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Final Technical Memorandum for Groundwater Investigation at Parcel E-2

Hunters Point Shipyard
San Francisco, California

February 2009

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Prepared for:

Department of the Navy
Base Realignment and Closure
Project Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:
CE2-Kleinfelder Joint Venture
4457 Willow Road, Suite 210
Pleasanton, California 94588
(925) 463-7301

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Certification

Final Technical Memorandum for Groundwater Investigation at Parcel E-2

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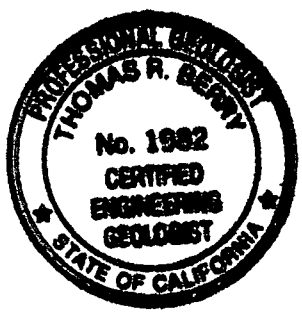
February 2009

I certify that the work presented in this report was performed under my supervision. To the best of my knowledge, the data contained herein are true and accurate and the work was performed in accordance with professional standards.



Thomas R. Berry, PG, CEG
Project Manager
CE2 Corporation

2/12/2009
Date

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Abbreviations and Acronyms

APPL	Agriculture and Priority Pollutants Laboratory, Inc.
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CE2	CE2 Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Cs-137	Cesium-137
Co-60	Cobalt-60
DOT	Department of Transportation
DPT	Direct-Push Technology
DQO	Data Quality Objective
DTSC	(California) Department of Toxic Substances Control
EPA	(United States) Environmental Protection Agency
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft	feet
HDPE	high-density polyethylene
HPS	Hunters Point Shipyard
IDW	investigation-derived waste
JV	Joint Venture
Kleinfelder	Kleinfelder, Inc.
L	liter
MS	matrix spike
MSD	matrix spike duplicate
MDL	method detection limit
µg/L	micrograms per Liter
mL	milliliter
msl	mean sea level
NAVFAC Southwest	Naval Facilities Engineering Command Southwest
NAVFAC ESC	Naval Facilities Engineering Service Center
Navy	United States Department of the Navy
NNP	non-Navy Property
NPL	National Priorities List
PID	photoionization detector
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PCBs	polychlorinated biphenyls
PMO	(BRAC) Project Management Office
PPE	personal protective equipment
ppmv	parts per million by volume
QC	quality control
QCSR	quality control summary report
Ra-226	radium-226b

Abbreviations and Acronyms
(continued)

RPD	Relative Percent Difference
RI/FS	Remedial Investigation/Feasibility Study
ROICC	Resident Officer in Charge of Construction
RPM	(Navy) Remedial Project Manager
RTC	Response to Comments
RWQCB	California Regional Water Quality Control Board – San Francisco Bay Region
SAP	Sampling and Analysis Plan
Sr-90	strontium-90
TC	terrain conductivity
TPH	Total Petroleum Hydrocarbons
TSA	Technical System Audits
TtECI	Tetra Tech EC, Inc.
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans
USC	United States Code
USCS	Unified Soil Classification System
VMG	vertical magnetic gradient
VOA	volatile organic analysis
VOC	volatile organic compound

Executive Summary

CE2-Kleinfelder Joint Venture (CE2-Kleinfelder JV) has prepared this Technical Memorandum for a supplemental groundwater investigation for a portion of Parcel E-2, Hunters Point Shipyard (HPS), San Francisco, California (Figure 1). This work was performed for the U.S. Department of the Navy (Navy), Base Realignment and Closure (BRAC) Project Management Office West, in accordance with Contract No. N62473-07-C-3001.

The Navy is in the process of preparing a Remedial Investigation/Feasibility Study (RI/FS) for the contiguous area consisting of the closed Industrial Landfill (hereafter identified as the "Parcel E-2 Landfill") and areas immediately adjacent to the landfill. Through comments on the Parcel E-2 RI/FS, the Base Realignment and Closure (BRAC) Cleanup Team (BCT) consisting of representatives from the Navy, the U.S. Environmental Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), and the California Regional Water Quality Control Board – San Francisco Bay Region (RWQCB) requested that additional analytical data be obtained. The approach to obtaining the necessary additional groundwater analytical data was developed in the August 2007 BCT meeting. The identified contaminants of concern are:

- Total petroleum hydrocarbons (TPH) - purgeables.
- TPH - extractables.
- Ammonia (as nitrogen).
- Polychlorinated biphenyls (PCBs).
- Dissolved metals.

The specific goals of this study presented below are intended to provide supplemental data for the Feasibility Study (FS) for Parcel E-2:

1. Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the shoreline.
2. Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the upper panhandle.
3. Provide data from the A-Aquifer to evaluate the effectiveness of the PCB Hot Spot Area soil removal action.
4. Provide data to evaluate whether A-Aquifer groundwater beneath the metal slag excavation area of the Parcel E-2 panhandle has been impacted by dissolved metals.

To meet these objectives, the following scope of work was performed:

1. A geophysical survey was conducted to identify potential subsurface obstructions.
2. 61 temporary wells were installed in the A-Aquifer using Direct Push Technology (DPT).

3. Grab groundwater samples were collected from the 61 temporary wells and 7 previously installed A-Aquifer piezometers using a peristaltic pump.
4. A location and elevation survey was conducted for the temporary well locations and to update horizontal coordinates and elevations of the seven piezometers.

Data collected under this investigation are intended to be incorporated as necessary into the remedial alternative evaluation and selection process for Parcel E-2. Analytical data generated by this investigation are presented in Section 7.0 of this report.

Additional Scope of Work – Groundwater Sampling for Radionuclides

An additional groundwater sampling event was conducted between June 27 and July 1, 2008 to collect samples for select radionuclide analysis. The scope of this work was initially presented in the *Final Addendum 1 to the Work Plan for Groundwater Investigation at Parcel E-2* (June 2008).

Groundwater samples were collected from the 61 temporary wells and 7 A-Aquifer piezometers using a peristaltic pump. Samples form all 68 locations were analyzed for cesium-127, radium-226, and strontium-90. Samples from 11 temporary well locations were also analyzed for cobalt-60.

The sampling methods and analytical results from this sampling event are presented in their entirety in Appendix J of this Final Technical Memorandum.

1.0 Introduction

CE2-Kleinfelder Joint Venture (CE2-Kleinfelder JV) has prepared this Technical Memorandum to present the results of a chemical data gap investigation conducted in the shallow groundwater within Parcel E-2, Hunters Point Shipyard (HPS), San Francisco, California (Figure 1). This work was performed for the U.S. Department of the Navy (Navy), Base Realignment and Closure (BRAC) Project Management Office West, in accordance with Contract No. N62473-07-C-3001.

The investigation was conducted by the CE2-Kleinfelder JV with portions of the work subcontracted to a geophysical survey firm, a temporary well point installation (drilling) firm, analytical laboratories, a third-party data validation company, and a land surveyor. The project was conducted in accordance with the following documents:

- *Work Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California* (CE2-Kleinfelder JV, 2008a).
- *Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Groundwater Investigation at Parcel E-2* (CE2-Kleinfelder JV, 2008b). This document was published as an appendix A to the Work Plan.

In February 2008, the Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB) provided the Navy with comments on the above documents. The Response to Comments (RTC) is included as Appendix A. As part of the response to comments, an additional six temporary wells were installed during the implementation of work scope under the above-referenced Work Plan and Final Sampling and Analysis Plan (SAP). Groundwater samples were collected for chemical analysis from these locations and the results are reported in this Technical Memorandum.

Prior to implementing the work under the above documents, key personnel reviewed the Final SAP as indicated in the project personnel sign-off sheets included in Appendix B.

1.1 Project Objectives

The Data Quality Objectives (DQOs) for this investigation were developed in accordance with the seven-step process presented in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) guidance (EPA, 2005). The DQO process was described in the SAP and includes the problem and the temporal, spatial, and resource boundaries; defines the decisions to be made during the project; and identifies data and other inputs required for decision-making. These objectives have, in turn, identified the sampling and analytical methods and quality assurance procedures that were followed during the investigation.

The Navy is currently in the process of preparing an RI/FS report for the contiguous area consisting of the closed Industrial Landfill (hereafter identified as the "Parcel E-2 Landfill") and the immediate adjacent areas. Through comments on the FS, the BCT requested that additional analytical data be obtained. The approach to obtaining the necessary additional groundwater

analytical data was developed in the August 2007 BCT meeting. The identified contaminants of concern are:

- Total petroleum hydrocarbons (TPH) - purgeables.
- Total petroleum hydrocarbons - extractables.
- Ammonia (as nitrogen).
- PCBs.
- Dissolved metals.

This groundwater investigation is part of ongoing efforts by the Navy to address contamination at HPS Parcel E-2 in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) by providing data for use in preparing the Parcel E-2 Feasibility Study (FS) report. The FS is a mechanism for characterizing the nature and extent of site risks and evaluating potential remedial alternatives.

The specific goals of this study presented below are intended to provide supplemental data for the evaluation of remedial alternatives in the FS for Parcel E-2:

1. Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the shoreline.
2. Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the upper panhandle.
3. Provide data from the A-Aquifer to evaluate the effectiveness of the PCB Hot Spot Area soil removal action.
4. Provide data to evaluate whether A-Aquifer groundwater beneath the metal slag excavation area of the Parcel E-2 panhandle has been impacted by dissolved metals.

1.2 Scope of Work

The site investigation consisted of the following field activities:

1. A geophysical survey was conducted to identify potential subsurface obstructions.
2. 61 temporary wells were installed in the A-Aquifer using DPT.
3. Grab groundwater samples were collected from the 61 temporary wells and 7 previously installed A-Aquifer piezometers.
4. A location and elevation survey was conducted for the temporary well locations and to update horizontal coordinates and elevations of the seven piezometers.

Temporary well and piezometer locations are shown on Figure 2. In response to regulatory request, installation and groundwater sampling of six temporary wells (TW056, TW057B, TW058, TW059, TW060, and TW061) were included in the above scope of work subsequent to the issuance of the Final SAP. The addition of these locations is included in the June 2008

Addendum 1 to the Final SAP. Sampling of these wells for chemical analysis was consistent with the procedures described in the Final SAP. One of the total 62 planned temporary wells was not installed because uneven terrain and observed surface obstructions made the location inaccessible to the drill rig.

Additionally, field measurements of temperature, specific conductance, and pH were collected during this investigation.

In February 2008, the BCT requested the addition of groundwater sampling and analysis for the following radionuclides:

- Cesium-137 (Cs-137).
- Cobalt-60 (Co-60).
- Radium-226 (Ra-226).
- Strontium-90 (Sr-90).

Sampling for these radionuclides will be conducted upon approval of Addendum 1 to the Final SAP and the results will be reported in a Supplemental Technical Memorandum.

1.3 Regulatory Framework

The following section presents the project regulatory framework.

1.3.1 Principal Decision Makers

Ongoing base closure work at HPS is overseen by the Navy's Base Realignment and Closure (BRAC) Program Management Office (PMO) West, in San Diego, California. As the lead agency under Executive Order 12580, the Navy has authority over evaluation of risk, remedy selection alternative, and overall public participation at HPS. The Navy is coordinating with the U.S. EPA, DTSC, and the RWQCB.

1.3.2 Technical or Regulatory Standards

This groundwater investigation was conducted under the auspices of a Federal Facilities Agreement (FFA) that provides a procedural framework and schedule for the CERCLA cleanup process at HPS.

1.3.3 Permitting Requirements

In accordance with Section 121(e) of CERCLA 1980 [CERCLA, 42 United States Code, Section 9621(e)], as amended, which states that no federal, state, or local permits shall be required for the portion of any removal or remedial action conducted entirely onsite, the work activities to be conducted do not require permits.

1.4 Boundaries of the Study

The lateral boundary of this investigation extended from the southern/southwestern edge of the landfill through the Parcel E-2 panhandle, along the shoreline, and to the southeast into the

former PCB Hot Spot area.. Figure 2 shows the location of the temporary wells and piezometers from which groundwater samples were collected for analysis for this investigation.

The vertical boundary is the bottom of the A-Aquifer beneath Parcel E-2 approximately 10-20 feet below ground surface.

The temporal boundary for this investigation was the first quarter of 2008. The well installation, coring, and groundwater sampling was conducted during the first quarter of 2008. Well and piezometer location surveying was conducted in the first week of April 2008. Temporary well decommissioning is on hold pending completion of additional groundwater sampling for radionuclide analysis under Addendum 1 to the Final SAP.

1.5 Performance or Acceptance Criteria

Because a judgmental sampling strategy was used, statistically derived acceptance criteria on sampling design error are not quantifiable. Groundwater sampling was conducted using the field sampling and handling methods in accordance with procedures presented in the SAP. The data quality indicators (precision, accuracy, representativeness, comparability, completeness, and sensitivity [PARCSS]) were evaluated in accordance with the PARCSS parameters defined in the SAP. A quality control summary report (QCSR) is presented as Appendix I of this technical memorandum.

2.0 Site History and Description

The location of HPS and its parcel divisions are shown in Figure 1. Figure 2 shows Parcel E-2 and the investigation locations where this scope of was performed.

2.1 Hunters Point Shipyard Parcel E-2 Background

HPS was owned and operated as a commercial dry dock facility until 1939, when the Navy purchased the property from Bethlehem Steel. Upon the entry of the U.S. into World War II in 1941, the Navy immediately began to expand HPS into a naval shipyard. The Navy began excavation of the hills surrounding the shipyard, using the resulting spoils to expand the shoreline into the Bay. Quays, docks, and support buildings were built on an expedited wartime schedule to support the shipyard's mission of fleet repair and maintenance.

Parcel E-2 is part of an area created by the Navy in the 1940s, 1950s, and 1960s by filling in the Bay margin with a variety of material, including soil, crushed bedrock, dredged sediments, and debris. From 1976 to 1986, most of Parcel E-2 was leased to and occupied by Triple A Machine Shop, Inc. a privately held ship repair company, after which the Navy resumed occupancy.

HPS was identified as a National Priorities List (NPL) site by the EPA in 1989. As a result, the Navy is conducting investigations in accordance with CERCLA (Title 42 *United States Code* [USC] Sections [§§] 9601-9675) at a number of sites at HPS where releases of CERCLA hazardous substance have occurred. As a management tool to accelerate site investigation, cleanup, and reuse, HPS was divided into geographic parcels and Installation Restoration sites within each parcel that are evaluated concurrently.

At the time of this groundwater sampling event in March 2008, HPS was divided into six parcels; Parcels B, C, D, E, E-2, and F (Figure 1). In 1992, the Navy divided HPS into five contiguous parcels (A, B, C, D, and E) to aid in coordination and tracking of environmental investigation and cleanup. In 1996, the Navy added a sixth parcel (Parcel F), also known as the offshore area that encompasses an area of about 465 acres extending under the San Francisco Bay. In September 2004, the Navy divided Parcel E into two parcels (Parcels E and E-2) to facilitate the closure of the Parcel E-2 Landfill and its adjacent areas. In December 2004, the Navy transferred Parcel A to the San Francisco Redevelopment Agency who subsequently transferred a portion of the former Parcel A to Lennar/BVHP in 2005. The former Parcel A area is referred to herein as non-Navy property (NNP).

2.2 Site Description and Physical Setting

Parcel E-2 consists of 47.4 acres of shoreline and lowland coast along the southwestern portion of HPS (Figure 1). Parcel E-2 is bounded by:

- Property owned by the University of California, City of San Francisco, and a portion of Parcel E to the north.
- San Francisco Bay to the south.

- Portions of Parcel E to the east.
- Non-Navy property (NNP) to the west outside the HPS perimeter.

The maximum ground surface elevation in Parcel E-2 is approximately 20 feet above mean sea level (msl). The Parcel E-2 Landfill is covered with either several feet of soil or a multilayer interim landfill cap composed of geosynthetic materials with a soil vegetative cover.

The area of this investigation extends from the southern/southwestern limit of the landfill cover throughout the upper panhandle area and along a line about 100-150 feet landward from the Parcel E-2 shoreline from the upper panhandle extending southwest. The southeastern side of the PCB Hot Spot area located near the southern edge of the landfill was also included in this investigation with five temporary well locations.

The area of this investigation has a relatively flat, general topography, and is covered by fill that contains non-contiguous pockets of solid waste. The ground surface is hummocky and mounds of rip-rap are located discontinuously along the shoreline. Saline emergent wetlands (approximately 2.38 acres) are present along the Parcel E-2 shoreline. In addition, a 1.3-acre seasonally ponded area is located in the Panhandle Area of Parcel E-2

No buildings or paved roads are present in the area of this investigation. There are several dirt/gravel access roads. No known underground utilities are in the area of current investigation temporary well installations. An approximately 500-foot long sheet-pile wall, installed by the Navy in 1997, extends along the shoreline to the south of the Parcel E-2 Landfill cap.

The former Metal Slag Area is an open field located near the southwest end of the panhandle extending about 50-200 feet landward from the shoreline. Part of this area was subject to a Time-Critical Removal Action for removal of radiological contamination in 2005-2006.

A former Experimental Ship Shielding Area is an open field located on the east end of the panhandle located adjacent and northeast of the Metal Slag Area. There are three parts to the Experimental Ship Shielding Area encompassing a total of about 1.7 acres.

The PCB Hot Spot area is oriented generally parallel with the Parcel E-2 southeastern shoreline. It is set back from the shoreline between about 50 and 120 feet. The majority of the area is between 200 and 300 feet wide with it tapering to about a 30-foot wide corridor along the northern portion of the sheetpile wall. A soil removal action to mitigate PCB contamination was conducted within the PCB Hot Spot area in 2006.

An intertidal zone, about 25 to 75 feet in width, extends along the length of the Bay shoreline (referred to as the "Shoreline area" on Figure 2). This zone contains areas covered with concrete riprap, exposed shoreline sediments, and emergent saline wetlands.

2.3 Site Use

Previous investigations document that Parcel E-2 was primarily used as a landfill for municipal-type waste and construction debris. Solid waste, including wood, paper, plastic, metal, glass, asphalt, concrete, and bricks is mixed with sand, clay, and gravel fill. Historic

information indicates that industrial wastes were also disposed of in or around the landfill including sandblast grit, radioluminescent devices, asbestos-containing debris, paint sludge, solvents, and waste oils.

2.4 Hydrogeology

A conceptual summary of the site hydrogeology is presented in the following sections. More detailed information about the site hydrogeology is available in the *Draft Parcel E-2 Remedial Investigation/Feasibility Study Hunters Point Shipyard San Francisco, California* (Engineering/Remediation Resources Group, Inc and Shaw Environmental, Inc., 2007).

The hydrostratigraphic units relevant to this data gap investigation are:

A-Aquifer - The unconfined A-Aquifer extends across all of Parcel E-2 and consists primarily of heterogeneous artificial fill and marine sediments comprised of fine sand, clay, silt, and silty and clayey sands. In some places the groundwater in shallow fractured bedrock is in hydraulic connection with the A-Aquifer. The A-Aquifer in Parcel E-2 extends from first encountered groundwater a few feet below grade up to between about 10 feet to 20 feet below ground surface.

Bay Mud Aquitard - The A-Aquifer is underlain by a thick, relatively impermeable layer of Bay Mud deposits (mostly clays and silty clays), which range in thickness from about 45 feet at the shoreline to about 10 feet under the central portion of the landfill. The Bay Mud Aquitard extends across most of Parcel E-2 except where it pinches out in the northernmost part of the parcel.

Most groundwater recharge occurs by direct infiltration of precipitation falling on the upland areas of non-Navy property (NNP) and by precipitation falling on unpaved areas onsite, especially in Parcels E and E-2. Most precipitation typically occurs November through April.

Across most of Parcel E-2, groundwater elevations in the A-Aquifer generally range from sea level to 7 feet above msl. A-Aquifer groundwater in the area of this investigation flows toward the San Francisco Bay where it discharges along a tidal mixing zone.

Groundwater elevations in the A-Aquifer are influenced by tidal fluctuations that create a sinusoidal pressure wave near the shoreline. Tidal influence in the A-Aquifer decreases with increasing distance from the shoreline.

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3.0 Geophysical Survey

Norcal Geophysical Consultants, Inc. (Norcal) performed a geophysical study over the areas of planned temporary well installation on September 13th and 14th and November 15th and 16th, 2007. Appendix C contains the geophysical survey report including a full discussion of methodology and findings.

The objectives of the geophysical survey included:

- Locate potential underground utilities.
- Assessing if proposed drilling locations would be precluded by subsurface obstructions.

3.1 Methodology

Norcal chose to divide the study area into five survey units as shown in Plate 1 of their report. In each survey unit, they established a grid to provide horizontal position control and performed a series of traverses using both vertical magnetic gradient (VMG) and terrain conductivity (TC) survey methods. Data acquisition consisted of a series of parallel traverses spaced 10 feet apart. Magnetic data were acquired along the grid lines at approximately 5-foot intervals. TC data were acquired along the northing grid lines at approximately 10-foot intervals.

3.2 Findings

There were numerous VMG and TC anomalies suggesting shallow subsurface debris. Existing monitoring wells and the sheet pile wall located near the shoreline in the southeast portion of Parcel E-2 were also evident on the anomaly map.

Strong TC anomalies were detected without corresponding VMG anomalies at several locations near the shoreline which may be due to the close proximity of saline water of the Bay.

No underground utilities were located. With the exception of the sheet pile wall and existing monitoring wells, none of the VMG or TC anomalies were viewed as precluding drilling at those locations. Therefore, drilling locations were not adjusted based on the geophysical survey.

Details of area-specific findings are provided in Appendix C.

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4.0 Soil Coring and Temporary Well Installation

This section discusses the methodologies for borehole soil coring, installation of temporary wells, and elevation/location surveying of the temporary wells and the previously installed piezometers.

4.1 Preparatory Activities

Prior to beginning drilling, the following preparatory activities were conducted:

- The Navy Remedial Project Manager (RPM), Resident Officer in Charge of Construction (ROICC) and the appropriate HPS security and fire department personnel were notified regarding the anticipated work.
- Personnel leading field activities reviewed the appropriate sections of the Sampling and Analysis Plan (SAP) and signed the project sign-off sheet.
- The affected personnel read the Accident Prevention Plan (APP) and associated Site-Specific Safety and Health Plan (SSHP) and signed an acknowledgement form. They also attended required HPS Radiation Awareness Training conducted by the Navy's radiation contractor: Tetra Tech EC, Inc. (TtECI).
- Underground Service Alert was notified at least two full working days in advance of drilling.

4.2 Borehole Installation and Soil Coring

Drilling and associated temporary well installation was conducted between February 13 and 29, 2008 by Vironex of Pacheco, California (California C57 license #705927) under the supervision of the CE2-Kleinfelder JV field manager Tom Sayre, a California Professional Geologist. The locations of the temporary wells are shown in Figure 2. Graphical logs of boreholes where soil cores were collected are presented in Appendix D.

The temporary well boreholes were advanced using DPT, using a truck-mounted hydraulic/percussion rig.

The temporary well boreholes (except at the six locations where soil coring was conducted) were advanced using 1.75-inch diameter, steel drive rods with a sacrificial tip. This method displaced soil as the drive rods were advanced and produced no soil cuttings. Upon reaching total borehole depth, temporary well casings were installed through the drill rods. The drill rods were fully removed from the borehole, and the sand pack and bentonite seal were installed (see Section 4.3 below).

Sub-surface obstructions were encountered at six proposed temporary well locations (TW002, TW006, TW008, TW009, TW011, and TW043). These obstructions caused either drilling refusal above the borehole targeted depth or deviation of the borehole such that the well casing could not be properly installed. In these instances, additional boreholes were drilled

approximately 5 feet laterally from the initial location until the temporary well could be installed successfully.

One drilling location proposed in the SAP, between temporary wells TW048 and TW051, near the shoreline of the upper panhandle, was not accessible due to uneven terrain and observed surface obstructions and therefore not included in the sampling program.

Continuous soil cores were collected at six temporary well locations: TW001, TW002, TW003, TW004, TW031, and TW033 as shown on Figure 2. Boreholes at these locations were advanced at 5-foot intervals using a 1.75-inch diameter, steel sampling barrel lined with opaque acetate sleeves. Soil was pushed into the sampling sleeves as the drill string was advanced. Upon retrieval, the acetate sleeves were cut open, and soil cores were screened using a photoionization detector (PID) and described by the field geologist using the Unified Soil Classification System (USCS) on borehole logs. The borehole logs are presented in Appendix D. Temporary wells were subsequently installed at these six locations.

Soil cores from these locations were stored as composited waste in a 55-gallon Department of Transportation (DOT) approved drum for waste profiling and disposal. To allow for potential depth-specific radionuclide analysis by another Navy contractor, another set of companion borehole of equal or greater depth were advanced within about five feet of the six soil coring locations on March 11, 2008. Soil cores were retrieved from these boreholes using the same method. To maintain sample integrity, the acetate sleeves were not cut open and soil description was logged based on observations made at the end of each 5-foot coring run. These logs are also included in Appendix D. The core sleeves from the March 11 drilling were capped, labeled, and after passing radioactive screening at the drilling location, were stored in a locked storage container located within the Parcel E-2 boundaries. These cores are awaiting possible transfer to another Navy contractor for radionuclide analysis, reporting, and disposal.

Table 1 presents borehole drilling dates and total depths. Laboratory analysis of soil samples was not conducted as part of the scope of work.

4.3 Temporary Well Installation

Temporary wells were installed at each location immediately following borehole advancement. Temporary wells were constructed by manually emplacing 0.75-inch outer diameter PVC well casing in the drill rods, followed by removing the drill rods and emplacing annular filter pack (#2/16 sand) from well total depth to no more than two feet above the well screen. The annular space above the san pack was backfilled using bentonite chips to approximately 1.0 to 0.5-feet below grade. The annular space above the bentonite chips was sealed using hydrated bentonite powder to prevent surface materials or surface water from entering the borehole. Table 1 summarizes the construction details of the temporary wells.

Over the weekend of March 8 and 9, five temporary wells; TW026, TW027, TW028, TW030, and TW057, located in the southern half of the panhandle were vandalized. This occurred before these locations were either sampled or surveyed. On March 10, these wells were replaced with the same construction specifications as the originals within about five feet from the original locations, and were named TW026B, TW027B, TW028B, TW030B, and TW057B

respectively. The original temporary wells were decommissioned by pulling out remaining casing to the extent possible and backfilling the boreholes to surface with Portland Type I/II cement.

4.4 Temporary Well and Piezometer Surveying

On April 3, 2008, Espinosa Surveyors, Easton, California, a California-licensed professional land surveyor, surveyed the elevation and location of the 61 temporary wells and 7 piezometers (elevation and location). Appendix E contains the surveyor's report.

Table 2 summarizes the construction details of the seven piezometers including the updated survey data. Ground surface and top-of-casing elevations were different than the original survey data obtained in 1998 when these piezometers were installed. Copies of the original 1998 logs with elevation, location, and construction depth revisions based on the 2008 survey are included in Appendix D. Ground surface elevation was higher at each of the seven locations ranging from a 0.10 to 3.59 feet increase. This is likely attributed to additional soil placement related to the landfill fill cap installation conducted in August 2000 since six of the piezometers lie near the cap edge and one (PZ-138F) is within the cap. Differences in top-of-casing elevations ranged from a decrease of 0.48 feet to an increase of 3.56 feet from measurements taken in 1998. The cause(s) of discrepancies between top-of-casing elevations is not known.

4.4.1 Vertical Coordinates

The surveyor reported the elevation at ground surface for each temporary well location to a precision of 0.01 ft, based on the borehole center. The elevations were surveyed relative to the 1929 National Geodetic Vertical Datum Vertical coordinates, and were reported as feet relative to mean sea level (msl).

4.4.2 Geographic Coordinates

The surveyor reported the geographic coordinates at the center of each temporary well to a precision of plus or minus 0.1 ft. The geographic coordinates of the temporary wells were surveyed using the 1927 North American Datum State Plane Coordinate System, California, Zone 3.

The seven piezometers were also surveyed according to the above procedures, and also included elevation surveying of the top of well casing in addition to ground elevation.

4.5 Temporary Well Decommissioning

The temporary surface seal and well screens removal has been postponed until after additional groundwater sampling for radionuclides is conducted under Addendum 1 to the Work Plan for Groundwater Investigation at Parcel E-2. Well decommissioning will be accomplished by using a winch to pull the PVC casing out of the boreholes. Boreholes will then be backfilled with neat Portland Type I/II cement grout.

4.6 Equipment Decontamination

Reusable drilling and sampling equipment was decontaminated prior to and after use. This included soil core barrels and drive rods. Decontamination was conducted by Vironex personnel.

5.0 Groundwater Sampling Methodology

Groundwater samples were collected from the temporary wells and seven piezometers as shown on Figure 2. Table 3 summarizes sampling information including location and sample IDs, dates of sampling, analytical suite, and field measurements of temperature, specific conductivity, and pH.

Prior to sampling, depth to water was measured with an electric water level indicator, relative to top of casing.

Groundwater samples were collected from temporary wells once water levels were at least three feet above the well bottom. Groundwater samples were collected from existing piezometers regardless of initial water level. Samples were collected using a peristaltic pump located at ground surface with well-specific, disposable, Teflon-lined, plastic tubing lowered to within one foot of the bottom of each temporary well or piezometer. If the well/piezometer ran dry during the initial sampling attempt, samples were collected on subsequent days as water recharged into the well/piezometer.

Groundwater samples were collected by purging the wells/piezometers at a rate of $\leq$ 500 mL/minute to minimize turbidity and potential volatilization of lighter petroleum hydrocarbons. Stabilization parameter monitoring was not applicable to this sampling technique. However, pH, specific conductance, and temperature were measured once at each location during sampling.

Samples were collected directly into pre-cleaned, laboratory-supplied sample containers. The volatile organic analysis (VOA) vials (for TPH-purgeables) were filled to a positive meniscus and were inspected for air bubbles. If air bubbles were detected, the vial was discarded and a replacement vial was filled. If air bubbles persisted, VOAs without preservative were used and a notation was made to the chain of custody.

Samples for dissolved metals analyses were collected in containers without preservative. The analytical laboratory filtered the samples using a 0.45 micron filter and added nitric acid preservative within 24 hours of receipt and prior to analysis.

Samples were collected at each well/piezometer, as applicable to each location, in the following order:

1. TPH-purgeables.
2. TPH-extractables.
3. PCBs.
4. Dissolved metals.
5. Ammonia, as nitrogen.

The sample containers were placed in an ice-filled cooler for transport to the analytical laboratory Agriculture and Priority Pollutants Laboratory, Inc. (APPL) of Fresno, California following chain-of-custody protocol. The chain-of-custody records are presented in Appendix F.

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6.0 Management of Investigation-Derived Waste

Investigation-derived waste (IDW) generated by this project included equipment decontamination water (rinsate), soil cores, used personal protective equipment (PPE), and drilling-related solid waste (such as used temporary well casings and acetate sleeves from soil coring).

Equipment decontamination rinsate was collected in DOT-approved 55-gallon drums and transported to the CE2-Kleinfelder JV field office where it was transferred into the 4,000-gallon storage tank used for storing purgewater from the Basewide Groundwater Monitoring Program. That water was managed according to the IDW Management Plan for that Program.

Soil cores were generated from two sources; (1) boreholes advanced for installation of temporary wells TW001, TW002, TW003, TW004, TW031, and TW033, and (2) boreholes advanced at these six locations to collect soil core samples.

The cores from the well installation were placed within one DOT-approved 55-gallon steel drum, labeled, and stored in Parcel E-2. This soil was screened for radioactivity by another Navy contractor. Pending receipt of the screening results, the soil will be profiled and disposed of off-site. Profiling and disposal will be reported as a part of the future groundwater radiological data addendum to this technical memorandum.

The soil core samples collected were retained in the acetate sampling sleeves, capped, labeled, and stored in the on-site CE2-Kleinfelder JV storage container located in Parcel E-2. This core was screened for elevated radioactivity by another Navy contractor during drilling. No elevated radioactivity was detected. These samples are awaiting possible transfer to another Navy contractor for radionuclide analysis.

Regular trash and PPE were placed in waste bins for offsite disposal as non-hazardous waste.

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7.0 Groundwater Analytical Results

The groundwater samples were analyzed by APPL for:

- TPH-purgeables by EPA Method 8015B.
- TPH-extractables by EPA Method 8015B.
- Ammonia (as nitrogen) by EPA Method 350.1.
- PCBs by EPA Method 8082.
- Dissolved metals by EPA Method 6010B with EPA Method 7470A for mercury.

Table 3 shows the analyses performed for each sampling location. Tables 4 though 7 present the analytical results for the samples collected during this investigation, including field duplicates and trip blanks. Plate 1 shows the analytical results for the non-metal analytes and for selected metals (copper, lead, mercury, nickel, and zinc). The laboratory analytical reports TPH-purgeables as TPH gasoline. TPH-extractables is reported as (1) TPH diesel and (2) TPH motor oil.

Executed chain-of-custody documents are included as Appendix F.

Laboratory analytical reports are incorporated into the data validation report and included as Appendix G.

7.1 Total Petroleum Hydrocarbons

Groundwater samples for TPH-gasoline, TPH-diesel, and TPH-motor oil analysis were collected from 53 temporary wells and 7 piezometers. Location-specific concentration values for TPH as gasoline, diesel, and motor oil are presented in Table 4.

TPH-gasoline was detected in groundwater at 25 of the 60 sampled locations. Concentrations ranged from an estimated value of 11 micrograms per liter (µg/L) ("J"-qualified) to 230 µg/L.

TPH-diesel was detected in groundwater 58 of the 60 sampled locations. Concentrations ranged from 56 µg/L to 7,100 µg/L.

TPH-motor oil was detected in groundwater at 55 of the 60 sampled locations. Concentrations ranged from an estimated value of 270 µg/L to 9,200 µg/L.

A visible sheen and hydrocarbon odor was observed on soil collected between 10 and 15 feet below grade from the borehole for TW031 (BH039) and the adjacent second borehole BH039B.

7.2 Ammonia

Groundwater samples for ammonia analysis were collected from 48 temporary wells and 7 piezometers.

Ammonia was detected in groundwater at 54 of the 55 sampled locations. Concentrations ranged from an estimated value of 140 µg/L ("J"-qualified) to 31,700 µg/L. Location-specific concentration values for ammonia are presented in Table 5.

7.3 PCBs

Groundwater samples for PCBs (Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260) analysis were collected from 53 temporary wells and 7 piezometers.

PCBs were detected in groundwater water from 10 of the 60 sampled locations. Concentrations ranged from an estimated value of 0.27 µg/L to 7.2 µg/L. The project quantitation limit for each analyte was 0.5 µg/L. There were no locations with more than one Aroclor detected.

Aroclor 1016 was detected in groundwater samples from four locations at concentrations ranging from an estimated value of 0.92 µg/L to 2.6 µg/L.

Aroclor 1254 was detected in one groundwater sample at a concentration of 7.2 µg/L.

Aroclor 1260 was detected in groundwater samples from four locations at concentrations ranging from an estimated value of 0.27 µg/L to 1 µg/L.

Location-specific concentration values for PCBs are presented in Table 6.

7.4 Dissolved Metals

Groundwater samples for dissolved metals analysis were collected from 56 temporary wells and 7 piezometers.

Multiple metals were detected in groundwater samples in each of the 62 locations. Concentration ranges were analyte-specific. Location-specific concentration values for dissolved metals are presented in Table 7.

8.0 Data Quality, Verification, and Validation

A Quality Control Summary Report (QCSR) is included in Appendix I. This summarizes the QC sampling procedures and analytical results, the findings of the data validation process relative to the SAP-defined data quality indicators, and the data storage process. The data quality indicators either met or exceeded the acceptance criteria as defined in the SAP and is therefore meets the project Data Quality Objectives.

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9.0 References

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Engineering/Remediation Resources Group, Inc and Shaw Environmental, Inc., 2007. *"Draft Parcel E-2 Remedial Investigation/Feasibility Study, Hunters Point Shipyard, San Francisco, California."* March.

Kleinfelder, 2004. *"Draft Investigation-Derived Waste Management Plan, Basewide Groundwater Monitoring Program, HPS, San Francisco, California."* April 5.

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

EPA. 2000. *"Data Quality Objectives Process for Hazardous Waste Site Investigations (EPA QA/G-4HW)."* Office of Environmental Information. Washington, DC. EPA/600/R-00/007. January.

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Figures

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Chapter 4: Navy's Cleanup Program at Hunters Point Shipyard *(continued)*

Following is a map of the region, followed by a map of the entire HPS showing its various parcel boundaries. The following pages provide an overview of the historical use, contamination, and current environmental investigations at each parcel.

