kg
		Tetrachloroethene	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	110	µg/kg
		Trichloroethene	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	3.6	µg/kg
		Percent water	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	15.0	%mst
9852N024	SB-6 (duplicate)	Aluminum	Soil	10 5 to 11.0.0	13,700 00	mg/kg
		Arsenic	Soil	10 5 to 11.0.0	3.0	mg/kg
		Barium	Soil	10.5 to 11 0.0	402	mg/kg
		Beryllium	Soil	10.5 to 11.0 0	0.51	mg/kg
		Cadmium	Soil	10.5 to 11 0.0	0 68	mg/kg
		Calcium	Soil	10.5 to 11.0 0	13,100 00	mg/kg
		Chromium	Soil	10.5 to 11.0 0	55.0	mg/kg
		Cobalt	Soil	10.5 to 11.0 0	7.8	mg/kg
		Copper	Soil	10.5 to 11.0 0	20.0	mg/kg
		Iron	Soil	10.5 to 11.0.0	23,700 00	mg/kg
		Lead	Soil	10 5 to 11.0.0	4 7	mg/kg
		Magnesium	Soil	10.5 to 11 0 0	6,950.00	mg/kg
		Manganese	Soil	10 5 to 11 0 0	1,100.00	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N024 (cont)	SB-6 (dup. cont.)	Nickel	Soil	10.5 to 11.0 0	68.8	mg/kg
		Potassium	Soil	10.5 to 11.0.0	1,280.00	mg/kg
		Sodium	Soil	10.5 to 11.0.0	948	mg/kg
		Vanadium	Soil	10.5 to 11.0.0	30.3	mg/kg
		Zinc	Soil	10.5 to 11.0.0	46.3	mg/kg
		Tetrachloroethene	Soil	10.5 to 11 0.0	2.5	µg/kg
		Trichloroethene	Soil	10.5 to 11.0.0	1.2	µg/kg
		Percent water	Soil	10.5 to 11.0.0	13.6	% mst
9852N025	Trip blanks	Naphthalene	Water	—	0.15	µg/L
		1,2,3-Trichlorobenzene	Water	—	0.22	µg/L
		1,2,4-Trichlorobenzene	Water	—	0.16	µg/L

Notes:

bgs Below ground surface
DDD Dichlorodiphenyldichloroethane
DDT Dichlorodiphenyltrichloroethane
µg/kg Microgram per kilogram
mg/kg Milligram per kilogram
mg/L Milligram per liter
µg/L Microgram per liter

TABLE E-2

ANALYTICAL RESULTS FOR UNKNOWN HYDROCARBONS ABOVE HPS VALUES IN SOIL

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result
9852N013	SB-3	TPH-extractables[a]	Soil	2.0 to 2.5	7,700.00
		TPH-purgeables[b]	Soil	2.0 to 2.5	900.00
9852N014	SB-3	TPH-extractables[a]	Soil	10.5 to 11.0	490
		TPH-purgeables[b]	Soil	10.5 to 11.0	100.00
9852N016	SB-4	TPH-extractables[a]	Soil	2.0 to 2.5	320.00
9852N021	SB-3	TPH-extractables[a]	Soil	7 to 7.5	970
		TPH-purgeables[b]	Soil	7 to 7.5	410.00

Notes:

bgs Below ground surface
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbons

a Hunters Point Shipyard (HPS) risk-based screening level (RBSL) for diesel and motor oil (TPH-extractables) is 100 mg/kg.
b HPS RBSL for gasoline (TPH-purgeables) is 1,000 mg/kg.

TABLE E-3

ANALYTICAL RESULTS FOR TPH IN GROUNDWATER

Sample ID	Boring ID	Analyte	Matrix	Result (µg/L)	HPS Value (µg/L)
9852N001	SB-1	Unknown hydrocarbon	Water	650	100
9852N002	SB-2	Unknown hydrocarbon	Water	2,400	100
9852N003	SB-3	Unknown hydrocarbon	Water	390,000	100
9852N007	SB-6	Unknown hydrocarbon	Water	360	100

Notes:

HPS Hunter's Point Shipyard
µg/L Microgram per liter

APPENDIX F

TIER 1 RISK-BASED SCREENING LEVELS

TABLE F-1

ANALYTICAL RESULTS FOR SURFACE SOIL ABOVE RBSLs
INDUSTRIAL/DIRECT CONTACT AND INGESTION PATHWAYS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result (mg/kg)	Soil PRG (mg/kg)	RBSL (mg/kg)
9852N013	SB-3	Tetrachloroethene	Soil	2.0 to 2.5	6,400	~~16.00~~ 19	C-180 H-3,000
		Trichloroethene	Soil	2.0 to 2.5	740	6.10	C-590
		Aroclor-1254	Soil	2.0 to 2.5	3.80	~~18.00~~ 1.0	C-1.9

Notes:

bgs Below ground surface
C Carcinogenic
H Hazardous
mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RBSL Risk-based screening level

TABLE F-2

ANALYTICAL RESULTS FOR SUBSURFACE SOIL ABOVE RBSLs
INDUSTRIAL/INHALATION OF OUTDOOR AIR PATHWAY

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result (mg/kg)	Soil PRG (mg/kg)	RBSL (mg/kg)
9852N014	SB-3	Tetrachloroethene	Soil	10.5 to 11.0	1,100	16	C-32
		Trichloroethene	Soil	10.5 to 11.0	50	6.10	C-11
9852N021	SB-3	Tetrachloroethene	Soil	7 to 7.5	2,700	16	C-32
		Trichloroethene	Soil	7 to 7.5	180	6.10	C-11

Notes:

bgs Below ground surface
C Carcinogenic
mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RBSL Risk-based screening level