Regional Map

Chapter 4: Navy's Cleanup Program at Hunters Point Shipyard (continued)

Hunters Point Shipyard Map

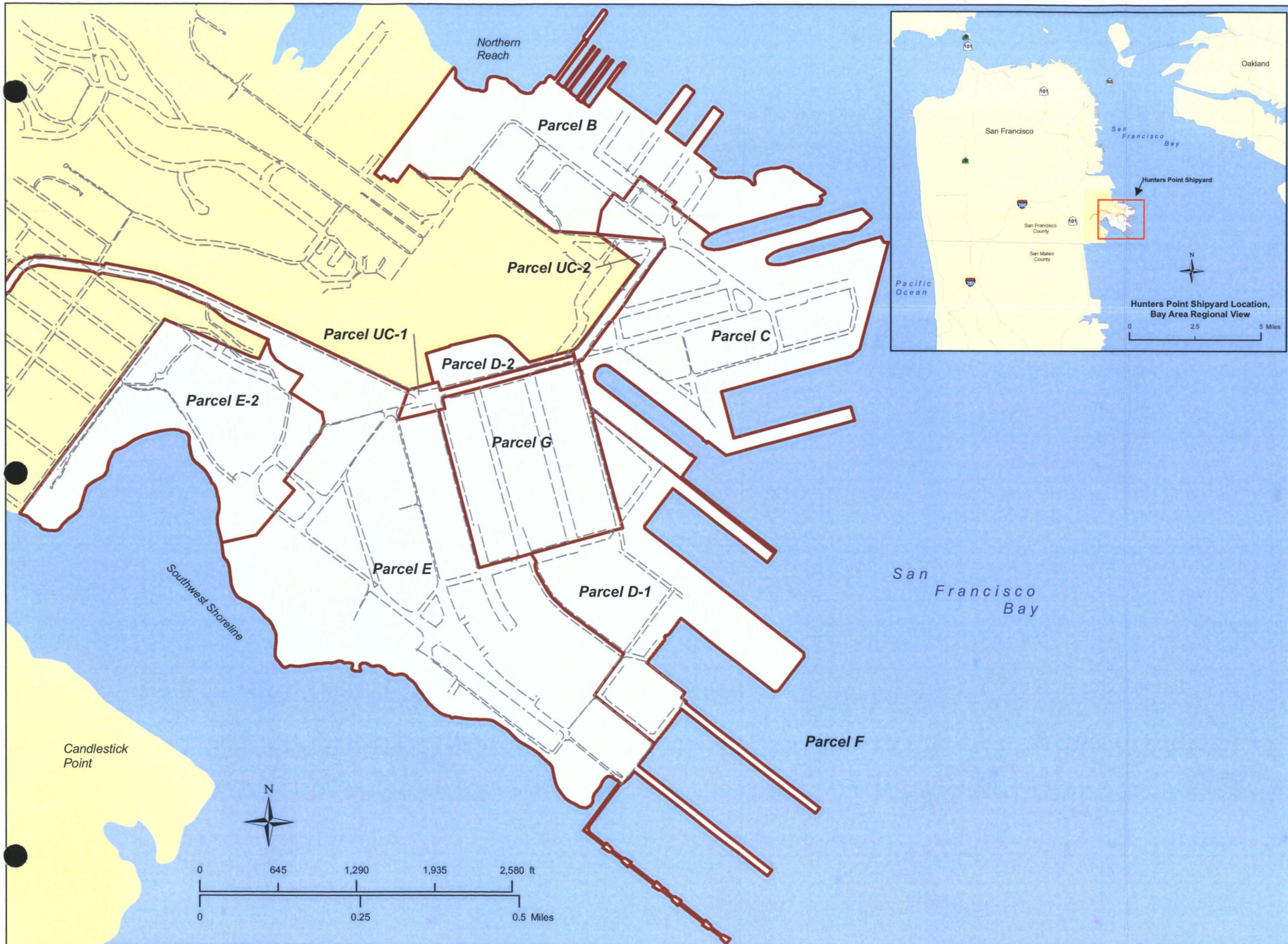

Figure 1.
Site Vicinity and Parcel Locations

Final Technical Memorandum for Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
February 2009

CE² KLEINFELDER
4457 Willow Road, Suite 210,
Pleasanton, CA 94588-3677
PH. (925)463-7301 FAX. (925)462-7531

N. Cook CE2/Corp plot 12/05/08

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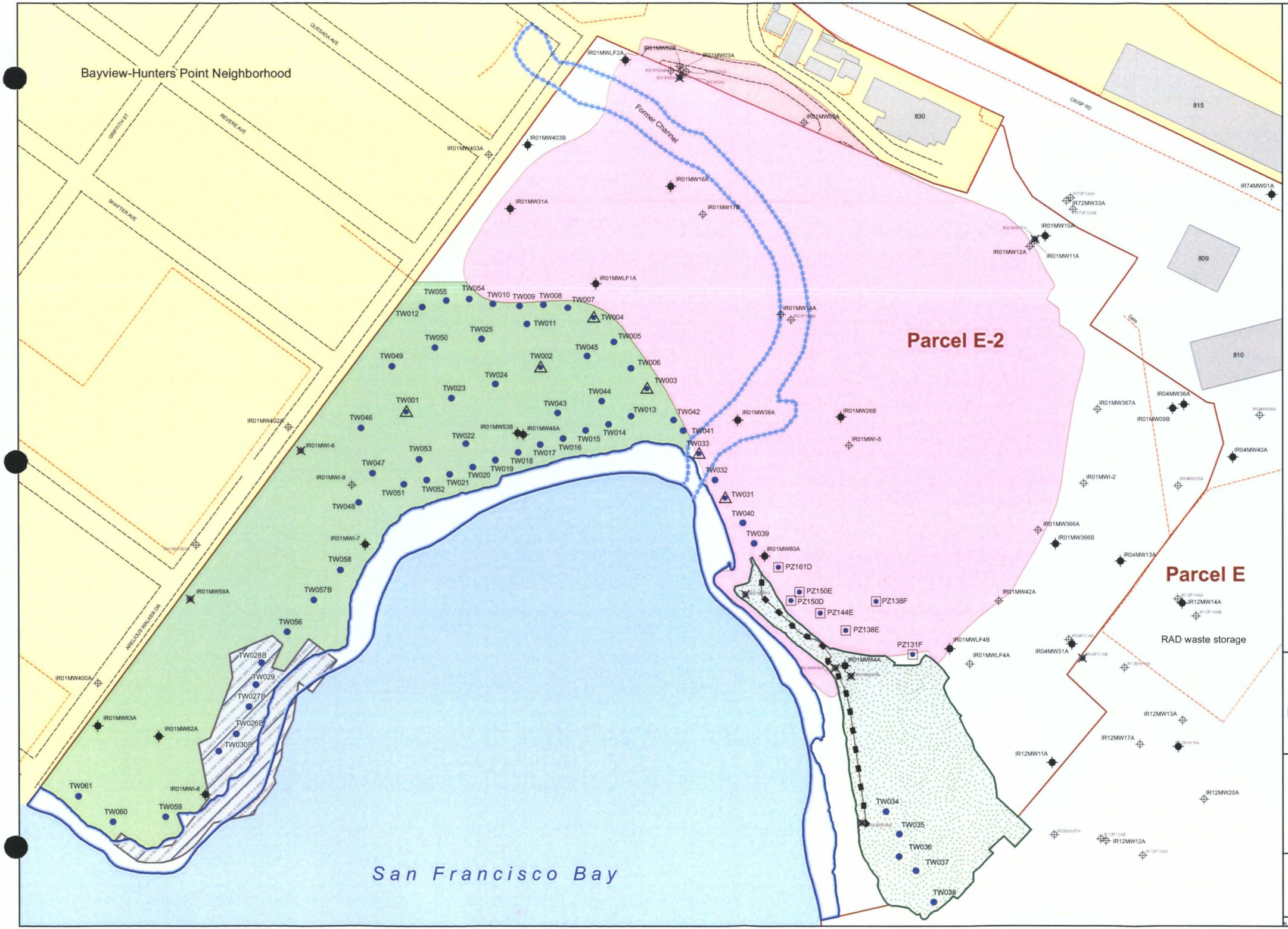

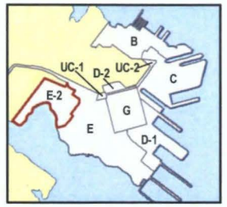

HPS Parcel Locations

Legend

- Monitoring well
- Monitoring well, decommissioned
- Monitoring well, other
- Temporary well
- Piezometer
- Temporary well and coring location
- Former Channel 1969
- Fence
- Sheetpile wall
- Roads, boundaries approximate
- Buildings
- Metal slag area
- PCB Hot Spot area
- Landfill area
- Panhandle area
- Shoreline area
- Parcel E
- Parcel E-2
- Non - Navy property
- San Francisco Bay

N

0 50 100 150 200 250 300 ft

Figure 2.
Temporary Well and Piezometer Sampling Locations
Parcel E-2

Final
Technical Memorandum for Groundwater Investigation at Parcel E-2
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CE² KLEINFELDER
4457 Willow Road, Suite 210
Pleasanton, CA 94588-3677
PH. (925)463-7301 FAX. (925)462-7531

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N. Cook CE2 Corporation Plot: 12/05/08

Tables

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Table 1. Temporary well construction details.

Investigation goal # [1]	Installation location area [2]	Temporary Well ID	Borehole ID	Date installed	Grade elevation (ft above MSL)	Total boring depth (ft below grade)	Total boring depth (ft above MSL)	Top of casing (ft above grade)	Top of screen (ft below grade)	Bottom of screen (ft below grade)	Top of screen (ft above MSL)	Bottom of screen (ft above MSL)	Top of sand pack (ft below grade)	Bottom of sand pack (ft below grade)	Top of sand pack (ft above MSL)	Bottom of sand pack (ft above MSL)	Comments
2	panhandle	TW001	BH020	02/13/08	7.49	15.0	(7.5)	1.1	4.0	14.0	3.5	(6.5)	2.0	15.0	5.5	(7.5)	Soil coring location.
2	panhandle	boring only	BH020B	03/11/08	NS	15.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW001. Soil core retained.* Grouted borehole.
2	panhandle	boring only	BH023	02/13/08	NS	6.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Soil coring location. 1st attempt, refusal at 6.5 ft. Grouted borehole.
2	panhandle	TW002	BH023B	02/13/08	7.15	15.0	(7.9)	1.5	3.8	13.8	3.4	(6.7)	1.8	14.8	5.4	(7.7)	Soil coring location. 2nd attempt. Well installed.
2	panhandle	boring only	BH023C	03/11/08	NS	15.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW002. Soil core retained.* Grouted borehole.
2	panhandle	TW003	BH034	02/14/08	6.94	15.0	(8.1)	1.4	1.2	11.2	5.7	(4.3)	0.5	11.2	6.4	(4.3)	Soil coring location.
2	panhandle	boring only	BH034B	03/11/08	NS	9.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW003. 1st return attempt for collecting soil core. Refusal at 9 ft. Grouted borehole.
2	panhandle	boring only	BH034C	03/11/08	NS	14.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW003. 2nd return attempt for collecting soil core. Refusal at 14.5 ft. Grouted borehole.
2	panhandle	boring only	BH034D	03/11/08	NS	15.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW003. 3rd return attempt for collecting soil core. Soil core retained.* Grouted borehole.
2	panhandle	TW004	BH031	02/14/08	6.67	15.0	(8.3)	1.4	0.8	10.8	5.9	(4.1)	0.2	11.2	6.5	(4.5)	Soil coring location.
2	panhandle	boring only	BH031B	03/11/08	NS	15.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW004. Soil core retained.* Grouted borehole.
2	panhandle	TW005	BH032	02/14/08	7.07	11.0	(3.9)	1.0	1.0	11.0	6.1	(3.9)	0.5	11.0	6.6	(3.9)	
2	panhandle	boring only	BH033	02/14/08	NS	8.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1st attempt. Refusal at 8 ft. Grouted borehole.
2	panhandle	boring only	BH033B	02/14/08	NS	5.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2nd attempt. Refusal at 5 ft. Grouted borehole.
2	panhandle	TW006	BH033C	02/14/08	7.01	10.0	(3.0)	2.6	0.0	10.0	7.0	(3.0)	0.2	10.0	6.8	(3.0)	3rd attempt. Well installed.
2	panhandle	TW007	BH047	02/14/08	7.49	10.5	(3.0)	1.8	0.5	10.5	7.0	(3.0)	0.2	10.5	7.3	(3.0)	
2	panhandle	boring only	BH048	02/14/08	NS	10.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1st attempt. Obstruction deviates rods preventing well installation. Grouted borehole.
2	panhandle	boring only	BH048B	02/14/08	NS	10.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2nd attempt. Obstruction deviates rods preventing well installation. Grouted borehole.
2	panhandle	TW008	BH048C	02/14/08	7.74	11.0	(3.3)	1.6	1.0	11.0	6.7	(3.3)	0.5	11.0	7.2	(3.3)	3rd attempt. Well installed.
2	panhandle	boring only	BH049	02/15/08	NS	11.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1st attempt. Rods clogged preventing well installation. Grouted borehole.
2	panhandle	boring only	BH049B	02/15/08	NS	9.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2nd attempt. Total depth 9 ft, but obstruction deviates rods at 5.5 ft. Grouted borehole.
2	panhandle	TW009	BH049C	02/15/08	7.80	8.6	(0.8)	1.2	3.6	8.6	4.2	(0.8)	1.6	8.6	6.2	(0.8)	3rd attempt. Still meeting obstruction. Shorter-screened well installed.
2	panhandle	TW010	BH050	02/15/08	7.02	10.8	(3.8)	1.5	0.8	10.8	6.2	(3.8)	0.3	10.8	6.7	(3.8)	
2	panhandle	boring only	BH025	02/15/08	NS	6.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1st attempt. Refusal at 6.5 ft. Grouted borehole.
2	panhandle	TW011	BH025B	02/15/08	8.20	10.7	(2.5)	2.0	0.7	10.7	7.5	(2.5)	0.5	10.7	7.7	(2.5)	2nd attempt. Well installed.
2	panhandle	TW012	BH029	02/15/08	7.05	10.6	(3.6)	2.1	0.6	10.6	6.5	(3.6)	0.3	10.6	6.8	(3.6)	
1	panhandle	TW013	BH013	02/15/08	10.05	18.3	(8.3)	1.5	8.3	18.3	1.8	(8.3)	3.4	18.3	6.7	(8.3)	
1	panhandle	TW014	BH012	02/15/08	11.05	19.1	(8.1)	0.9	9.1	19.1	2.0	(8.1)	3.3	19.1	7.8	(8.1)	
1	panhandle	TW015	BH011	02/19/08	10.21	18.8	(8.6)	1.2	8.8	18.8	1.4	(8.6)	6.8	18.8	3.4	(8.6)	
1	panhandle	TW016	BH010	02/19/08	8.30	18.6	(10.3)	1.4	8.6	18.6	(0.3)	(10.3)	6.6	18.6	1.7	(10.3)	
1	panhandle	TW017	BH009	02/19/08	10.27	19.2	(8.9)	0.8	9.2	19.2	1.1	(8.9)	4.3	19.2	6.0	(8.9)	
1	panhandle	TW018	BH008	02/19/08	10.63	17.2	(6.6)	1.5	7.2	17.2	3.4	(6.6)	5.2	17.2	5.4	(6.6)	
1	panhandle	TW019	BH007	02/19/08	9.53	15.4	(5.9)	1.5	5.4	15.4	4.1	(5.9)	3.4	15.4	6.1	(5.9)	

Table 1. Temporary well construction details.

Investigation goal # [1]	Installation location area [2]	Temporary Well ID	Borehole ID	Date installed	Grade elevation (ft above MSL)	Total boring depth (ft below grade)	Total boring depth (ft above MSL)	Top of casing (ft above grade)	Top of screen (ft below grade)	Bottom of screen (ft below grade)	Top of screen (ft above MSL)	Bottom of screen (ft above MSL)	Top of sand pack (ft below grade)	Bottom of sand pack (ft below grade)	Top of sand pack (ft above MSL)	Bottom of sand pack (ft above MSL)	Comments
1	panhandle	TW020	BH006	02/19/08	8.25	13.9	(5.7)	1.1	3.9	13.9	4.4	(5.7)	2.0	13.9	6.3	(5.7)	600 lbs sand used to fill annulus.
1	panhandle	TW021	BH005	02/20/08	7.43	13.0	(5.6)	2.0	3.0	13.0	4.4	(5.6)	1.0	13.0	6.4	(5.6)	
2	panhandle	TW022	BH016	02/20/08	6.29	11.7	(5.4)	3.0	1.7	11.7	4.6	(5.4)	0.5	11.7	5.8	(5.4)	
2	panhandle	TW023	BH021	02/20/08	5.28	11.5	(6.2)	1.5	1.5	11.5	3.8	(6.2)	0.5	11.5	4.8	(6.2)	
2	panhandle	TW024	BH022	02/20/08	6.90	11.1	(4.2)	3.0	1.1	11.1	5.8	(4.2)	0.5	11.1	6.4	(4.2)	
2	panhandle	TW025	BH026	02/20/08	8.54	11.2	(2.7)	3.0	1.2	11.2	7.3	(2.7)	0.5	11.2	8.0	(2.7)	
4	metal slag	TW026B	BH055	03/10/08	5.42	12.7	(7.3)	2.3	2.7	12.7	2.7	(7.3)	0.7	12.7	4.7	(7.3)	TW026 (installed 02/20/08) was vandalized & reinstalled as TW026B.
4	metal slag	TW027B	BH054	03/10/08	5.65	13.6	(8.0)	1.4	3.6	13.6	2.1	(8.0)	1.6	13.6	4.1	(8.0)	TW027 (installed 02/20/08) was vandalized & reinstalled as TW027B.
4	metal slag	TW028B	BH052	03/10/08	5.29	13.2	(7.9)	1.8	3.2	13.2	2.1	(7.9)	1.2	13.2	4.1	(7.9)	TW028 (installed 02/20/08) was vandalized & reinstalled as TW028B.
4	metal slag	TW029	BH053	02/20/08	4.89	11.8	(6.9)	3.1	1.8	11.8	3.1	(6.9)	0.5	11.8	4.4	(6.9)	
4	metal slag	TW030B	BH056	03/10/08	5.49	12.5	(7.0)	2.5	2.5	12.5	3.0	(7.0)	0.5	12.5	5.0	(7.0)	TW030 (installed 02/20/08) was vandalized & reinstalled as TW030B.
1	landfill area	TW031	BH039	02/21/08	7.80	20.0	(12.2)	3.0	1.8	11.8	6.0	(4.0)	0.8	11.8	7.0	(4.0)	Soil coring location.
1	landfill area	boring only	BH039B	03/11/08	NS	20.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW031. Soil core retained.* Grouted borehole.
1	landfill area	TW032	BH038	02/21/08	7.63	12.4	(4.8)	2.6	2.4	12.4	5.2	(4.8)	0.5	12.4	7.1	(4.8)	
1	landfill area	TW033	BH037	02/21/08	7.87	20.0	(12.1)	2.6	2.1	12.1	5.8	(4.2)	0.5	12.1	7.4	(4.2)	Soil coring location.
1	landfill area	boring only	BH037B	03/11/08	NS	20.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Adjacent to TW033. Soil core retained.* Grouted borehole.
3	PCB Hot Spot	TW034	BH042	02/22/08	7.50	19.5	(12.0)	0.9	9.5	19.5	(2.0)	(12.0)	2.0	19.5	5.5	(12.0)	
3	PCB Hot Spot	TW035	BH043	02/22/08	7.52	18.1	(10.6)	1.9	8.1	18.1	(0.6)	(10.6)	1.0	18.1	6.5	(10.6)	
3	PCB Hot Spot	TW036	BH044	02/22/08	7.59	14.3	(6.7)	0.7	4.3	14.3	3.3	(6.7)	1.0	14.3	6.6	(6.7)	
3	PCB Hot Spot	TW037	BH045	02/22/08	7.75	11.9	(4.2)	3.2	1.9	11.9	5.9	(4.2)	0.9	11.9	6.9	(4.2)	
3	PCB Hot Spot	TW038	BH046	02/22/08	8.00	12.3	(4.3)	2.8	2.3	12.3	5.7	(4.3)	1.0	12.3	7.0	(4.3)	
1	landfill area	TW039	BH041	02/25/08	11.49	13.2	(1.7)	1.8	3.2	13.2	8.3	(1.7)	1.2	13.2	10.3	(1.7)	
1	landfill area	TW040	BH040	02/25/08	10.28	14.3	(4.0)	0.7	4.3	14.3	6.0	(4.0)	0.7	14.3	9.6	(4.0)	
1	panhandle	TW041	BH036	02/25/08	6.87	12.5	(5.6)	2.5	2.5	12.5	4.4	(5.6)	0.5	12.5	6.4	(5.6)	
1	panhandle	TW042	BH035	02/25/08	6.05	11.7	(5.7)	3.0	1.7	11.7	4.4	(5.7)	0.5	11.7	5.6	(5.7)	
2	panhandle	boring only	BH015	02/25/08	NS	6.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1st attempt. Refusal at 6 ft. Grouted borehole.
2	panhandle	boring only	BH015B	02/25/08	NS	6.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2nd attempt. Refusal at 6 ft. Grouted borehole.
2	panhandle	TW043	BH015C	02/25/08	6.99	12.1	(5.1)	2.9	2.1	12.1	4.9	(5.1)	0.5	12.9	6.5	(5.9)	3rd attempt. Well installed.
2	panhandle	TW044	BH014	02/25/08	6.66	11.0	(4.3)	3.0	1.0	11.0	5.7	(4.3)	0.5	11.0	6.2	(4.3)	
2	panhandle	TW045	BH024	02/25/08	7.47	11.4	(3.9)	3.0	1.4	11.4	6.1	(3.9)	0.5	11.4	7.0	(3.9)	
2	panhandle	TW046	BH019	02/26/08	7.06	12.0	(4.9)	3.0	2.0	12.0	5.1	(4.9)	0.5	12.0	6.6	(4.9)	
2	panhandle	TW047	BH018	02/26/08	6.85	12.4	(5.6)	2.6	2.4	12.4	4.5	(5.6)	0.5	12.4	6.4	(5.6)	
1	panhandle	TW048	BH001	02/26/08	9.22	15.2	(6.0)	0.2	5.2	15.2	4.0	(6.0)	1.9	15.2	7.3	(6.0)	
2	panhandle	TW049	BH028	02/26/08	6.17	11.9	(5.7)	3.1	1.9	11.9	4.3	(5.7)	0.9	11.9	5.3	(5.7)	Sheen on water surface and hydrocarbon odor.
2	panhandle	TW050	BH027	02/26/08	5.90	11.4	(5.5)	1.5	1.4	11.4	4.5	(5.5)	0.7	11.4	5.2	(5.5)	

Table 1. Temporary well construction details.

Investigation goal # [1]	Installation location area [2]	Temporary Well ID	Borehole ID	Date installed	Grade elevation (ft above MSL)	Total boring depth (ft below grade)	Total boring depth (ft above MSL)	Top of casing (ft above grade)	Top of screen (ft below grade)	Bottom of screen (ft below grade)	Top of screen (ft above MSL)	Bottom of screen (ft above MSL)	Top of sand pack (ft below grade)	Bottom of sand pack (ft below grade)	Top of sand pack (ft above MSL)	Bottom of sand pack (ft above MSL)	Comments
1	panhandle	TW051	BH003	02/27/08	4.71	11.0	(6.3)	3.0	1.0	11.0	3.7	(6.3)	0.5	11.0	4.2	(6.3)	
1	panhandle	TW052	BH004	02/27/08	4.06	11.0	(6.9)	3.0	1.0	11.0	3.1	(6.9)	0.5	11.0	3.6	(6.9)	
2	panhandle	TW053	BH017	02/27/08	4.31	11.0	(6.7)	3.0	1.0	11.0	3.3	(6.7)	0.5	11.0	3.8	(6.7)	
2	panhandle	TW054	BH051	02/27/08	6.93	11.0	(4.1)	3.0	1.0	11.0	5.9	(4.1)	0.5	11.0	6.4	(4.1)	
2	panhandle	TW055	BH030	02/27/08	7.05	11.4	(4.4)	3.0	1.4	11.4	5.7	(4.4)	0.5	11.4	6.6	(4.4)	
1	panhandle	TW056	BH057	02/27/08	5.47	14.3	(8.8)	0.7	4.3	14.3	1.2	(8.8)	2.3	14.3	3.2	(8.8)	
1	panhandle	TW057B	BH058	03/10/08	6.10	14.5	(8.4)	0.5	4.5	14.5	1.6	(8.4)	0.5	14.5	5.6	(8.4)	TW057 (installed 02/27/08) was vandalized & reinstalled as TWO57B.
1	panhandle	TW058	BH059	02/27/08	5.89	14.8	(9.0)	3.0	4.8	14.8	1.1	(9.0)	1.8	14.8	4.1	(8.9)	
4	panhandle	TW059	BH060	03/10/08	4.12	13.5	(9.4)	1.5	3.5	13.5	0.6	(9.4)	1.5	13.5	2.6	(9.4)	
4	panhandle	TW060	BH061	03/10/08	8.38	18.1	(9.7)	6.4	8.1	18.1	0.3	(9.7)	6.1	18.1	2.3	(9.7)	
4	panhandle	TW061	BH062	03/10/08	8.74	17.3	(8.6)	2.4	7.3	17.3	1.4	(8.6)	5.3	17.3	3.4	(8.6)	
		NA	BH002	NA													Location inaccessible. No well installed at proposed location.

Notes:
[1] = Investigation goal #'s based on the four goals presented in Worksheet #17 of the Sampling and Analysis Plan, February 2008 as follows:
#1: Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the shoreline.
#2: Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the upper panhandle.
#3: Provide data from the A-Aquifer to evaluate the effectiveness of the PCB Hot Spot Area removal action.
#4: Provide data to evaluate whether A-Aquifer groundwater beneath the metal slag excavation area of the Parcel E-2 panhandle has been impacted by metals.
[2] = Installation location area identifies the physical location of the well/borehole as shown on Figure 2 and Plate 1.
* = Soil core for potential future analytical use by RASO collected from boreholes drilled on 03/11/08 at locations between 5.5 and 7 laterally away from corresponding temporary wells.
Top of casing: height above ground taken from post-installation notes 02/29 and 03/03; reinstalled wells (labelled "B") as noted after reinstallation. Elevations not surveyed.
NA = not applicable
NS = not surveyed

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Table 2. Piezometer construction details.

Piezometer ID	Date installed	Piezometer diameter (inches)	Grade elevation (ft above MSL)	Total boring depth (ft below grade)	Total boring depth (ft above MSL)	Top of casing (ft above MSL)	Top of screen (ft below grade)	Bottom of screen (ft below grade)	Top of screen (ft above MSL)	Bottom of screen (ft above MSL)
PZ-131F	01/05/98	1.25	11.07	8.2	2.9	13.37	3.2	8.2	7.9	2.9
PZ-138E	01/26/98	1.25	12.01	13.4	(1.4)	14.22	5.4	10.4	6.6	1.6
PZ-138F	01/26/98	1.25	16.99	19.6	(2.6)	19.30	12.6	17.6	4.4	(0.6)
PZ-144E	01/26/98	1.25	12.59	16.2	(3.6)	14.91	8.2	13.2	4.4	(0.6)
PZ-150D	01/26/98	1.25	12.02	17.5	(5.5)	14.82	12.5	17.5	(0.5)	(5.5)
PZ-150E	01/29/98	1.25	12.34	13.3	(1.0)	14.91	8.3	13.3	4.0	(1.0)
PZ-161D	01/29/98	1.25	12.10	17.1	(5.0)	14.66	11.1	16.1	1.0	(4.0)

Notes:

Construction details from boring logs generated by International Technology Corporation (International Technology Corporation [IT], 2001, "Draft, Groundwater Control System Evaluation Report, Hunters Point Shipyard, San Francisco, California" July 26.) were adjusted based on elevation survey performed under this investigation by Espinosa Surveying, April 3, 2008.

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Table 3. Sampling information.

Temporary Well ID	Investigation goal # [1]	Installation location area [2]	Sample ID	Sample Date	Sample Time	Sample Type	Comments	TPH-purgeables	TPH-extractables	Ammonia as nitrogen EPA350.1	PCBs	Dissolved Metals EPA6010B 7470A	Temp C	SpC	pH
TW001	2	panhandle	0810G011	3/5/2008	1415	N		X	X	X	X	X	16.40	21.150	7.00
TW002	2	panhandle	0810G019	3/7/2008	0937	N		X	X	X	X	X	14.38	2.179	8.31
TW003	2	panhandle	0810G024	3/7/2008	1155	N		X	X	X	X	X	15.45	3.694	8.97
TW004	2	panhandle	0810P014	3/7/2008	1115	N		X	X	X	X	X	15.31	0.992	7.71
TW005	2	panhandle	0810P016	3/7/2008	1218	N		X	X	X	X	X	14.56	0.634	7.28
TW006	2	panhandle	0810G025	3/7/2008	1218	N		X	X	X	X	X	14.40	3.883	6.91
TW007	2	panhandle	0810P013	3/7/2008	1050	N		X	X	X	X	X	14.08	1.881	7.93
TW008	2	panhandle	0810P012	3/7/2008	1018	N		X	X	X	X	X	13.74	2.064	7.83
TW009	2	panhandle	0810P007	3/6/2008	1422	N		X	X	X	X	X	13.95	2.459	7.92
TW010	2	panhandle	0810P006	3/6/2008	1347	N		X	X	X	X	X	14.27	5.257	8.03
TW011	2	panhandle	0810P010	3/7/2008	0937	N		X	X	X	X	X	14.02	3.561	8.83
TW011	2	panhandle	0810P011	3/7/2009	0942	FD		X	X	X	X	X			
TW012	2	panhandle	0810G014	3/5/2008	1516	N		X	X	X	X	X	14.42	12.750	6.91
TW013	1	panhandle	0810G022	3/7/2008	1102	N		X	X	X	X	X	15.93	10.520	7.97
TW014	1	panhandle	0810G021	3/7/2008	1038	N		X	X	X	X	X	14.84	7.980	7.78
TW015	1	panhandle	0810G020	3/7/2008	1015	N		X	X	X	X	X	12.87	1.114	7.50
TW016	1	panhandle	0810W006	3/6/2008	1428	N		X	X	X	X	X	13.65	2.159	7.75
TW017	1	panhandle	0810W005	3/6/2008	1358	N		X	X	X	X	X	13.84	0.468	7.77
TW018	1	panhandle	0810W004	3/6/2008	1317	N		X	X	X	X	X	13.54	2.384	7.38
TW019	1	panhandle	0810W003	3/6/2008	1242	N		X	X	X	X	X	13.33	2.443	7.40
TW020	1	panhandle	0810W002	3/6/2008	1156	N		X	X	X	X	X	12.52	2.264	7.18
TW021	1	panhandle	0810G009	3/5/2008	1343	N		X	X	X	X	X	13.39	1.561	7.16
TW021	1	panhandle	0810G010	3/5/2008	1348	FD		X	X	X	X	X			
TW022	2	panhandle	0810G016	3/6/2008	1042	N	MS/MSD	X	X	X	X	X	12.89	2.653	7.14
TW023	2	panhandle	0810P002	3/6/2008	1045	N		X	X	X	X	X	13.30	2.534	8.19
TW024	2	panhandle	0810G018	3/7/2008	0909	N		X	X	X	X	X	14.09	2.238	8.39
TW025	2	panhandle	0810P005	3/6/2008	1301	N		X	X	X	X	X	14.46	5.043	8.23
TW026B	4	metal slag	0811P029	3/11/2008	1005	N						X	14.48	9.651	7.43
TW027B	4	metal slag	0811P025	3/10/2008	1521	N						X	16.36	2.999	9.00
TW028B	4	metal slag	0811P024	3/10/2008	1359	N	MS/MSD					X	15.70	5.601	8.85
TW029	4	metal slag	0811P019	3/10/2008	0856	N						X	14.60	5.729	6.87
TW030B	4	metal slag	0811P028	3/11/2008	0948	N						X	14.56	8.688	8.36
TW031	1	landfill area	0811D007	3/10/2008	1412	N		X	X	X	X	X	15.34	3.275	6.67
TW031	1	landfill area	0811D008	3/10/2008	1417	FD		X	X	X	X	X			
TW032	1	landfill area	0811D010	3/11/2008	0925	N		X	X	X	X	X	14.89	3.690	6.89

Table 3. Sampling information.

Temporary Well ID	Investigation goal # [1]	Installation location area [2]	Sample ID	Sample Date	Sample Time	Sample Type	Comments	TPH-purgeables	TPH-extractables	Ammonia as nitrogen EPA350.1	PCBs	Dissolved Metals EPA6010B 7470A	Temp C	SpC	pH
TW033	1	landfill area	0811D011	3/11/2008	0950	N		X	X	X	X	X	13.74	3.441	6.86
TW033	1	landfill area	0811D012	3/11/2008	1000	FD		X	X	X	X	X			
TW034	3	PCB Hot Spot	0811P017	3/7/2008	1450	N	Slow recharge – TPH samples only	X	X						
TW034	3	PCB Hot Spot	0811P017	3/10/2008	1018	N	Slow recharge – PCBs sample only				X				
TW034	3	PCB Hot Spot	0811P017	3/11/2008	0908	N	Slow recharge – water quality parameters						15.60	18.830	7.25
TW035	3	PCB Hot Spot	0811D003	3/10/2008	1000	N	Slow recharge – TPH purgeable collected, partial volume for TPH extractable sample collected	X	X						
TW035	3	PCB Hot Spot	0811D003	3/11/2008	0900	N	Slow recharge – additional volume collected for TPH extractable sample (one analysis run)		X						
TW035	3	PCB Hot Spot	0811D003	3/12/2008	0935	N	Slow recharge – PCBs sample and water quality parameters only				X		NM	NM	NM
TW036	3	PCB Hot Spot	0811D002	3/10/2008	0928	N		X	X		X		14.38	8.244	6.44
TW037	3	PCB Hot Spot	0811G027	3/7/2008	1448	N	Slow recharge – TPH samples only	X	X						
TW037	3	PCB Hot Spot	0811G027	3/10/2008	1507	N	Slow recharge – PCBs sample only				X				
TW037	3	PCB Hot Spot	0810G027	3/11/2008	0845	N	Slow recharge – water quality parameters						13.96	9.311	6.97
TW038	3	PCB Hot Spot	0811G026	3/7/2008	1413	N	Slow recharge – TPH samples only	X	X						
TW038	3	PCB Hot Spot	0811G026	3/10/2008	1502	N	Slow recharge – PCBs sample only				X				
TW038	3	PCB Hot Spot	0810G026	3/11/2008	0840	N	Slow recharge – water quality parameters						14.19	5.758	6.83
TW039	1	landfill area	0811D004	3/10/2008	1045	N		X	X	X	X	X	16.41	3.175	6.72
TW040	1	landfill area	0811D005	3/10/2008	1325	N		X	X	X	X	X	17.21	3.115	6.78
TW040	1	landfill area	0811D006	3/10/2008	1330	FD		X	X	X	X	X			
TW041	1	panhandle	0811D013	3/11/2008	1020	N		X	X	X	X	X	17.15	3.233	6.60
TW042	1	panhandle	0811D014	3/11/2008	1050	N		X	X	X	X	X	16.66	3.044	6.62
TW043	2	panhandle	0810W007	3/6/2008	1456	N		X	X	X	X	X	13.51	2.209	7.78
TW044	2	panhandle	0810G023	3/7/2008	1128	N		X	X	X	X	X	15.01	1.556	7.02
TW045	2	panhandle	0810P015	3/7/2008	1139	N		X	X	X	X	X	15.43	2.699	7.42
TW046	2	panhandle	0810G002	3/4/2008	1346	N		X	X	X	X	X	15.69	2.768	6.89
TW047	2	panhandle	0810G003	3/4/2008	1430	N		X	X	X	X	X	18.43	2.020	7.38
TW048	1	panhandle	0810G004	3/4/2008	1445	N		X	X	X	X	X	17.83	17.140	6.43
TW049	2	panhandle	0810G012	3/5/2008	1446	N		X	X	X	X	X	14.56	5.654	8.40
TW049	2	panhandle	0810G013	3/5/2008	1450	FD		X	X	X	X	X			
TW050	2	panhandle	0810P009	3/7/2008	0907	N		X	X	X	X	X	12.90	4.367	6.93
TW051	1	panhandle	0810G005	3/4/2008	1517	N	sheen detected and stained tubing	X	X	X	X	X	12.80	4.040	7.00
TW052	1	panhandle	0810G007	3/5/2008	1224	N		X	X	X	X	X	13.93	4.064	7.05
TW053	2	panhandle	0810G008	3/5/2008	1255	N	MS/MSD	X	X	X	X	X	13.76	4.122	7.25
TW054	2	panhandle	0810P004	3/6/2008	1220	N		X	X	X	X	X	14.53	3.168	7.30

Table 3. Sampling information.