APPENDIX G

TIER 2 SITE-SPECIFIC TARGET LEVELS

TABLE G-1

ANALYTICAL RESULTS FOR SURFACE SOIL ABOVE SSTLs
INDUSTRIAL/DIRECT CONTACT AND INGESTION PATHWAY

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units	Soil PRG (mg/kg)	SSTL (mg/kg)
9852N013	SB-3	Tetrachloroethene	Soil	2.0 to 2.5	6,400	mg/kg	16	C-180 H-3,000
		Trichloroethene	Soil	2.0 to 2.5	740	mg/kg	6.1	C-590
		Aroclor-1254	Soil	2.0 to 2.5	3.80	mg/kg	18	C-1.9

Notes:

bgs Below ground surface
C Carcinogenic
H Hazardous
mg/kg Milligram per kilogram
PRG Preliminary remediation goal
SSTL Site-specific target levels

TABLE G-2

ANALYTICAL RESULTS FOR SUBSURFACE SOIL ABOVE SSTLs
INDUSTRIAL/INHALATION OF OUTDOOR AIR PATHWAY

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result (mg/kg)	Soil PRG (mg/kg)	SSTL (mg/kg)
9852N014	SB-3	Tetrachloroethene	Soil	10.5 to 11.0	1,100.00	16	C-32
	SB-3	Trichloroethene	Soil	10.5 to 11.0	50.00	6.1	C-11
9852N021	**SB-3**	**Tetrachloroethene**	**Soil**	**7 to 7.5**	**2,700.00**	**16**	**C-32**
	SB-3	**Trichloroethene**	**Soil**	**7 to 7.5**	**180.00**	**6.1**	**C-11**

Notes:

bgs	Below ground surface
C	Carcinogenic
mg/kg	Milligram per kilogram
PRG	Preliminary remediation goal
SSTL	Site-specific target level

TABLE G-3

ANALYTICAL RESULTS FOR SUBSURFACE SOIL ABOVE SSTLs
INDUSTRIAL/INHALATION OF INDOOR AIR PATHWAY

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result (mg/kg)	PRG (mg/kg)	SSTL (mg/kg)
9852N014	SB-3	Tetrachloroethene	Soil	10.5 to 11.0	1,100	16	C-92
9852N021	SB-3	Tetrachloroethene	Soil	7 to 7.5	2,700	16	C-92

Notes:

bgs Below ground surface
C Carcinogenic
mg/kg Milligram per kilogram
PRG Preliminary remediation goal
SSTL Site-specific target level

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N003 (cont.)	SB-3 (cont.)	Chromium	Water	—	0.22	mg/L
		Cobalt	Water	—	0.065	mg/L
		Copper	Water	—	0.14	mg/L
		Iron	Water	—	109	mg/L
		Lead	Water	—	0.067	mg/L
		Magnesium	Water	—	111	mg/L
		Manganese	Water	—	3.8	mg/L
		Mercury	Water	—	0.0020	mg/L
		Nickel	Water	—	0.28	mg/L
		Potassium	Water	—	18.5	mg/L
		Silver	Water	—	0.0066	mg/L
		Sodium	Water	—	1,920.00	mg/L
		Vanadium	Water	—	0.24	mg/L
		Zinc	Water	—	0.32	mg/L
		2-Methylnaphthalene	Water	—	2.1	µg/L
		di-n-butylphthalate	Water	—	33	µg/L
		cis-1,2-Dichloroethene	Water	—	18,000.00	µg/L
		Tetrachloroethene	Water	—	150,000.00	µg/L
		Trichloroethene	Water	—	21,000.00	µg/L
		Unknown hydrocarbon	Water	—	390,000.00	µg/L
9852N004	SB-4	Aluminum	Water	—	45.6	mg/L
		Arsenic	Water	—	0.019	mg/L
		Barium	Water	—	0.64	mg/L
		Calcium	Water	—	34.5	mg/L
		Chromium	Water	—	0.13	mg/L
		Cobalt	Water	—	0.030	mg/L
		Copper	Water	—	0.12	mg/L
		Iron	Water	—	69.6	mg/L
		Lead	Water	—	0.10	mg/L
		Magnesium	Water	—	32.9	mg/L
		Manganese	Water	—	1.5	mg/L
		Molybdenum	Water	—	0.022	mg/L
		Nickel	Water	—	0.16	mg/L
		Potassium	Water	—	6.3	mg/L
		Sodium	Water	—	605	mg/L
		Vanadium	Water	—	0.14	mg/L
		Zinc	Water	—	0.40	mg/L
		Tetrachloroethene	Water	—	1.2	µg/L
		Aroclor-1254	Water	—	0.66	µg/L
9852N005	SB-5	Aluminum	Water	—	206	mg/L
		Arsenic	Water	—	0.080	mg/L
		Barium	Water	—	3.0	mg/L
		Beryllium	Water	—	0.0044	mg/L
		Cadmium	Water	—	0.0064	mg/L
		Calcium	Water	—	61.6	mg/L
		Chromium	Water	—	0.46	mg/L
		Cobalt	Water	—	0.14	mg/L
		Copper	Water	—	0.28	mg/L
		Iron	Water	—	261	mg/L
		Lead	Water	—	0 088	mg/L
		Magnesium	Water	—	83 9	mg/L
		Manganese	Water	—	10.8	mg/L
		Mercury	Water	—	0.00052	mg/L
		Molybdenum	Water	—	0.016	mg/L
		Nickel	Water	—	0.83	mg/L
		Potassium	Water	—	22.1	mg/L
		Sodium	Water	—	520	mg/L
		Vanadium	Water	—	0.40	mg/L
		Zinc	Water	—	0.63	mg/L
		cis-1,2-Dichloroethene	Water	—	57	µg/L
		Tetrachloroethene	Water	—	59	µg/L