Temporary Well ID	Investigation goal # [1]	Installation location area [2]	Sample ID	Sample Date	Sample Time	Sample Type	Comments	TPH-purgeables	TPH-extractables	Ammonia as nitrogen EPA350.1	PCBs	Dissolved Metals EPA6010B 7470A	Temp C	SpC	pH
TW055	2	panhandle	0810P003	3/6/2008	1133	N		X	X	X	X	X	13.59	4.379	7.71
TW056	1	panhandle	0811P020	3/10/2008	0921	N		X	X	X	X	X	13.33	3.389	7.31
TW057B	1	panhandle	0811P023	3/10/2008	1327	N		X	X	X	X	X	16.97	4.732	7.91
TW058	1	panhandle	0811P021	3/10/2008	1112	N		X	X	X	X	X	15.45	3.904	7.80
TW058	1	panhandle	0811P022	3/10/2008	1124	FD		X	X	X	X	X			
TW059	4	panhandle	0811P027	3/11/2008	0928	N						X	13.67	21.310	7.75
TW060	4	panhandle	0811P030	3/11/2008	1051	N						X	16.36	25.100	8.33
TW061	4	panhandle	0811P031	3/11/2008	1122	N						X	16.41	0.059	7.99
PZ131F	1	landfill area	0811D015	3/11/2008	1300	N		X	X	X	X	X	13.61	0.674	6.73
PZ138E	1	landfill area	0811D019	3/12/2008	1135	N		X	X	X	X	X	12.69	0.621	6.48
PZ138F	1	landfill area	0811P033	3/11/2008	1407	N		X	X	X	X	X	15.46	1.455	6.74
PZ144E	1	landfill area	0811P034	3/11/2008	1455	N		X	X	X	X	X	13.63	1.049	6.90
PZ150D	1	landfill area	0811D016	3/11/2008	1350	N	MS/MSD	X	X	X	X	X	16.68	6.150	6.55
PZ150E	1	landfill area	0811D017	3/11/2008	1445	N		X	X	X	X	X	15.36	1.588	6.57
PZ161D	1	landfill area	0811P032	3/11/2008	1331	N		X	X	X	X	X	16.61	2.461	6.61
Trip Blank			0810G001	3/4/2008	1330	TB		X							
Trip Blank			0810G006	3/5/2008	1145	TB		X							
Trip Blank			0810P001	3/6/2008	0900	TB		X							
Trip Blank			0810W001	3/6/2008	1215	TB		X							
Trip Blank			0810G015	3/6/2008	1015	TB		X							
Trip Blank			0810G017	3/7/2008	0830	TB		X							
Trip Blank			0810P008	3/7/2008	0900	TB		X							
Trip Blank			0811P018	3/10/2008	0830	TB		X							
Trip Blank			0811D001	3/10/2008	0800	TB		X							
Trip Blank			0811D009	3/11/2008	0822	TB		X							
Trip Blank			0811P026	3/11/2008	0849	TB		X							
Trip Blank			0811D018	3/12/2008	0800	TB		X							

Notes:
[1] = Investigation goal #'s based on the four goals presented in Worksheet #17 of the Sampling and Analysis Plan, February 2008 as follows:
#1: Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the shoreline.
#2: Provide data to evaluate whether landfill contaminants are present in A-Aquifer groundwater at the upper panhandle.
#3: Provide data from the A-Aquifer to evaluate the effectiveness of the PCB Hot Spot Area removal action.
#4: Provide data to evaluate whether A-Aquifer groundwater beneath the metal slag excavation area of the Parcel E-2 panhandle has been impacted by metals.
[2] = Installation location area identifies the physical location of the well/borehole as shown on Figure 2 and Plate 1.
FD = Field Duplicate
MS/MSD = Matrix Spike Duplicate
N = Normal sample

PCBs = Polychlorinated biphenyls
PZ = Piezometer
SpC = Specific conductance
TB = Trip blank
TPH = Total petroleum hydrocarbons
TW = Temporary well

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Table 4. Analytical results for total petroleum hydrocarbons as gasoline, diesel, and motor oil in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	TPH-G	Laboratory Quantitation Limit (TPH-G)	Method Detection Limit (TPH-G)	TPH-D	Laboratory Quantitation Limit (TPH-D)	Method Detection Limit (TPH-D)	TPH-MO	Laboratory Quantitation Limit (TPH-MO)	Method Detection Limit (TPH-MO)
				EPA Method 8015B_G (µg/L)			**EPA Method 8015B_D (µg/L)**			**EPA Method 8015B_D (µg/L)**		
PZ131F	0811D015	3/11/08	N	20 U	20	8.6	**3700 J**	50	40.4	**9200**	2500	106.0
PZ138E	0811D019	3/12/08	N	**45**	20	8.6	**960**	50	40.4	**1300 J**	500	106.0
PZ138F	0811P033	3/11/08	N	**15 J**	20	8.6	**3900 J**	50	40.4	**8100**	1000	106.0
PZ144E	0811P034	3/11/08	N	**37**	20	8.6	**1100**	50	40.4	**1500**	500	106.0
PZ150D	0811D016	3/11/08	N	**93**	20	8.6	**2300**	50	40.4	**2000**	500	106.0
PZ150E	0811D017	3/11/08	N	**94**	20	8.6	**3200**	50	40.4	**4900**	500	106.0
PZ161D	0811P032	3/11/08	N	**140 J**	20	8.6	**1900**	50	40.4	**1400**	500	106.0
TW001	0810G011	3/5/08	N	20 U	20	8.6	**280**	50	40.4	**290 J**	500	106.0
TW002	0810G019	3/7/08	N	20 U	20	8.6	**740**	50	40.4	**1400**	500	106.0
TW003	0810G024	3/7/08	N	**120**	20	8.6	**1100**	50	40.4	**2000**	500	106.0
TW004	0810P014	3/7/08	N	20 U	20	8.6	**830**	50	40.4	**2000**	500	106.0
TW005	0810P016	3/7/08	N	20 U	20	8.6	**360**	50	40.4	**900**	500	106.0
TW006	0810G025	3/7/08	N	**17 J**	20	8.6	**1400**	50	40.4	**3000**	500	106.0
TW007	0810P013	3/7/08	N	20 U	20	8.6	**340**	50	40.4	**930**	500	106.0
TW008	0810P012	3/7/08	N	**16 J**	20	8.6	**260**	50	40.4	**350 J**	500	106.0
TW009	0810P007	3/6/08	N	**54**	20	8.6	**440 J**	100	40.4	**1000**	1000	106.0
TW010	0810P006	3/6/08	N	20 U	20	8.6	**1100 J**	50	40.4	**2600**	500	106.0
TW011	0810P010	3/7/08	N	**48**	20	8.6	**860**	50	40.4	**2000**	500	106.0
TW011	0810P011	3/7/08	FD	**72**	20	8.6	**630**	50	40.4	**1700**	500	106.0
TW012	0810G014	3/5/08	N	20 U	20	8.6	**220**	50	40.4	500 U	500	106.0
TW013	0810G022	3/7/08	N	20 U	20	8.6	**1800**	50	40.4	**3200**	500	106.0

Table 4. Analytical results for total petroleum hydrocarbons as gasoline, diesel, and motor oil in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	TPH-G	Laboratory Quantitation Limit (TPH-G)	Method Detection Limit (TPH-G)	TPH-D	Laboratory Quantitation Limit (TPH-D)	Method Detection Limit (TPH-D)	TPH-MO	Laboratory Quantitation Limit (TPH-MO)	Method Detection Limit (TPH-MO)
				EPA Method 8015B_G (µg/L)			**EPA Method 8015B_D (µg/L)**			**EPA Method 8015B_D (µg/L)**		
TW014	0810G021	3/7/08	N	20 U	20	8.6	**980**	50	40.4	**2500**	500	106.0
TW015	0810G020	3/7/08	N	20 U	20	8.6	**550**	50	40.4	**1400**	500	106.0
TW016	0810W006	3/6/08	N	20 U	20	8.6	**1400 J**	50	40.4	**2900 J**	500	106.0
TW017	0810W005	3/6/08	N	20 U	20	8.6	**160 J**	50	40.4	**440 J**	500	106.0
TW018	0810W004	3/6/08	N	20 U	20	8.6	**200 J**	50	40.4	**540**	500	106.0
TW019	0810W003	3/6/08	N	20 U	20	8.6	**240 J**	50	40.4	**690**	500	106.0
TW020	0810W002	3/6/08	N	20 U	20	8.6	**120**	50	40.4	**300 J**	500	106.0
TW021	0810G009	3/5/08	N	20 U	20	8.6	**82**	50	40.4	500 U	500	106.0
TW021	0810G010	3/5/08	FD	20 U	20	8.6	**74**	50	40.4	500 U	500	106.0
TW022	0810G016	3/6/08	N	20 U	20	8.6	**220**	50	40.4	**460 J**	500	106.0
TW023	0810P002	3/6/08	N	20 U	20	8.6	**1700**	250	40.4	**3500**	2500	106.0
TW024	0810G018	3/7/08	N	20 U	20	8.6	**890**	50	40.4	**1800**	500	106.0
TW025	0810P005	3/6/08	N	**37**	20	8.6	**770 J**	250	40.4	**2100 J**	2500	106.0
TW031	0811D007	3/10/08	N	**190 J**	20	8.6	**1800**	50	40.4	**1600**	500	106.0
TW031	0811D008	3/10/08	FD	**180 J**	20	8.6	**1800**	50	40.4	**1400**	500	106.0
TW032	0811D010	3/11/08	N	**67**	20	8.6	**7100**	100	40.4	**8500**	1000	106.0
TW033	0811D011	3/11/08	N	**48**	20	8.6	**3300**	50	40.4	**4800**	500	106.0
TW033	0811D012	3/11/08	FD	**39**	20	8.6	**3400 J**	50	40.4	**5000 J**	500	106.0
TW034	0810P017	3/7/08	N	20 U	20	8.6	50 U	50	40.4	500 U	500	106.0
TW035	0811D003	3/10/08	N	20 U	20	8.6	**310**	50	40.4	**270 J**	500	106.0
TW036	0811D002	3/10/08	N	50 U	50	8.6	**870**	50	40.4	**950**	500	106.0

Table 4. Analytical results for total petroleum hydrocarbons as gasoline, diesel, and motor oil in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	TPH-G	Laboratory Quantitation Limit (TPH-G)	Method Detection Limit (TPH-G)	TPH-D	Laboratory Quantitation Limit (TPH-D)	Method Detection Limit (TPH-D)	TPH-MO	Laboratory Quantitation Limit (TPH-MO)	Method Detection Limit (TPH-MO)
				EPA Method 8015B_G (µg/L)			**EPA Method 8015B_D (µg/L)**			**EPA Method 8015B_D (µg/L)**		
TW037	0810G027	3/7/08	N	20 U	20	8.6	**290**	50	40.4	**640**	500	106.0
TW038	0810G026	3/7/08	N	**18 J**	20	8.6	**5200**	50	40.4	**2500**	500	106.0
TW039	0811D004	3/10/08	N	**190 J**	20	8.6	**2300**	50	40.4	**1700**	500	106.0
TW040	0811D005	3/10/08	N	**200 J**	20	8.6	**2300**	50	40.4	**1800**	500	106.0
TW040	0811D006	3/10/08	FD	**220 J**	20	8.6	**2200**	50	40.4	**1600**	500	106.0
TW041	0811D013	3/11/08	N	**47**	20	8.6	**4400 J**	50	40.4	**6700**	1000	106.0
TW042	0811D014	3/11/08	N	**21**	20	8.6	**4400 J**	50	40.4	**5900**	1000	106.0
TW043	0810W007	3/6/08	N	20 U	20	8.6	**350 J**	50	40.4	**770**	500	106.0
TW044	0810G023	3/7/08	N	**18 J**	20	8.6	**980**	50	40.4	**1300**	500	106.0
TW045	0810P015	3/7/08	N	**11 J**	20	8.6	**1600**	50	40.4	**4100**	500	106.0
TW046	0810G002	3/4/08	N	**230**	20	8.6	**560**	50	40.4	**860**	500	106.0
TW047	0810G003	3/4/08	N	20 U	20	8.6	**240**	50	40.4	**530**	500	106.0
TW048	0810G004	3/4/08	N	20 U	20	8.6	**56**	50	40.4	500 U	500	106.0
TW049	0810G012	3/5/08	N	**18 J**	20	8.6	**1200**	50	40.4	**2600**	500	106.0
TW049	0810G013	3/5/08	FD	**16 J**	20	8.6	**1300**	50	40.4	**2800**	500	106.0
TW050	0810P009	3/7/08	N	20 U	20	8.6	**370**	50	40.4	**790**	500	106.0
TW051	0810G005	3/4/08	N	20 U	20	8.6	**110**	50	40.4	**310 J**	500	106.0
TW052	0810G007	3/5/08	N	20 U	20	8.6	**120**	50	40.4	**250 J**	500	106.0
TW053	0810G008	3/5/08	N	20 U	20	8.6	**170**	50	40.4	**290 J**	500	106.0
TW054	0810P004	3/6/08	N	**74**	20	8.6	**350**	50	40.4	**760**	500	106.0
TW055	0810P003	3/6/08	N	20 U	20	8.6	**240**	50	40.4	**470 J**	500	106.0

Table 4. Analytical results for total petroleum hydrocarbons as gasoline, diesel, and motor oil in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	TPH-G	Laboratory Quantitation Limit (TPH-G)	Method Detection Limit (TPH-G)	TPH-D	Laboratory Quantitation Limit (TPH-D)	Method Detection Limit (TPH-D)	TPH-MO	Laboratory Quantitation Limit (TPH-MO)	Method Detection Limit (TPH-MO)
				EPA Method 8015B_G (µg/L)			**EPA Method 8015B_D (µg/L)**			**EPA Method 8015B_D (µg/L)**		
TW056	0811P020	3/10/08	N	20 U	20	8.6	**340**	50	40.4	**780**	500	106.0
TW057B	0811P023	3/10/08	N	20 U	20	8.6	**270**	50	40.4	**600**	500	106.0
TW058	0811P021	3/10/08	N	20 U	20	8.6	50 U	50	40.4	500 U	500	106.0
TW058	0811P022	3/10/08	FD	20 U	20	8.6	50 U	50	40.4	500 U	500	106.0
TB	0810G001	3/4/08	TB	20 U	20	8.6						
TB	0810G006	3/5/08	TB	20 U	20	8.6						
TB	0810P001	3/6/08	TB	20 U	20	8.6						
TB	0810W001	3/6/08	TB	20 U	20	8.6						
TB	0810G015	3/6/08	TB	20 U	20	8.6						
TB	0810G017	3/7/08	TB	20 U	20	8.6						
TB	0810P008	3/7/08	TB	20 U	20	8.6						
TB	0811D001	3/10/08	TB	50 U	50	8.6						
TB	0811P018	3/10/08	TB	20 U	20	8.6						
TB	0811D009	3/11/08	TB	20 U	20	8.6						
TB	0811P026	3/11/08	TB	20 U	20	8.6						
TB	0811D018	3/12/08	TB	20 U	20	8.6						

Table 4. Analytical results for total petroleum hydrocarbons as gasoline, diesel and motor oil in groundwater.

Notes: Bolded values are results detected above the method detection limit

Abbreviations:
- FD: Field Duplicate
- N: Normal
- PZ: Piezometer
- TB: Trip Blank
- TPH-D: Total Petroleum Hydrocarbons as diesel
- TPH-G: Total Petroleum Hydrocarbons as gasoline
- TPH-MO: Total Petroleum Hydrocarbons as motor oil
- µg/L: Micrograms per liter

Validation Qualifiers:
- J: Estimated value
- U: Not detected at the laboratory quantitation limit

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Table 5. Analytical results for ammonia as nitrogen in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Ammonia as nitrogen	Laboratory Quantitation Limit	Method Detection Limit
				← EPA method 350.1 (µg/L) →		
PZ131F	0811D015	3/11/08	N	350 U	350	122
PZ138E	0811D019	3/12/08	N	**2000**	350	122
PZ138F	0811P033	3/11/08	N	**5700**	350	122
PZ144E	0811P034	3/11/08	N	**3500**	350	122
PZ150D	0811D016	3/11/08	N	**31700**	1750	122
PZ150E	0811D017	3/11/08	N	**10500**	350	122
PZ161D	0811P032	3/11/08	N	**16200**	350	122
TW001	0810G011	3/5/08	N	**31700**	1750	122
TW002	0810G019	3/7/08	N	**5000**	350	122
TW003	0810G024	3/7/08	N	**14300**	350	122
TW004	0810P014	3/7/08	N	**770**	350	122
TW005	0810P016	3/7/08	N	**640**	350	122
TW006	0810G025	3/7/08	N	**3000**	350	122
TW007	0810P013	3/7/08	N	**3100**	350	122
TW008	0810P012	3/7/08	N	**860**	350	122
TW009	0810P007	3/6/08	N	**8000**	350	122
TW010	0810P006	3/6/08	N	**3100**	350	122
TW011	0810P010	3/7/08	N	**9300**	350	122
TW011	0810P011	3/7/08	FD	**10500**	350	122
TW012	0810G014	3/5/08	N	**6400**	350	122
TW013	0810G022	3/7/08	N	**7600**	350	122
TW014	0810G021	3/7/08	N	**9700**	350	122
TW015	0810G020	3/7/08	N	**910**	350	122
TW016	0810W006	3/6/08	N	**5700**	350	122
TW017	0810W005	3/6/08	N	**570**	350	122
TW018	0810W004	3/6/08	N	**170 J**	350	122
TW019	0810W003	3/6/08	N	**220 J**	350	122
TW020	0810W002	3/6/08	N	**410**	350	122
TW021	0810G009	3/5/08	N	**590**	350	122
TW021	0810G010	3/5/08	FD	**550**	350	122
TW022	0810G016	3/6/08	N	**690**	350	122
TW023	0810P002	3/6/08	N	**5300**	350	122
TW024	0810G018	3/7/08	N	**4900**	350	122
TW025	0810P005	3/6/08	N	**5600**	350	122
TW031	0811D007	3/10/08	N	**20900**	350	122
TW031	0811D008	3/10/08	FD	**21000**	350	122
TW032	0811D010	3/11/08	N	**14600**	350	122
TW033	0811D011	3/11/08	N	**11800**	350	122
TW033	0811D012	3/11/08	FD	**12200**	350	122
TW039	0811D004	3/10/08	N	**16700**	350	122
TW040	0811D005	3/10/08	N	**20100**	350	122

Table 5. Analytical results for ammonia as nitrogen in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Ammonia as nitrogen	Laboratory Quantitation Limit	Method Detection Limit
				← EPA method 350.1 (µg/L) →		
TW040	0811D006	3/10/08	FD	**16000**	350	122
TW041	0811D013	3/11/08	N	**18800**	350	122
TW042	0811D014	3/11/08	N	**17100**	350	122
TW043	0810W007	3/6/08	N	**4000**	350	122
TW044	0810G023	3/7/08	N	**4000**	350	122
TW045	0810P015	3/7/08	N	**4600**	350	122
TW046	0810G002	3/4/08	N	**5000**	350	122
TW047	0810G003	3/4/08	N	**2800**	350	122
TW048	0810G004	3/4/08	N	**1900**	350	122
TW049	0810G012	3/5/08	N	**1700**	350	122
TW049	0810G013	3/5/08	FD	**140 J**	350	122
TW050	0810P009	3/7/08	N	**3500**	350	122
TW051	0810G005	3/4/08	N	**360**	350	122
TW052	0810G007	3/5/08	N	**5800**	350	122
TW053	0810G008	3/5/08	N	**6800**	350	122
TW054	0810P004	3/6/08	N	**1100**	350	122
TW055	0810P003	3/6/08	N	**5100**	350	122
TW056	0811P020	3/10/08	N	**2600**	350	122
TW057B	0811P023	3/10/08	N	**4100**	350	122
TW058	0811P021	3/10/08	N	**500**	350	122
TW058	0811P022	3/10/08	FD	**560**	350	122

Notes: Bolded values are results detected above the method detection limit

Abbreviations:
- FD: Field Duplicate
- N: Normal
- PZ: Piezometer
- TW: Temporary Well
- µg/L: micrograms per liter

Validation Qualifiers:
- J: Estimated value
- U: Not detected at the laboratory quantitation limit

Table 6. Analytical results for polychlorinated biphenyls in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
				←			EPA Method 8082 (µg/L)			→
PZ131F	0811D015	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**7.2**	0.5 U
PZ138E	0811D019	3/12/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
PZ138F	0811P033	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PZ144E	0811P034	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PZ150D	0811D016	3/11/08	N	**1.1**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PZ150E	0811D017	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PZ161D	0811P032	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW001	0810G011	3/5/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW002	0810G019	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW003	0810G024	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW004	0810P014	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW005	0810P016	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.64**
TW006	0810G025	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW007	0810P013	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW008	0810P012	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW009	0810P007	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW010	0810P006	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW011	0810P010	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW011	0810P011	3/7/08	FD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW012	0810G014	3/5/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW013	0810G022	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW014	0810G021	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 6. Analytical results for polychlorinated biphenyls in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
				←			EPA Method 8082 (µg/L)			→
TW015	0810G020	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW016	0810W006	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW017	0810W005	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW018	0810W004	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW019	0810W003	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW020	0810W002	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW021	0810G009	3/5/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.27 J**
TW021	0810G010	3/5/08	FD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW022	0810G016	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW023	0810P002	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW024	0810G018	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW025	0810P005	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW031	0811D007	3/10/08	N	**0.99 J**	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW031	0811D008	3/10/08	FD	**0.92 J**	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW032	0811D010	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW033	0811D011	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW033	0811D012	3/11/08	FD	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW034	0810P017	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW035	0811D003	3/10/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW036	0811D002	3/10/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	**0.28 J**
TW037	0810G027	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW038	0810G026	3/7/08	N	**2.6 J**	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ

Table 6. Analytical results for polychlorinated biphenyls in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
				←			EPA Method 8082 (µg/L)			→
TW039	0811D004	3/10/08	N	**0.92 J**	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW040	0811D005	3/10/08	N	**2 J**	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW040	0811D006	3/10/08	FD	**2 J**	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW041	0811D013	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW042	0811D014	3/11/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW043	0810W007	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW044	0810G023	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW045	0810P015	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW046	0810G002	3/4/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW047	0810G003	3/4/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**1**
TW048	0810G004	3/4/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW049	0810G012	3/5/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW049	0810G013	3/5/08	FD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW050	0810P009	3/7/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW051	0810G005	3/4/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW052	0810G007	3/5/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW053	0810G008	3/5/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW054	0810P004	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW055	0810P003	3/6/08	N	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TW056	0811P020	3/10/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW057B	0811P023	3/10/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
TW058	0811P021	3/10/08	N	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ

Table 6. Analytical results for polychlorinated biphenyls in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
				←			**EPA Method 8082 (µg/L)**		→	
TW058	0811P022	3/10/08	FD	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ

Notes: Bolded values are results detected above the method detection limit

Abbreviations:
- FD: Field Duplicate
- N: Normal
- PZ: Piezometer
- TW: Temporary Well
- µg/L: micrograms per liter

Validation Qualifiers:
- J: Estimated value
- U: Not detected at the laboratory quantitation limit
- UJ: Estimated non-detected value

Table 7. Analytical results for dissolved metals in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
				← EPA Method 6010B, except mercury by EPA Method 7470A (µg/L) →																
PZ131F	0811D015	3/11/08	N	100 U	38.3	5 U	96.3 J	2 U	11.7	3.1 J	18.9	1630	12.6	2000	1	196	5 U	1 U	5 UJ	5530
PZ138E	0811D019	3/12/08	N	32.3 U	2.7 J	5 U	150 J	2 U	5 U	2.2 J	5 U	2.2 U	5 U	625	0.2 U	8.1	5 U	0.74 J	5 U	3.4 U
PZ138F	0811P033	3/11/08	N	100 U	3 U	5 U	623 J	2 U	5 U	14.2	5 U	5 U	5 U	473	0.061 U	5 U	5 U	1 U	5 UJ	50 U
PZ144E	0811P034	3/11/08	N	100 U	5 U	5 U	208 J	2 U	5 U	2.2 J	5 U	5 U	5 U	392	0.2 U	4.6 J	5 U	1 U	5 UJ	50 U
PZ150D	0811D016	3/11/08	N	100 U	8.8 U	5 U	659 J	2 U	5 U	4 J	5 U	6.7 U	5 U	118	0.071 U	5 U	3.6 J	0.71 J	5 UJ	50 U
PZ150E	0811D017	3/11/08	N	100 U	5 U	5 U	335 J	2 U	5 U	4.1 J	5 U	5 U	5 U	211	0.2 U	4.7 J	5 U	1 U	5 UJ	50 U
PZ161D	0811P032	3/11/08	N	100 U	5 U	5 U	424 J	2 U	5 U	3.7 J	5 U	5 U	5 U	216	0.066 U	9.6	5 U	1 U	5 UJ	50 U
TW001	0810G011	3/5/08	N	100 U	5 U	4.1 U	303 J	2 U	5 U	5 U	3 J	5 U	5 U	886 J	0.2 U	8.1	6.2	1.1	5 U	50 U
TW002	0810G019	3/7/08	N	100 U	3.3 U	5 U	118 J	2 U	5 U	1.7 J	5 U	3 U	5 UJ	72.1 J	0.2 U	5 U	12.1	1 U	5 UJ	50 U
TW003	0810G024	3/7/08	N	100 U	4.3 U	5 U	148 J	2 U	5 U	5 U	5 U	5 U	5 UJ	227 J	0.075 U	5 U	13.9	1 U	5 UJ	50 U
TW004	0810P014	3/7/08	N	151	7.2 U	10.1	154 J	2 U	5 U	1.7 J	1.9 J	1580	15.2 J	988 J	0.13 U	18.6	11.1	1 U	5 UJ	26.9 J
TW005	0810P016	3/7/08	N	100 U	7.5 U	5 U	246 J	2 U	5 U	5 U	0.63 J	31.1	5 UJ	662 J	0.11 U	13.4	9.5	1 U	5 UJ	51.5
TW006	0810G025	3/7/08	N	100 U	2.8 U	5 U	112 J	2 U	5 U	5 U	5.3	4.9 U	5 UJ	3110 J	0.2 U	32.9	10.3	1 U	5 UJ	105
TW007	0810P013	3/7/08	N	100 U	5 U	5 U	96.7 J	2 U	5 U	5 U	5 U	1.9 U	5 UJ	144 J	0.067 U	5 U	10.8	1 U	5 UJ	50 U
TW008	0810P012	3/7/08	N	100 U	5 U	3.2 J	60.6 J	2 U	5 U	5 U	5 U	6 U	5 UJ	124 J	0.2 U	6.9	9.5	1 U	5 UJ	50 U
TW009	0810P007	3/6/08	N	100 U	5 U	5 U	118 J	2 U	5 U	4.4 J	5 U	2.3 U	5 U	291	0.2 U	6.8	12.6	1 U	5 U	50 U
TW010	0810P006	3/6/08	N	100 U	5 U	5 U	276 J	2 U	5 U	2.4 J	0.66 J	5 U	5 U	354	0.2 U	12.9	6.8	1 U	5 U	50 U
TW011	0810P010	3/7/08	N	100 U	2.7 U	2.6 J	90.8 J	2 U	5 U	3 J	0.67 J	17.1	5 UJ	38.4 J	0.2 U	7.7	12.8	1 U	5 UJ	34.8 J
TW011	0810P011	3/7/08	FD	100 U	1.8 U	2.9 J	110 J	2 U	5 U	3.1 J	5 U	9.7	5 UJ	24.4 J	0.2 U	7.2	17.1	1 U	5 UJ	32.8 J
TW012	0810G014	3/5/08	N	100 U	5 U	5 U	991 J	2 U	5 U	5 U	8	5 U	5 U	11300 J	0.2 U	31.7	5 U	2.2	5 U	50 U
TW013	0810G022	3/7/08	N	100 U	5 U	5 U	769 J	2 U	5 U	5 U	5 U	5 U	5 UJ	655 J	0.13 U	5 U	5 U	1 U	5 UJ	2.8 U
TW014	0810G021	3/7/08	N	100 U	5 U	5 U	571 J	2 U	5 U	5 U	5 U	5 U	5 UJ	444 J	0.2 U	5 U	4.7 J	1 U	5 UJ	50 U
TW015	0810G020	3/7/08	N	100 U	3.6 U	5 U	114 J	2 U	5 U	5 U	5 U	2.5 U	5 UJ	406 J	0.2 U	5 U	8.9	1 U	5 UJ	8.3 U
TW016	0810W006	3/6/08	N	100 U	5 U	5 U	143 J	2 U	5 U	5 U	5 U	4.5 U	5 U	419	0.2 U	5 U	11.6	1 U	5 U	50 U
TW017	0810W005	3/6/08	N	100 U	5 U	2.7 U	96.6 J	2 U	5 U	5 U	5 U	1.6 U	5 U	240	0.2 U	5 U	8.6	1 U	5 U	3 J
TW018	0810W004	3/6/08	N	100 U	3 U	5 U	77.2 J	2 U	5 U	1.5 J	5 U	41.6	5 U	37	0.2 U	19.4	13.2	1 U	5 U	3.6 J
TW019	0810W003	3/6/08	N	100 U	2.3 U	5 U	99.6 J	2 U	0.85 J	1.8 J	5 U	57.5	5 U	318	0.2 U	26.8	12.1	1 U	5 U	42.4 J
TW020	0810W002	3/6/08	N	100 U	17.2	5 U	79.5 J	2 U	1.1 J	2.5 J	1.3 J	41.4	5 U	275	0.064 J	37.4	9.7	0.85 J	5 U	98.6
TW021	0810G009	3/5/08	N	100 U	4.2 U	5 U	61.5 J	2 U	0.61 J	3.4 J	0.72 J	25.4	25.5	194 J	0.064 J	18.5	9.7	1 U	5 U	105
TW021	0810G010	3/5/08	FD	100 U	3.6 U	5 U	61.6 J	2 U	0.58 J	3.5 J	0.75 J	24.9	23.1	196 J	0.11 J	18.6	9	1 U	5 U	30.5 J
TW022	0810G016	3/6/08	N	100 U	3 U	5 U	113 J	2 U	5 U	4.3 J	1.7 J	27.5	8	519	0.2 U	16.9	13.8	1 U	5 U	21.3 J
TW023	0810P002	3/6/08	N	220	5 U	5 U	140 J	2 U	5 U	2.4 J	1 J	2.9 U	5 U	66.6	0.2 U	5.7	11.6	0.78 J	5 U	5.7 J
TW024	0810G018	3/7/08	N	100 U	3.2 U	5 U	111 J	2 U	5 U	2 J	5 U	4.1 U	5 UJ	86.2 J	0.2 U	5 U	12.7	1 U	5 UJ	50 U

Table 7. Analytical results for dissolved metals in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
				← EPA Method 6010B, except mercury by EPA Method 7470A (µg/L) →																
TW025	0810P005	3/6/08	N	100 U	5 U	5 U	242 J	2 U	5 U	3 J	5 U	1.8 U	5 U	166	0.2 U	10.5	6.8	1 U	5 U	50 U
TW026B	0811P029	3/11/08	N	100 U	5 U	5 U	50.3 J	2 U	5 U	5 U	2 J	1.2 U	5 U	3750	0.2 U	7	6.1	0.83 J	2.1 UJ	50 U
TW027B	0811P025	3/10/08	N	100 U	5 U	5 U	1490	2 U	5 U	5 U	5 U	5 U	5 U	12.9	0.068 J	5 U	5 U	1 U	5 U	50 U
TW028B	0811P024	3/10/08	N	178	2.9 J	5 U	166 J	2 U	5 U	1.8 J	5 U	18.1	27.2	123	0.12 J	5 U	3.3 J	1 U	5 U	48.3 J
TW029	0811P019	3/10/08	N	22600	26.4	19.9	510 J	0.2 J	5 U	115	9.5	528	1110	1230	0.95	93.2	5 U	1 U	5 U	1280
TW030B	0811P028	3/11/08	N	100 U	5 U	5 U	479 J	2 U	5 U	5 U	5 U	5 U	5 U	432	0.2 U	5 U	4.3 J	1 U	5 UJ	50 U
TW031	0811D007	3/10/08	N	100 U	5 U	5 U	566	2 U	5 U	6.1	5 U	5 U	5 U	254	0.084 J	44.6	5 U	1 U	5 U	50 U
TW031	0811D008	3/10/08	FD	100 U	5 U	5 U	562	2 U	5 U	6.2	5 U	5 U	5 U	255	0.064 J	42.6	3.4 J	1 U	5 U	50 U
TW032	0811D010	3/11/08	N	100 U	4.6 U	5 U	471 J	2 U	5 U	6.4	1.8 J	2.3 U	5 U	1320	0.2 U	24.3	5	1 U	5 UJ	50 U
TW033	0811D011	3/11/08	N	100 U	4.7 U	5 U	337 J	2 U	5 U	5.2	10	2.6 U	5 U	1940	0.063 U	47.1	3.2 J	1 U	5 UJ	50 U
TW033	0811D012	3/11/08	FD	100 U	4.9 U	5 U	325 J	2 U	5 U	5	9.7	2.5 U	5 U	1860	0.069 U	44.6	4.7 J	1 U	5 UJ	50 U
TW039	0811D004	3/10/08	N	100 U	5 U	5 U	494	2 U	5 U	5	5 U	5 U	5 U	156	0.067 J	19.9	3.5 J	1 U	5 U	50 U
TW040	0811D005	3/10/08	N	100 U	2.2 J	5 U	499	2 U	5 U	6	2.2 J	5 U	5 U	216	0.07 J	117	5 U	1 U	5 U	50 U
TW040	0811D006	3/10/08	FD	100 U	5 U	5 U	506	2 U	5 U	6	2.1 J	5 U	5 U	209	0.089 J	115	5 U	1 U	5 U	50 U
TW041	0811D013	3/11/08	N	100 U	4 U	5 U	555 J	2 U	5 U	4.3 J	1 J	5 U	5 U	125	0.11 U	15.3	3.5 J	1.1	5 UJ	50 U
TW042	0811D014	3/11/08	N	100 U	3.2 U	5 U	552 J	2 U	5 U	4.2 J	5 U	5 U	5 U	483	0.093 U	13.4	3.4 J	1 U	5 UJ	50 U
TW043	0810W007	3/6/08	N	100 U	5 U	5 U	184 J	2 U	5 U	5 U	5 U	4.6 U	5 U	304	0.2 U	5.3	12.7	1 U	5 U	26.1 J
TW044	0810G023	3/7/08	N	100 U	6.6	5 U	273 J	2 U	5 U	5 U	1.4 J	8.6	5 UJ	548 J	0.075 U	10.3	8	1 U	5 UJ	53.4
TW045	0810P015	3/7/08	N	100 U	5.5 U	9.5	503 J	2 U	0.5 J	1.4 J	6	224	5 UJ	1640 J	0.079 U	27.9	4.3 J	1 U	5 UJ	71.3
TW046	0810G002	3/4/08	N	160	2.3 U	6.8 U	356 J	2 U	5 U	4.5 J	5 U	3.9 U	5 U	87.4 J	0.2 U	25.7	13.3	1 U	5 U	5.6 J
TW047	0810G003	3/4/08	N	66.2 J	5 U	5 U	181 J	2 U	5 U	1.5 J	5 U	3.8 U	5 U	232 J	0.2 U	12.1	11.9	1 U	5 U	50 U
TW048	0810G004	3/4/08	N	100 U	5 U	2.7 U	202 J	2 U	5 U	5 U	5.3	10.4	5 U	14200 J	0.2 U	14.5	3.8 J	1.3	5 U	21.6 J
TW049	0810G012	3/5/08	N	100 U	5 U	5 U	228 J	2 U	5 U	4 J	5 U	5 U	5 U	108 J	0.2 U	10.3	13	1.1	5 U	43.1 J
TW049	0810G013	3/5/08	FD	100 U	5 U	5 U	240 J	2 U	5 U	4.2 J	5 U	5 U	5 U	113 J	0.2 U	10.6	15.1	1 U	5 U	50 U
TW050	0810P009	3/7/08	N	100 U	5 U	5 U	73.4 J	2 U	5 U	4.1 J	5 U	5 U	5 UJ	305 J	0.2 U	10.6	17	1 U	5 UJ	50 U
TW051	0810G005	3/4/08	N	20.1 J	4.2 U	5 U	99.5 J	2 U	5 U	3.9 J	5 U	8.9	5 U	700 J	0.2 U	6.9	6.9	1 U	5 U	3.3 J
TW052	0810G007	3/5/08	N	100 U	2.3 U	5.6 U	141 J	2 U	5 U	4.6 J	1.3 J	15	10.7	483 J	0.2 U	9.6	12.7	1 U	5 U	50 U
TW053	0810G008	3/5/08	N	100 U	5 U	8 U	169 J	2 U	5 U	4.3 J	1.1 J	6.6 U	7.3	1370 J	0.2 U	7	12.5	1 U	5 U	50 U
TW054	0810P004	3/6/08	N	33.6 J	5 U	6 U	148 J	2 U	5 U	2.2 J	5 U	1.1 U	5 U	2020	0.2 U	9.1	13.9	0.84 J	5 U	50 U
TW055	0810P003	3/6/08	N	94.6 J	5.2 U	5.9 U	157 J	2 U	5 U	5 U	5 U	1.4 U	5.9	1140	0.2 U	11.1	16.7	1.2	5 U	50 U
TW056	0811P020	3/10/08	N	100 U	5 U	7	203	2 U	5 U	5 U	5 U	5 U	5 U	346	0.066 J	7.5	5 U	1 U	5 U	50 U
TW057B	0811P023	3/10/08	N	100 U	5 U	9.2	287	2 U	5 U	5 U	5 U	5 U	5 U	335	0.2 U	10.9	3.2 J	1 U	5 U	50 U
TW058	0811P021	3/10/08	N	100 U	5 U	8.4	127	2 U	5 U	5 U	5 U	5 U	5 U	484	0.2 U	5 U	5 U	1 U	5 U	50 U

Table 7. Analytical results for dissolved metals in groundwater.

Well ID	Sample ID	Sample Date	Sample Type	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
				← EPA Method 6010B, except mercury by EPA Method 7470A (µg/L) →																
TW058	0811P022	3/10/08	FD	100 U	5 U	**8.7**	**124**	2 U	5 U	5 U	5 U	1.6 U	5 U	**497**	**0.061 J**	5 U	5 U	1 U	5 U	50 U
TW059	0811P027	3/11/08	N	100 U	5 U	5 U	**195 J**	2 U	5 U	5 U	5 U	5 U	5 U	**129**	0.2 U	5 U	**6.1**	**1**	5 UJ	50 U
TW060	0811P030	3/11/08	N	100 U	5 U	5 U	**237 J**	2 U	5 U	5 U	5 U	1.2 U	5 U	**378**	0.2 U	5 U	5 U	**2.5**	5.7 UJ	50 U
TW061	0811P031	3/11/08	N	100 U	5 U	5 U	**166J**	2 U	5 U	5 U	**1.4 J**	2.8 U	5 U	**567**	0.2 U	**8.2**	5 U	1 U	5 UJ	50 U

Notes: Bolded values are results detected above the method detection limit

Abbreviations:
- FD: Field Duplicate
- N: Normal
- PZ: Piezometer
- TW: Temporary Well
- µg/L: micrograms per liter

Validation Qualifiers:
- J: Estimated value
- U: Not detected at the laboratory quantitation limit
- UJ: Estimated non-detected value

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Appendix A.
Response to Comments
on
Work Plan and Final Sampling and Analysis Plan

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U.S Navy Responses to Regulatory Comments on the Work Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California, February 2008

August 1, 2008

Environmental Protection Agency Comments (submitted by Mark Ripperda)

Comment 1. I would like to see several well points along the border of the landfill and also near the ship-shielding area sampled for radiological constituents. I understand from our phone conversation [referring to conversation with Mark Walden, CIV NAVFAC SW] that this is planned pending the radiological addendum from RASO.

Response: Radiological sampling of groundwater has been conducted under Addendum 1 to the Work Plan (and associated Addendum 1 to the Final SAP) dated June 2008. As requested, samples along the border of the landfill and near the ship shielding area are being analyzed for radionuclides and at all other planned sampling locations in the Parcel E-2 Groundwater Investigation Work Plan. Including the six new temporary well locations added as discussed in response to comment #2 below, the 61 temporary wells and the 7 piezometers are being analyzed for the following radionuclides:

- Cesium-137 (Cs-137).
- Radium-226 (Ra-226).
- Strontium-90 (Sr-90).

Additionally, samples have been collected from the 11 most southerly temporary well locations, including the 6 new locations, for Cobalt-60 (Co-60) analysis.

Comment 2. I would like to see several (4-6) wellpoints moved from the top of the panhandle to the middle and bottom. While this is not in the current DQOs, it would completely cover the shoreward migration of the entire parcel, since you already have wellpoints planned in the metal slag area.

Response: Six additional temporary well locations were added and installed in conjunction with the other temporary well installations under the Final SAP. Three (TW056, TW057B, and TW058) are located between the metal slag area and monitoring well IR01MWI-7. Groundwater samples from these locations were collected in March 2008 and analyzed for the same chemical suite as the northern/central panhandle locations with results reported in the Technical Memorandum. A second set of groundwater samples was collected from these locations between June 30 and July 1, 2008 and are being analyzed d for Cs-137, Co-60, Ra-226, and Sr-90.

The other three added temporary wells (TW059, TW060, and TW061) were installed along the southwestern end of the panhandle between the metal slag area and the property line. Groundwater samples from these locations will be analyzed for the list of dissolved metals already planned for the metal slag area and also for Cs-137, Co-60, Ra-226, and Sr-90.

Groundwater from these temporary wells was sampled for chemical constituents during the same sampling period as the other Parcel E-2 temporary wells and consistent with the Final

SAP. The addition of these temporary wells and associated sample analyses for both chemical and radiological analytes has been incorporated into Addendum 1 to the Work Plan and Addendum 1 to the Final SAP for the Parcel E 2 Groundwater Investigation, June 2008.

Department of Toxic Substances Control Comments (submitted by Tom Lanphar)

Comment 1. First, please add radiological constituents to the analyte list.

Response: Radiological sampling of groundwater was conducted between June 27 and July 1, 2008 under Addendum 1 to the Work Plan (and associated Addendum 1 to the Final SAP). As requested, samples along the border of the landfill and near the ship shielding area are being analyzed for radionuclides and at all other sampling locations installed under the Parcel E-2 Groundwater Investigation Work Plan. Including the six new temporary well locations added as discussed in response to comment #2 below, the 61 temporary wells and the 7 piezometers are being analyzed for the following radionuclides:

- Cesium-137 (Cs-137).
- Radium-226 (Ra-226).
- Strontium-90 (Sr-90).