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N005 (cont.)	SB-5 (cont.)	Toluene	Water	—	1.0	µg/L
		trans-1,2-Dichloroethene	Water	—	2.0	µg/L
		Trichloroethene	Water	—	190	µg/L
		Vinyl Chloride	Water	—	9.5	µg/L
9852N006	SB-5 (duplicate)	Aluminum	Water	—	223	mg/L
		Arsenic	Water	—	0.084	mg/L
		Barium	Water	—	3.1	mg/L
		Beryllium	Water	—	0.0042	mg/L
		Cadmium	Water	—	0.0072	mg/L
		Calcium	Water	—	67.3	mg/L
		Chromium	Water	—	0.50	mg/L
		Cobalt	Water	—	0.13	mg/L
		Copper	Water	—	0.30	mg/L
		Iron	Water	—	279	mg/L
		Lead	Water	—	0.097	mg/L
		Magnesium	Water	—	90.7	mg/L
		Manganese	Water	—	11.6	mg/L
		Mercury	Water	—	0.00055	mg/L
		Molybdenum	Water	—	0.017	mg/L
		Nickel	Water	—	0.86	mg/L
		Potassium	Water	—	23.4	mg/L
		Sodium	Water	—	541	mg/L
		Vanadium	Water	—	0.43	mg/L
		Zinc	Water	—	0.67	mg/L
		cis-1,2-Dichloroethene	Water	—	56	µg/L
		Tetrachloroethene	Water	—	53	µg/L
		Toluene	Water	—	0.72	µg/L
		trans-1,2-Dichloroethene	Water	—	1.8	µg/L
		Trichloroethene	Water	—	180	µg/L
		Vinyl Chloride	Water	—	8.7	µg/L
9852N007	SB-6	Aluminum	Water	—	47.8	mg/L
		Arsenic	Water	—	0.024	mg/L
		Barium	Water	—	1.8	mg/L
		Cadmium	Water	—	0.0041	mg/L
		Calcium	Water	—	155	mg/L
		Chromium	Water	—	0.13	mg/L
		Cobalt	Water	—	0.040	mg/L
		Copper	Water	—	0.12	mg/L
		Iron	Water	—	69.9	mg/L
		Lead	Water	—	0.069	mg/L
		Magnesium	Water	—	123	mg/L
		Manganese	Water	—	10.4	mg/L
		Mercury	Water	—	0.00031	mg/L
		Molybdenum	Water	—	0.012	mg/L
		Nickel	Water	—	0.32	mg/L
		Potassium	Water	—	9.6	mg/L
		Sodium	Water	—	652	mg/L
		Vanadium	Water	—	0.13	mg/L
		Zinc	Water	—	0 22	mg/L
		cis-1,2-Dichloroethene	Water	—	77	µg/L
		Tetrachloroethene	Water	—	75	µg/L
		Toluene	Water	—	0.77	µg/L
		trans-1,2-Dichloroethene	Water	—	2.8	µg/L
		Trichloroethene	Water	—	170	µg/L
		Trichlorofluoromethane	Water	—	1 9	µg/L
		Vinyl Chloride	Water	—	3 3	µg/L
		Unknown hydrocarbon	Water	—	360	µg/L
9852N008	SB-1	Aluminum	Soil	2.0 to 2.5	12,800.00	mg/kg
		Arsenic	Soil	2 0 to 2.5	7.1	mg/kg
		Barium	Soil	2.0 to 2 5	290	mg/kg
		Beryllium	Soil	2.0 to 2.5	0 43	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N008 (cont.)	SB-1 (cont.)	Cadmium	Soil	2.0 to 2.5	0.55	mg/kg
		Calcium	Soil	2.0 to 2.5	4,460.00	mg/kg
		Chromium	Soil	2.0 to 2.5	49.5	mg/kg
		Cobalt	Soil	2.0 to 2.5	14.8	mg/kg
		Copper	Soil	2.0 to 2.5	37.4	mg/kg
		Iron	Soil	2.0 to 2.5	26,600.00	mg/kg
		Lead	Soil	2.0 to 2.5	31.6	mg/kg
		Magnesium	Soil	2.0 to 2.5	5600	mg/kg
		Manganese	Soil	2.0 to 2.5	587	mg/kg
		Mercury	Soil	2.0 to 2.5	0.25	mg/kg
		Nickel	Soil	2.0 to 2.5	49.7	mg/kg
		Potassium	Soil	2.0 to 2.5	1,470.00	mg/kg
		Silver	Soil	2.0 to 2.5	0.29	mg/kg
		Sodium	Soil	2.0 to 2.5	215	mg/kg
		Vanadium	Soil	2.0 to 2.5	57.7	mg/kg
		Zinc	Soil	2.0 to 2.5	102	mg/kg
		Percent water	Soil	2.0 to 2.5	14.7	%mst
		Phenol	Soil	2.0 to 2.5	82	µg/kg
		1,2-Dichloroethene (total)	Soil	2.0 to 2.5	7.4	µg/kg
		Tetrachloroethene	Soil	2.0 to 2.5	150	µg/kg
		Toluene	Soil	2.0 to 2.5	1.6	µg/kg
		Trichloroethene	Soil	2.0 to 2.5	25	µg/kg
		Aroclor-1254	Soil	2.0 to 2.5	160	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	8.3	mg/kg