Additionally, samples were collected from the 11 most southerly temporary well locations, including the 6 new locations, for Cobalt-60 (Co-60) analysis.

Comment 2. Second, this is a good opportunity to better characterize the groundwater at the shoreline of the pan-handle. Could we spread out the temporary well locations to cover more of the shoreline or can a few additional wells be added to the project? Current well spacing is about 50-80 feet; maybe we can have a greater spacing in the panhandle. By adding these wells we can better characterize the groundwater in the panhandle and perhaps put to rest any issues for groundwater containment in that area.

Response: Six additional temporary well locations were added and installed in conjunction with the other temporary well installations under the Final SAP. Three (TW056, TW057B, and TW058) are located between the metal slag area and monitoring well IR01MWI-7. Groundwater samples from these locations will be analyzed for the same chemical suite as the northern/central panhandle locations and also for Cs-137, Co-60, Ra-226, and Sr-90.

The other three added temporary wells (TW059, TW060, and TW061) were installed along the southwestern end of the panhandle between the metal slag area and the property line. Groundwater samples from these locations will be analyzed for the list of dissolved metals already planned for the metal slag area and also for Cs-137, Co-60, Ra-226, and Sr-90.

Groundwater from these temporary wells was sampled for chemical constituents during the same sampling period as the other Parcel E-2 temporary wells and consistent with the Final SAP. The addition of these temporary wells and associated sample analyses for both chemical and radiological analytes has been incorporated into Addendum 1 to the Work Plan and Addendum 1 to the Final SAP for the Parcel E 2 Groundwater Investigation, June 2008.

Regional Water Quality Control Board Comments (submitted by Erich Simon)

Comment 1. Section 1.1 - Page 1-1 – List of analytes – Please discuss why other contaminants of concern associated with the landfill at Parcel E-2 are not included in the proposed list of analytes.

Response: The list of analytes for the Parcel E-2 investigations was determined to be the contaminants of concern that drive the risks and potential remedies for Parcel E-2. This list was the outcome of joint discussions with Navy/contractor staff and regulators. After reviewing the Draft Feasibility Study for Parcel E-2, a new field investigation was proposed for analytes having incomplete geographic coverage for a proper evaluation of remedial alternatives.

Comment 2. Section 1.1 – Page 1-2 – Specific Goals List item #3 – Please describe how the effectiveness of the PCB hot spot removal will be evaluated using the data collected in this data gap investigation.

Response: The investigation will provide data that will need to be supplemented with regular ground water monitoring to evaluate the long-term effectiveness of the removal action. The Navy's Feasibility Study team will use the data collected in this investigation as a post-excavation baseline against which to evaluate if PCB concentrations in groundwater have or will meet cleanup objectives over time without further active remediation in the PCB Hot Spot area. The revised Basewide Groundwater Monitoring Plan SAP (in preparation) includes a process for adding groundwater monitoring at locations deemed by the Feasibility Study team as requiring long-term groundwater monitoring to support the cleanup objectives.

Comment 3. Worksheet #15 – This worksheet indicates that only 3 PCB congeners (1248, 1254, 1260) will be analyzed for. Please include justification for analyzing these 3 congeners. The California Toxics Rule (CTR) criteria apply to total PCBs. The total PCB calculation specified in the CTR (See footnotes u and v in the CTR table) includes the sum of 7 congeners (1248, 1254, 1260, 1242, 1221, 1232, and 1016).

Response: The proposed analysis, EPA Method 8082, includes the seven PCB Aroclors cited in the CTR. These data are reported in the Technical Memorandum. The Addendum 1 to the Final SAP for Parcel E-2 indicates Aroclor-1016, -1221, -1232, and -1242.

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Appendix B.
Project personnel sign-off sheets

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SAP Worksheet #4 -- Project Personnel Sign-Off Sheet

Name	Organization/Title/Role	Telephone Number (optional)	Signature/email receipt	SAP Section Reviewed	Date SAP Read
Mark Walden	Navy / RPM	619-532-0931	Mark Walden	Complete SAP	2/14/08
Edward Kilduff	CE2-Kleinfelder JV / Program Manager	925-463-7301			
Robert Ferry	CE2-Kleinfelder JV / Project Manager	925-463-7301			
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Patricia Walters	CE2-Kleinfelder JV / Project Chemist	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
TBD	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

SAP Worksheet #4 -- Project Personnel Sign-Off Sheet

Name	Organization/Title/Role	Telephone Number (optional)	Signature/email receipt	SAP Section Reviewed	Date SAP Read
Mark Walden	Navy / RPM	619-532-0931			
Edward Kilduff	CE2-Kleinfelder JV / Program Manager	925-463-7301	Ed Kilduff	Complete SAP	2/05/08
Robert Ferry	CE2-Kleinfelder JV / Project Manager	925-463-7301	Robert Ferry	Complete SAP	2/05/08
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Patricia Walters	CE2-Kleinfelder JV / Project Chemist	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
TBD	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

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Robert Ferry	CE2-Kleinfelder JV / Project Manager	925-463-7301			
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000	Gary Goodemote	all	2/8/08
Patricia Walters	CE2-Kleinfelder JV / Project Chemist	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
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Robert Ferry	CE2-Kleinfelder JV / Project Manager	925-463-7301			
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Patricia Walters	CE2-Kleinfelder JV / Project Chemist	510-628-9000	Patricia Walters	Complete SAP	2/10/2008
Diane Anderson	APPL	559-275-2175			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
TBD	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

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Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Patricia Walters	CE2-Kleinfelder JV / Project Chemist	510-628-9000			
Diane Anderson	APPL	559-275-2175	Diane Anderson	3,4,5,6,7,14,15,16,20-29 30,34	2/15/08
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
TBD	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

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Robert Ferry	CE2-Kleinfelder JV / Project Manager	925-463-7301			
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Patricia Walters	CE2-Kleinfelder JV / Project Chemist	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Richard Amano	LDC	760-634-0437		Complete SAP	2/14/08
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
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Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Patricia Walters	CE2-Kleinfelder JV / Project Chemist	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000	Thomas A Sayre	complete SAP	02/14/08
TBD	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

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Appendix C.
Geophysical survey report

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NORCAL GEOPHYSICAL CONSULTANTS, INC.

February 7, 2008

Mr. Tom Sayre
Kleinfelder
1970 Broadway
Suite 710
Oakland, California 94612

Subject: Geophysical Investigation at Hunters Point Shipyard, San Francisco, California
NORCAL Project No. 07-177.153

Dear Mr. Sayre:

This report presents the findings of a geophysical investigation performed by NORCAL Geophysical Consultants, Inc. at the Hunters Point Shipyard site, located in San Francisco, California. NORCAL geophysicists David Hagin and geophysical technician Travis Black conducted the field investigation on September 13th and 14th and November 15th and 16th, 2007. Background information, site logistics and safety information were provided on site by Mr. Tom Sayre.

SITE DESCRIPTION AND PURPOSE

The geophysical survey areas are in Parcel E-2, and consist of 5 locations along the San Francisco Bay (Plate 1). Numerous proposed temporary wells are planned as part of the remediation of the site prior to new construction. The purpose of this investigation is to assess the potential for the existence of any remaining landfill material through geophysical methods; drill hole locations may be modified by the results of this survey.

METHODOLOGY

The geophysical methods used for this investigation are vertical magnetic gradient (VMG), and terrain conductivity (TC) methods. The VMG is designed to locate localized ferrous sources, such as metallic debris. Variations in soil type and moisture content can be detected and mapped using TC; landfill material characteristically affects the conductivity of the subsurface, allowing for detection by the TC method. A more detailed discussion of these methods, data analysis, geophysical instrumentation, and limitations is presented in Appendix A.

321A BLODGETT STREET • COTATI, CA 94931 • TELEPHONE (707) 796-7170 • FAX (707) 796-7175
www.norcalgeophysical.com

FIELD INVESTIGATION

Area 1

Initially, a survey grid was established in each area to provide horizontal position control for data acquisition. Data acquisition consisted of a series of parallel traverses spaced 10 feet apart. Magnetic data were acquired along the grid lines at approximately 5-foot intervals. TC data were acquired along the northing grid lines at approximately 10-foot intervals.

DATA ANALYSIS

Magnetic Data

Magnetic data are carefully evaluated and edited, then contoured as VMG and MAG for review and interpretation. These contour maps are then assessed for magnetic variations which cannot be explained by known magnetic sources; strong unexplained variations in the magnetic field are referenced as VMG anomalies, and interpreted as potential areas for further exploration. Groups of proximal anomalies which may be associated have been hachured for the purpose of illustration.

Terrain Conductivity Data

Terrain conductivity data are reviewed for quality control, edited and contoured for interpretation. TC contour maps are interpreted based on variation in TC values and the potential causes for these variations. Strong unexplained variations in the TC values are referenced as TC anomalies. Groups of proximal anomalies which may be associated have been hachured for the purpose of illustration.

RESULTS and CONCLUSIONS

The VMG and TC data are presented as contour maps on Plates 2 through 6. The following discussion details the findings for each area.

Area 1

Significant VMG variation on the western portion of the grid is noted on Plate 2; however, a sheetpile wall in this area provides an apparent source for these variations. A small, isolated VMG anomaly is hachured; the character of this anomaly suggests that it is caused by isolated shallow sub-surface ferromagnetic debris. TC data also shows marked variation in the sheetwall area; however the remainder of the site shows gradual variation, typically indicating varying soil type and moisture content.

Area 2

The VMG map on Plate 3 shows high variation and numerous elongate closed contours in this area. The sheetwall traverses directly beneath this area, and several monitoring wells and/or piezometers are also located here. It is likely that these numerous large magnetic sources are responsible for the high variation seen on the VMG map. As the TC map shows similar variation, it is interpreted that the same sources which caused the VMG anomalies are responsible for the TC anomalies.

Area 3

This area shows numerous tightly closed contours on the VMG map (Plate 4). Although abundant metallic debris is noted at the surface, it appears that there are more magnetic anomalies than can be accounted for by the surface debris. These anomalies tend to be grouped in areas, possibly suggesting relatively large accumulations of buried debris in these locations. These areas cover approximately half of this site, and have been hachured for emphasis. The TC map indicates several areas of interest, which have been hachured. The hachured anomaly near the southwest corner is especially strong. Since there is no magnetic correlation, this is possibly due to the proximity to saline waters of the San Francisco Bay.

Area 4

This area also shows numerous tightly closed contours on the VMG map (Plate 5). These anomalies are grouped on the western portion of the map. As no apparent magnetic sources were noted at the surface, this indicates buried ferromagnetic objects in this area. These areas cover over half of this site, and have been hachured for emphasis. TC values show significant variation over the entire area. This type of variation is characteristic of zones that are in close proximity to saline waters, such as the San Francisco Bay.

Area 5

The southern portion of this area shows strong VMG values; however it is our understanding that the sheetpile wall exists in this area, providing an explanation for these anomalous values. The hachured section in the northern portion of the site is adjacent to Area 3, and is interpreted to be a continuation of the anomalies noted there.

STANDARD CARE AND WARRANTY

The scope of NORCAL's services for this project consisted of using geophysical methods to characterize the shallow subsurface. The accuracy of our findings is subject to specific site conditions and limitations inherent to the techniques used. We performed our services in a manner consistent with the level of skill ordinarily exercised

by members of the profession currently employing similar methods. No warranty, with respect to the performance of services or products delivered under this agreement, expressed or implied, is made by NORCAL.

We appreciate having the opportunity to provide our services to Kleinfelder

Sincerely,

NORCAL Geophysical Consultants, Inc.

David T. Hagin
Geophysicist GP-1033

DTH/KGB/tt

Enclosures: Plates 1-6

Appendix A - Geophysical Methodology, Instrumentation, Data Analysis, and Limitations

Appendix A

GEOPHYSICAL METHODOLOGY

Appendix A

VERTICAL MAGNETIC GRADIENT (VMG)

Methodology

Vertical magnetic gradient surveys are used to determine the presence of buried ferrous objects. A magnetic gradiometer measures the vertical gradient of the earth's magnetic field. It consists of two total field magnetic sensors separated vertically by one-half meter. The magnetic field strength is measured simultaneously at both of these sensors. The difference in magnetic intensity between these measurements is proportional to the vertical gradient of the earth's magnetic field. Because the vertical gradient is constant with respect to time, the effect of diurnal variations is eliminated. Therefore, a gradiometer provides higher sensitivity and better resolution of near surface sources than total field magnetometers. Areas with significant amounts of buried metal typically produce anomalously steep magnetic gradients. Since it is sensitive to ferrous metal sources both above and below ground, site and vicinity surface conditions can affect survey results.

A Geometrics G-858 cesium vapor magnetometer or a SCINTREX ENVI-MAP proton precession magnetometer is typically used to obtain vertical magnetic gradient data. These instruments feature a built-in memory that stores the vertical magnetic gradient and survey grid information. The information can be down loaded to a computer for further processing.

Data Analysis

Computer Processing

The VMG data are down loaded to a lap-top computer and converted it into a format for contouring. The contouring program (SURFER Version 8.0 by Golden Software) calculates an evenly spaced array of values (grid) based on the observed field data. Finally, these gridded values are contoured to produce a VMG contour map.

Contour Map Interpretation

The VMG contour map illustrates the variations in the vertical magnetic gradient across the site. Areas without below or above ground ferrous metal are characterized by very low magnetic gradients. In these areas, there are very few contours. In areas with above or below ground ferrous metal, the magnetic gradient is relatively steep. These areas are characterized by numerous closely spaced contours and are considered anomalous. If the source of the anomaly is linear (e.g. underground utilities or fence lines), then the contours tend to be parallel and evenly distributed. If the source of the anomaly is localized (e.g. sign post, buried drum, etc.), then the contours tend to form circular or elliptical closures

proportional to the size of the object. The larger the object and the closer it is to the magnetometer, the denser the concentrations of contours. Magnetic anomalies that cannot be attributed to above ground objects (fences, vehicles, buildings, etc.) are probably caused by buried objects.

USTs are often characterized by circular to elliptical contour closures. These closures have magnitudes ranging from several hundred to several thousand nano-Tesla per meter (nT/m) depending on the size and depth of the tank. If the UST is cylindrical and lying horizontally, it will often produce a bi-polar VMG anomaly. This consists of two adjacent contour closures. One has VMG values that increase towards the center of the closure and is referred to as a positive lobe. The second has VMG values that decrease towards the center of the closure and is referred to as a negative lobe. Typically, the positive lobe is situated directly above the UST and the negative lobe is to the north of the UST. Utilities and scattered metal debris, on the other hand, are generally characterized by single circular or irregular shaped negative lobes, or a group of alternating positive and negative lobes (closures). These closures typically have magnitudes ranging from less than fifty to several hundred nano-Tesla per meter (nT/m) depending on the size, depth, and amount of utilities and debris in a given area.

Limitations

Below ground metal ferrous objects produce localized variations in the earth's magnetic field. The magnetic intensity associated with buried metal depends on the mass of the metal and the distance the metal object is from the magnetometer sensor. As the distance between the object and the magnetometer sensor increases, the intensity of the associated field decreases, thereby making detection more difficult. In addition, the ability to detect a buried metal object is based on the intensity of these variations versus the intensity of the background variations. Background variations can be caused by other nearby above or below ground metallic sources. Cultural features such as chain link fences, buildings, debris, railroad spurs, utilities, above ground electric lines, etc. typically produce numerous magnetic variations with high intensities. These variations may mask effects from buried metal objects, or make it very difficult to determine whether the magnetic variations are associated with below ground metal or above/below ground cultural features.

ELECTROMAGNETIC TERRAIN CONDUCTIVITY (TC)

Methodology

The electromagnetic method is used to measure variations in subsurface electrical conductivity that may be due to buried foreign objects or changes in subsurface materials. The electromagnetic system utilizes two coils separated by a specified distance. One of

these coils transmits a time-varying electromagnetic signal (primary magnetic field) which induces current flow in the earth. This in turn creates a secondary magnetic field which is detected by the receiver coil. The secondary signal is complex and has both quadrature and in-phase components. The amplitude of the quadrature component is proportional to the electrical conductivity of the subsurface materials. The in-phase component is proportional to conductivity, but is also affected by electrical properties associated with metal objects. The instrument displays the quadrature component in units of milliSiemens/meter (mS/m). Since this measurement represents the conductivity of the volume of material sampled, rather than individual layers, it is an apparent value and is referred to as terrain conductivity.

Electromagnetic surveys are typically conducted using a Geonics EM31-DL ground conductivity meter connected to an Omnidata data recorder. The EM31 has a fixed coil separation of 12 feet, which results in a total depth of investigation of approximately 10 to 15 feet depending upon local site conditions. The data recorder automatically stores EM values as well as station locations and annotations regarding cultural features.

Data Analysis

Computer Processing

The TC data are down loaded to a lap-top computer and converted it into a format for contouring. The contouring program (SURFER Version 8.0 by Golden Software) calculates an evenly spaced array of values (grid) based on the observed field data. Finally, these gridded values are contoured to produce a TC contour map.

Contour Map Interpretation

The TC contour map shows the variations in the electromagnetic terrain conductivity values within the survey area. The contour map is characterized by a series of contour lines that represent specific values. Areas that lack contour lines, or where the contours are spaced far apart, indicate a minimal change or variation in the respective values. This is indicative of relatively uniform conditions. Areas where contours are closely spaced indicate variations that are not uniform and probably caused by local sources.

In areas where there are significant quantities of above or below ground metal objects, the measured values are relatively large. These areas are characterized by numerous closely spaced contours. If the source of the anomaly is linear (e.g. underground utilities, railroad spurs, culvert, etc.), then the contours tend to parallel the object, and are closely spaced in close proximity to the object. If the below ground source is localized (e.g. buried drum, isolated metal debris, etc.), then the contours tend to form circular or elliptical closures that enclose the object. The larger the object and the closer it is to the geophysical instrument,

the more contours there are in a given area. Variations that cannot be attributed to known above and/or below ground objects (metal well casings, reinforced concrete surface drain, above ground 55 gallon drums, utilities, etc.) are caused by unknown buried objects and are considered anomalous.

Buried landfill material is often characterized by circular to elliptical contour closures. These closures can vary from large circular closures that cover broad areas, to clusters of small closures that occur in zones. If the composition of the landfill is generally homogenous and nonmetallic, the contours tend to form large closures representing low values. If the fill material consists of both nonmetallic and metallic debris that varies significantly throughout the landfill, the contours tend to occur as numerous small closures representing both high and low values.

Limitations

There are inherent limitations associated with TC techniques that may not allow for the detection of all subsurface features of interest. These limitations are related to the composition of the subsurface feature, its size and depth of burial, and its proximity to other above or below ground features. In general, as the distance between a subsurface object and the respective geophysical instrument increases, the intensity of the associated field decreases, thereby making detection more difficult. In addition, above and below ground objects, such as buildings, debris, utilities, above ground electric lines, etc., typically produce interference that may mask effects from nearby buried features (targets).

Apart from the physical limitations of the instruments and the unwanted effects from secondary objects, the ability to detect subsurface features is also dependent upon the density of data acquisition points. If the distance between data acquisition points is significantly larger than the size of the subsurface feature, then this object may not be detectable.

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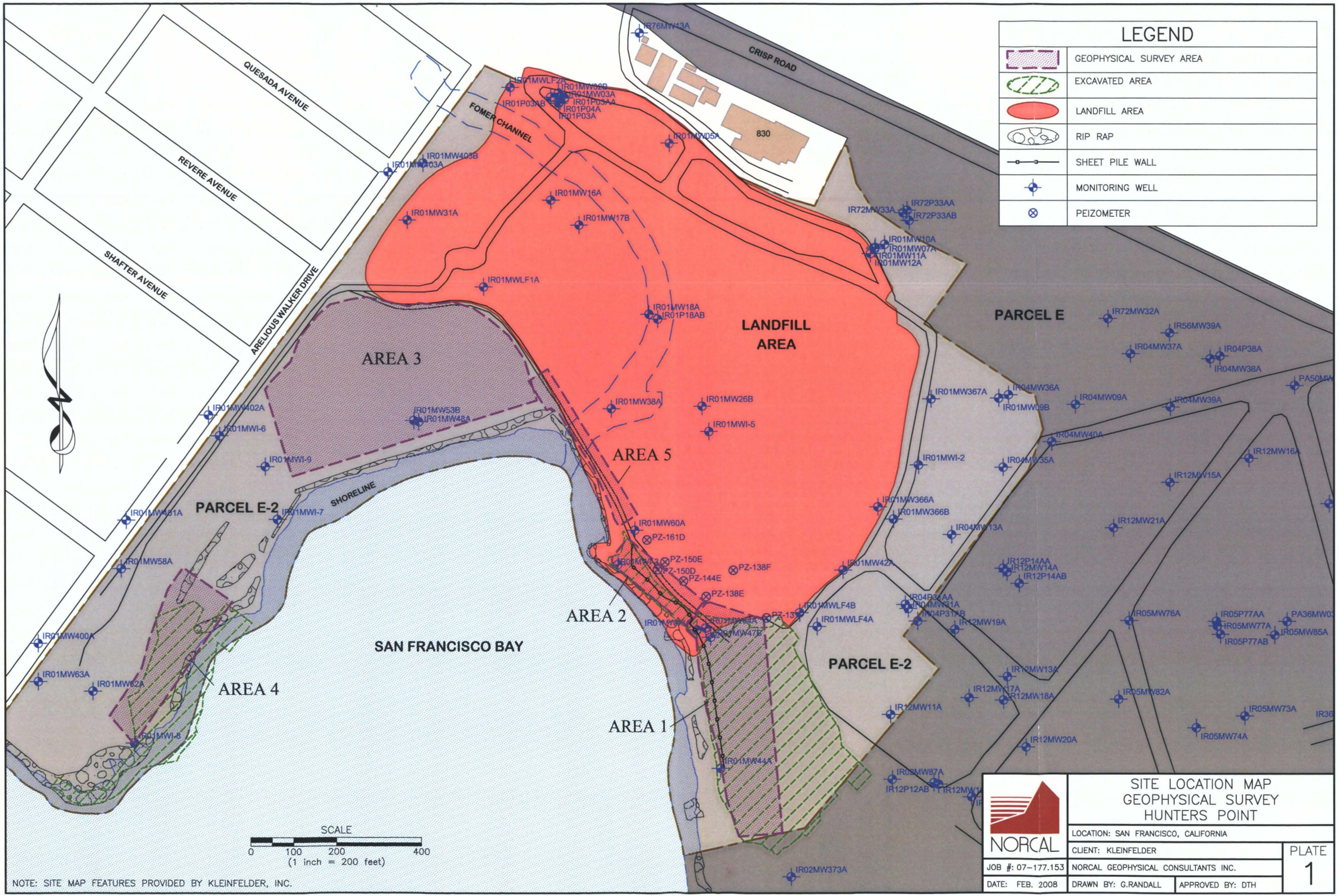
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EXCAVATED AREA
LANDFILL AREA
RIP RAP
SHEET PILE WALL
MONITORING WELL
PEIZOMETER
QUESADA AVENUE
REVERE AVENUE
SHAFTER AVENUE
ARELIOUS WALKER DRIVE
CRISP ROAD
FOMER CHANNEL
830
LANDFILL AREA
PARCEL E
PARCEL E-2
PARCEL E-2
AREA 1
AREA 2
AREA 3
AREA 4
AREA 5
SHORELINE
SAN FRANCISCO BAY
SCALE
0 100 200 400
(1 inch = 200 feet)
NOTE: SITE MAP FEATURES PROVIDED BY KLEINFELDER, INC.
NORCAL
SITE LOCATION MAP
GEOPHYSICAL SURVEY
HUNTERS POINT
LOCATION: SAN FRANCISCO, CALIFORNIA
CLIENT: KLEINFELDER
JOB #: 07-177.153
NORCAL GEOPHYSICAL CONSULTANTS INC.
DATE: FEB. 2008
DRAWN BY: G.RANDALL
APPROVED BY: DTH
PLATE
1

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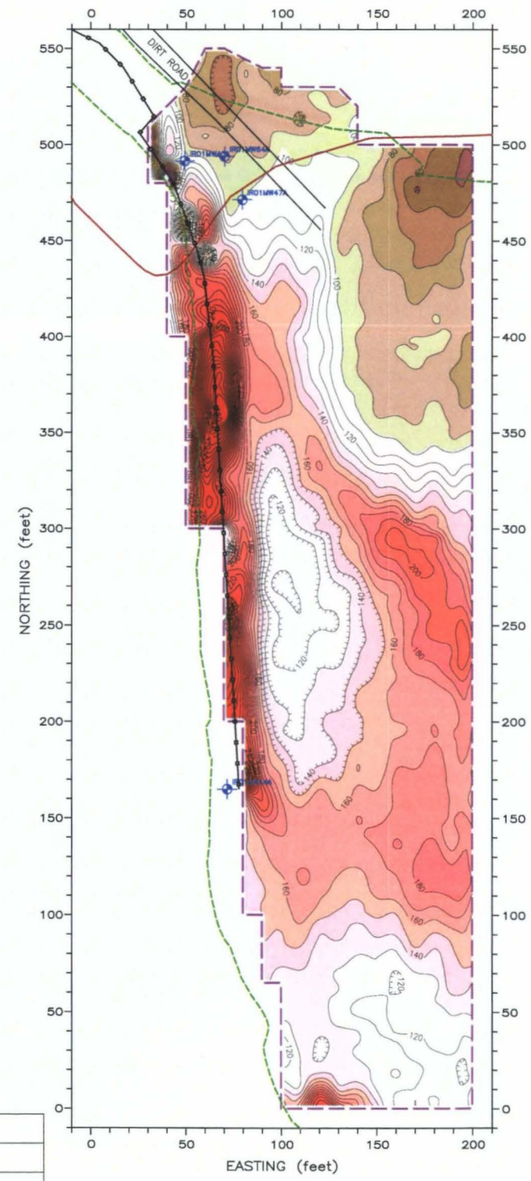
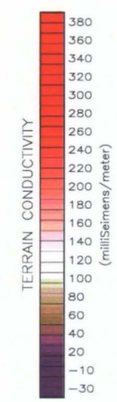
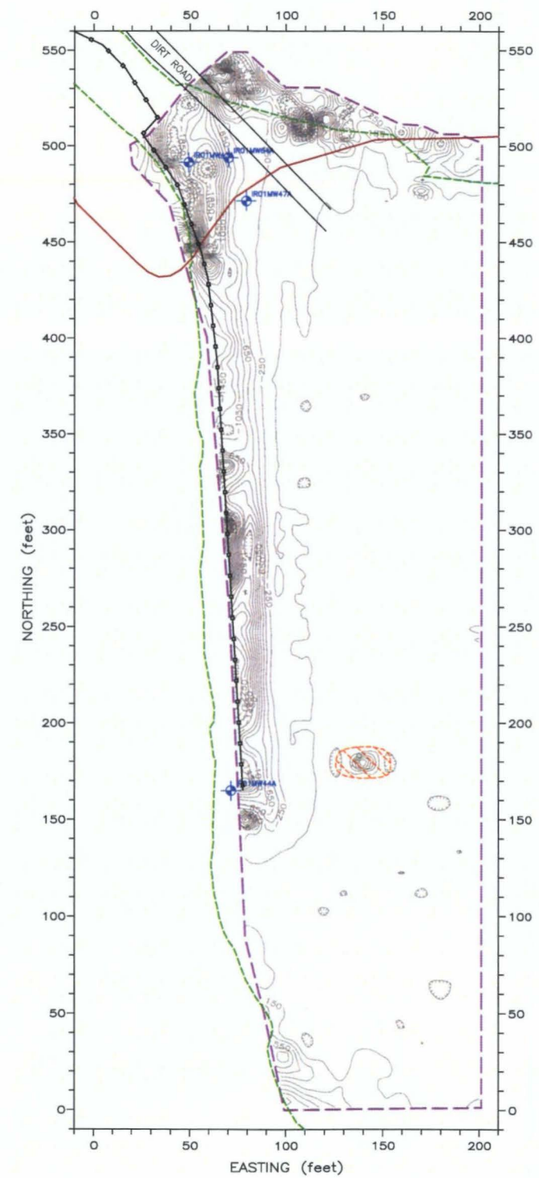
TERRAIN CONDUCTIVITY CONTOUR MAP





VERTICAL MAGNETIC GRADIENT CONTOUR MAP



LEGEND

	LIMITS OF GEOPHYSICAL SURVEY
	TERRAIN CONDUCTIVITY CONTOUR (CONTOUR INTERVAL = 10 mS/m)
	VERTICAL MAGNETIC GRADIENT CONTOUR (CONTOUR INTERVAL = 200 nT/m)
	VERTICAL MAGNETIC GRADIENT ANOMALY
	LIMITS OF EXCAVATED AREA
	LIMITS OF LANDFILL AREA
	SHEET PILE WALL
	MONITORING WELL

NOTE: SEE PLATE 1, SITE LOCATION MAP, FOR REFERENCING AREA FEATURES

SCALE
0 25 50 100
(1 inch = 50 feet)

NORCAL

AREA 1 – TERRAIN CONDUCTIVITY & VERTICAL MAGNETIC GRADIENT CONTOUR MAPS – HUNTERS POINT

LOCATION: SAN FRANCISCO, CALIFORNIA
CLIENT: KLEINFELDER
JOB #: 07-177.153 NORCAL GEOPHYSICAL CONSULTANTS INC.
DATE: FEB. 2008 DRAWN BY: G.RANDALL APPROVED BY: DTH

PLATE 2

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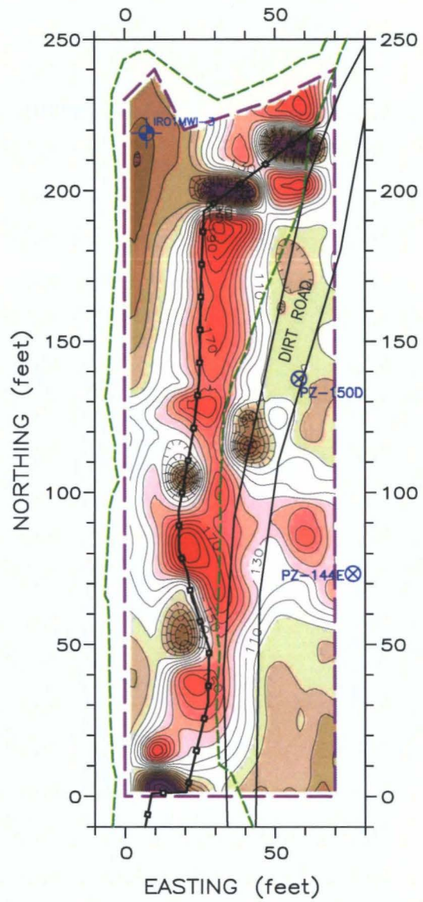
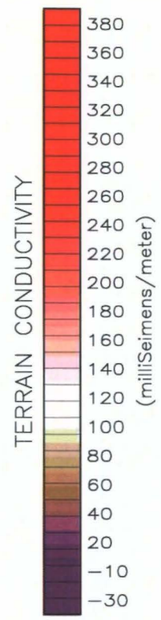
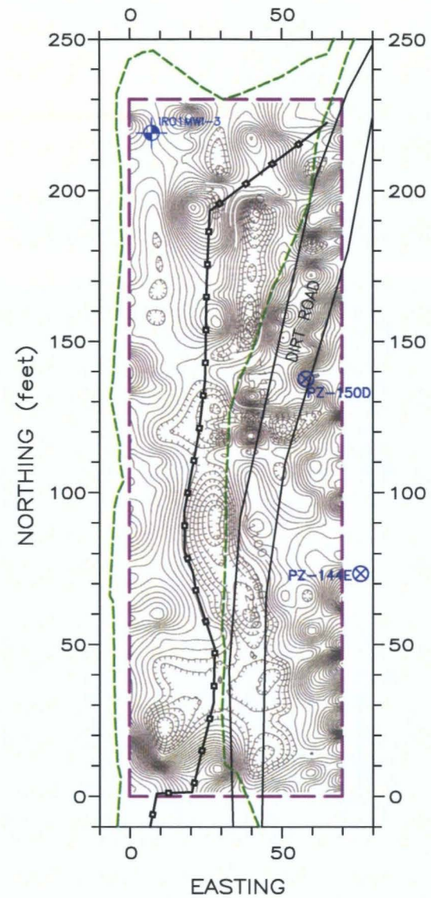
TERRAIN CONDUCTIVITY CONTOUR MAP





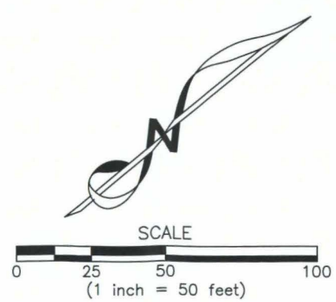
VERTICAL MAGNETIC GRADIENT CONTOUR MAP



LEGEND

	LIMITS OF GEOPHYSICAL SURVEY
	TERRAIN CONDUCTIVITY CONTOUR (CONTOUR INTERVAL = 10 mS/m)
	VERTICAL MAGNETIC GRADIENT CONTOUR (CONTOUR INTERVAL = 200 nT/m)
	LIMITS OF EXCAVATED AREA
	SHEET PILE WALL
	MONITORING WELL
	PIEZOMETER

NOTE: SEE PLATE 1, SITE LOCATION MAP, FOR REFERENCING AREA FEATURES



NORCAL

AREA 2 – TERRAIN CONDUCTIVITY & VERTICAL MAGNETIC GRADIENT CONTOUR MAPS – HUNTERS POINT

LOCATION: SAN FRANCISCO, CALIFORNIA

CLIENT: KLEINFELDER

JOB #: 07-177.153

NORCAL GEOPHYSICAL CONSULTANTS INC.