9852N009	SB-1	Aluminum	Soil	10.0 to 10.5	16,100.00	mg/kg
		Arsenic	Soil	10.0 to 10.5	4.7	mg/kg
		Barium	Soil	10.0 to 10.5	217	mg/kg
		Beryllium	Soil	10.0 to 10.5	0.50	mg/kg
		Calcium	Soil	10.0 to 10.5	3,370.00	mg/kg
		Chromium	Soil	10.0 to 10.5	61.0	mg/kg
		Cobalt	Soil	10.0 to 10.5	13.6	mg/kg
		Copper	Soil	10.0 to 10.5	34.5	mg/kg
		Iron	Soil	10.0 to 10.5	33,200.00	mg/kg
		Lead	Soil	10.0 to 10.5	5.5	mg/kg
		Magnesium	Soil	10.0 to 10.5	6,410.00	mg/kg
		Manganese	Soil	10.0 to 10.5	174	mg/kg
		Nickel	Soil	10.0 to 10.5	62.7	mg/kg
		Potassium	Soil	10.0 to 10.5	770	mg/kg
		Selenium	Soil	10.0 to 10.5	0.54	mg/kg
		Sodium	Soil	10.0 to 10.5	1,750.00	mg/kg
		Vanadium	Soil	10.0 to 10.5	68.2	mg/kg
		Zinc	Soil	10.0 to 10.5	56.0	mg/kg
		Phenol	Soil	10.0 to 10.5	820	µg/kg
		1,2-Dichloroethene (total)	Soil	10.0 to 10.5	55	µg/kg
		Tetrachloroethene	Soil	10.0 to 10.5	240	µg/kg
		Trichloroethene	Soil	10.0 to 10.5	76	µg/kg
		Aroclor-1254	Soil	10.0 to 10.5	48	µg/kg
		Unknown hydrocarbon	Soil	10.0 to 10.5	30	mg/kg
		Percent water	Soil	10.0 to 10.5	14.5	%mst
9852N010	SB-2	Aluminum	Soil	1.5 to 2.0	14,800.00	mg/kg
		Arsenic	Soil	1.5 to 2.0	6.4	mg/kg
		Barium	Soil	1.5 to 2.0	207	mg/kg
		Beryllium	Soil	1.5 to 2.0	0.53	mg/kg
		Cadmium	Soil	1.5 to 2.0	1.0	mg/kg
		Calcium	Soil	1.5 to 2.0	3,710.00	mg/kg
		Chromium	Soil	1.5 to 2.0	58.1	mg/kg
		Cobalt	Soil	1.5 to 2.0	15.5	mg/kg
		Copper	Soil	1.5 to 2.0	33.8	mg/kg
		Iron	Soil	1.5 to 2.0	27,700.00	mg/kg
		Lead	Soil	1.5 to 2.0	16.6	mg/kg
		Magnesium	Soil	1.5 to 2.0	6,080.00	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N010 (cont.)	SB-2 (cont.)	Manganese	Soil	1.5 to 2.0	617	mg/kg
		Mercury	Soil	1.5 to 2.0	0.12	mg/kg
		Nickel	Soil	1.5 to 2.0	53.9	mg/kg
		Potassium	Soil	1.5 to 2.0	1,330.00	mg/kg
		Sodium	Soil	1.5 to 2.0	171	mg/kg
		Vanadium	Soil	1.5 to 2.0	60.0	mg/kg
		Zinc	Soil	1.5 to 2.0	71.4	mg/kg
		1,2-Dichloroethene (total)	Soil	1.5 to 2.0	5.9	µg/kg
		Tetrachloroethene	Soil	1.5 to 2.0	200	µg/kg
		Toluene	Soil	1.5 to 2.0	0.95	µg/kg
		Trichloroethene	Soil	1.5 to 2.0	40	µg/kg
		Aroclor-1254	Soil	1.5 to 2.0	380	µg/kg
		Unknown hydrocarbon	Soil	1.5 to 2.0	33	mg/kg
		Percent water	Soil	1.5 to 2.0	13.6	%mst
9852N011	SB-2	Aluminum	Soil	10.0 to 10.5	16,300.00	mg/kg
		Arsenic	Soil	10.0 to 10.5	3.9	mg/kg
		Barium	Soil	10.0 to 10.5	161	mg/kg
		Beryllium	Soil	10.0 to 10.5	0.60	mg/kg
		Cadmium	Soil	10.0 to 10.5	0.55	mg/kg
		Calcium	Soil	10.0 to 10.5	3,000.00	mg/kg
		Chromium	Soil	10.0 to 10.5	58.8	mg/kg
		Cobalt	Soil	10.0 to 10.5	16.5	mg/kg
		Copper	Soil	10.0 to 10.5	42.6	mg/kg
		Iron	Soil	10.0 to 10.5	32,700.00	mg/kg
		Lead	Soil	10.0 to 10.5	6.4	mg/kg
		Magnesium	Soil	10.0 to 10.5	7,170.00	mg/kg
		Manganese	Soil	10.0 to 10.5	221	mg/kg
		Mercury	Soil	10.0 to 10.5	0.14	mg/kg
		Nickel	Soil	10.0 to 10.5	79.8	mg/kg
		Potassium	Soil	10.0 to 10.5	1,150.00	mg/kg
		Selenium	Soil	10.0 to 10.5	0.58	mg/kg
		Sodium	Soil	10.0 to 10.5	1,690.00	mg/kg
		Vanadium	Soil	10.0 to 10.5	70.8	mg/kg
		Zinc	Soil	10.0 to 10.5	61.9	mg/kg
		1,2-Dichloroethene (total)	Soil	10.0 to 10.5	16	µg/kg
		Tetrachloroethene	Soil	10.0 to 10.5	760	µg/kg
		Trichloroethene	Soil	10.0 to 10.5	150	µg/kg
		Percent water	Soil	10.0 to 10.5	17.2	%mst
9852N013	SB-3	Aluminum	Soil	2.0 to 2.5	13,600.00	mg/kg
		Arsenic	Soil	2.0 to 2.5	6.9	mg/kg
		Barium	Soil	2.0 to 2.5	243	mg/kg
		Beryllium	Soil	2.0 to 2.5	0.52	mg/kg
		Cadmium	Soil	2.0 to 2.5	1.2	mg/kg
		Calcium	Soil	2.0 to 2.5	5,400.00	mg/kg
		Chromium	Soil	2.0 to 2.5	52.4	mg/kg
		Cobalt	Soil	2.0 to 2.5	16.1	mg/kg
		Copper	Soil	2.0 to 2.5	43.3	mg/kg
		Iron	Soil	2.0 to 2.5	27,500.00	mg/kg
		Lead	Soil	2.0 to 2.5	59.6	mg/kg
		Magnesium	Soil	2.0 to 2.5	5,940.00	mg/kg
		Manganese	Soil	2.0 to 2.5	707	mg/kg
		Mercury	Soil	2.0 to 2.5	0.18	mg/kg
		Nickel	Soil	2.0 to 2.5	48.9	mg/kg
		Potassium	Soil	2.0 to 2.5	1,540.00	mg/kg
		Silver	Soil	2.0 to 2.5	0.28	mg/kg
		Sodium	Soil	2.0 to 2.5	337	mg/kg
		Vanadium	Soil	2.0 to 2.5	54.1	mg/kg
		Zinc	Soil	2.0 to 2.5	107	mg/kg
		2-Methylnaphthalene	Soil	2.0 to 2.5	470	µg/kg
		Di-N-Butylphthalate	Soil	2.0 to 2.5	6,600.00	µg/kg
		Naphthalene	Soil	2.0 to 2.5	530	µg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N013 (cont.)	*SB-3 (cont.)*	*Tetrachloroethene*	*Soil*	*2.0 to 2.5*	*6,400,000.00*	*µg/kg*
		Trichloroethene	Soil	2.0 to 2.5	740,000.00	µg/kg
		Aroclor-1254	Soil	2.0 to 2.5	3,800.00	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	7,700.00	mg/kg
			Soil	2.0 to 2.5	900,000.00	µg/kg
		Percent water	Soil	2.0 to 2.5	12.2	%mst
			Soil	2.0 to 2.5	12.2	%mst
9852N014	SB-3	Aluminum	Soil	10.5 to 11.0	17,600.00	mg/kg
		Arsenic	Soil	10.5 to 11.0	2.5	mg/kg
		Barium	Soil	10.5 to 11.0	146	mg/kg
		Beryllium	Soil	10.5 to 11.0	0.76	mg/kg
		Calcium	Soil	10.5 to 11.0	2,670.00	mg/kg
		Chromium	Soil	10.5 to 11.0	57.8	mg/kg
		Cobalt	Soil	10.5 to 11.0	10.9	mg/kg
		Copper	Soil	10.5 to 11.0	35.6	mg/kg
		Iron	Soil	10.5 to 11.0	28,100.00	mg/kg
		Lead	Soil	10.5 to 11.0	6.6	mg/kg
		Magnesium	Soil	10.5 to 11.0	6,970.00	mg/kg
		Manganese	Soil	10.5 to 11.0	151	mg/kg
		Nickel	Soil	10.5 to 11.0	76.2	mg/kg
		Potassium	Soil	10.5 to 11.0	833	mg/kg
		Sodium	Soil	10.5 to 11.0	2,410.00	mg/kg
		Vanadium	Soil	10.5 to 11.0	59.2	mg/kg
		Zinc	Soil	10.5 to 11.0	49.7	mg/kg
		Percent water	Soil	10.5 to 11.0	24.2	%mst
		Phenol	Soil	10.5 to 11.0	630	µg/kg
		Tetrachloroethene	Soil	10.5 to 11.0	1,100,000.00	µg/kg
		Trichloroethene	Soil	10.5 to 11.0	50,000.00	µg/kg
		Aroclor-1254	Soil	10.5 to 11.0	210	µg/kg
		Unknown hydrocarbon	Soil	10.5 to 11.0	490	mg/kg
			Soil	10.5 to 11.0	100,000.00	µg/kg
9852N016	SB-4	Aluminum	Soil	2.0 to 2.5	9,090.00	mg/kg
		Antimony	Soil	2.0 to 2.5	2.5	mg/kg
		Arsenic	Soil	2.0 to 2.5	10.7	mg/kg
		Barium	Soil	2.0 to 2.5	369	mg/kg
		Beryllium	Soil	2.0 to 2.5	0.63	mg/kg
		Cadmium	Soil	2.0 to 2.5	5.4	mg/kg
		Calcium	Soil	2.0 to 2.5	39,100.00	mg/kg
		Chromium	Soil	2.0 to 2.5	84.2	mg/kg
		Cobalt	Soil	2.0 to 2.5	8.2	mg/kg
		Copper	Soil	2.0 to 2.5	166	mg/kg
		Iron	Soil	2.0 to 2.5	58,000.00	mg/kg
		Lead	Soil	2.0 to 2.5	388	mg/kg
		Magnesium	Soil	2.0 to 2.5	4,440.00	mg/kg
		Manganese	Soil	2.0 to 2.5	2,650.00	mg/kg
		Mercury	Soil	2.0 to 2.5	0.67	mg/kg
		Molybdenum	Soil	2.0 to 2.5	2.2	mg/kg
		Nickel	Soil	2.0 to 2.5	57.7	mg/kg
		Potassium	Soil	2.0 to 2.5	903	mg/kg