DATE: FEB. 2008

DRAWN BY: G.RANDALL

APPROVED BY: DTH

PLATE 3

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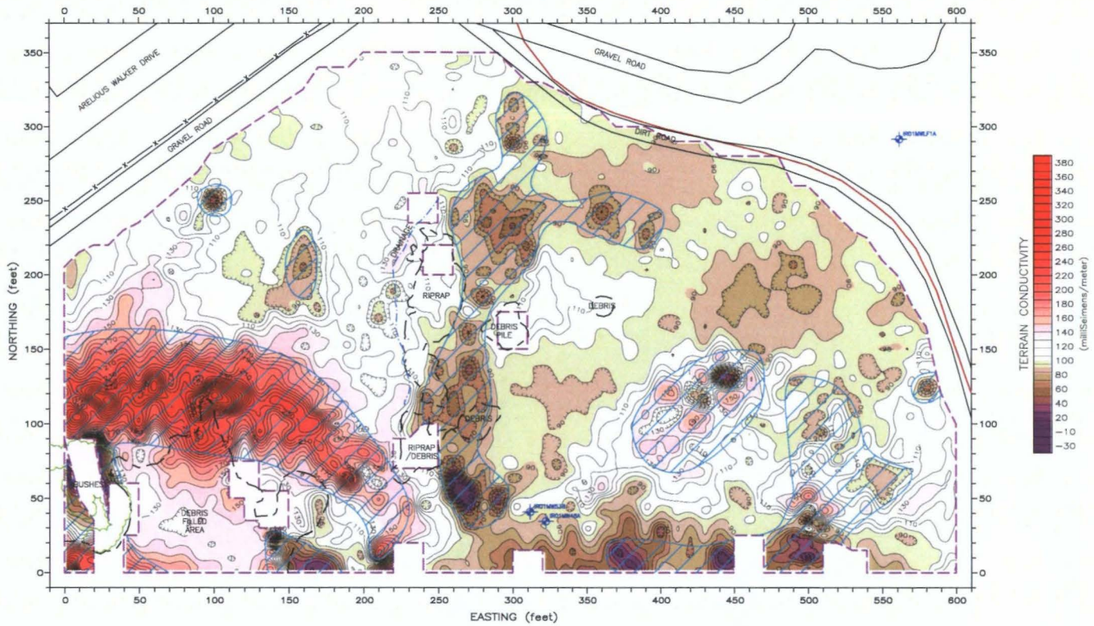
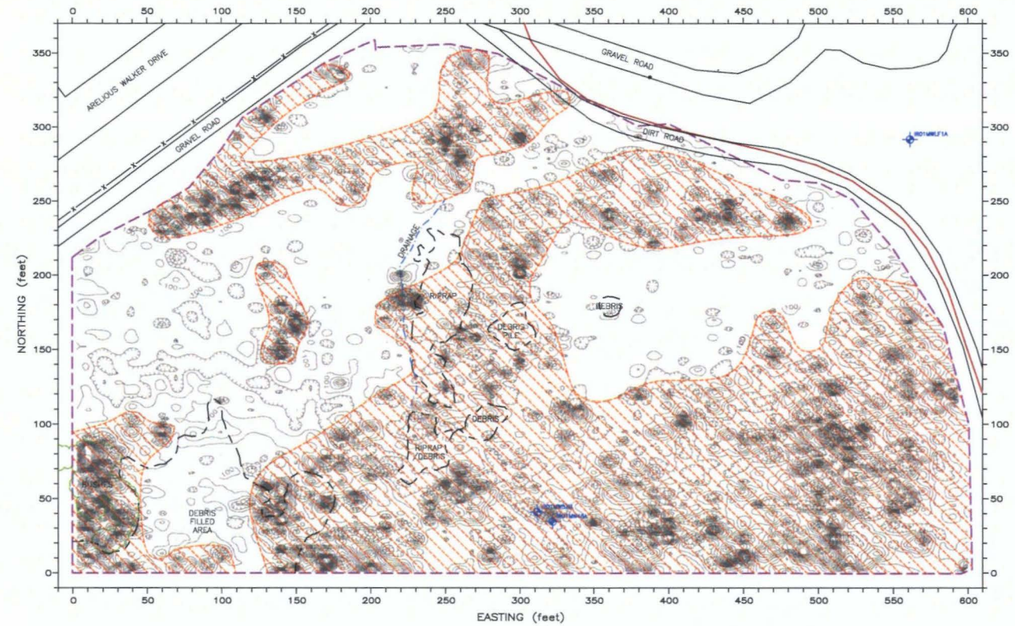
TERRAIN CONDUCTIVITY
CONTOUR MAP



VERTICAL MAGNETIC GRADIENT
CONTOUR MAP



LEGEND

	LIMITS OF GEOPHYSICAL SURVEY
	TERRAIN CONDUCTIVITY CONTOUR (CONTOUR INTERVAL = 10 mS/m)
	VERTICAL MAGNETIC GRADIENT CONTOUR (CONTOUR INTERVAL = 200 nT/m)
	TERRAIN CONDUCTIVITY ANOMALY
	VERTICAL MAGNETIC GRADIENT ANOMALY
	FENCE
	LIMITS OF LANDFILL AREA
	MONITORING WELL

NOTE: SEE PLATE 1, SITE LOCATION MAP, FOR REFERENCING AREA FEATURES

SCALE
0 25 50 100
(1 inch = 50 feet)

NORCAL

AREA 3 – TERRAIN CONDUCTIVITY & VERTICAL MAGNETIC GRADIENT CONTOUR MAPS – HUNTERS POINT

LOCATION: SAN FRANCISCO, CALIFORNIA
CLIENT: KLEINFELDER
JOB #: 07-177.153
NORCAL GEOPHYSICAL CONSULTANTS INC.
DATE: FEB. 2008
DRAWN BY: G.RANDALL
APPROVED BY: DTH

PLATE 4

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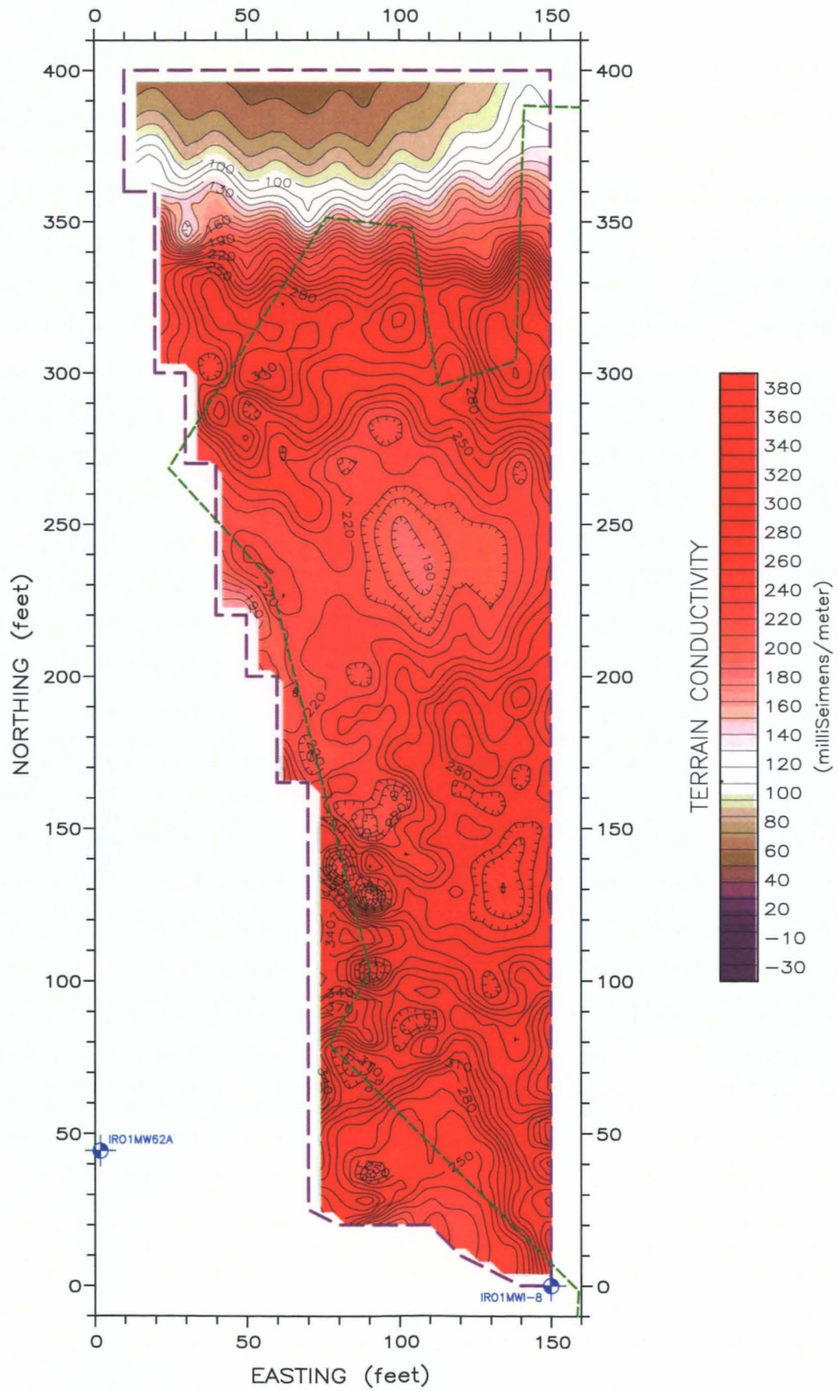
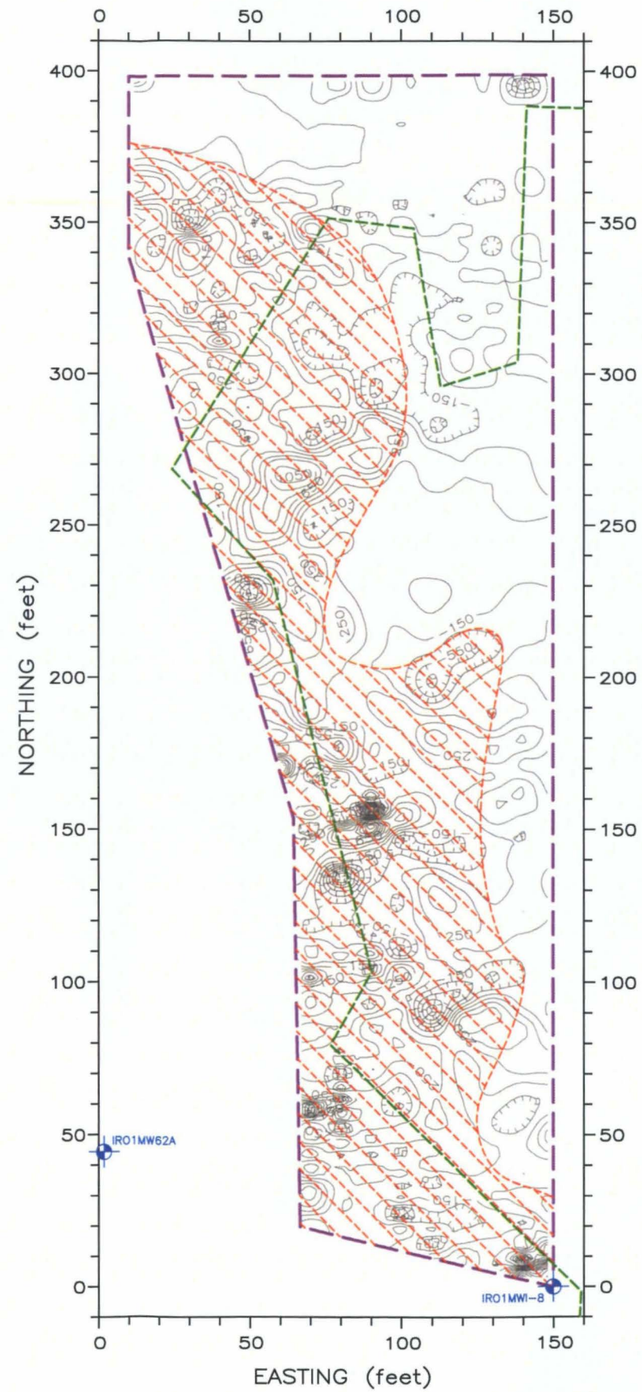
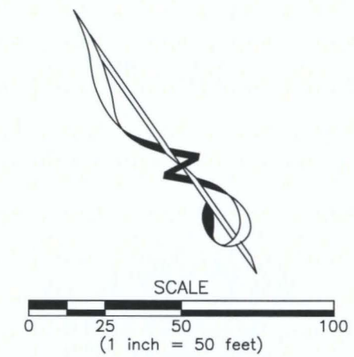
TERRAIN CONDUCTIVITY CONTOUR MAP



VERTICAL MAGNETIC GRADIENT CONTOUR MAP





LEGEND

	LIMITS OF GEOPHYSICAL SURVEY
	TERRAIN CONDUCTIVITY CONTOUR (CONTOUR INTERVAL = 10 mS/m)
	VERTICAL MAGNETIC GRADIENT CONTOUR (CONTOUR INTERVAL = 200 nT/m)
	VERTICAL MAGNETIC GRADIENT ANOMALY
	LIMITS OF EXCAVATED AREA
	MONITORING WELL

NOTE: SEE PLATE 1, SITE LOCATION MAP, FOR REFERENCING AREA FEATURES

NORCAL

AREA 4 – TERRAIN CONDUCTIVITY & VERTICAL MAGNETIC GRADIENT CONTOUR MAPS – HUNTERS POINT

LOCATION: SAN FRANCISCO, CALIFORNIA

CLIENT: KLEINFELDER

JOB #: 07-177.153 | NORCAL GEOPHYSICAL CONSULTANTS INC.

DATE: FEB. 2008 | DRAWN BY: G.RANDALL | APPROVED BY: DTH

PLATE 5

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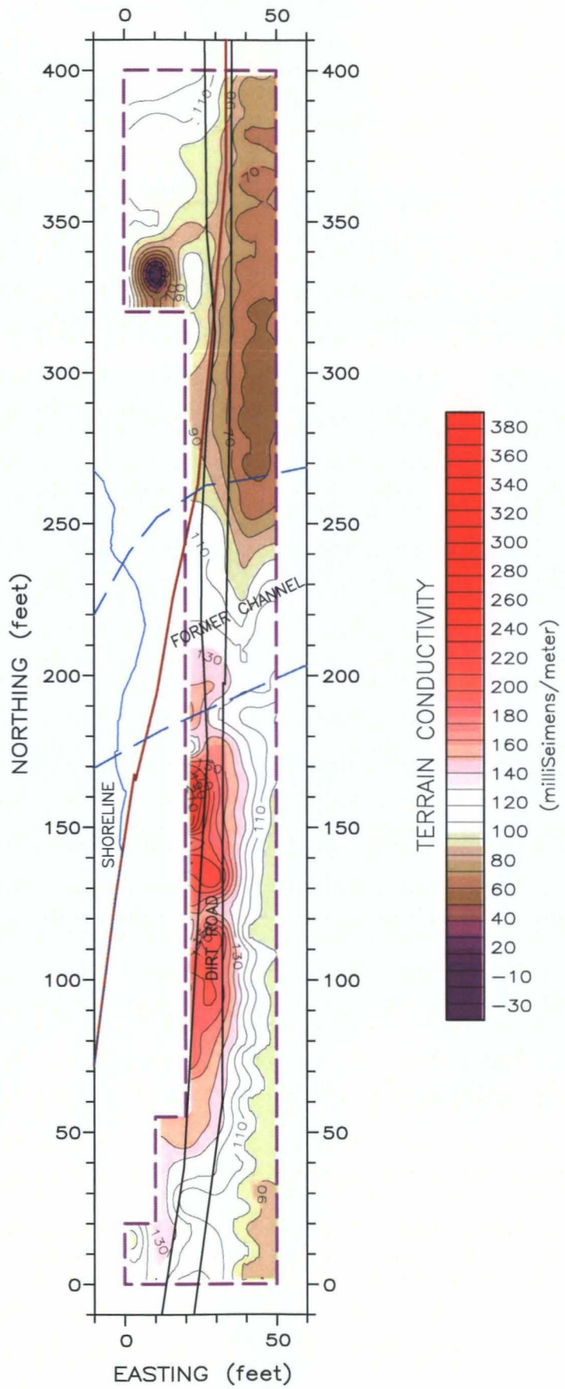
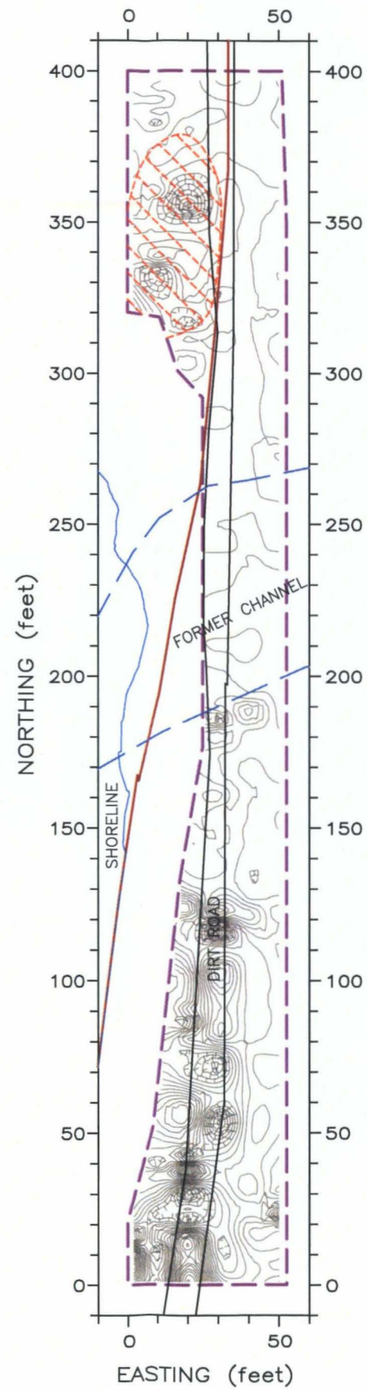
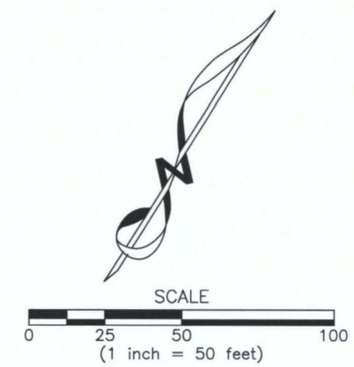
TERRAIN CONDUCTIVITY CONTOUR MAP



VERTICAL MAGNETIC GRADIENT CONTOUR MAP





LEGEND

	LIMITS OF GEOPHYSICAL SURVEY
	TERRAIN CONDUCTIVITY CONTOUR (CONTOUR INTERVAL = 10 mS/m)
	VERTICAL MAGNETIC GRADIENT CONTOUR (CONTOUR INTERVAL = 200 nT/m)
	VERTICAL MAGNETIC GRADIENT ANOMALY
	LIMITS OF LANDFILL AREA

NOTE: SEE PLATE 1, SITE LOCATION MAP, FOR REFERENCING AREA FEATURES

NORCAL

AREA 5 – TERRAIN CONDUCTIVITY & VERTICAL MAGNETIC GRADIENT CONTOUR MAPS – HUNTERS POINT

LOCATION: SAN FRANCISCO, CALIFORNIA

CLIENT: KLEINFELDER

JOB #: 07–177.153 | NORCAL GEOPHYSICAL CONSULTANTS INC.

DATE: FEB. 2008 | DRAWN BY: G.RANDALL | APPROVED BY: DTH

PLATE 6

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Appendix D.
Borehole logs

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CE2 KLEINFELDER

Borehole Log

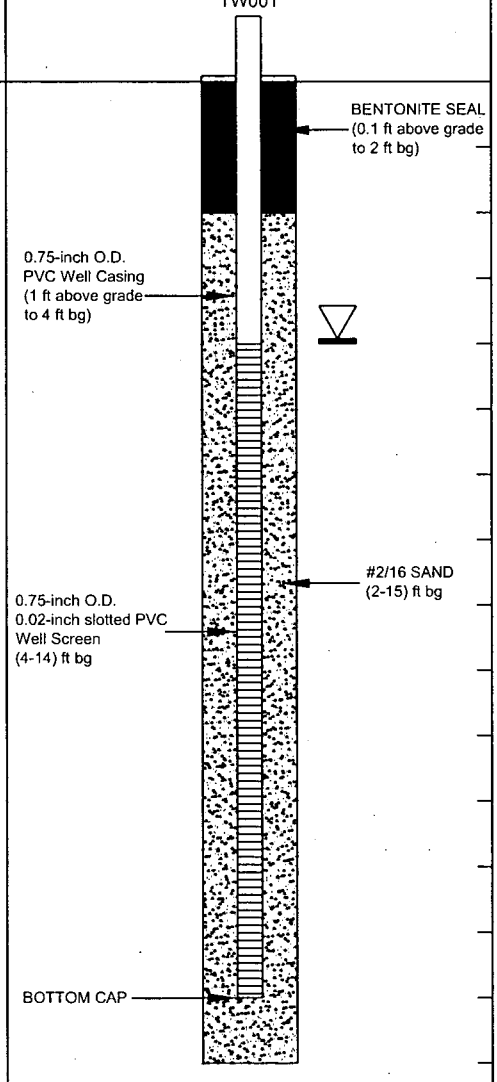
Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH020 / TW001

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 2/13/08	Date Finished: 2/13/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: hummocky, uneven, grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 15.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 4.0 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Northing 451282.78	Easting 1456897.49	Surface Elevation: 7.5 ft MSL	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC		Clayey Sand (SC), yellow brown, moist, fine sand, trace silt, (Fill).		55		
			Woven Material (~4" thick) at 4 ft, possibly burlap.			1.1	
5			Clayey Sand (SC), black, wet, weakly cemented, fine-medium sand, wood, hydrocarbon odor, (Fill).			104	
			Clayey Sand (SC), black, wet, fine-medium grained sand, wood, cement fragments, (Fill).		62	0.4	
	GP		Sandy Gravel (GP), black, wet, wood and cement fragments, (Fill).				
10	SC		Clayey Sand (SC), black, wet, some gravel, fine-medium grained sand, (Fill).		38	0.4	
15	CL		Inorganic Clay (CL), black, wet, low plasticity.				
			Bottom of borehole at 15 ft bg				
20							

Temporary Well TW001



CE2 KLEINFELDER

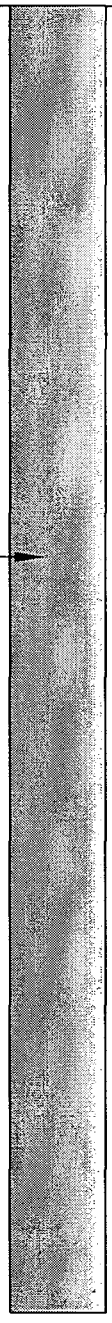
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH020B

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition:	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: Not Measured	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Suveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC		Clayey Sand (SC), yellow brown, fine grained sand.		50		
5	SC		Clayey Sand (SC), black, wet, fine-grained sand, hydrocarbon odor.		87	0.7 0.0	
10			Trace gravel		27	0.0 0.0	
15	CL		Sandy Clay (CL), black, wet, fine-grained sand.		3	0.0 0.0	
20	SC		Clayey Sand (SC), black, wet, fine to medium grained sand.			0.0	
			Bottom of borehole at 20 ft bg				



CE2 KLEINFELDER

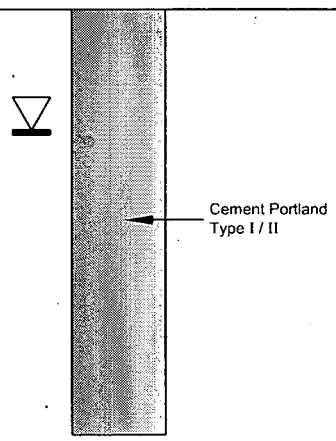
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH023

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 2/13/08	Date Finished: 2/13/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: fairly level, grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 6.5 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 2.0 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SP		Poorly Graded Sand with Clay and Gravel (SP), with gravel, light-brown, moist, medium to coarse grained sand, (Fill).			0.0	
	CL		Inorganic clay (CL)with gravel, dark brown, moist, (Fill).			0.0	
	SC		Clayey Sand (SC), black, moist/wet, medium to fine grained sand, (Fill).		48	0.1	
5			Clayey Sand with gravel and wood (SC), black, wet, medium to fine sand, gravel and wood fragment, (Fill).		100	0.2	
			Refusal at 6.5 ft bg				
10							
15							
20							



CE2 KLEINFELDER

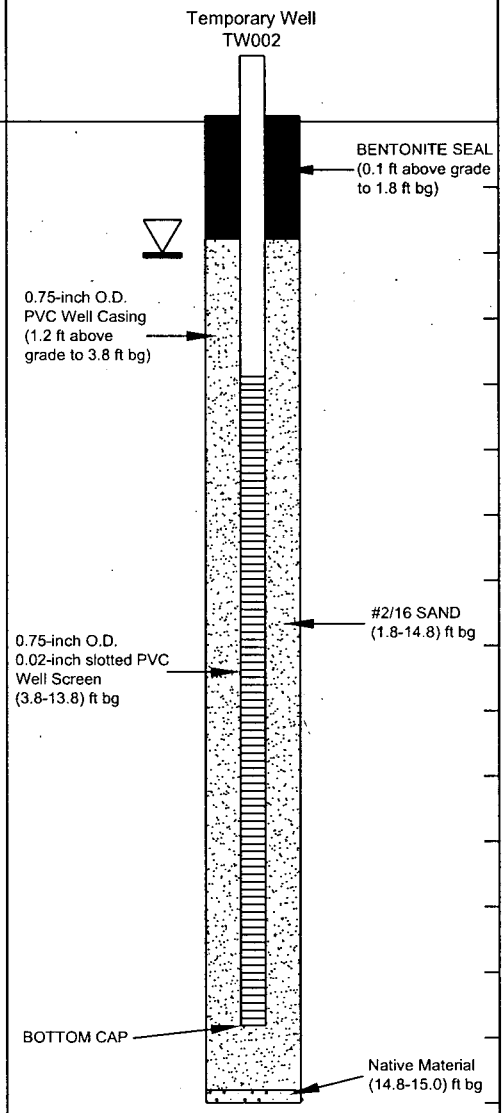
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH023B / TW002

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 2/13/08	Date Finished: 2/13/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: Fairly level grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 15.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 2.0 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Northing 451376.11	Easting 1457180.28	Surface Elevation: 7.2 ft MSL	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SP		Poorly Graded Sand (SP), light brown, moist, coarse to medium grained sand, (Fill).				
	CL		Inorganic Clay (CL) with gravel, dark green cobble/boulder fragments, (Fill).				
	SP		Poorly Graded Sand (SP), dark gray, moist/wet, medium to fine-grained sand, (Fill).		58	0.0	
	CL		Inorganic Clay (CL), dark gray, moist, brick and cement fragment, (Fill).				
						0.0	
5			Poorly Graded Sand (SP), dark gray, wet, medium to fine-grained sand, (Fill).				
						0.0	
			Fine-grained sand, slight hydrocarbon odor, (Fill).		57		
	SP						
10			Poorly-Graded Sand with Gravel (SP), black, wet, fine-grained sand, trace clay, slight hydrocarbon odor (Fill).			0.0	
					33	0.0	
15			Bottom of borehole at 15 ft bg			0.0	
20							



CE2 KLEINFELDER

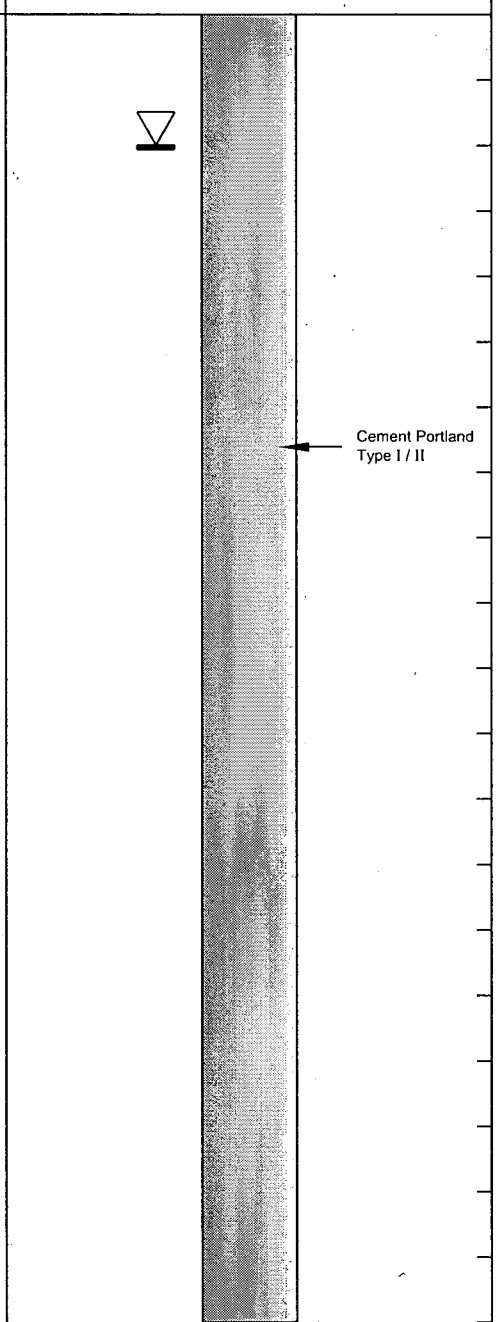
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH023C

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition:	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 2.0 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC		Clayey Sand (SC) with gravel, brown, moist, fine-grained sand. Concrete fragments, (Fill).		68	0.0	
						0.0	
5	SP		Poorly-Graded Sand (SP), wet, dark gray, medium-grained sand.		60	0.0	
10			With gravel			0.0	
					35	0.0	
15	CL		Inorganic Clay (CL), black		78	0.0	
						0.0	
20	CL		Inorganic Clay (CL), dark gray.			0.0	
			Bottom of borehole at 20 ft bg				



CE2 KLEINFELDER

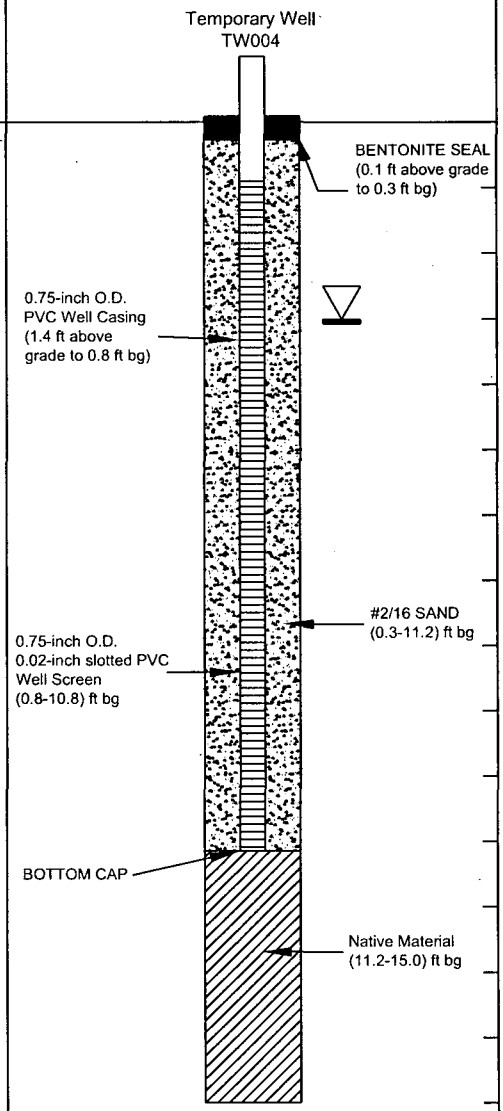
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH031 / TW004

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 2/14/08	Date Finished: 2/14/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: relatively flat, grassy	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 15.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 3.0 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Northing 451480.35	Easting 1457292.24	Surface Elevation: 6.7 ft MSL	

Depth (feet)	USCS Soil Type	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC	Poorly Graded Sand (SC) with gravel, light brown, moist, medium to coarse-grained sand, (Fill).				
	CL	Inorganic Clay (CL), light brown, moist, low plasticity, (Fill).			0.0	
	SP	Poorly Graded Sand (SP) with gravel, dark brown, moist, fine to medium grained sand, (Fill).		73	0.0	
	CL	Inorganic Clay (CL), some sand, some gravel, dark brown, moist, fine-grained sand, (Fill).			0.0	
	SC	Clayey Sand (SC), dark gray, wet, fine-grained sand				
5	CL	Inorganic Clay (CL) with sand, dark gray, moist, fine-grained sand, (Fill).			0.0	
	SP	Poorly Graded Sand (SP), light brown, wet, medium to coarse grained sand, (Fill).			0.0	
		Sandy Clay (CL), olive gray, wet, fine grained sand, trace gravel, (Fill).		48	0.0	
10	CL				90.2	
				5		
15		Bottom of borehole at 15 ft bg				
20						



CE2 KLEINFELDER

Borehole Log

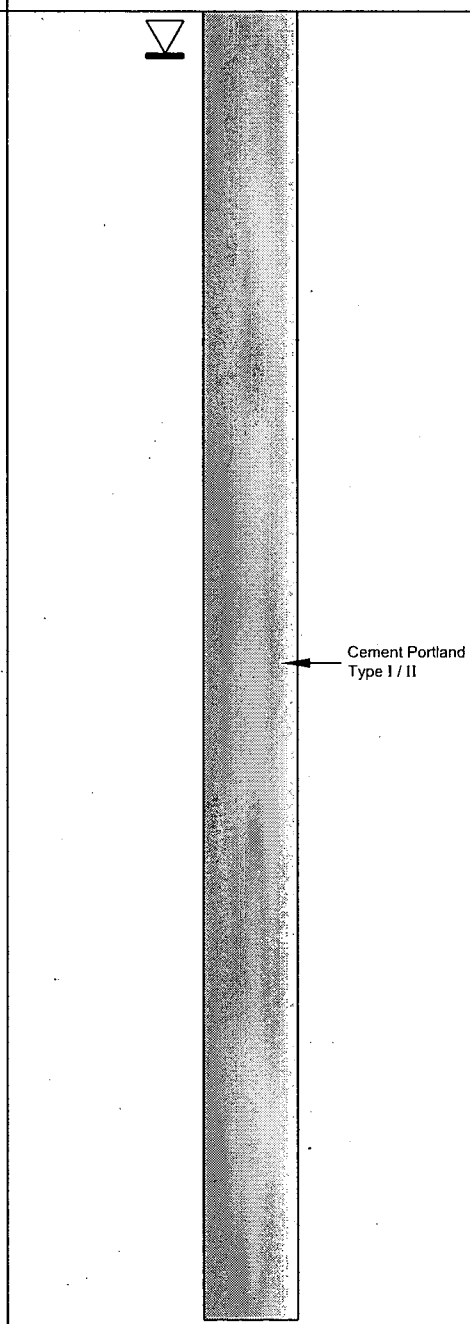
Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH031B

Page 1 of 1

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: Level, grassy	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 0.5 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SP		Poorly Graded Sand (SP)			0.0	
					70		
						0.1	
5	SC		Clayey Sand (SC), dark gray, wet.			0.1	
					60		
			With gravel			0.1	
10	CL		Inorganic Clay (CL), black, wet.			0.0	
					35		
						0.0	
15	CL		Inorganic Clay (CL), dark gray, wet.			0.0	
					80		
20			Bottom of borehole at 20 ft bg			0.0	



CE2 KLEINFELDER

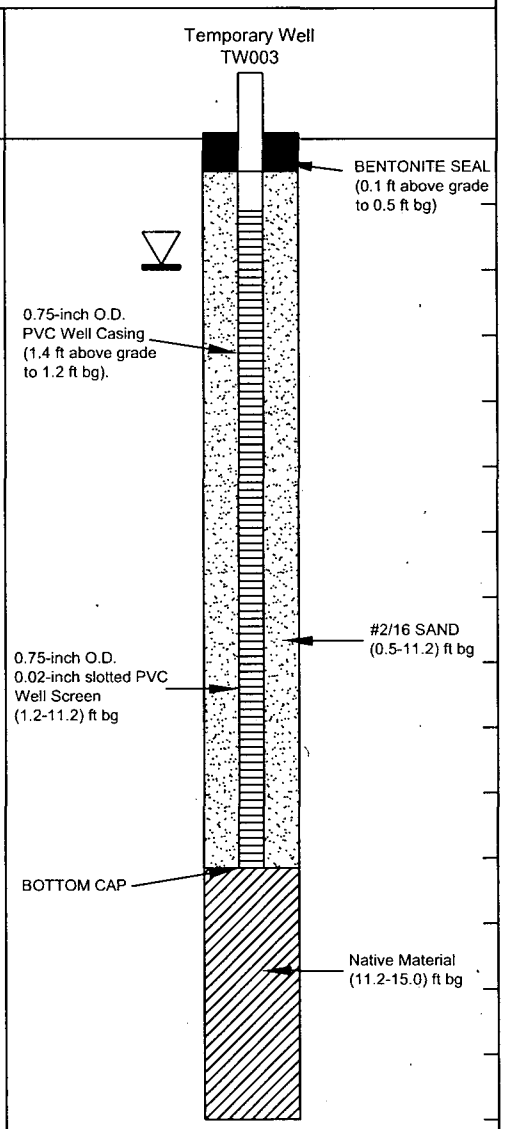
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH034 / TW003

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 2/14/08	Date Finished: 2/14/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: Relatively flat, grassy	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 15.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 2.0 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Northing 451331.07	Easting 1457404.00	Surface Elevation: 6.9 ft MSL	

Depth (feet)	USCS Soil Type	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	CL	Sandy Clay (CL), dark brown, moist, fine to medium-grained sand, trace gravel, (Fill).			0.0	
	SC	Clayey Sand (SC) with gravel, dark gray, moist, fine to medium-grained sand, (Fill).		70		
	CL	Inorganic Clay (CL), dark red-brown, moist, trace gravel, trace wood fragments, slight hydrocarbon odor, buff/tan cobble/boulder, (Fill).			0.0	
5	SC	Clayey Sand (SC) with gravel, gray, wet, fine to medium-grained sand, (Fill).			0.0	
	GW	Well-Graded Gravel (GW) with sand and clay, light gray dark gray, wet, fine to medium-grained sand, (Fill).		57	0.1	
	SC	Clayey Sand (SC) with gravel, dark gray, moist, fine-grained sand, (Fill).			0.8	
10	CL	Inorganic Clay, black, wet, moderately plastic, slight hydrocarbon odor, (Fill).		63		
15		Bottom of borehole at 15 ft bg				
20						



CE2 KLEINFELDER

Borehole Log

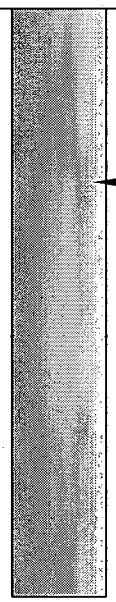
Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH034B

Page 1 of 1

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: hummocky, uneven, grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 9.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: Not Measured	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0						0.0	
					67		
	SC		Clayey Sand (SC), dark gray, wet, fine-medium grained sand, (Fill).			0.0	
5						0.0	
					93		
	SP		Poorly-Graded Sand (SP), dark brown, trace gravel, concrete fragments, (Fill).			0.6	
			Refusal at 9 ft bg				
10							
15							
20							



CE2 KLEINFELDER

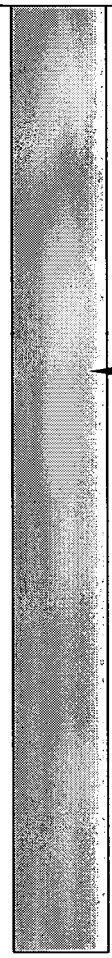
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH034C

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: hummocky, uneven, grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 14.5 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: Not Measured	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC		Clayey Sand (SC), dark brown, moist, brick fragments, (Fill).		65	0.1	
5	CL		Sandy Clay (CL) some gravel, dark gray, moist, (Fill).			0.1	
10	SP		Poorly Graded Sand (SP) with gravel, black, moist, (Fill).		88	0.5 0.1	
	SC		Sandy Clay (SC), dark gray, moist, concrete fragments, (Fill).			0.3	
15			Refusal at 14.5 ft bg				
20							



CE2 KLEINFELDER

Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH034D

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: fairly level, grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: Not Measured	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC		Clayey Sand (SC), brown, moist.			0.1	
					63		
5	CL		Inorganic Clay (CL), olive gray, moist, trace gravel.			0.1 0.1	
					52		
10	GW		Well Graded Gravel (GW), black, wet, hydrocarbon odor.			0.1 0.0	
					38		
15	CL		Inorganic Clay (CL), black, wet, hydrocarbon odor.			0.1	
					52		
20	CL		Inorganic Clay (CL), dark gray, wet.			0.1	
			Bottom of borehole at 20 ft bg				

CE2 KLEINFELDER

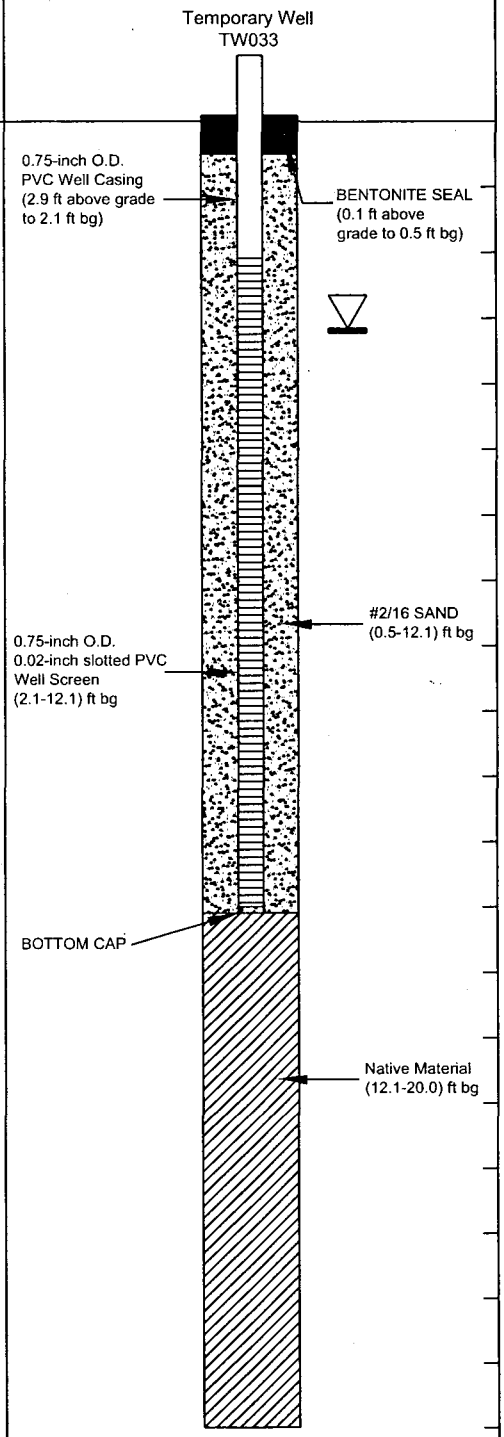
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH037 / TW033