		Selenium	Soil	2.0 to 2.5	6.4	mg/kg
		Silver	Soil	2.0 to 2.5	0.34	mg/kg
		Sodium	Soil	2.0 to 2.5	569	mg/kg
		Vanadium	Soil	2.0 to 2.5	36.0	mg/kg
		Zinc	Soil	2.0 to 2.5	1,290.00	mg/kg
		Acenaphthene	Soil	2.0 to 2.5	150	µg/kg
		Anthracene	Soil	2.0 to 2.5	240	µg/kg
		Benzo(a)anthracene	Soil	2.0 to 2.5	570	µg/kg
		Benzo(a)pyrene	Soil	2.0 to 2.5	620	µg/kg
		Benzo(b)fluoranthene	Soil	2.0 to 2.5	450	µg/kg
		Benzo(g,h,i)perylene	Soil	2.0 to 2.5	310	µg/kg
		Benzo(k)fluoranthene	Soil	2.0 to 2.5	620	µg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N016 (cont.)	SB-4 (cont.)	Chrysene	Soil	2.0 to 2.5	740	µg/kg
		Fluoranthene	Soil	2.0 to 2.5	1,200.00	µg/kg
		Indeno(1,2,3-cd)pyrene	Soil	2.0 to 2.5	370	µg/kg
		Phenanthrene	Soil	2.0 to 2.5	1,000.00	µg/kg
		Pyrene	Soil	2.0 to 2.5	1,300.00	µg/kg
		m-Xylene	Soil	2.0 to 2.5	1.7	µg/kg
		p-Xylene	Soil	2.0 to 2.5	1.70	µg/kg
		o-Xylene	Soil	2.0 to 2.5	0.93	µg/kg
		Tetrachloroethene	Soil	2.0 to 2.5	270	µg/kg
		Trichloroethene	Soil	2.0 to 2.5	28	µg/kg
		4,4'-DDD	Soil	2.0 to 2.5	5.0	µg/kg
		4,4'-DDT	Soil	2.0 to 2.5	7.4	µg/kg
		alpha-Chlordane	Soil	2.0 to 2.5	1.8	µg/kg
		gamma-Chlordane	Soil	2.0 to 2.5	1.6	µg/kg
		Aroclor-1260	Soil	2.0 to 2.5	58	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	320	mg/kg
		Percent water	Soil	2.0 to 2.5	10.9	%mst
9852N017	SB-4	Aluminum	Soil	10.5 to 11.0	16,400.00	mg/kg
		Arsenic	Soil	10.5 to 11.0	6.3	mg/kg
		Barium	Soil	10.5 to 11.0	182	mg/kg
		Beryllium	Soil	10.5 to 11.0	0.54	mg/kg
		Calcium	Soil	10.5 to 11.0	2,230.00	mg/kg
		Chromium	Soil	10.5 to 11.0	49.0	mg/kg
		Cobalt	Soil	10.5 to 11.0	15.9	mg/kg
		Copper	Soil	10.5 to 11.0	36.0	mg/kg
		Iron	Soil	10.5 to 11.0	30,900.00	mg/kg
		Lead	Soil	10.5 to 11.0	6.2	mg/kg
		Magnesium	Soil	10.5 to 11.0	6,380.00	mg/kg
		Manganese	Soil	10.5 to 11.0	432	mg/kg
		Molybdenum	Soil	10.5 to 11.0	0.62	mg/kg
		Nickel	Soil	10.5 to 11.0	66.0	mg/kg
		Potassium	Soil	10.5 to 11.0	1,130.00	mg/kg
		Sodium	Soil	10.5 to 11.0	1,990.00	mg/kg
		Vanadium	Soil	10.5 to 11.0	61.4	mg/kg
		Zinc	Soil	10.5 to 11.0	66.4	mg/kg
		Tetrachloroethene	Soil	10.5 to 11.0	1.7	µg/kg
		Percent water	Soil	10.5 to 11.0	15.6	%mst
9852N018	SB-5	Aluminum	Soil	2.0 to 2.5	16,700.00	mg/kg
		Arsenic	Soil	2.0 to 2.5	10.3	mg/kg
		Barium	Soil	2.0 to 2.5	302	mg/kg
		Beryllium	Soil	2.0 to 2.5	0.58	mg/kg
		Calcium	Soil	2.0 to 2.5	4,560.00	mg/kg
		Chromium	Soil	2.0 to 2.5	59.5	mg/kg
		Cobalt	Soil	2.0 to 2.5	13.3	mg/kg
		Copper	Soil	2.0 to 2.5	44.5	mg/kg
		Iron	Soil	2.0 to 2.5	27,700.00	mg/kg
		Lead	Soil	2.0 to 2.5	27.7	mg/kg
		Magnesium	Soil	2.0 to 2.5	6,570.00	mg/kg
		Manganese	Soil	2.0 to 2.5	434	mg/kg
		Nickel	Soil	2.0 to 2.5	51.4	mg/kg
		Potassium	Soil	2.0 to 2.5	2,730.00	mg/kg
		Selenium	Soil	2.0 to 2.5	0.41	mg/kg
		Silver	Soil	2.0 to 2.5	0.25	mg/kg
		Sodium	Soil	2.0 to 2.5	376	mg/kg
		Vanadium	Soil	2.0 to 2.5	61.9	mg/kg
		Zinc	Soil	2.0 to 2.5	82.9	mg/kg
		Benzene	Soil	2.0 to 2.5	0.43	µg/kg
		Tetrachloroethene	Soil	2.0 to 2.5	290	µg/kg
		Trichloroethene	Soil	2.0 to 2.5	18	µg/kg
		Unknown hydrocarbon	Soil	2.0 to 2.5	31	mg/kg
		Percent water	Soil	2.0 to 2.5	21.8	%mst