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 2/21/08	Date Finished: 2/21/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: grassy, sloping to south	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: 3.3 ft bg	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Northing 451195.05	Easting 1457513.43	Surface Elevation: 7.9 ft. MSL	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC		Sandy Clay (SC) with gravel, red-brown, moist, fine-grained sand, (Fill).			0.0	
	CL		Inorganic Clay (CL), light brown, moist, trace gravel, (Fill).			0.0	
	GW		Sandy Gravel (GW), dark brown, moist, 70% angular to sub-angular gravel, 20% fine-grained sand, 10% plastic fines, (Fill).		47	0.0	
	SC		Clayey Sand (SC) with gravel, brown, wet, fine grained sand, sub-angular to sub-rounded gravel, (Fill).				
5			Sandy Clay (CL) with gravel, gray, wet, fine grained sand, angular to rounded gravel, (Fill).			0.0	
						0.0	
					20		
	CL						
10						0.0	
						0.0	
					10		
15			Inorganic Clay (CL), dark green, wet, hydrocarbon odor, (Fill).			0.0	
			Thick white, flakes/fragments			0.0	
	CL				42	0.0	
20			Bottom of borehole at 20 ft bg				



CE2 KLEINFELDER

Borehole Log

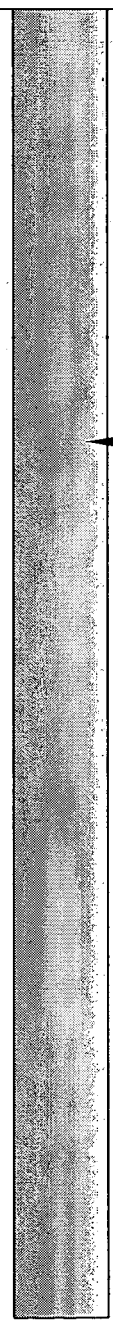
Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH037B

Page 1 of 1

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: hummocky, uneven, grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: Not Measured	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC		Clayey Sand (SC), dark brown, moist.		53	0.0	
			Trace gravel			0.1	
5					43	0.0	
10	GW		Gravel (GW) with fine sand, black, wet.		57	0.1	
						0.0	
15	CL		Inorganic Clay (CL), black, wet.		50	0.0	
						0.0	
20	CL		Inorganic Clay (CL), dark gray, wet, shell fragment.			0.0	
			Bottom of borehole at 20 ft bg				



CE2 KLEINFELDER

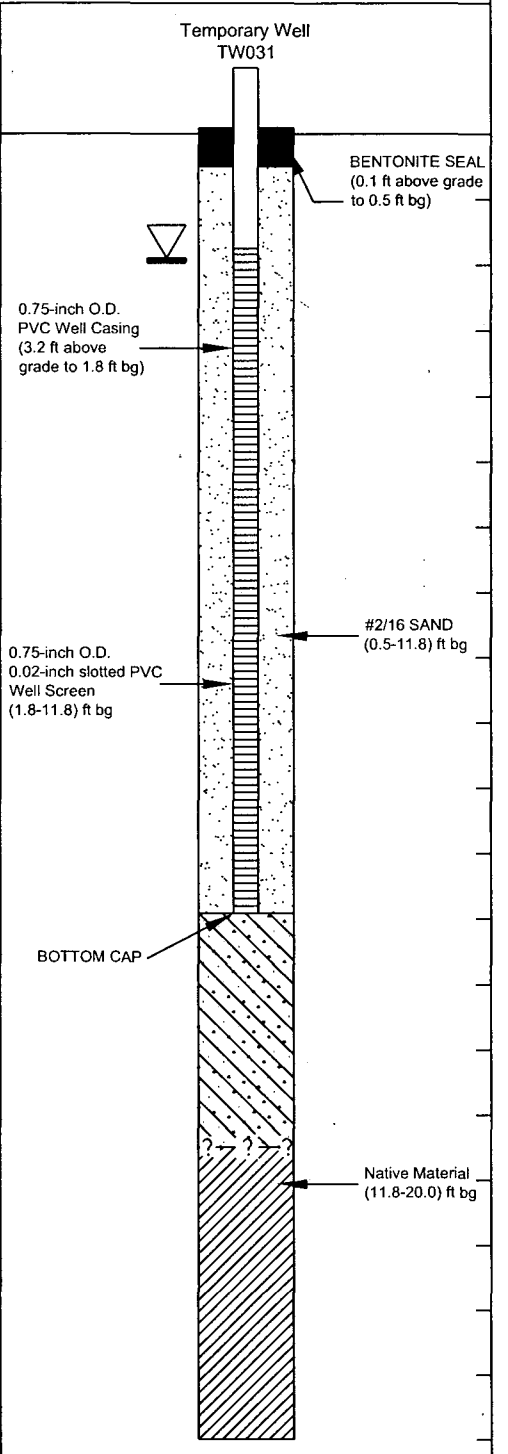
Borehole Log

Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH039 / TW031

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 2/21/08	Date Finished: 2/21/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: grassy, sloping to south	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: N/A	Drilling Fluid: None	Depth Water First Encountered: 2.2 ft.	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Northing 451103.49	Easting 1457570.29	Surface Elevation: 7.8 ft MSL	

Depth (feet)	USCS Soil Type	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	SC	Clayey Sand (SC), brown, moist, fine grained sand, trace gravel, (Fill).			0.0	
	GC	Clayey Gravel (GC), brown, moist/wet, (Fill).				
	SP	Gravelly Sand (SP) with clay, brown, moist, fine grained sand, (Fill).		72	0.0	
		Gravelly Sand (SP) some clay, olive-gray, moist, fine grained sand, (Fill).				
	GC	Clayey Gravel (GC) some sand, dark brown, moist, fine grained sand, angular to subangular gravel, (Fill).			0.0	
5		Clayey Sand (SC) with wood, black, wet, fine-grained sand, trace, subrounded gravel, slight hydrocarbon odor, (Fill).			0.0	
					0.0	
				20		
10	SC	Clayey Sand (SC) with wood, black, wet, fine to medium grained sand, trace gravel, visible sheen, hydrocarbon odor, (Fill).			0.0	
					3.7	
				20		
15					1.4	
					0.0	
	CL	Inorganic Clay (CL) with wood, dark grey, wet, (Fill).		20		
20		Bottom of borehole at 20 ft bg				



CE2 KLEINFELDER

Borehole Log

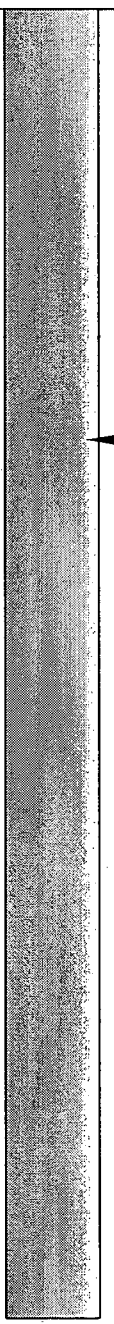
Project Name: Groundwater Investigation at Parcel E-2
Hunters Point Shipyard
San Francisco, California

Borehole / Well ID: BH039B

Page 1 of 1

Borehole Location: Hunters Point Shipyard - Parcel E-2		Date Started: 3/11/08	Date Finished: 3/11/08
Drilling Contractor: Vironex	Driller: Josh Ryken	Surface Condition: hummocky, uneven, grass covered	
Drilling Rig: Geoprobe 6600 DT	Borehole Diameter: 1.75 in.	Total Depth: 20.0 ft.	
Sampling Method: Acetate Sleeve	Drilling Fluid: None	Depth Water First Encountered: Not Measured	
Drilling Method: Direct Push	Logged By: Gabe Fuson, Kleinfelder		
Coordinates: Not Surveyed		Surface Elevation: Not Surveyed	

Depth (feet)	USCS Soil Type	Graphic Log	Description	Drive Interval	Recovery (%)	PID (PPMV)	Sample Collected for Lab Analysis
0	CL		Sandy Clay (CL), red-brown, moist.		62	0.0	
5	CL		Inorganic Clay (CL), black, moist, some gravel.		25	0.2 0.0	
10			Wood fragments, black		17	0.0 0.2	
15			Wood fragments, black, wet, sheen; strong hydrocarbon odor.		42	0.0 0.2	
20	CL		Inorganic Clay (CL), olive gray/dark gray, wet, shell fragments.			0.0	
			Bottom of borehole at 20 ft bg				



BORING NO.PZ-131F

COORDINATES: N. 450778.1
E. 1457961.8

FIELD GEOLOGIST W. Akiyama
CHECKED BY C. Carlton
APPROVED BY J. Baur
TOTAL DEPTH 8 ft.

DATE BEGAN 1/5/98
DATE FINISHED 1/5/98
SURFACE ELEV. 10.9 feet MSL
T.O.C. ELEV. 13.50 ft MSL

DEPTH IN FEET	SAMPLE NUMBER	BLOWS ON SAMPLER (in)	RECOVERY	PIEZOMETER CONSTRUCTION DETAILS	USCS	PROFILE	
0				Steel Stand up well cover; Concrete Apron			
				Steel Locking Cap	gm		SILTY GRAVEL: moist. 0.5'
			90%		sp		Poorly-graded SAND: yellowish brown, loose, fine sand, pieces of serpentine rock.
5				1.25" dia. 304SS Casing			
			50%	1.25" dia. 304SS 0.010" continuous slot Screen	gm		6.0' SILTY GRAVEL: dense, wet. Dry, hard, serpentine rock.
							TOTAL DEPTH 8.0 FEET
10							
15							
20							
25							
30							
35							

Revised by CE2-Kleinfelder JV, 5/28/2008

Survey performed by Espinosa Surveying
Easton,CA
4/3/2008

N. 450777.83
E. 1457961.77

Surf. Elev. 11.07 above MSL
TOC Elev. 13.37 above MSL
4/3/2008

SURVEY CONTROL DATUM
HORIZONTAL (BASIC OF BEARINGS)
CALIFORNIASTATE PLANE COORDINATED,
ZONE 3, NAD 27US FEET. HPGN POINTS
HUNTERS POINT EAST "HT0620" & HUNTERS
POINT WEST "HT0613"

VERTICAL (BENCH MARK)
PID NO. HT0620 HPGN BRASS CAP MONUMENT
(FIRST ORDER CLASS II VERTICAL ORDER)
ELEV.= 7.58' NGVD29 USFEET DATUM.

Added 0.2 ft to total depth and other construction details

DRILLER : R. Nessinger
DRILLING CO. : Gregg Drilling Co.
DRILLING METHOD : Geoprobe/ Direct Push
SAMPLING METHOD : 4 ft MACRO Core Sampler
PROJECT NAME: Site IR-1/21 D.O. 60
LOCATION : Hunters Point Shipyard
PROJECT NO. : 767497.02106000

PAGE 1 OF 1

DRAWN BY	T.R.S.	CHECKED BY	9.33.98	FILE NAME & DISK NUMBER	HPPZ131F (HP43)
DATE	9/23/98	APPROVED BY	DWB 11.9.98		

INTERNATIONAL TECHNOLOGY CORPORATION

BORING NO.PZ-138E

COORDINATES: N. 450828.1
E. 1457821.4

FIELD GEOLOGIST W. Akiyama — DATE BEGAN 1/26/98
CHECKED BY C. Carlton — DATE FINISHED 1/26/98
APPROVED BY J. Baur — SURFACE ELEV. 11.6 ft MSL
TOTAL DEPTH 13 ft. — T.O.C. ELEV. 14.39 ft MSL

DEPTH IN FEET	SAMPLE NUMBER	BLOWS ON SAMPLER (in)	RECOVERY	PIEZOMETER CONSTRUCTION DETAILS	USCS	PROFILE	
0				Steel Stand up well cover; Concrete Apron; Steel Locking Cap			CLAYEY GRAVEL; very moist, medium dense. (Auger first 2 feet)
			50%		gc		
5			50%	1.25" dia. 304SS Casing			6.0'
					sp		Poorly-graded SAND; loose, wet, coarse to medium sand. ▽ Groundwater encountered at 7.0'. Wood. 8.0'
10			90%	1.25" dia. 304SS 0.010" continuous slot Screen	sm		SILTY SAND; wet, loose, medium to fine sand. Obstruction at 12' (wood).
15							TOTAL DEPTH 13.0 FEET
20							
25							
30							
35							

Revised by CE2-Kleinfelder JV, 5/28/2008

Survey performed by Espinosa Surveying
Easton,CA
4/3/2008

N. 450827.56
E. 1457821.39

Surf. Elev. 12.01 above MSL
TOC Elev. 14.22 above MSL
4/3/2008

SURVEY CONTROL DATUM
HORIZONTAL (BASIC OF BEARINGS)
CALIFORNIASTATE PLANE COORDINATED, ZONE 3, NAD 27US FEET. HPGN POINTS HUNTERS POINT EAST "HT0620" & HUNTERS POINT WEST "HT0613"

VERTICAL (BENCH MARK)
PID NO. HT0620 HPGN BRASS CAP MONUMENT (FIRST ORDER CLASS II VERTICAL ORDER) ELEV.= 7.58' NGVD29 USFEET DATUM.

Added 0.4 ft to total depth and other construction details

DRILLER : R. Nessinger
DRILLING CO. : Gregg Drilling Co.
DRILLING METHOD : Geoprobe/ Direct Push
SAMPLING METHOD : 4 ft MACRO Core Sampler
PROJECT NAME: Site IR-1/21 D.O. 60
LOCATION : Hunters Point Shipyard
PROJECT NO. : 767497.02106000

PAGE 1 OF 1

DRAWN BY	T.R.S.	CHECKED BY	9.23.98	FILE NAME & DISK NUMBER	HPPZ138E (HP44)
DATE	9/23/98	APPROVED BY	11.4.98		

INTERNATIONAL TECHNOLOGY CORPORATION

BORING NO.PZ-138F

COORDINATES: N. 450889.0
E. 1457884.8

FIELD GEOLOGIST W. Akiyama — DATE BEGAN 1/26/98
CHECKED BY C. Carlton — DATE FINISHED 1/26/98
APPROVED BY J. Baur — SURFACE ELEV. 13.4 feet MSL
TOTAL DEPTH 16 ft. — T.O.C. ELEV. 15.76 ft MSL

DEPTH IN FEET	SAMPLE NUMBER	BLOWS ON SAMPLER (in)	RECOVERY	PIEZOMETER CONSTRUCTION DETAILS	USCS	PROFILE	
0				Steel Stand up well cover; Concrete Apron; Steel Locking Cap			CLAYEY GRAVEL; dark gray to dark brown, slightly moist clay, hard drilling. (Auger first 2 feet)
			50%		gc		
5			100%	1.25" dia. 304SS Casing			Wood. 8.0'
					cl		CLAY; dark brown, stiff. 10.0'
10			90%		sp		Poorly-graded SAND; dark gray, wet, medium sand, shell fragments. 14.0'
			100%	1.25" dia. 304SS 0.010" continuous slot Screen	ch		CLAY; plastic, wet, BAY MUD.
15							TOTAL DEPTH 16.0 FEET
20							
25							
30							
35							

Revised by CE2-Kleinfelder JV, 5/28/2008

Survey performed by Espinosa Surveying
Easton,CA
4/3/2008

N. 450888.27
E. 1457884.95

Surf. Elev. 16.99 above MSL
TOC Elev. 19.30 above MSL
4/3/2008

SURVEY CONTROL DATUM
HORIZONTAL (BASIC OF BEARINGS)
CALIFORNIASTATE PLANE COORDINATED, ZONE 3, NAD 27US FEET. HPGN POINTS HUNTERS POINT EAST "HT0620" & HUNTERS POINT WEST "HT0613"

VERTICAL (BENCH MARK)
PID NO. HT0620 HPGN BRASS CAP MONUMENT (FIRST ORDER CLASS II VERTICAL ORDER) ELEV.= 7.58' NGVD29 USFEET DATUM.

Added 3.6 ft to total depth and other construction details

DRILLER : R. Nessinger
DRILLING CO. : Gregg Drilling Co.
DRILLING METHOD : Geoprobe/ Direct Push
SAMPLING METHOD : 4 ft MACRO Core Sampler
PROJECT NAME: Site IR-1/21 D.O. 60
LOCATION : Hunters Point Shipyard
PROJECT NO. : 767497.02106000

PAGE 1 OF 1

DRAWN BY	T.R.S.	CHECKED BY	9.23.98	FILE NAME & DISK NUMBER	HPPZ138F (HP44)
DATE	9/23/98	APPROVED BY	DWB 11.4.98		

INTERNATIONAL TECHNOLOGY CORPORATION

BORING NO.PZ-144E

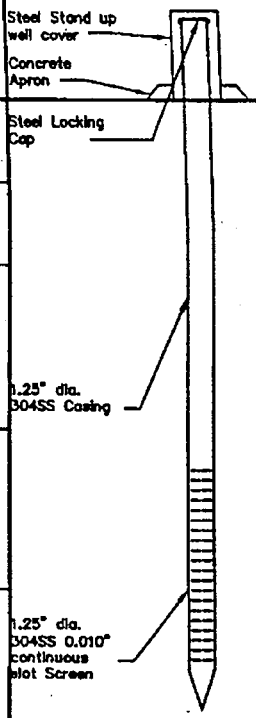
COORDINATES: N. 450864.1
E. 1457768.5

FIELD GEOLOGIST W. Akiyama
CHECKED BY C. Carlton
APPROVED BY J. Baur
TOTAL DEPTH 16 ft.

DATE BEGAN 1/26/98
DATE FINISHED 1/26/98
SURFACE ELEV. 12.4 ft MSL
T.O.C. ELEV. 15.08 ft MSL

DEPTH IN FEET	SAMPLE NUMBER	BLOWS ON SAMPLER (in)	RECOVERY	USCS	PROFILE	DESCRIPTION
0			50%	cl		CLAY; very dark gray, moist, firm, concrete. (4.0')
5			50%	sc		CLAYEY SAND; dense, wood (1.5" thick).
10			25%			At 10': Wood.
			0%			(14.0')
15				ch		CLAY; gray, soft, wet, BAY MUD.
						TOTAL DEPTH 16.0 FEET
20						
25						
30						
35						

PIEZOMETER CONSTRUCTION DETAILS



Revised by CE2-Kleinfelder JV, 5/28/2008

Survey performed by Espinosa Surveying
Easton,CA
4/3/2008

N. 450863.48
E. 1457768.64

Surf. Elev. 12.59 above MSL
TOC Elev. 14.91 above MSL
4/3/2008

SURVEY CONTROL DATUM
HORIZONTAL (BASIC OF BEARINGS)
CALIFORNIASTATE PLANE COORDINATED, ZONE 3, NAD 27US FEET. HPGN POINTS HUNTERS POINT EAST "HT0620" & HUNTERS POINT WEST "HT0613"

VERTICAL (BENCH MARK)
PID NO. HT0620 HPGN BRASS CAP MONUMENT (FIRST ORDER CLASS II VERTICAL ORDER) ELEV.= 7.58' NGVD29 USFEET DATUM.

Added 0.2 ft to total depth and other construction details

DRILLER : R. Nessinger
DRILLING CO. : Gregg Drilling Co.
DRILLING METHOD : Geoprobe/ Direct Push
SAMPLING METHOD : 4 ft MACRO Core Sampler
PROJECT NAME: Site IR-1/21 D.O. 60
LOCATION : Hunters Point Shipyard
PROJECT NO. : 767497.02106000

PAGE 1 OF 1

DRAWN BY	T.R.S.	CHECKED BY	10-12-98	FILE NAME & DISK NUMBER	HPPZ144E (HP44)
DATE	9/28/98	APPROVED BY	11-4-98		

INTERNATIONAL TECHNOLOGY CORPORATION

BORING NO.PZ-150D

COORDINATES: N. 450890.5
E. 1457707.3

FIELD GEOLOGIST W. Akiyama
CHECKED BY C. Carlton
APPROVED BY J. Baur
TOTAL DEPTH 17 ft.

DATE BEGAN 1/26/98
DATE FINISHED 1/26/98
SURFACE ELEV. 11.5 feet MSL
T.O.C. ELEV. 15.15 ft MSL

DEPTH IN FEET	SAMPLE NUMBER	BLOWS ON SAMPLER (in)	RECOVERY	PIEZOMETER CONSTRUCTION DETAILS	USCS	PROFILE	
0				Steel Stand up well cover; Concrete Apron; Steel Locking Cap; Formation Sand	sm		SILTY SAND; light brown. 3.0'
5			1%	Bareid Holeplug 3/8" Bentonite chips; 1.25" dia. 304SS Casing; #3 Lonestar Sand; Formation Sand	sp		Poorly-graded SAND; black. At 4': Wood pieces. At 7': Wire, diamond shaped metal grating. At 9': Light brown, 50% wood pieces. 14.0'
10			25%				
15			50%	1.25" dia. 304SS 0.010" continuous slot Screen	sw		Well-graded SAND; black, coarse to fine sand, 25% wood pieces, black water.
20							TOTAL DEPTH 17.0 FEET
25							
30							
35							

Revised by CE2-Kleinfelder JV, 5/28/2008

Survey performed by Espinosa Surveying
Easton,CA
4/3/2008

N. 450889.70
E. 1457707.58

Surf. Elev. 12.02 above MSL
TOC Elev. 14.82 above MSL
4/3/2008

SURVEY CONTROL DATUM
HORIZONTAL (BASIC OF BEARINGS)
CALIFORNIASTATE PLANE COORDINATED, ZONE 3,
NAD 27US FEET. HPGN POINTS HUNTERS POINT EAST
"HT0620" & HUNTERS POINT WEST "HT0613"

VERTICAL (BENCH MARK)
PID NO. HT0620 HPGN BRASS CAP MONUMENT (FIRST ORDER CLASS II VERTICAL ORDER) ELEV.= 7.58'
NGVD29 USFEET DATUM.

Added 0.5 ft to total depth and other construction details

PAGE 1 OF 1

DRILLER : R. Nessinger
DRILLING CO. : Gregg Drilling Co.
DRILLING METHOD : 6.25" O.D. Hollow-stem Auger
SAMPLING METHOD : California Modified Split-spoon Sampler
PROJECT NAME: Site IR-1/21 D.O. 60
LOCATION : Hunters Point Shipyard
PROJECT NO. : 767497.02106000

DRAWN BY	T.R.S.	CHECKED BY	TTK 10-12-98	FILE NAME & DISK NUMBER	HPPZ150D(HP45)
DATE	9/28/98	APPROVED BY	DWB 11-4-98		

INTERNATIONAL TECHNOLOGY CORPORATION

BORING NO.PZ-150E

COORDINATES: N. 450908.1
E. 1457724.6

FIELD GEOLOGIST W. Akiyama
CHECKED BY C. Carlton
APPROVED BY J. Baur
TOTAL DEPTH 12 ft.

DATE BEGAN 1/29/98
DATE FINISHED 1/29/98
SURFACE ELEV. 12.0 feet MSL
T.O.C. ELEV. 15.30 feet MSL

DEPTH IN FEET	SAMPLE NUMBER	BLOWS ON SAMPLER (in)	RECOVERY	PIEZOMETER CONSTRUCTION DETAILS	USCS	PROFILE	
0				Steel Stand up well cover; Concrete Apron; Steel Locking Cap; Formation Sand; Baroid Holeplug 3/8" Bentonite chips	ml		SANDY SILT; dark gray. 4.0'
5			50%	#3 Lonestar Sand; 1.25" dia. 304SS Casing; Formation Sand	sm		SILTY SAND; dark brown, medium dense, wood pieces. ▼ Groundwater encountered at 6.5'.
10			0%	1.25" dia. 304SS 0.010" continuous slot Screen			
15							TOTAL DEPTH 12.0 FEET
20							
25							
30							
35							

Revised by CE2-Kleinfelder JV, 5/28/2008

Survey performed by Espinosa Surveying
Easton,CA
4/3/2008

N. 450907.56
E. 1457724.79

Surf. Elev. 12.34 above MSL
TOC Elev. 14.82 above MSL
4/3/2008

SURVEY CONTROL DATUM
HORIZONTAL (BASIC OF BEARINGS)
CALIFORNIASTATE PLANE COORDINATED, ZONE 3, NAD 27US FEET. HPGN POINTS HUNTERS POINT EAST "HT0620" & HUNTERS POINT WEST "HT0613"

VERTICAL (BENCH MARK)
PID NO. HT0620 HPGN BRASS CAP MONUMENT (FIRST ORDER CLASS II VERTICAL ORDER) ELEV.= 7.58' NGVD29 USFEET DATUM.

Added 0.3 ft to total depth and other construction details

DRILLER : R. Nessinger
DRILLING CO. : Gregg Drilling Co.
DRILLING METHOD : 6.25" O.D. Hollow-stem Auger
SAMPLING METHOD : California Modified Split-Spoon Sampler.
PROJECT NAME: Site IR-1/21 D.O. 60
LOCATION : Hunters Point Shipyard
PROJECT NO. : 767497.02106000

PAGE 1 OF 1

DRAWN BY	T.R.S.	CHECKED BY	[illegible] 10.12.98	FILE NAME & DISK NUMBER	HPPZ150E(HP45)
DATE	9/28/98	APPROVED BY	DWB 11.4.98		

INTERNATIONAL TECHNOLOGY CORPORATION

BORING NO.PZ-161D

COORDINATES: N. 450959.5 E.1457682.2

FIELD GEOLOGIST W. Akiyama
CHECKED BY C. Carlton
APPROVED BY J. Baur
TOTAL DEPTH 17 ft.

DATE BEGAN 1/29/98
DATE FINISHED 1/29/98
SURFACE ELEV. 12.0 feet MSL
T.O.C. ELEV. 13.28 ft MSL

DEPTH IN FEET	SAMPLE NUMBER	BLOWS ON SAMPLER (in)	RECOVERY	PIEZOMETER CONSTRUCTION DETAILS	USCS	PROFILE	
0				Steel Stand up well cover; Concrete Apron; Steel Locking Cap; Formation Sand	cl		CLAY; brown, slightly moist. Sandy gravelly clay, wood pieces. 4.0'
5			25%	1.25" dia. 304SS Casing; Bored Hole plug. 3/8" Bentonite chips	sc		CLAYEY SAND; very moist, medium dense, wood pieces. ▽ Groundwater encountered at 5.0' 9.0'
10			75%	Formation Sand	sp		Poorly-graded SAND, dark brown, fine sand. 14.0'
15			25%	1.25" dia. 304SS 0.010" continuous slot Screen	sw		Well-graded SAND, black, fine to coarse sand.
20							TOTAL DEPTH 17.0 FEET
25							
30							
35							

Revised by CE2-Kleinfelder JV, 5/28/2008

Survey performed by Espinosa Surveying
Easton,CA
4/3/2008

N. 450958.99
E. 1457768.64

Surf. Elev. 12.10 above MSL
TOC Elev. 14.66 above MSL
4/3/2008

SURVEY CONTROL DATUM
HORIZONTAL (BASIC OF BEARINGS)
CALIFORNIASTATE PLANE COORDINATED, ZONE 3, NAD 27US FEET. HPGN POINTS HUNTERS POINT EAST "HT0620" & HUNTERS POINT WEST "HT0613"

VERTICAL (BENCH MARK)
PID NO. HT0620 HPGN BRASS CAP MONUMENT (FIRST ORDER CLASS II VERTICAL ORDER) ELEV.= 7.58' NGVD29 USFEET DATUM.

Added 0.1 ft to total depth and other construction details

DRILLER : Gregg Drilling Co.
DRILLING CO. : Gregg Drilling Co.
DRILLING METHOD : 6.25" O.D. Hollow-stem Auger
SAMPLING METHOD : California Modified Split-spoon Sampler.
PROJECT NAME: Site IR-1/21 D.O. 60
LOCATION : Hunters Point Shipyard
PROJECT NO. : 767497.02106000

PAGE 1 OF 1

DRAWN BY	T.R.S.	CHECKED BY	TLR 9-23-98	FILE NAME & DISK NUMBER	HPPZ161D(HP38)
DATE	9/23/98	APPROVED BY	DJB 11-4-98		

INTERNATIONAL TECHNOLOGY CORPORATION

Appendix E.
Well location survey report

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ESPINOSA SURVEYING

5654 South Elm Ave.
Easton, CA 93706

Tel. 559.442.0883
Fax 559.442.0884

www.espls.com

HUNTERS POINT SHIPYARD

Survey Notes-Parcel E-2 Monitor Well Survey

1. All coordinates are CCS NAD 27, in US Survey feet.

2. All elevations are NGVD 29, in US Survey feet.

3. The horizontal datum is based on the California State Plane Coordinate System, Zone III, North American Datum, 1927 (NAD 27). Found bronze disk in concrete and in monument well, PID Number HT 0620 (Hunter East) and HT 0613 (Hunter West 1) as per National Geodetic Survey Data Sheet, see Coordinate Table 'A'.

4. The vertical datum is based on National Geodetic Vertical Datum 1929 (NGVD 29), found bronze disk in concrete and in monument well, PID Number HT 0620 (elevation = 7.58 US ft, NGVD 29) as per National Geodetic Survey Data Sheet, see Coordinate Table 'A'.

5. The field survey was performed on April 3, 2008.

6. The field survey was performed using
   - Trimble S6 Robotic Total Station
   - Trimble 5800 GPS RTK.
   - Topcon Digital Level DL102.

COORDINATE TABLE 'A'

PID #	NORTHING (LAT) NAD27	EASTING (LONG) NAD27	ELEV. (NGVD29)
HT0613 (ESP #5000)	452606.451' N37°43'42.17100"	1,461,800.750' W122°21'39.78600"	
HT0620 (ESP #5001)	452,846.995' N37°43'44.71900"	1,462,667.060' W122°21'29.06400"	7.58' US FT

Prepared by me or under my direct supervision on May 8, 2008.

PROFESSIONAL LAND SURVEYOR
MAURO R. WEYANT
NO. 7773
EXP. 12/31/09
STATE OF CALIFORNIA

5/9/08

Mauro R. Weyant, P.L.S.
R:\LP\08051MX HUNTERS MW AREA E-2\Hps_MonWell_Parcel E-2.doc

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Hunters Point Shipyard

Parcel E-2

Monitoring Well Survey

San Francisco, CA

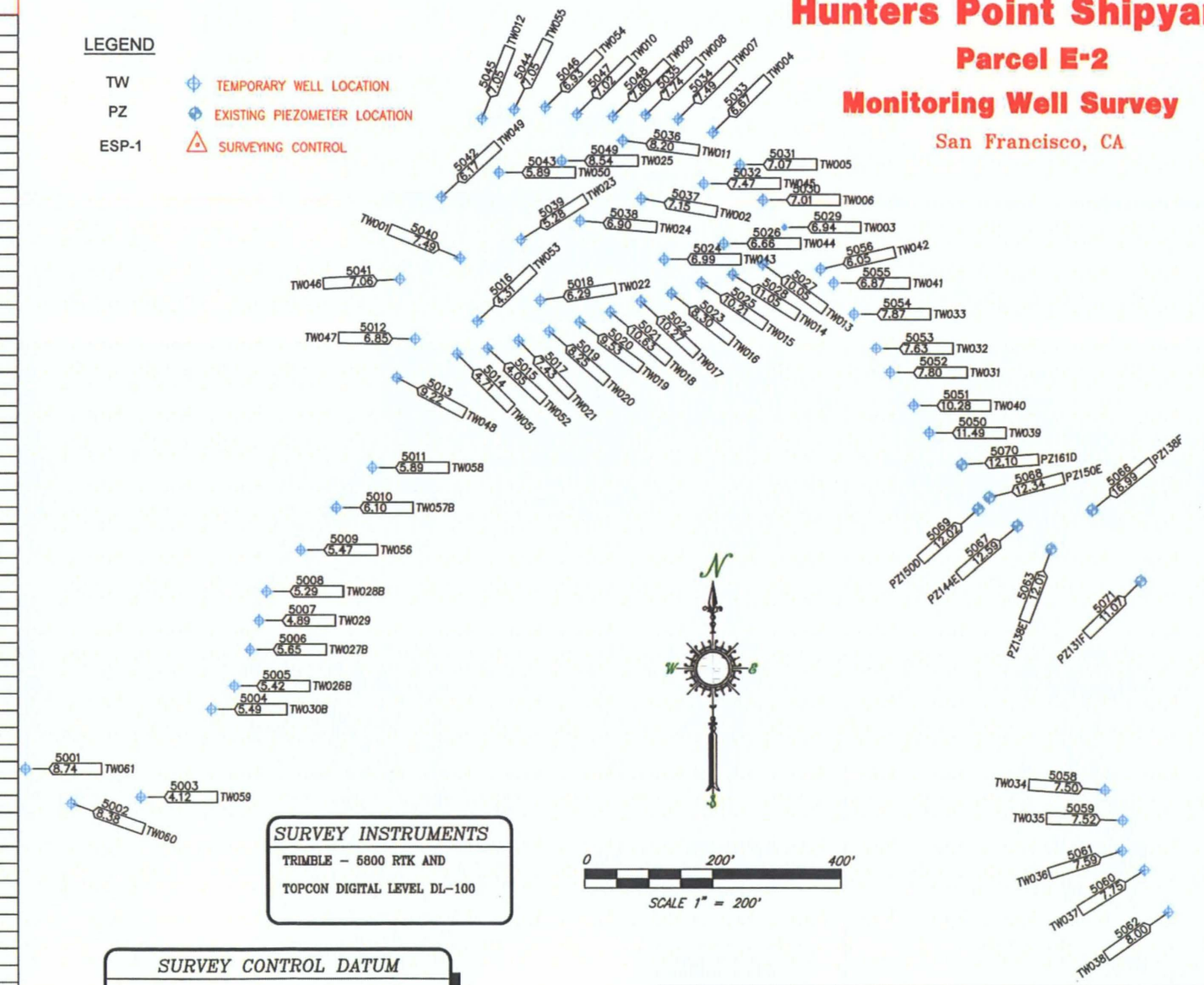
ESP No.	Northing	Easting	Elevation TOP OF CASING	Elevation GROUND SURFACE	Latitude	Longitude	Description
5001	450484.22	1456213.91		8.74	37°43'20.08822"N	122°22'48.78465"W	TW061
5002	450430.51	1456285.56		8.38	37°43'19.57152"N	122°22'47.87951"W	TW060
5003	450440.59	1456395.21		4.12	37°43'19.69295"N	122°22'46.51752"W	TW059
5004	450576.90	1456505.97		5.49	37°43'21.06239"N	122°22'45.17333"W	TW030B
5005	450613.31	1456542.57		5.42	37°43'21.42959"N	122°22'44.72694"W	TW026B
5006	450669.99	1456568.46		5.65	37°43'21.99500"N	122°22'44.41893"W	TW027B
5007	450715.33	1456582.87		4.89	37°43'22.44603"N	122°22'44.25088"W	TW029
5008	450760.88	1456594.85		5.29	37°43'22.89875"N	122°22'44.11325"W	TW028B
5009	450825.06	1456648.38		5.47	37°43'23.54373"N	122°22'43.46307"W	TW056
5010	450891.07	1456704.15		6.10	37°43'24.20733"N	122°22'42.78560"W	TW057B
5011	450953.83	1456760.00		5.89	37°43'24.83888"N	122°22'42.10627"W	TW058
5012	451155.69	1456827.19		6.85	37°43'26.84755"N	122°22'41.32058"W	TW047
5013	451094.86	1456798.53		9.22	37°43'26.24060"N	122°22'41.66206"W	TW048
5014	451132.09	1456892.35		4.71	37°43'26.62723"N	122°22'40.50372"W	TW051
5015	451141.06	1456940.29		4.06	37°43'26.72537"N	122°22'39.90937"W	TW052
5016	451183.75	1456924.21		4.31	37°43'27.14424"N	122°22'40.12015"W	TW053
5017	451153.38	1456988.84		7.43	37°43'26.85680"N	122°22'39.30838"W	TW021
5018	451216.38	1457022.68		6.29	37°43'27.48625"N	122°22'38.90287"W	TW022
5019	451168.13	1457036.77		8.25	37°43'27.01212"N	122°22'38.71555"W	TW020
5020	451182.47	1457084.57		9.53	37°43'27.16334"N	122°22'38.12430"W	TW019
5021	451198.25	1457132.65		10.63	37°43'27.32890"N	122°22'37.52984"W	TW018
5022	451214.87	1457179.90		10.27	37°43'27.50253"N	122°22'36.94602"W	TW017
5023	451227.35	1457227.75		8.30	37°43'27.63539"N	122°22'36.35364"W	TW016
5024	451280.86	1457216.22		6.99	37°43'28.16209"N	122°22'36.51052"W	TW043
5025	451244.31	1457274.70		10.21	37°43'27.81239"N	122°22'35.77367"W	TW015
5026	451305.71	1457309.23		6.66	37°43'28.42615"N	122°22'35.35919"W	TW044
5027	451273.66	1457370.40		10.05	37°43'28.12140"N	122°22'34.59007"W	TW013
5028	451257.01	1457323.40		11.05	37°43'27.94750"N	122°22'35.17071"W	TW014
5029	451331.07	1457404.00		6.94	37°43'28.69562"N	122°22'34.18624"W	TW003
5030	451373.84	1457370.63		7.01	37°43'29.11182"N	122°22'34.61220"W	TW006
5031	451429.55	1457334.73		7.07	37°43'29.65539"N	122°22'35.07282"W	TW005
5032	451399.67	1457278.01		7.47	37°43'29.34875"N	122°22'35.77125"W	TW045
5033	451480.35	1457292.24		6.67	37°43'30.14911"N	122°22'35.61426"W	TW004
5034	451501.35	1457237.99		7.49	37°43'30.34591"N	122°22'36.29465"W	TW007
5035	451507.48	1457186.85		7.74	37°43'30.39635"N	122°22'36.93255"W	TW008
5036	451467.47	1457151.63		8.20	37°43'29.99395"N	122°22'37.36087"W	TW011
5037	451376.11	1457180.28		7.15	37°43'29.09653"N	122°22'36.98156"W	TW002
5038	451341.31	1457085.00		6.90	37°43'28.73357"N	122°22'38.15861"W	TW024
5039	451311.99	1456992.42		5.28	37°43'28.42543"N	122°22'39.30343"W	TW023
5040	451282.78	1456897.49		7.49	37°43'28.11780"N	122°22'40.47747"W	TW001
5041	451249.37	1456803.32		7.06	37°43'27.76884"N	122°22'41.64097"W	TW046
5042	451378.67	1456867.85		6.17	37°43'29.05985"N	122°22'40.87024"W	TW049
5043	451417.32	1456957.79		5.90	37°43'29.45974"N	122°22'39.76064"W	TW050
5044	451516.51	1456981.57		7.05	37°43'30.44497"N	122°22'39.48946"W	TW055
5045	451502.34	1456931.26		7.05	37°43'30.29486"N	122°22'40.11202"W	TW012
5046	451519.75	1457030.31		6.93	37°43'30.48663"N	122°22'38.88376"W	TW054
5047	451509.21	1457079.90		7.02	37°43'30.39234"N	122°22'38.26397"W	TW010
5048	451505.13	1457136.09		7.80	37°43'30.36315"N	122°22'37.56364"W	TW009
5049	451435.61	1457055.84		8.54	37°43'29.66000"N	122°22'38.54504"W	TW025
5050	451008.80	1457631.14		11.49	37°43'25.55494"N	122°22'31.27919"W	TW039
5051	451051.47	1457607.03		10.28	37°43'25.97197"N	122°22'31.58982"W	TW040
5052	451103.49	1457570.29		7.80	37°43'26.47889"N	122°22'32.06005"W	TW031
5053	451141.02	1457548.32		7.63	37°43'26.84556"N	122°22'32.34285"W	TW032
5054	451195.05	1457513.43		7.87	37°43'27.37275"N	122°22'32.79041"W	TW033
5055	451243.66	1457481.01		6.87	37°43'27.84680"N	122°22'33.20603"W	TW041
5056	451265.48	1457460.42		6.05	37°43'28.05840"N	122°22'33.46775"W	TW042
5058	450451.97	1457905.69		7.50	37°43'20.10500"N	122°22'27.72378"W	TW034
5059	450404.84	1457933.37		7.52	37°43'19.64458"N	122°22'27.36760"W	TW035
5060	450327.83	1457967.80		7.75	37°43'18.89013"N	122°22'26.91983"W	TW037
5061	450357.66	1457932.62		7.59	37°43'19.17808"N	122°22'27.36509"W	TW036
5062	450262.47	1458005.16		8.00	37°43'18.25147"N	122°22'26.43867"W	TW038
5063	450627.56	1457821.39	14.22	12.01	37°43'23.80105"N	122°22'28.86637"W	PZ138E
5066	450888.27	1457884.95	19.30	16.99	37°43'24.41378"N	122°22'28.09054"W	PZ138F
5067	450863.48	1457768.64	14.91	12.59	37°43'24.14562"N	122°22'29.53182"W	PZ144E
5068	450907.56	1457724.79	14.91	12.34	37°43'24.57267"N	122°22'30.08852"W	PZ150E
5069	450889.70	1457707.58	14.82	12.02	37°43'24.39272"N	122°22'30.29820"W	PZ150D
5070	450958.99	1457681.86	14.66	12.10	37°43'25.07266"N	122°22'30.63553"W	PZ161D
5071	450777.83	1457961.77	13.37	11.07	37°43'23.33723"N	122°22'27.10712"W	PZ131F

LEGEND

TW — TEMPORARY WELL LOCATION

PZ — EXISTING PIEZOMETER LOCATION

ESP-1 — SURVEYING CONTROL



SURVEY INSTRUMENTS

TRIMBLE – 5800 RTK AND

TOPCON DIGITAL LEVEL DL-100

SURVEY CONTROL DATUM

HORIZONTAL (BASIS OF BEARINGS):
CALIFORNIA STATE PLANE COORDINATES, ZONE 3, NAD 27 US FEET. HPGN POINTS HUNTERS POINT EAST "HT0620" & HUNTERS POINT WEST "HT0613"

VERTICAL (BENCH MARK):
PID NO. HT0620 HPGN BRASS CAP MONUMENT (FIRST ORDER CLASS II VERTICAL ORDER) ELEV. = 7.58' NGVD29 US FEET DATUM.