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N019	SB-5	Aluminum	Soil	10.0 to 10.5	11,900.00	mg/kg
		Arsenic	Soil	10.0 to 10.5	4.0	mg/kg
		Barium	Soil	10.0 to 10.5	150	mg/kg
		Beryllium	Soil	10.0 to 10.5	0.45	mg/kg
		Calcium	Soil	10.0 to 10.5	3,000.00	mg/kg
		Chromium	Soil	10.0 to 10.5	44.5	mg/kg
		Cobalt	Soil	10.0 to 10.5	6.8	mg/kg
		Copper	Soil	10.0 to 10.5	21.2	mg/kg
		Iron	Soil	10.0 to 10.5	19,500.00	mg/kg
		Lead	Soil	10.0 to 10.5	6.9	mg/kg
		Magnesium	Soil	10.0 to 10.5	5,510.00	mg/kg
		Manganese	Soil	10.0 to 10.5	189	mg/kg
		Nickel	Soil	10.0 to 10.5	50.9	mg/kg
		Potassium	Soil	10.0 to 10.5	912	mg/kg
		Sodium	Soil	10.0 to 10.5	1,850.00	mg/kg
		Vanadium	Soil	10.0 to 10.5	33.4	mg/kg
		Zinc	Soil	10.0 to 10.5	43.2	mg/kg
		Percent water	Soil	10.0 to 10.5	13.9	%mst
9852N021	SB-3	Aluminum	Soil	7 to 7.5	19,700.00	mg/kg
		Arsenic	Soil	7 to 7.5	2.5	mg/kg
		Barium	Soil	7 to 7.5	343	mg/kg
		Beryllium	Soil	7 to 7.5	0.80	mg/kg
		Calcium	Soil	7 to 7.5	4,320.00	mg/kg
		Chromium	Soil	7 to 7.5	62.5	mg/kg
		Cobalt	Soil	7 to 7.5	10.5	mg/kg
		Copper	Soil	7 to 7.5	36.3	mg/kg
		Iron	Soil	7 to 7.5	26,700.00	mg/kg
		Lead	Soil	7 to 7.5	8.8	mg/kg
		Magnesium	Soil	7 to 7.5	6,230.00	mg/kg
		Manganese	Soil	7 to 7.5	905	mg/kg
		Nickel	Soil	7 to 7.5	66.7	mg/kg
		Potassium	Soil	7 to 7.5	1,520.00	mg/kg
		Silver	Soil	7 to 7.5	0.27	mg/kg
		Sodium	Soil	7 to 7.5	3,170.00	mg/kg
		Vanadium	Soil	7 to 7.5	33.2	mg/kg
		Zinc	Soil	7 to 7.5	56.6	mg/kg
		Aroclor-1254	Soil	7 to 7.5	5,200.00	µg/kg
		di-N-Butylphthalate	Soil	7 to 7.5	610	µg/kg
		Tetrachloroethene	Soil	7 to 7.5	2,700,000.00	µg/kg
		Trichloroethene	Soil	7 to 7.5	180,000.00	µg/kg
		Unknown hydrocarbon	Soil	7 to 7.5	970	mg/kg
			Soil	7 to 7.5	410,000.00	µg/kg
		Percent water	Soil	7 to 7.5	23.1	%mst
			Soil	7 to 7.5	23.1	%mst
9852N022	SB-6	Aluminum	Soil	1.5 to 2.0	18,400.00	mg/kg
		Arsenic	Soil	1.5 to 2.0	7.0	mg/kg
		Barium	Soil	1.5 to 2.0	227	mg/kg
		Beryllium	Soil	1.5 to 2.0	0.58	mg/kg
		Calcium	Soil	1.5 to 2.0	4,670.00	mg/kg
		Chromium	Soil	1.5 to 2.0	68.3	mg/kg
		Cobalt	Soil	1.5 to 2.0	14.6	mg/kg
		Copper	Soil	1.5 to 2.0	39.8	mg/kg
		Iron	Soil	1.5 to 2.0	31,500.00	mg/kg
		Lead	Soil	1.5 to 2.0	13.4	mg/kg
		Magnesium	Soil	1.5 to 2.0	7,200.00	mg/kg
		Manganese	Soil	1.5 to 2.0	482	mg/kg
		Nickel	Soil	1.5 to 2.0	57.4	mg/kg
		Potassium	Soil	1.5 to 2.0	1,830.00	mg/kg
		Selenium	Soil	1.5 to 2.0	0.59	mg/kg
		Sodium	Soil	1.5 to 2.0	456	mg/kg
		Vanadium	Soil	1.5 to 2.0	67.7	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N022 (cont.)	SB-6 (cont.)	Zinc	Soil	1.5 to 2.0	67.4	mg/kg
		Percent water	Soil	1.5 to 2.0	21.7	%mst
9852N023	SB-6	Aluminum	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	16,600.00	mg/kg
		Arsenic	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	3.6	mg/kg
		Barium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	210	mg/kg
		Beryllium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	0.69	mg/kg
		Cadmium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	0.68	mg/kg
		Calcium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	4,780.00	mg/kg
		Chromium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	59.9	mg/kg
		Cobalt	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	17.0	mg/kg
		Copper	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	25.5	mg/kg
		Iron	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	26,900.00	mg/kg
		Lead	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	8.3	mg/kg
		Magnesium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	8,750.00	mg/kg
		Manganese	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	699	mg/kg
		Nickel	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	79.4	mg/kg
		Potassium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	2,130.00	mg/kg
		Silver	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	0.26	mg/kg
		Sodium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	882	mg/kg
		Vanadium	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	35.5	mg/kg
		Zinc	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	74.2	mg/kg
		Phenol	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	450	µg/kg
		Tetrachloroethene	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	110	µg/kg
		Trichloroethene	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	3.6	µg/kg
		Percent water	Soil	9.5 to 10.0 (MS/MSD) and 10.0 to 10.5	15 0	%mst
9852N024	SB-6 (duplicate)	Aluminum	Soil	10 5 to 11.0.0	13,700.00	mg/kg
		Arsenic	Soil	10 5 to 11.0.0	3 0	mg/kg
		Barium	Soil	10.5 to 11 0.0	402	mg/kg
		Beryllium	Soil	10 5 to 11 0.0	0.51	mg/kg
		Cadmium	Soil	10 5 to 11 0.0	0.68	mg/kg
		Calcium	Soil	10.5 to 11 0 0	13,100.00	mg/kg
		Chromium	Soil	10.5 to 11 0.0	55.0	mg/kg
		Cobalt	Soil	10 5 to 11.0.0	7 8	mg/kg
		Copper	Soil	10 5 to 11.0 0	20.0	mg/kg
		Iron	Soil	10 5 to 11.0.0	23,700.00	mg/kg
		Lead	Soil	10.5 to 11.0.0	4 7	mg/kg
		Magnesium	Soil	10.5 to 11.0.0	6,950 00	mg/kg
		Manganese	Soil	10.5 to 11.0.0	1,100 00	mg/kg

TABLE E-1

DETECTED SOIL AND GROUNDWATER SAMPLE RESULTS

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result	Units
9852N024 (cont.)	SB-6 (dup. cont.)	Nickel	Soil	10.5 to 11.0.0	68.8	mg/kg
		Potassium	Soil	10.5 to 11.0.0	1,280.00	mg/kg
		Sodium	Soil	10.5 to 11.0.0	948	mg/kg
		Vanadium	Soil	10.5 to 11.0.0	30.3	mg/kg
		Zinc	Soil	10.5 to 11.0.0	46.3	mg/kg
		Tetrachloroethene	Soil	10.5 to 11.0.0	2.5	µg/kg
		Trichloroethene	Soil	10.5 to 11.0.0	1.2	µg/kg
		Percent water	Soil	10.5 to 11.0.0	13.6	%mst
9852N025	Trip blanks	Naphthalene	Water	—	0.15	µg/L
		1,2,3-Trichlorobenzene	Water	—	0.22	µg/L
		1,2,4-Trichlorobenzene	Water	—	0.16	µg/L

Notes:

bgs Below ground surface
DDD Dichlorodiphenyldichloroethane
DDT Dichlorodiphenyltrichloroethane
µg/kg Microgram per kilogram
mg/kg Milligram per kilogram
mg/L Milligram per liter
µg/L Microgram per liter

TABLE E-2

ANALYTICAL RESULTS FOR UNKNOWN HYDROCARBONS ABOVE HPS VALUES IN SOIL

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result
9852N013	SB-3	TPH-extractables[a]	Soil	2.0 to 2.5	7,700.00
		TPH-purgeables[b]	Soil	2.0 to 2.5	900.00
9852N014	SB-3	TPH-extractables[a]	Soil	10.5 to 11.0	490
		TPH-purgeables[b]	Soil	10.5 to 11.0	100.00
9852N016	SB-4	TPH-extractables[a]	Soil	2.0 to 2.5	320.00
9852N021	SB-3	TPH-extractables[a]	Soil	7 to 7.5	970
		TPH-purgeables[b]	Soil	7 to 7.5	410.00

Notes:

bgs Below ground surface
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbons

a Hunters Point Shipyard (HPS) risk-based screening level (RBSL) for diesel and motor oil (TPH-extractables) is 100 mg/kg.
b HPS RBSL for gasoline (TPH-purgeables) is 1,000 mg/kg.

TABLE E-3

ANALYTICAL RESULTS FOR TPH IN GROUNDWATER

Sample ID	Boring ID	Analyte	Matrix	Result (µg/L)	HPS Value (µg/L)
9852N001	SB-1	Unknown hydrocarbon	Water	650	100
9852N002	SB-2	Unknown hydrocarbon	Water	2,400	100
9852N003	SB-3	Unknown hydrocarbon	Water	390,000	100
9852N007	SB-6	Unknown hydrocarbon	Water	360	100

Notes:

HPS Hunter's Point Shipyard
µg/L Microgram per liter

TABLE F-2

ANALYTICAL RESULTS FOR SUBSURFACE SOIL ABOVE RBSLs
INDUSTRIAL/INHALATION OF OUTDOOR AIR PATHWAY

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result (mg/kg)	Soil PRG (mg/kg)	RBSL (mg/kg)
9852N014	SB-3	Tetrachloroethene	Soil	10.5 to 11.0	1,100	16	C-32
		Trichloroethene	Soil	10.5 to 11.0	50	6.10	C-11
9852N021	SB-3	Tetrachloroethene	Soil	7 to 7.5	2,700	16	C-32
		Trichloroethene	Soil	7 to 7.5	180	6.10	C-11

Notes:

bgs Below ground surface
C Carcinogenic
mg/kg Milligram per kilogram
PRG Preliminary remediation goal
RBSL Risk-based screening level

TABLE G-2

ANALYTICAL RESULTS FOR SUBSURFACE SOIL ABOVE SSTLs
INDUSTRIAL/INHALATION OF OUTDOOR AIR PATHWAY

Sample ID	Boring ID	Analyte	Matrix	Depth (feet bgs)	Result (mg/kg)	Soil PRG (mg/kg)	SSTL (mg/kg)
9852N014	SB-3	Tetrachloroethene	Soil	10.5 to 11.0	1,100.00	16	C-32
	SB-3	Trichloroethene	Soil	10.5 to 11.0	50.00	6.1	C-11
9852N021	SB-3	Tetrachloroethene	Soil	7 to 7.5	2,700.00	16	C-32
	SB-3	Trichloroethene	Soil	7 to 7.5	180.00	6.1	C-11

Notes:

bgs Below ground surface
C Carcinogenic
mg/kg Milligram per kilogram
PRG Preliminary remediation goal
SSTL Site-specific target level