ESPINOSA SURVEYING

5654 S. Elm Ave.
Easton, CA 93706

Tel. 559.442.0883
Fax 559.442.0884

EMAIL
info@espls.com

DATE OF SURVEY	04/03/08
ESP JOB Path	R:\LP\08051MX
DRAWN BY	N.Sahota
REVISION DATE	05/09/08
DRAWING NAME	MW-Area_E2.dwg

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Appendix F.
Chain-of-custody forms

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APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 26693

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)
E-2189762	Patricia Walters
Purchase Order Number	**Sampler (Signature)**
89762	Patricia Walters

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)	TPH-e (EPA 8015B)	PCBs (EPA 8082)	NH3-N (EPA 350.1)	Diss. Metals (EPA 6010B/7470A)
0810G001	Trip Blank	3/4/08	1330	L	3	X				
0810G002	TW046		1346		7	X	X	X	X	X
0810G003	TW047		1430		7	X	X	X	X	X
0810G004	TW048		1445		7	X	X	X	X	X
0810G005	TW051		1517		7	X	X	X	X	X

PW 3/4/08

PW 3/4/08

PW 3/4/08

Date Shipped:
Carrier:
Waybill No.:
Comments: please filter & acidify metal samples

VOAs unprescribed (7day HT)

Shuttle Temperature:

Turnaround Requested: MUST CHECK ONE ☆10 TAT☆
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/4/08	1553					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					03/05/08	0810	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

CHAIN OF CUSTODY RECORD

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

C.O.C. № 26716

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Purchase Order Number	Sampler (Signature)
E-2/89762	Patricia Walters	89762	Patricia Walters

Analysis Requested/Method Number: TPH-g (EPA 8015B); NH_3-N (EPA 350.1); Diss. Metals (EPA 6010B/7470A)

Date Shipped:
Carrier:
Waybill No.:
Comments: please filter & acidify metal samples

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)	NH_3-N (EPA 350.1)	Diss. Metals (EPA 6010B/7470A)								Comments
0810G006	Trip Blank	3/5/08	1145	L	3	X										
0810G007	TW052		1224		5	X	X	X								VOAs unpreserved (short hold time)
0810G008	TW053		1255		15	X	X	X								MS/MSD
0810G009	TW021		1343		5	X	X	X								
0810G010	TW021		1348		5	X	X	X								
0810G011	TW001		1415		5	X	X	X								VOAs unpreserved (short hold time)
0810G012	TW049		1446		3	X										
0810G013	TW049		1450		3	X										
0810G014	TW012		1516		3	X										VOAs unpreserved

PW 3/5/08

PW 3/5/08

Shuttle Temperature: 2.0°C

Turnaround Requested: MUST CHECK ONE *10 Day TAT*
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/5/08	1559					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-6-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY . ORD

C.O.C. № 26717

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name Kleinfelder/CE2	Phone: 415-822-2253	Company Name Kleinfelder/CE2	Phone:
Address	Fax:	Address	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-e (EPA 8015B)	PCBs (EPA 8082)									Comments
0810G007	TW052	3/5/08	1224	L	2	X	X									~~*please filter & acidify Metals Samples*~~ PW 3/5/08
0810G008	TW053	↓	1255	↓	6	X	X									MS/MSD
0810G009	TW021	↓	1343	↓	2	X	X									
0810G010	TW021	↓	1348	↓	2	X	X									
~~0810G011~~	~~TW001~~	~~3/5/08~~	~~1415~~	PW	3/5/08											

TW 3/5/08

PW 3/5/08

TW 3/5/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE *10 day TAT*	Sample Disposal:
2.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/5/08	1605					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-6-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

CHAIN OF CUSTODY RECORD

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

C.O.C. № 26718

Report to: (PLEASE PRINT)		Invoice to: (PLEASE PRINT)	
Company Name: Kleinfelder/CA2	Phone: 415-822-2253	Company Name: Kleinfelder/CA2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2189762	Patricia Walters	Carrier:
Purchase Order Number: 89762	Sampler (Signature): Patricia Walters	Waybill No.:
		Comments: please filter & acidify metals samples

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-G (EPA 8015B)	PCBs (EPA 8082)	Diss Metals (EPA 6010B/7470A)	NH_3-N (EPA 350.1)	
0810G011	TW001	3/5/08	1415	L	2	X	X			
0810G012	TW049	↓	1446	↓	4	X	X	X	X	
0810G013	TW049	↓	1450	↓	4	X	X	X	X	
0810G014	TW012	↓	1516	↓	4	X	X	X	X	

PW 3/5/08

PW 3/5/08

PW 3/5/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE ★ 10 day TAT ★	Sample Disposal:
2.5°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/5/08	1609					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-6-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
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Fresno, CA 93722

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CHAIN OF CUSTODY RECORD

C.O.C. № 26726

Report to: (PLEASE PRINT)		Invoice to: (PLEASE PRINT)	
Company Name: Kleinfelder/CE2	Phone: 415-822-2253	Company Name: Kleinfelder/CE2	Phone: 415-822-2253
Address:	Fax: 415-822-1329	Address:	Fax: 415-822-1329
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2, 89762/3	Patricia Walters		Carrier:
Purchase Order Number: 89762	Sampler (Signature): Patricia Walters		Waybill No.:
			Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	PCBs (EPA 8082)	TPH-c (EPA 8015B)
0810P006	TW010	3/6/08	1347	L	2	X	X
0810W005	TW017	3/6/08	1358	L	2	X	X
0810P007	TW009	↓	1422	↓	2	X	X
0810W006	TW016	↓	1428	↓	2	X	X
0810W007	TW043	↓	1456	↓	2	X	X

PW 3/6/08

PW 3/6/08

PW 3/6/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE *10 day TAT*	Sample Disposal:
2.0°C	☒ Standard (2-3 week) PW 3/6/08 ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/6/08	1600					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-7-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Phone: (559) 275 2175

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CHAIN OF CUSTODY RECORD

C.O.C. № 26731

PLEASE PRINT

Report to:
Company Name: Kleinfelder/CE2 Phone: 415-822-2253
Address:
Fax: 415-822-1329
Attn:

PLEASE PRINT

Invoice to:
Company Name: Kleinfelder/CE2 Phone: 415-822-2253
Address:
Fax: 415-822-1329
Attn:

Project Name/Number: E2, 89762/3
Purchase Order Number: 89762
Sampler (Print): Gabriel Fuson
Sampler (Signature): Gabriel Fuson

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	PCBs (EPA 8082)	TPH-e (EPA 8015B)										Date Shipped:
0810P002	TW023	3/6/08	1045	L	2	X	X										Carrier:
0810W002	TW020	3/6/08	1156	L	2	X	X										Waybill No.:
0810G016	~~TW020~~ TW022	3/6/08	1042	L	6	X	X										Comments:

Gabriel Fuson 03/06/08

Sample ID: TW022 MS/MSD

Shuttle Temperature: 2.0°C

Turnaround Requested: MUST CHECK ONE ☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour ☐ 10 day TAT

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Gabriel Fuson	03/06/08	1600					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-7-08	0800	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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CHAIN OF CUSTODY RECORD

C.O.C. № 26730

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Report to:
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Address:
Fax: 415-822-1329
Attn:

PLEASE PRINT

Invoice to:
Company Name: Kleinfelder/CE2 Phone: 415-822-2253
Address:
Fax: 415-822-1329
Attn:

Project Name/Number: E-289762/3
Purchase Order Number: 89762
Sampler (Print): Pamela Walters
Sampler (Signature): Pamela Walters

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	PCB's (EPA 8082)	TPH-c (EPA 8015B)										Date Shipped:
0810P003	TW055	3/6/08	1133	L	2	X	X										Carrier:
0810P004	TW054	3/6/08	1220	L	2	X	X										Waybill No.:
0810P005	TW025	3/6/08	1301	L	2	X	X										Comments:
0810W003	TW019	3/6/08	1242	L	2	X	X										
0810W004	TW018		1317	L	2	X	X										

PW 3/6/08

PW 3/6/08

PW 3/6/08

Shuttle Temperature:

Turnaround Requested: MUST CHECK ONE ☆10 day TAT☆
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Pamela Walters	3/6/08	1604					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3/7/08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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CHAIN OF CUSTODY RECORD

pg 1 of 2

C.O.C. № 26732

Report to: (PLEASE PRINT)		Invoice to: (PLEASE PRINT)	
Company Name: Kleinfelder/CEC	Phone: 415-822-2253	Company Name: Kleinfelder/CEC	Phone: 415-822-2253
Address:	Fax: 415-822-1329	Address:	Fax: 415-822-1329
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E2, 89762/3	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number: TPH-g (EPA 8015B)

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)	Comments
0810P001	Trip Blank	3/6/08	0900	L	3	X	
0810P002	TW023	↓	1045	L	3	X	
0810P003	TW055		1133	L	3	X	
0810P004	TW054		1220	L	3	X	
0810W001	Trip blank		1215	L	3	X	
0810W002	TW020		1158	L	3	X	☆ no preservative ☆
0810 GP16	TW022		1042	L	9	X	MS/MSD
0810P005	TW025		1301	L	3	X	
0810W004	TW018		1317	L	3	X	
0810W003	TW019	↓	1242	L	3	X	

DW 3/6/08

TW 3/6/08

Shuttle Temperature: 2.5°C

Turnaround Requested: MUST CHECK ONE ☆ 10 day TAT ☆

☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/6/08	1615					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-7-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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CHAIN OF CUSTODY RECORD

pg 2 of 2

C.O.C. № 26728

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder / CE2	Phone: 415-822-2253	Company Name: Kleinfelder / CE2	Phone: 415-822-2253
Address:	Fax: 415-822-1329	Address:	Fax: 415-822-1329
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E2 89762/3	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature) Patricia Walters		Waybill No.:
			Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)											Comments
0810P006	TW010	03/06/08	1347	L	3	X											* no preservative
~~0810P TAS~~																	
0810W005	TW017	3/6/08	1358	L	3	X											
0810P007	TW009	↓	1422	↓	↓	X											
0810W006	TW016	↓	1428	↓	↓	X											
0810W007	TW043	↓	1456	↓	3	X											
0810G015	Trip Blank	3/6/08	1015	L	3	X											
				PW 3/6/08													

PW 3/6/08

PW 3/6/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE *10 day TAT*	Sample Disposal:
2.5 C	☑ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/6/08	1615					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-7-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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CHAIN OF CUSTODY RECORD

pg 1 of 2

c.o.c. № 26729

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Address:
Fax: 415-822-1329
Attn:

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Invoice to:
Company Name: Kleinfelder/CE2 Phone: 415-822-2253
Address:
Fax: 415-822-1329
Attn:

Project Name/Number: E289762/3
Purchase Order Number: 89762
Sampler (Print): Patricia Walters
Sampler (Signature): Patricia Walters

Analysis Requested/Method Number

Date Shipped:
Carrier:
Waybill No.:
Comments: please filter & acidify metals samples

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	Diss Metals (EPA 6010B/7470A)	NH_3-N (EPA 350.1)	
0810P002	TW023	3/6/08	1045	L	2	X	X	
0810P003	TW055	3/6/08	1133	L	2	X	X	
0810P004	TW054	3/6/08	1220	L	2	X	X	
0810W002	TW020	3/6/08	1156	L	2	X	X	
0810G016	TW022	3/6/08	1042	L	6	X	X	MS/MSD
0810P005	TW025	3/6/08	1301	L	2	X	X	
0810W004	TW018		1317	L	2	X	X	
0810P006	TW010		1347	L	2	X	X	
0810W003	TW019	3/6/08	1242	L	2	X	X	
0810W005	TW017	3/6/08	1358	L	2	X	X	

PW 3/6/08

Shuttle Temperature: 2.5 C

Turnaround Requested: MUST CHECK ONE ★10 day TAT★
☑ Standard (2-3 week) PW 3/6/08 ☐ One week ☐ 24-48 hour

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/6/08	1552					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-7-08	0800	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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CHAIN OF CUSTODY RECORD

Pg 2 of 2

C.O.C. № 26724

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name Kleinfelder/CE2	Phone: 415-822-2253	Company Name Kleinfelder/CE2	Phone: 415-822-2253
Address	Fax: 415-822-1329	Address	Fax: 415-822-1329
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E2 89762/3	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89702	Patricia Walters	Comments: please filter and acidify metals samples

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	Diss. Metals (EPA 6010B/7470A)	NH_3-N (EPA 350.1)
0810P007	TW009	3/6/08	1422	L	2	X	X
0810W006	TW016	↓	1428	L	2	X	X
0810W007	TW043	↓	1456	L	2	X	X

PW 3/6/08

PW 3/6/08

PW 3/6/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE 10 day TAT	Sample Disposal:
2.5 C	☑ Standard (2-3 week) PW 3/6/08 ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/6/08	1552					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-7-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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CHAIN OF CUSTODY RECORD

c.o.c. № 26695

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2/89762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TCBs (EPA 8082)	TPH-e (EPA 8015B)
0810G018	TW024	3/7/08	0909	L	2	X	X
0810P009	TW050	↓	0907	↓	2	X	X
0810G019	TW002	↓	0937	↓	2	X	X
0810G020	TW015	↓	1015	↓	2	X	X
0810P010	TW011	↓	0937	↓	2	X	X

PW 3/7/08

PW 3/7/08

PW 3/7/08

Shuttle Temperature: 3.0°C

Turnaround Requested: MUST CHECK ONE * 10 day TAT *
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	1445					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-8-8	3:02	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

pg 1 of 3

C.O.C. № 26697

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)	Comments
0810G018	TW024	3/7/08	0909	L	3	X	
0810P009	TW050		0907		3	X	
0810G019	TW002		0937		3	X	*VOAs unpreserved*
0810G020	TW015		1015		3	X	
0810P010	TW011		0937		3	X	
0810P011	TW011		0942		3	X	
0810P012	TW008		1018		3	X	
0810G021	TW014		1038		3	X	
0810G022	TW013		1102		3	X	*VOAs unpreserved*
0810G023	TW044		1128		3	X	*VOAs unpreserved*

PW 3/7/08

PW 3/7/08

Shuttle Temperature: 3.0°C

Turnaround Requested: MUST CHECK ONE *10 day TAT*

☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	1535					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-8-8	3:02 pm	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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CHAIN OF CUSTODY RECORD

pg 2 of 3

C.O.C. № 26701

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2/89762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)		Comments
0810G024	TW003	3/7/08	1155	L	3	X		
0810G025	TW006		1218		3	X		★VOAs unpreserved★
0810P013	TW007		~~1429~~ PW 3/7/08		3	X		sample time = 1050
0810P014	TW004		1115		3	X		
0810P015	TW045		1139		3	X		★VOAs unpreserved★
0810P016	TW005		1218		3	X		
0810G017	Trip Blank		0830		3	X		
0810P017	TW034		1452		3	X		
0810P008	Trip Blank		0900		3	X		
0810G026	TW038	↓	1413	↓	3	X		

PW 3/7/08

PW 3/7/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE ★10 day TAT★	Sample Disposal:
3.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	1535					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-5-08	3:02pm	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

pg 3 of 3

C.O.C. № 26719

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Report to:
Company Name: Kleinfelder/Ca2
Phone: 415-822-7253
Address:
Fax:
Attn:

PLEASE PRINT

Invoice to:
Company Name: Kleinfelder/Ca2
Phone:
Address:
Fax:
Attn:

Project Name/Number: E-2189762
Purchase Order Number: 89762
Sampler (Print): Patricia Walters
Sampler (Signature): Patricia Walters

Analysis Requested/Method Number: TPH-g (EPA 8015B)

Date Shipped:
Carrier:
Waybill No.:
Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)
0810G027	TW037	3/7/08	1448	L	3	X

PW 3/7/08

PW 3/7/08

PW 3/7/08

Shuttle Temperature: 3.0°C

Turnaround Requested: MUST CHECK ONE ☆ 10 day TAT ☆
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	15:35					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-7-8	3:00pm	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 26698

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2/89762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	EPA PCBs (EPA 8082)	TPH-e (EPA 8015B)	
0810P011	TW011	3/7/08	0942	L	2	X	X	
0810P012	TW008	↓	1018	↓	2	X	X	
0810G021	TW014	↓	1038	↓	2	X	X	
0810G022	TW013	↓	1102	↓	2	X	X	
0810G023	TW044	↓	1128	↓	2	X	X	Sample ID = 0810G023

PW 3/7/08

PW 3/7/08

PW 3/7/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE * 10 day TAT *	Sample Disposal:
3.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	1441					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-8-8	3:04 pm	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

Pg 1 of 2

C.O.C. № 26696

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name Kleinfelder/Ce2	Phone: 415-822-2253	Company Name Kleinfelder/Ce2	Phone:
Address	Fax:	Address	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	Diss Metals (EPA 6010B/7470A)	NH3-N (EPA 350.1)										Comments: please filter & acidify metals samples
0810G018	TW024	3/7/08	0909	L	2	X	X										
0810P009	TW050		0907		2	X	X										
0810G019	TW002		0937		2	X	X										
0810G020	TW015		1015		2	X	X										
0810P010	TW011		0937		2	X	X										
0810P011	TW011		0942		2	X	X										
0810P012	TW008		1018		2	X	X										
0810G021	TW014		1038		2	X	X										
0810G022	TW013		1102		2	X	X										
0810G023	TW044		1128		2	X	X										

PW 3/7/08

PW 3/7/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE * 10 day TAT	Sample Disposal:
3.5C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	1500					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-8-8	3:02pm	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

Pg 2 of 2

C.O.C. № 26700

Report to: PLEASE PRINT
Company Name: Kleinfelder/Ce2 Phone: 415-822-2253
Address:
Fax:
Attn:

Invoice to: PLEASE PRINT
Company Name: Kleinfelder/Ce2 Phone:
Address:
Fax:
Attn:

Project Name/Number: E-2/89762
Purchase Order Number: 89762
Sampler (Print): Patricia Walters
Sampler (Signature): Patricia Walters

Analysis Requested/Method Number

Date Shipped:
Carrier:
Waybill No.:
Comments: Please filter & acidify metals samples

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	Diss Metals (EPA 6010B/7470A)	NH3-N (EPA 350.1)
0810G024	TW003	3/7/08	1155	L	2	X	X
0810G025	TW006		1218		2	X	X
0810P013	TW007		1050		2	X	X
0810P014	TW004		1115		2	X	X
0810P015	TW045		1139		2	X	X
0810P016	TW005		1218		2	X	X

PW 3/7/08

PW 3/7/08

PW 3/7/08

Shuttle Temperature: 3.5°C

Turnaround Requested: MUST CHECK ONE ★10 day TAT★
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	1500					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-8-08	3:02pm	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 26699

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2/89762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	PCBs (EPA 8082)	TPH-e (EPA 8015B)
0810G024	TW003	3/7/08	1155	L	2	X	X
0810G025	TW006	↓	1218	↓	2	X	X
0810P013	TW007	↓	1424	↓	2	X	X
0810P014	TW004	↓	1115	↓	2	X	X
0810P015	TW045	↓	1415	↓	2	X	X
0810P016	TW005	↓	1218	↓	2	X	X

TW 3/7/08

TW 3/7/08

TW 3/7/08

Shuttle Temperature: 4.0°C

Turnaround Requested: MUST CHECK ONE ★10 day TAT★

☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/7/08	1453					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-8-8	3:02 pm	

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 26745

PLEASE PRINT

Report to:
Company Name: Kleinfelder/Ce2
Phone: 415-822-2258
Address:
Fax:
Attn:

PLEASE PRINT

Invoice to:
Company Name: Kleinfelder/Ce2
Phone:
Address:
Fax:
Attn:

Project Name/Number: E-2189762
Purchase Order Number: 89762
Sampler (Print): Patricia Walters
Sampler (Signature): Patricia Walters

Date Shipped:
Carrier:
Waybill No.:
Comments: please filter & acidify metals samples

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	Diss Metals (EPA 6010B/7470A)	NH_3-N (EPA 350.1)		Comments
0811P020	TW056	3/10/08	0921	L	2	X	X		
0811P019	TW029	3/10/08	0856		2	X	X	*	*per client email 3-13-08
0811P021	TW058		1112		2	X	X		
0811P022	TW058		1124		2	X	X		
0811P023	TW057B		1327		2	X	X		
0811P024	TW028B		1359		6	X	X	*	MS/MSD
0811D002	TW036		0928		2	X	X	*	
0811D004	TW039		1045		2	X	X		
0811D005	TW040		1325		2	X	X		
0811D006	TW040		1330		2	X	X		

PW 3/10/08

PW 3/10/08

Shuttle Temperature: 2.0°C

Turnaround Requested: MUST CHECK ONE
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/10/08	1640					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-11-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 26748

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Co2	Phone: 415-822-2253	Company Name: Kleinfelder/Co2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-e (EPA 8015B)	PCBs (EPA 8082)	Comments
~~0811P024~~	~~TW028B~~	~~3/10/08~~	~~1389~~	~~L~~	~~6~~	X	X	*per client email 3-13-08 (6 containers) MS/MSD
0811D002	TW036	↓	0930	↓	2	X	X	
0810P017	TW034	3-7-08	1450	↓	1	X		limited sample volume
0810P017	TW034	3-10-08	1018	↓	1		X	

PW 3/10/08

PW 3/10/08

PW 3/10/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE * 10 day TAT *	Sample Disposal:
3.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/10/08	1611					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3/10/08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

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Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 26746

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder / Co2	Phone: 415-822-2253	Company Name: Kleinfelder / Co2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-e (EPA 8015B)	PCBs (EPA 8082)	Diss Metals (EPA 6010B/7470A)	NH3-N (EPA 350.1)							Comments
0811D008	TW031	3/10/08	1417	L	4	X	X	X	X							please filter's acidify metal samples
0811D007	TW031	↓	1412		2			X	X							
0810G026	TW038	3/7/08	1413		1	X										limited sample volume
0810G026	TW038	3/10/08	1502		1		X									
0810G027	TW037	3/7/08	1448		1	X										
0810G027	TW037	3/10/08	1507	↓	1		X									
~~0811P025~~	~~TW027B~~	↓	~~1521~~	~~L~~	~~2~~	~~X~~	~~X~~									* per client email 3-13-08

PW 3/10/08

PW 3/10/08

PW 3/10/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
3.5°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/10/08	1708					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-11-08	0820	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Fresno, CA 93722

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CHAIN OF CUSTODY RECORD

c.o.c. № 26744

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/CGZ	Phone: 415-822-2253	Company Name: Kleinfelder/CGZ	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number: TPH-G (EPA 8015B); PCBs (EPA 8082)

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-G (EPA 8015B)	PCBs (EPA 8082)	
* ~~0811P019~~	~~TW029~~	~~3/10/08~~	~~0956~~	~~L~~	~~2~~	~~X~~	~~X~~	~~* per client email 3-13-08~~
0811P020	TW056	↓	0921	↓	2	X	X	
0811P021	TW058	↓	1112	↓	2	X	X	
0811P022	TW058	↓	1124	↓	2	X	X	
0811P023	TW057B	↓	1327	↓	2	X	X	

PW 3/10/08

PW 3/10/08

PW 3/10/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE ☆ 10 day TAT ☆	Sample Disposal:
3.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/10/08	1529					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-11-08	0800	Chris Gruell

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
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Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 26749

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Cez	Phone: 415-822-2253	Company Name: Kleinfelder/Cez	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2/89762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPHg (EPA 8015B)	PCB35 (EPA 8082)										Comments
0811D003	TW035	3/10/08	1000	L	1	X											*limited sample volume
0811D004	TW039	↓	1045	↓	2	X	X										
0811D005	TW040	↓	1325	↓	2	X	X										
0811D006	TW040	↓	1330	↓	2	X	X										
0811D007	TW031	↓	1412	↓	2	X	X										

PW 3/10/08

PW 3/10/08

PW 3/10/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE ☆ 10 day TAT ☆	Sample Disposal:
2.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/10/08	1639					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-11-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
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Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

Pg 1 of 2

C.O.C. № 26743

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder LCZ	Phone: 415-822-2253	Company Name: Kleinfelder LCZ	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Purchase Order Number	Sampler (Signature)
E-2189762	Patricia Walters	E-2189762	Patricia Walters

Analysis Requested/Method Number: TPH-g (EPA 8015B)

Date Shipped:
Carrier:
Waybill No.:
Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)		Comments
0811D001	Trip Blank	3/10/08	0800	L	3	X		
0811D002	TW036		0928		3	X		
0811D003	TW035		1000		3	X		
0811D004	TW039		1045		3	X		VOAs unpreserved
0811D005	TW040		1325		3	X		
0811D006	TW040		1330		3	X		
0811D007	TW031		1412		3	X		
0811D008	TW031	3/10/08	1417	L	3	X		

PW 3/10/08

PW 3/10/08

PW 3/10/08

Shuttle Temperature: 3.0°C

Turnaround Requested: MUST CHECK ONE
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/10/08	1720					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3/11/08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

Pg 2 of 2

C.O.C. № 26750

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name Kleinfelder/Ce2	Phone: 415-822-2253	Company Name Kleinfelder/Ce2	Phone:
Address	Fax:	Address	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-g (EPA 8015B)	Diss Metals (EPA 6010B/3-1704A)	NH3-N (EPA 350.1)								Comments
·0811P018	Trip Blank	3/10/08	0830	L	3	X										~~please filter & acidify metals sample~~
* ~~0811P019~~	~~TW029~~		~~0856~~		~~3~~	X										
·0811P020	TW056		0921		3	X										*per client email
·0811P021	TW058		1112		3	X										st 3-13-08
·0811P022	TW058		1124		3	X										
·0811P023	TW057B		1327		3	X										
* ~~0811P024~~	~~TW028B~~		~~1359~~		~~3~~ 9	X										MS/MSD 9 containers
·0811P025	TW027B		1521		5	X	X	X	*							

PW 3/10/08

PW 3/10/08

PW 3/10/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
3.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour *10 day TAT*	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/10/08	1720					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3/11/08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

Pg 1 of 2

C.O.C. № 27509

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Co2	Phone: 415-822-2253	Company Name: Kleinfelder/Co2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments: Please filters acidify metals samples

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	DISS metals (EPA 6010B/7470A)	NH_3-N (EPA 350.1)	Comments
0811P034	PZ144E	3/11/08	1455	L	2	X	X	Sample ID = 0811P034
0811P032	PZ161B	↓	1331	↓	2	X	X	
0811P033	PZ138F	↓	1407	↓	2	X	X	
0811D015	PZ131F	↓	1300	↓	2	X	X	

PW 3/11/08

PW 3/11/08

PW 3/11/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
2.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour ★ 10 day TAT★	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/11/08	1604					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-12-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

Pg 2 of 2

C.O.C. № 27511

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments: ~~please filter 3~~ acidify metals samples

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	DISS Metals (EPA 6010B 7470A)	NH3-N (EPA 350.1)									Comments
0811D016	PZ150D	3/11/08	1350	L	6	X	X									MS/MSD
0811D017	PZ130E	↓	1445	↓	2	X	X									

PW 3/11/08

PW 3/11/08

PW 3/11/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
2.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour *10 day TAT*	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/11/08	1604					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-12-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

pg 1 of 2

C.O.C. № 27505

Report to: (PLEASE PRINT)		Invoice to: (PLEASE PRINT)	
Company Name: Kleinfelder ICG2	Phone: 415-822-2253	Company Name: Kleinfelder ICG2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2189762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-D											
0811D010	TW032	3/14/08	925	L	3	X											
0811D011	TW033		950		3	X											
0811D012	TW033		1000		3	X											
0811D013	TW041		1020		3	X											
0811D014	TW042		1050		3	X											
0811D009	~~TAP~~ Trip Blank (Pat 3/14/08)		0822		3	X											
0811P032	PZ161B		1331		3	X											
0811P033	PZ138F		1407		3	X											
0811P034	PZ144E		1455		3	X											
0811P026	Trip Blank		849		3	X											

PW 3/14/08

PW 3/14/08

Shuttle Temperature: 3.0 C

Turnaround Requested: MUST CHECK ONE ★ 10 day TAT ★

☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/14/08	1600					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-17-08	0820	Chris Quell

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

pg 2 of 2

C.O.C. № 26747

Report to: PLEASE PRINT
Company Name: Kleinfelder/Ce2
Phone: 415-822-2253
Address:
Fax:
Attn:

Invoice to: PLEASE PRINT
Company Name: Kleinfelder/Ce2
Phone:
Address:
Fax:
Attn:

Project Name/Number: E-2 89762
Purchase Order Number: 89762
Sampler (Print): Patricia Walters
Sampler (Signature): Patricia Walters

Analysis Requested/Method Number: TPH-d (EPA 8015B)

Date Shipped:
Carrier:
Waybill No.:
Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-d (EPA 8015B)	Comments
0811D015	PZ131F	3/11/08	1300	L	3	X	
0811D016	PZ150D	↓	1350	↓	9	X	MS/MSD
0811D017	PZ130E	↓	1445	↓	3	X	

PW 3/11/08

PW 3/11/08

PW 3/11/08

Shuttle Temperature: 3.0C

Turnaround Requested: MUST CHECK ONE
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/11/08	1600					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-12-08	0820	[illegible]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

Pg 1 of 2

C.O.C. № 27506

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder/Co2	Phone: 415-822-2253	Company Name: Kleinfelder/Co2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Purchase Order Number	Sampler (Signature)
E-2/89762	Patricia Walters	89762	Patricia Walters

Analysis Requested/Method Number

Date Shipped:
Carrier:
Waybill No.:
Comments: please filters acidify metals samples

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	Diss Metals (EPA 6010B/7470A)	NH_3-N (EPA 350.1)
0811P027	TW059	3/11/08	0928	L	1	X	
0811P028	TW030B		0948		1	X	
0810P017	TW034		0908		1	X	
0811P029	TW026B		1005		1	X	
0811P030	TW060		1051		1	X	
0811P031	TW061		1122		1	X	
0811D010	TW032		0925		2	X	X
0811D011	TW033		0950		2	X	X
0811D012	TW033		1000		2	X	X
0811D013	TW041		1020		2	X	X

TW 3/11/08

TW 3/11/08

Shuttle Temperature: 3.0°C

Turnaround Requested: MUST CHECK ONE *10 day TAT*
☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour

Sample Disposal:
☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/11/08	1541					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-12-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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4203 W. Swift
Fresno, CA 93722

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CHAIN OF CUSTODY RECORD

Pg 2 of 2

C.O.C. № 27507

Report to: (PLEASE PRINT)		Invoice to: (PLEASE PRINT)	
Company Name: Kleinfelder/Ce2	Phone: 415-822-2253	Company Name: Kleinfelder/Ce2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2/89762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	Diss Metals (EPA 6010B/7470A)	NH3-N (EPA 350.1)	Comments
0811D014	TW042	3/4/08	1050	L	2	X	X	please filter & acidify metals samples
0810G026	TW038	↓	0840	↓	1	X		
0810G027	TW037	↓	0845	↓	1	X		

PWJ 3/4/08

PWJ 3/4/08

PWJ 3/4/08

Shuttle Temperature: 3.0°C

Turnaround Requested: MUST CHECK ONE ☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour ★10 day TAT★

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/4/08	154					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-12-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 27510

Report to: (PLEASE PRINT)		Invoice to: (PLEASE PRINT)	
Company Name: Kleinfelder LCZ	Phone: 415-822-2253	Company Name: Kleinfelder LCZ	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E2189762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-e (EPA 8015B)	PCBs (EPA 8082)									
0811D016	PZ150D	3/11/08	1350	L	6	X	X									MS/MSD
0811D017	PZ130E	↓	1445	↓	2	X	X									

PW 3/11/08

PW 3/11/08

PW 3/11/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
2.0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour ☆ 10-day TAT	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/11/08	1657					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-12-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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Fresno, CA 93722

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CHAIN OF CUSTODY RECORD

C.O.C. № 27504

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Klemfelder/Cez	Phone: 415-822-2253	Company Name: Klemfelder/Cez	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Date Shipped:
E-2/89762	Patricia Walters	Carrier:
Purchase Order Number	Sampler (Signature)	Waybill No.:
89762	Patricia Walters	Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	PCBs	TPH-e									Comments
0811P032	PZ161B	3/11/08	1331	L	2	X	X									
0811P033	PZ138F	↓	1407	↓	2	X	X									
0811P034	PZ144E	↓	1455	↓	2	X	X									
0811D003	TW035	↓	0900	↓	1		X									additional sample volume for TPH-e analysis
0811D015	PZ131F	↓	1300	↓	2	X	X									

PW 3/11/08

PW 3/11/08

PW 3/11/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
3.5°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/11/08	1558					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					3-12-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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4203 W. Swift
Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 27508

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: Kleinfelder LLC2	Phone: 415-822-2253	Company Name: Kleinfelder LLC2	Phone:
Address:	Fax:	Address:	Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
E-2/89762	Patricia Walters		Carrier:
Purchase Order Number	Sampler (Signature)		Waybill No.:
89762	Patricia Walters		Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	TPH-e (EPA 8015B)	PCBs (EPA 8082)
0811D010	TW032	3/11/08	0925	L	2	X	X
0811D011	TW033		0950		2	X	X
0811D012	TW033		1000		2	X	X
0811D013	TW041		1020		2	X	X
0811D014	TW042		1050		2	X	X

PW 3/11/08

PW 3/11/08

PW 3/11/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
2-0°C	☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour ★ 10 day TAT ★	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Patricia Walters	3/11/08	1510					
Relinquished by:	**Date**	**Time**	**Received by:**	**Relinquished by:**	**Date**	**Time**	**Received at lab by:**
					3-12-08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

APPL, Inc.
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Fresno, CA 93722

Phone: (559) 275 2175

Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. № 27521

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name Kleinfelder/CE2	Phone: 415-822-2253	Company Name Kleinfelder/CE2	Phone:
Address	Fax: 415-822-1329	Address	Fax:
Attn:		Attn:	

Project Name/Number E-2/ ~~Hunters Point~~ CR 3/12/08 89762	Sampler (Print) Cynthia Ruelas	Date Shipped:
Purchase Order Number	Sampler (Signature) [signature]	Carrier:
		Waybill No.:
		Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers	PCBS	TPH-e	TPH-p	Diss. Metals	NH_3-N						
0811D003	TW035	3/12/08	0935	L	1	X										
0811D019	PZ138E	↓	1135	↓	7	X	X	X	X	X						
0811D018	Trip Blanks	↓	0800	↓	3			X								

CR 3/12/08

CR 3/12/08

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE	Sample Disposal:
2.0	☑ Standard (2-3 week) ☐ One week ☐ 24-48 hour	☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
[signature]	3/12/08	1453					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					03/13/08	0800	[signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Appendix G.
Laboratory and data validation reports (CD only)

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Appendix H.
Technical System Audit report

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TECHNICAL SYSTEM AUDIT - SUMMARY REPORT
HUNTERS POINT SHIPYARD
GROUNDWATER INVESTIGATION AT PARCEL E-2
SAN FRANCISCO, CALIFORNIA

Navy Contract:
N62473-07-C-3001

Prepared by:

CE2-Kleinfelder Joint Venture
7901 Stoneridge Drive, Suite 505
Pleasanton, CA 94588

March 25, 2008

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Prepared for:

Mr. Mark Walden
Remedial Project Manager
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

TECHNICAL SYSTEM AUDIT - SUMMARY REPORT
GROUNDWATER INVESTIGATION AT PARCEL E-2
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

Contract No.: N62473-07-C-3001

Prepared by:

Thomas A. Sayre
Field Manager

Reviewed By:

Mohammad Abri
Corporate Quality Assurance Manager

CE2-Kleinfelder Joint Venture
7901 Stoneridge Drive
Suite 505
Pleasanton, CA 94588
(925) 463-7301

March 25, 2008

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2.0 AUDIT PROCEDURES **2-1**

3.0 AUDIT ACTIVITIES **3-1**

4.0 AUDIT RESULTS **4-1**

5.0 SUMMARY **5-1**

APPENDICES

Appendix A. Soil Boring/Temporary Well Installation and Grab Groundwater Sampling Audit Forms and Auditor's Field Notes.

Appendix B. Daily Equipment Calibration Logs.

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EXECUTIVE SUMMARY

Two Technical System Audits (TSA) were performed during the Groundwater Investigation at Parcel E-2 at Hunters Point Shipyard. The purpose of the TSAs was to verify that the field team is following the proper procedures during the temporary well installation and grab groundwater sampling. The TSA activities for the soil boring and temporary well installation were performed on February 27, 2008 by Tom Sayre of Kleinfelder. The TSA activities for the grab groundwater sampling were performed on March 12, 2008 by Stacie Wissler of Kleinfelder. A total of two field team-specific audits were conducted, one for each activity. The TSA activities were performed in accordance with the Final Sampling and Analysis Plan (SAP) for the Groundwater Investigation at Parcel E-2 at Hunters Point Shipyard in San Francisco, California, prepared by CE2-Kleinfelder for the US Navy, Naval Facilities Engineering Command Southwest, dated February 4, 2008. The results of the TSA activities were discussed with the individual field teams and the Field Manager: Tom Sayre of Kleinfelder. All observed activities under the two TSAs were found to be in compliance with the SAP. Therefore no corrective actions were necessary.

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1.0 PURPOSE OF TECHNICAL SYSTEM AUDITS

Per SAP Worksheet #31 of the SAP (dated February 4, 2008), CE2-Kleinfelder conducted a TSA during the temporary well installation and a TSA during the grab groundwater sampling. The purpose of the TSA was to verify that each team is following the temporary well installation procedure and the data and groundwater samples collection procedures identified in Worksheet #17 of the SAP. Results of the TSA were forwarded to the Field Manager and Project Manager. If deficiencies had been noted, then corrective actions would have been identified and immediately implemented for each deficiency.

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2.0 AUDIT PROCEDURES

The CE2-Kleinfelder auditor visited the team to be audited with an audit form and observed a temporary well installation and a complete well sampling event. If any activities were noted as not being in compliance with the SAP, corrective action would be initiated and recorded. The audit form completed by the auditor is divided into the following four categories:

- Health and Safety: a review of proper personal protective equipment (PPE) and air monitoring procedures.
- Documentation: proper recording of data during temporary well installation and grab groundwater sampling.
- Soil Boring/Temporary Well Installation: a review of proper temporary well installation procedures and equipment decontamination.
- Grab Groundwater Sampling: a review of proper bottle collection, equipment usage, and equipment decontamination.

In addition, the designated auditor observed the calibration of field instruments at the beginning of the day, or discussed the calibration activities with the person responsible for meter calibrations. To ensure that each instrument is calibrated following the same procedures, the Field Manager or Sample Control Manager calibrated the instruments for the field teams. Appendix B contains the calibration logs for the audit days. Upon completion of the TSA, the auditor briefed CE2-Kleinfelder's Field Manager on the results of the TSA. No deficiencies were observed during the two TSAs. Therefore, no corrective actions were necessary.

2.1 AUDIT TEAM

The following are the audit team members and their respective roles:

Kleinfelder Project Manager:	Tom Sayre, Kleinfelder
Field Manager:	Tom Sayre, Kleinfelder
Field Team Auditors:	Stacie Wissler and Tom Sayre, Kleinfelder
Sample Control Managers:	Patricia Walters and Cynthia Ruelas, Kleinfelder

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3.0 AUDIT ACTIVITIES

During the groundwater investigation at Parcel E-2, grab groundwater samples were collected from 61 temporary wells, installed as part of the investigation, and from 7 existing piezometers. Temporary well installation began on February 2 and concluded on March 11, 2008. Grab groundwater sampling began on March 4 and is expected to conclude by June 1, 2008. A total of two activity-specific audits were performed, one auditing the temporary well installation, performed on February 27, and the second auditing the grab groundwater sampling, performed on March 12, 2008.

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4.0 AUDIT RESULTS

The results of the temporary well installation TSA are described below. Copies of the field audit form and the auditor's field notes are provided as Appendix A.

Health and Safety	
Deficiency	**Corrective Action**
1. No health and safety issues were noted.	1. No action was necessary regarding health and safety.
Documentation	
Deficiency	**Corrective Action**
1. No documentation deficiencies were noted.	1. No action was necessary regarding documentation.
Soil Boring/Temporary Well Installation	
Deficiency	**Corrective Action**
1. No deficiencies were noted.	1. No action was necessary regarding well installation.
Grab Groundwater Sampling	
Deficiency	**Corrective Action**
1. Not Applicable.	1. Not Applicable.
General Comments	
Deficiency	**Corrective Action**
1. No general issues were noted.	1. No action was necessary regarding general issues.
Calibration	
Deficiency	**Corrective Action**
1. Not Applicable	1. Not Applicable

The results of the grab groundwater sampling TSA are described below. Copies of the field audit form and the auditor's field notes are provided as Appendix A. Copies of the equipment calibration log for the audit days are provided as Appendix B.

Health and Safety	
Deficiency	**Corrective Action**
1. No health and safety issues were noted.	1. No action was necessary regarding health and safety.
Documentation	
Deficiency	**Corrective Action**
1. No documentation deficiencies were noted.	1. No action was necessary regarding documentation.
Soil Boring/Temporary Well Installation	
Deficiency	**Corrective Action**
1. Not Applicable.	1. Not Applicable.
Grab Groundwater Sampling	
Deficiency	**Corrective Action**
1. No grab sampling issues were noted.	1. No action was necessary regarding sampling.

General Comments	
Deficiency	**Corrective Action**
1. No general issues were noted.	1. No action was necessary regarding general issues.
Calibration	
Deficiency	**Corrective Action**
1. No deficiencies were noted in the calibration of field equipment.	1. No action was necessary regarding calibration.

5.0 SUMMARY

During the groundwater investigation at Parcel E-2, two TSAs were conducted. The first TSA was conducted on February 27 and the second TSA was conducted on March 12, 2008. No deficiencies were noted during the audit events.

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APPENDIX A

Soil Boring/Temporary Well Installation and Grab Groundwater Sampling Audit Forms and Auditor's Field Notes

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CE KLEINFELDER

Technical Systems Audit Form: Soil boring/temporary well installation and grab groundwater sampling

Crew members: Gaby Fuson, Chris Fluty, Josh Rykin, Ed Radros

Date: 2/27/08
Time: 0850 - 0905

Drilling/sampling location: Parcel E-2 TW052
Work activity: Installation of Temporary Well

	In compliance? Yes	In compliance? No	If "No" Corrective action taken (Attach additional documentation if necessary)
HEALTH & SAFETY			
APP/SSHP readilly available	✓		
Hard hats	✓		
Steel-toed boots	✓		
Safety vest	✓		
Gloves	✓		
Eye protection	✓		
Air monitoring conducted in breathing zone			NA - Unnecessary due to Steady wind
DOCUMENTATION			
SAP onsite	✓		
Boring and well log			NA - Well installation only, no logs Required
Field notebook	✓		
Sample labels			NA
Chain of custody			NA
SOIL BORING/TEMPORARY WELL INSTALLATION			
Drill rods clean	✓		
Boring location	✓		
Boring/well installation form			NA - No form required for well installation
Total boring depth	✓		
Soil classified to USCS			NA - Well installation only
Well materials	✓		
Well construction	✓		
Soil core stored appropriately			NA - Well installation only
GRAB GROUNDWATER SAMPLING			
Water level probe cleaned			NA
Total well depth measured			NA
Depth to water measured			NA
Adequate water in well to begin sampling			NA
Sample tubing installed to correct depth			NA
Sampling flow rate < 500 mL/minute			NA
Samples collected in correct order by analysis			NA
TPH-purgeable samples (in VOAs) free of bubbles			NA
Samples collected in correct containers			NA
QC samples collected			NA
Sample storage (cooler, ice, etc.)			NA
If well runs dry, documented and sampled later			NA
Well head closed			NA
Water level probel cleaned			NA
IDW stored and labeled appropriately			NA

ADDITIONAL NOTES/COMMENTS:
NA = Not Applicable

QA/QC Reviewer: _____

Signature: [signature]

WS31-3

CE² KLEINFELDER

Technical Systems Audit Form: Soil boring/temporary well installation and grab groundwater sampling

Crew members: DAN BLOREDGE, BILL BERGERON

Date: 3/12/08

Time: 11 30

Drilling/sampling location: PARCEL E2 PZ138E

Work activity: GW SAMPLING

	In compliance? Yes	In compliance? No	If "No" Corrective action taken (Attach additional documentation if necessary)
HEALTH & SAFETY			
APP/SSHP readiliy available	✓		
Hard hats	✓		
Steel-toed boots	✓		
Safety vest	✓		
Gloves	✓		
Eye protection	✓		
Air monitoring conducted in breathing zone	✓		
DOCUMENTATION			
SAP onsite	✓		
Boring and well log	—		
Field notebook	✓		
Sample labels	✓		
Chain of custody			DO NOT HAVE
SOIL BORING/TEMPORARY WELL INSTALLATION			
Drill rods clean			
Boring location			Not Applicable
Boring/well installation form			
Total boring depth			
Soil classified to USCS			
Well materials			
Well construction			
Soil core stored appropriately			
GRAB GROUNDWATER SAMPLING			
Water level probe cleaned	✓		
Total well depth measured	✓		
Depth to water measured	✓		5.79' bgs
Adequate water in well to begin sampling	✓		
Sample tubing installed to correct depth	✓		
Sampling flow rate < 500 mL/minute	—		
Samples collected in correct order by analysis	✓		
TPH-purgeable samples (in VOAs) free of bubbles	✓		
Samples collected in correct containers	✓		
QC samples collected	✓		TRIP BLANKS, TEMP BLANK
Sample storage (cooler, ice, etc.)	✓		
If well runs dry, documented and sampled later	—		
Well head closed	✓		
Water level probel cleaned	✓		
IDW stored and labeled appropriately	✓		

ADDITIONAL NOTES/COMMENTS:

WHEN TEAM HAD BUBBLE IN VOA VIAL, GOT A NEW VIAL RATHER THAN DILUTING OUT HCL

QA/QC Reviewer: Stacie Wissler

Signature:

APPENDIX B

Daily Equipment Calibration Logs

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E-2 EQUIPMENT CALIBRATION LOG

Date	Time	Equipment			Successful Calibration (Y/N)			Initials
		YSI		Equip. Set No.	pH 4	pH 7	Conductivity 1 mS/cm	
3/3/2008	1300	1			Y	Y	Y	PW
↓	1310	3			Y	Y	Y	PW
↓	1400	5			Y	Y	Y	PW
3/4/2008	0710	1			Y	Y	Y	PW
↓	0714	3			Y	Y	Y	PW
↓	0718	4			Y	Y	Y	PW
3/5/2008	0725	1			Y	Y	Y	NC
↓	0730	3			Y	Y	Y	↓
↓	0735	4			Y	Y	Y	↓
3/6/2008	0720	1			Y	Y	Y	NC
↓	0730	3			Y	Y	Y	↓
↓	0735	4			Y	Y	Y	↓
3/7/2008	0700	1	+	PW 3-10-08	Y	Y	Y	NC
↓	0710	3	~~3~~	PW 3-11-08	Y	Y	Y	NC
3/10/2008	0705	1			Y	Y	Y	NC
↓	0710	3			Y	Y	Y	↓
↓	0715	4			Y	Y	Y	↓
3/11/08	0710	1			Y	Y	Y	NC

Notes:
Equip. Set No. = Equipment Set Number
mS/cm = milliSiemens per centimeter

E-2 **EQUIPMENT CALIBRATION LOG**

Date	Time	Equipment			Successful Calibration (Y/N)			Initials
		YSI		Equip. Set No.	pH 4	pH 7	Conductivity 1 mS/cm	
3/11/08	0715	3			Y	Y	Y	NC
↓	0725	4			Y	Y	Y	↓

Notes:
Equip. Set No. = Equipment Set Number
mS/cm = milliSiemens per centimeter

Appendix I.
Quality Control Summary Report

Abbreviations and Acronyms

APPL	Agriculture and Priority Pollutants Laboratories, Inc.
DQO	data quality objectives
EDD	electronic data deliverable
HPS	Hunters Point Shipyard
LCS	laboratory control sample
LDC	Laboratory Data Consultants
LUFT	leaking underground fuel tank
MS	matrix spike
MSD	matrix spike duplicate
NEDD	Navy Electronic Data Deliverable
NFESC	Naval Facilities Engineering Service Center
NIRIS	Naval Installation Restoration Information Solution
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
PCBs	polychlorinated biphenyls
QC	quality control
QCSR	Quality Control Summary Report
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SOP	standard operating procedure
TPH	total petroleum hydrocarbons
USEPA	United Stated Environmental Protection Agency

1.0 Introduction

This Quality Control Summary Report (QCSR) summarizes the quality control (QC) activities associated with the groundwater investigation at Parcel E-2, located at the Hunters Point Shipyard (HPS) in San Francisco, California. Groundwater sampling procedures, analytical methods, analytical results, project objectives and data quality objectives (DQOs) are described in the Final Sampling and Analysis Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard (SAP) (CE2-Kleinfelder Joint Venture [CE2-Kleinfelder JV], 2008).

This QCSR consists of eight sections. Section 2.0 provides an overview of the groundwater sampling procedures. Section 3.0 provides an overview of the decontamination procedures. Section 4.0 provides a summary of the QC samples collected along with their analytical results. Section 5.0 identifies the analytical methods. Section 6.0 summarizes the findings of the data quality assessment process, which includes a review, verification, validation and usabilty assessment of the data, in accordance with the data quality indicators defined in the SAP. Section 7.0 provides an overview of the data storage process. Section 8.0 provides references.

2.0 Groundwater Sampling Procedure

Field personnel measured depth to water in the wells and piezometers in Parcel E-2, using electronic water level indicators, prior to sampling. Grab groundwater samples were collected from temporary wells and piezometers in Parcel E-2 by pumping groundwater using peristaltic pumps and well-dedicated Teflon™-lined polyethylene tubing. Grab samples do not require purging prior to sample collection. Groundwater was pumped at a rate of 500 milliliters (mL/min) or less. Groundwater samples were collected in the following order: total petroleum hydrocarbons (TPH)-purgeables, TPH-extractables, polychlorinated biphenyls (PCBs), dissolved metals, ammonia. Dissolved metals samples were filtered and acidified with nitric acid by the laboratory prior to analysis.

Water quality parameters were measured at sample locations designated for ammonia analysis. Water quality parameters (i.e., temperature, specific conductance, and pH) were measured after sample collection using YSI™ multi-probe water quality meters.

3.0 Decontamination Procedure

Sampling equipment that came in contact with groundwater was decontaminated immediately after sampling was completed at each well. Additionally, the electronic water level indicators were decontaminated after the sampling of each well, using a mixture of tap water and non-phosphate detergent, a rinse with tap water, and a final rinse with distilled water. The YSI™ water quality meters were decontaminated using tap water and distilled water. Dedicated Teflon™-lined polyethylene tubing was used for pumping each well; therefore, decontamination of the tubing was not necessary.

4.0 Quality Control Samples

Field and laboratory QC samples were collected in the field and laboratory to evaluate and monitor the quality of both the field and laboratory procedures. Field and laboratory QC samples were collected at a frequency in accordance with the SAP. Table I-1 summarizes the field and laboratory QC samples collected during the groundwater investigation at Parcel E-2.

Field samples, including field QC samples, were preserved (if required), stored, and transported in coolers with sufficient "wet" ice to maintain sample temperature at less than 6 degrees Celsius. Upon receipt, the laboratory measured the cooler temperatures using temperature blanks, which were submitted with each cooler. The laboratory did not detect temperatures in any sample cooler that exceeded the limit of 6 degrees Celsius.

During the data quality assessment, organic and inorganic contaminants reported in field samples with less than 5 times the concentrations detected in blanks (or 10 times for common laboratory contaminants) were qualified as not detected and assigned a "U" qualifier. A low percentage of sample results (approximately 4.1 percent) were qualified due to laboratory blank contamination, which indicates that laboratory decontamination procedures were effective.

During a data quality assessment of the field and laboratory QC samples, no significant discrepancies were noted. Trip blank samples were included in each of the coolers containing samples for TPH-purgeables analysis, and accompanied the samples during sample collection, storage, and transport. TPH-purgeables were not detected in any of the trip blank samples, and thus no data was qualified due to trip blank contamination.

Field duplicate pairs were collected at 7 of the 68 locations. Relative percent differences (RPDs) were calculated using the field duplicate pair results, then evaluated against a RPD criterion of 30 percent. Of the 196 field duplicate pair analyte results, 15 (approximately 7.7 percent) exceeded the 30 percent RPD criterion. Analytical data were not qualified based on field duplicate pair results.

Table I-1. QC Samples Collected during the Groundwater Investigation at Parcel E-2

Field QC Samples		
Sample Type	**Purpose**	**Frequency**
Trip blank	Measures background levels of TPH-purgeables from sample handling, storing, and transport.	One per cooler containing TPH-purgeables samples
Field duplicate	Measures variability in results from sampling procedures.	One per 20 field samples collected
Laboratory QC Samples		
Sample Type	**Purpose**	**Frequency**
Instrument blank	Sets baseline or instrument zero.	Start of calibration process and per method
Method blank	Measures laboratory contamination during sample preparation and analysis.	One per preparation or analytical batch
Matrix spikes	Measures matrix effect and accuracy of analytical process.	One per preparation or analytical batch
Laboratory duplicate	Indicates precision of laboratory procedures	One per 10 samples
Laboratory Control Sample	Measures accuracy of analytical process and calibration.	One per preparation or analytical batch

5.0 Laboratory Analyses

A total of 68 groundwater samples, with 19 accompanying field QC samples, were collected for chemical analysis during the groundwater investigation at Parcel E-2. The groundwater samples were collected from March 5, 2008 to March 13, 2008. Field and laboratory QC samples were collected at a frequency in accordance with the SAP. Table I-2 summarizes the analytical parameters and methods performed for the groundwater investigation at Parcel E2.

Table I-2. Analytical Groups and Methods

Analytical Group	Analytical Method
Ammonia Nitrogen	USEPA Method 350.1
Dissolved Metals	USEPA Method 6010B
	USEPA Method 7470A
PCBs	USEPA Method 8082
TPH-extractables	USEPA Method 8015B
TPH-purgeables	USEPA Method 8015B

Notes:
USEPA: United States Environmental Protection Agency, *Test Methods for Evaluating Solid Wastes Physical/Chemical Methods* (SW-846, 4th Edition, Update III)
PCBs: polychlorinated biphenyls
TPH: total petroleum hydrocarbons

Samples collected during the Parcel E-2 groundwater investigation were submitted and analyzed by a California State- and Naval Facilities Engineering Service Center (NFESC)-certified laboratory, Agriculture and Priority Pollutants Laboratories, Inc. (APPL), located in Fresno, California.

6.0 Data Quality Assessment

The data quality assessment process consists of a systematic review, verification, validation, and usability assessment of the data. The purpose of the data quality assessment is to evaluate and monitor the performance of the field sampling and analytical procedures and assess the quality of the data. Data review and verification were performed by the Project Chemist on 100 percent of the data. Laboratory Data Consultants, Inc. (LDC), located in Carlsbad, California, was selected to perform the independent, third-party data validation. The data were reviewed, verified and validated in accordance with procedures, presented in the following documents:

- *Final Sampling and Analysis Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard (Kleinfelder-CE2 JV, February 2008)*
- *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1999b)*
- *USEPA Contract Laboratory National Functional Guidelines for Inorganic Data Review (USEPA 2004).*

- *USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition. Updates I, II, IIA, IIB, III, IIIA, and IV (USEPA 1998).*

6.1 Summary of the Data Quality Assessment

One hundred percent of the data were subject to a data quality assessment (i.e. review, verification, validation, and usability assessment), with approximately 80 percent undergoing a Level III data validation and 20 percent undergoing a Level IV validation in accordance with the SAP.

A total of 1,953 analytical results were evaluated by LDC during the data validation process.

Based on the data validation process, some analytical results were qualified as estimated (i.e., "J" qualified) or estimated at an elevated project quantitation (i.e. "UJ" qualified). Results were qualified as estimated for one or more of the following reasons:

- Laboratory blank contamination
- Serial dilution criteria exceeded
- Surrogates, laboratory control sample (LCS), matrix spike (MS), or matrix spike duplicate (MSD) samples reported percent recoveries outside the acceptable criteria
- Technical holding times exceeded
- Calibration with percent differences outside the acceptable criteria.

Table I-3 summarizes the data qualified as estimated ("J" or "UJ" qualified") or rejected ("R" qualified), as well as the percent of qualified analytical data, generated during the groundwater investigation at Parcel E-2. During the data quality assessment process, it was deemed that the results are of good quality and are acceptable for use during the decision-making process.

Table I-3. Summary of Qualified Analytical Data by Analytical Method

Analytical Group	Analytical Method	Total Estimated, Usable ("J" or "UJ") Data	Total Unusable ("R") Data
Ammonia Nitrogen	USEPA Method 350.1	0	0
Dissolved Metals	USEPA Method 6010B	0	0
	USEPA Method 7470A	136	0
PCBs	USEPA Method 8082	0	0
TPH-extractables	USEPA Method 8015B	16	0
TPH-purgeables	USEPA Method 8015B	7	0
Total qualified analytical results		159	0
Percent of total qualified analytical results		8.1%	0 %

Note:

The percent of data qualified by category was calculated using the total number of analytical results (including QC samples) generated by the groundwater investigation at Parcel E-2 (i.e., total of 1,953 analytical results).

The data quality indicators, otherwise known as precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS), were evaluated in accordance with the PARCCS parameters defined in the SAP to assess data usability. The PARCCS parameters were met for the groundwater investigation at Parcel E-2, and were assessed as follows:

- **Precision** was assessed by evaluating the RPDs of the MS/MSD samples and duplicates for each applicable analytical method. The low percentage (approximately 7.7 percent) of precision exceedances indicates that the analytical methods were consistently precise.
- **Accuracy** was assessed by evaluating percent recoveries of MS samples, LCS, and surrogate recoveries for each applicable analytical method. A low percentage of sample results (approximately 4.9 percent) were qualified due to MS, LCS, or surrogate recoveries, indicating that the methods were consistently accurate.
- **Representativeness** was assessed by the use of established field and laboratory procedures, and their consistent application. Representativeness was maintained by using standard operating procedures (SOPs), including chain-of-custody protocol and documentation, groundwater sampling, sample labeling, sample packaging and transport, as well as the condition of the samples upon receipt at the laboratory.
- **Comparability** was assessed by evaluating the use of well-documented analytical methods and SOPs, standard reference materials, QC samples, and reporting each data type in consistent units. The use of the USEPA analytical methods, specified and well-documented analyses, California State- and NFESC-certified laboratories, and a standardized data quality assessment process give the data a high degree of analytical comparability.
- **Completeness** was assessed by evaluating the validity of data obtained as a result of the data quality assessment process (i.e. amount of valid data obtained as compared to the amount that was expected to be obtained under normal conditions). Estimated data ("J" or "UJ" qualified) are considered valid and usable; however, rejected data ("R" qualified) and missing analyses are considered unusable and incomplete. One hundred percent of the analytical results are considered usable, which exceeds the SAP completeness goal of 90 percent.
- **Sensitivity** was assessed by evaluating the use of project quantitation limits. In general, project quantitation limits were low enough to satisfy the action levels being applied and used to evaluate the project data.

As a result of the DQA process, it has been concluded that the data quality indicators (i.e., PARCCS) either met or exceeded the parameters, as defined in the SAP.

7.0 Data Storage

Data collected during the groundwater investigation at Parcel E-2 were recorded on field and laboratory forms, including but not limited to field notes or logbooks, chain-of-custody forms, field calibration logs, audit forms, laboratory raw data, hard copy analytical reports, electronic data deliverables (EDDs), and data validation reports. Field notes or logbooks, chain-of-custody forms, and field calibration logs were peer-reviewed and securely stored in the CE2-Kleinfelder JV field trailer, located on HPS.

Laboratory analytical results were provided by APPL to the Kleinfelder-Oakland office in hard copy and EDD format, as sample delivery groups (SDGs), to undergo data quality assessment procedures. The hard copy SDGs were retained in a secured location until final submittal to the NAVFAC Southwest Administrative Record along with the Technical Memorandum for Groundwater Investigation at Parcel E-2. The SDGs included the laboratory data deliverables defined in the SAP.

The EDDs were provided by APPL via electronic mail and contain the laboratory analytical results by SDG. The EDDs underwent a data checker to evaluate accuracy and completeness of information, and were then uploaded into the Kleinfelder-HPS database. Upon completion of the data quality assessment process, the validated data were finalized. Once finalized, the data were electronically submitted to the Department of the Navy's data repository, Naval Installation Restoration Information Solution (NIRIS), in the Navy Electronic Data Deliverable (NEDD) format.

Copies of the field forms, electronic laboratory analytical reports, and EDDs have been retained in the Kleinfelder-Oakland office in the project files.

8.0 References

CE2-Kleinfelder Joint Venture. 2008. Final Sampling and Analysis Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California. February.

CE2-Kleinfelder Joint Venture. 2008. Addendum 1 to the Final Sampling and Analysis Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California. March.

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USEPA. 1996. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition. Updates I, II, IIA, IIB, and III. OSWER. Washington, D.C. December.

USEPA. 1999a. U.S. EPA Contract Laboratory Program Statement of Work for Organic Analysis, Multi-media, Multi-concentration. Document Number OLM04.2. May.

USEPA. 1999b. National Functional Guidelines for Organic Data Review. Office of Emergency and Remedial Response. Washington, D.C. EPA-540/R-99-008. October.

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USEPA. 2004a. Statement of Work for Multi-media, Multi-concentration Inorganic Analysis (ILM05.3). March.

USEPA. 2004b. National Functional Guidelines for Inorganic Data Review. Office of Emergency and Remedial Response. Washington, D.C. EPA-540-R-04-004. October.

Appendix J.
Groundwater Sampling for Radionuclides at Parcel E-2

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Appendix J
Groundwater Sampling for Radionuclides at Parcel E-2

Hunters Point Shipyard
San Francisco, California

February 2009

Document Control No. CEKA-3001-0000-0011

Prepared for:

Department of the Navy
Base Realignment and Closure
Project Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:
CE2-Kleinfelder Joint Venture
7901 Stoneridge Drive, Suite 505
Pleasanton, California 94588
(925) 463-7301

Contract No.: N62473-07-C-3001
DO/CTO #: Not applicable. Stand-alone contract

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Appendix A. Project personnel sign-off sheets.

Appendix B. Analytical reports and chain-of-custody records.

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Abbreviations and Acronyms

BRAC	Base Realignment and Closure
Cs-137	cesium-137
Co-60	cobalt-60
COC	chain-of-custody
DOT	Department of Transportation
HPS	Hunters Point Shipyard
IDW	investigation-derived waste
JV	Joint Venture
mL	milliliter
Navy	United States Department of the Navy
NWT	New World Technology, Inc.
PALs	Project Action Limits
pCi/L	picoCuries per liter
Ra-226	radium-226
SAP	Sampling and Analysis Plan
Sr-90	strontium-90

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Executive Summary

CE2-Kleinfelder Joint Venture (CE2-Kleinfelder JV) has prepared this appendix to present radionuclide analytical results from groundwater sampling conducted between June 27 and July 1, 2008 at Parcel E-2. Radionuclides analyzed for were cesium-137 (Cs-137), cobalt-60 (Co-60), radium-226 (Ra-226), and strontium-90 (Sr-90). This supplements prior chemical analytical data provided in the Final Technical Memorandum for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, (HPS) San Francisco, California (Figure 1). This work was performed for the U.S. Department of the Navy (Navy), Base Realignment and Closure (BRAC) Project Management Office West, in accordance with Contract No. N62473-07-C-3001 except for analytical laboratory work which was performed under a separate contract between Tetra Tech ECI and the Navy. .

Sampling was conducted in accordance with a Work Plan addendum (CE2-Kleinfelder JV, 2008a) and a Sampling and Analysis Plan (SAP) addendum (CE2-Kleinfelder JV, 2008b).

Analysis was performed in accordance with the SAP addendum except that Ra-226 and Sr-90 were analyzed by an offsite analytical laboratory, TestAmerica.

The following scope of work was performed, in conjunction with and additional to the larger investigation:

- Grab groundwater samples were collected from the 61 temporary wells and 7 previously installed A-Aquifer piezometers between June 27 and July 1, 2008.
- Samples from the 61 temporary wells and 7 piezometers were analyzed for Cs-137, Ra-226, and Sr-90. Analysis for Co-60 was performed on samples from 11 of the temporary wells.

Summary of Analytical Results

Analytic results are reported in picoCuries/liter (pCi/L) and compared to HPS Project Action Limits (PALs) as follows:

Analyte	PAL (pCi/L)
Cs-137	111.9
Co-60	100
Ra-226	5
Sr-90	8

Analytic results from only two locations, TW004 and TW011, showed activities greater than PALs (11.0 and 6.08 pCi/L Ra-226, respectively).

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1.0 Introduction

CE2-Kleinfelder Joint Venture (CE2-Kleinfelder JV) has prepared this appendix to present radionuclide analytical results from groundwater sampling conducted between June 27 and July 1, 2008 at Parcel E-2. This supplements prior chemical analytical data provided in the Final Technical Memorandum for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, (HPS) San Francisco, California (Figure 1). This work was performed for the U.S. Department of the Navy (Navy), Base Realignment and Closure (BRAC) Project Management Office West, in accordance with Contract No. N62473-07-C-3001 except for analytical laboratory work which was performed under a separate contract between Tetra Tech ECI and the Navy.

This appendix presents the sampling and analytical work related to radionuclide investigation in groundwater conducted as implementation of the following documents:

- *Addendum 1 to the Work Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California* (CE2-Kleinfelder JV, 2008a).
- *Final Addendum 1 to the Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Groundwater Investigation at Parcel E-2* (CE2-Kleinfelder JV, 2008b).

Key personnel reviewed the Final Addendum 1 to the Final SAP prior to conducting the sampling event as indicated in the Personnel Sign-off Sheets included in Appendix A.

1.1 Project Objectives

The project objective for this work was to provide data to evaluate whether the A-Aquifer groundwater in Parcel E-2 has been impacted by radionuclides. This in turn will be used as supplemental data for the RI/FS report for evaluation of remedial alternatives for Parcel E-2.

1.2 Scope of Work

This radionuclide investigation consisted of the following field activities:

1. Groundwater samples were collected from the 61 temporary wells and 7 previously installed A-Aquifer piezometers, using a peristaltic pump. Temporary well and piezometer locations are shown on Plate 1.
2. Groundwater samples were analyzed for the following radionuclides (in all wells and piezometers except as noted below):
    - Cesium-137 (Cs-137).
    - Cobalt-60 (Co-6) - 11 temporary wells.
    - Radium-226 (Ra-226).
    - Strontium-90 (Sr-90).

Samples were collected by CE2-Kleinfelder JV personnel and submitted to the onsite analytical laboratory, New World Technology, Inc. (NWT) under contract with Tetra Tech ECI.

NWT subsequently submitted a complete set of samples to an offsite analytical laboratory, TestAmerica, for Ra-226 and Sr-90 analysis. NWT also submitted a subset of samples (from seven locations) to offsite analytical laboratory, Eberline Services, for confirmation analysis of Cs-137, Ra-226, and Sr-90 with one location to also be analyzed for Co-60.

2.0 Groundwater Sampling Methodology

Depth to water was measured in and groundwater samples were collected from the temporary wells and existing piezometers shown on Plate 1.

Prior to sampling, depth to water was measured with an electric water level indicator, relative to top of casing.

Samples were collected using a peristaltic pump located at ground surface with well-specific, disposable, Teflon-lined, plastic tubing lowered to within one foot of the bottom of each temporary well or piezometer. If the well/piezometer ran dry during the initial sampling attempt, samples were collected on subsequent days as water recharged into the well/piezometer.

Groundwater samples were collected by pumping the wells/piezometers at a rate of $\leq$ 500 mL/minute to minimize turbidity.

Samples were collected directly into pre-cleaned, laboratory-supplied sample containers (two 500-ml polyethylene containers per sampling location per radionuclide to be analyzed). Extra containers were filled if the location was to have a field duplicate or confirmatory sample.

The sample containers were placed in an ice-filled cooler for transport to the onsite analytical laboratory: NWT, following chain-of-custody protocol. The chain-of-custody records indicating transfer of samples from CE2-Kleinfelder JV to NWT are presented in Appendix B.

Samples were submitted to NWT unfiltered and unpreserved with chain of custody (COC) instruction for NWT to filter and acidify following sample receipt.

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3.0 Management of Investigation-Derived Waste

Investigation-derived waste (IDW) generated by the radionuclides sampling portion of this project included equipment decontamination water (rinsate), disposable sampling tubing and used personal protective equipment (PPE).

Equipment decontamination rinsate was collected in Department of Transportation (DOT)-approved 55-gallon drums and transported to the CE2-Kleinfelder JV field office where it was transferred into the 4,000-gallon storage tank used for storing purge water from the Basewide Groundwater Monitoring Program. That water was managed according to the IDW Management Plan for that Program.

Regular trash, disposal sampling tubing and PPE were placed in waste bins for offsite disposal as non-hazardous waste.

Less than one-quarter of a 55-gallon drum of soil had been generated from prior temporary well coring work at Parcel E-2. It was field-screened and cleared by NWT field radiation technicians. The soil was composite-sampled with other HPS drilling soil, also cleared for radiation, and profiled for offsite disposal. On February 9, 2009, the drum was transported offsite by North State Environmental (South San Francisco, California – U.S. EPA Hazardous Waste Transporter ID No. CAR000159459) for land disposal at Chemical Waste Management, Inc.'s Class I landfill in Kettleman City, California under manifest number 002507920FLE. This manifest was signed at the time of transport by Navy representative, Doug DeLong, Safety and Security Manager, BRAC PMO West. Once received and processed by the disposal facility, the fully executed manifest will be returned to Mr. DeLong for filing.

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4.0 Groundwater Analytical Results

Analytical results for groundwater sampling are reported based on the following analytical methods:

Normal field samples and field duplicates:

- Cs-137 and Co-60 – analysis performed by New World Technology using a proprietary analytical method utilizing gamma spectroscopy per standard operating procedures on file with the Navy.
- Ra-226 and Sr-90 _ analysis performed by TestAmerica by EPA 903.0 Modified and EPA 905, respectively.

Confirmation samples analysis performed by Eberline Services:

- Cs-137 by EPA 901.0 Modified.
- Co-60 by EPA 901.1.
- Ra-226 by EPA 903.1.
- Sr-90 by EPA 905.0.

Tables 1 and 2 show the analytical results for each location.

Table 1 presents analytical results for Cs-137 and Co-60 analyses. Table 2 presents analytical results for Ra-226 and Sr-60. Plate 1 shows the radionuclide analytical results at each sampled location. Co-60 results are shown on Plate 1 at the 11 temporary well locations specified in the SAP Addendum.

These analyses did not detect any of these analytes above their respective PALs except for Ra-226 at two locations as follows:

TW004 – Ra-226 was reported at 11.0 pCi/L

TW011 – Ra-226 was reported at 6.08 pCi/L

Laboratory analytical reports and chain-of-custody documents are included as Appendix B.

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5.0 Data Quality

This section summarizes the quality control measures implemented for this scope of work and deviations from the SAP addendum (CE2-Kleinfelder JV. 2008b).

Field duplicate and confirmation samples were collected at frequencies in accordance with the SAP addendum; 1 field duplicate per 10 field samples for each analyte rounded up to the nearest 10 field samples. Confirmation samples were submitted to Eberline Services at a rate of approximately 10 per cent of normal field samples. Results for both field duplicates and confirmation samples are shown on Tables 1 and 2 adjacent to their corresponding location-specific normal sample results. Groundwater sampling and analysis was conducted in accordance with procedures presented in the SAP addendum with the following deviations:

1. NWT did not perform Sr-90 analysis.
2. Samples were submitted to TestAmerica by NWT for Ra-226 and Sr-90 analysis.
3. TestAmerica used analytic method EPA 903.0 Modified for Ra-226 analysis. The SAP indicated use of NWT's standard operating procedure for the normal samples and, EPA Method 903.1 for confirmatory samples analyzed by Eberline Services, the offsite laboratory.
4. Confirmation sample analytical reports by Eberline Services did not undergo Level IV third-party validation (planned for Laboratory Data Consultants).

Two field duplicate and two confirmation sample locations were changed form locations indicated in the SAP addendum due to low groundwater recharge rates at the initially planned locations. This does not constitute a deviation as the frequency of these sample types met project requirements.

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6.0 References

CE2-Kleinfelder JV. 2008a. *"Addendum 1 to the Work Plan for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California.* June 23.

CE2-Kleinfelder JV. 2008b. *"Final Addendum 1 to the Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California.* June 23.

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Tables

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Table 1. Sample summary and analytical results for Cesium-137 and Cobalt-60 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Cesium-137: PAL = 111.9 pCi/L New World Technology Method					Cesium-137: PAL = 111.9 pCi/L EPA Method 901.0 Mod (Eberline)				Cobalt-60: PAL = 100 pCi/L New World Technology Method				
						New World Technology Method	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Result (pCi/L)	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)
Temporary Wells																			
TW001	panhandle	0827E021	6/30/2008	1035	N	23.985	F	43.901	43.921	22.2	-	-	-	-	2.4328	#B	22.807	22.808	12.3
TW002	panhandle	0826P009	6/27/2008	1338	N	8.5754	B	38.648	38.651	20.5	-	-	-	-	16.555	#F	10.947	10.986	15.0
TW003	panhandle	0826P006	6/27/2008	1153	N	12.085	F	18.363	18.375	9.86	-	-	-	-	11.715	F	18.727	18.738	10.0
TW004	panhandle	0826P011 (a)	6/27/2008	1424	N	9.1811	#B	28.982	28.986	14.1	-	-	-	-	-9.7505	#B	-111.04	-111.05	17.2
			6/30/2008	1500	*N*	34.566	F	36.794	*36.816*	27.8	-	-	-	-	25.707	#F	27.957	*27.973*	18.9
			7/1/2008	945	*N*	19.650	B	33.356	*33.364*	26.1	-	-	-	-	26.257	#F	24.537	*24.556*	18.4
TW005	panhandle	0826P007 (a)	6/27/2008	1317	N	-15.187	#B	-19.302	*-19.311*	10.9	-	-	-	-	15.401	#F	10.156	*10.172*	5.84
			6/30/2008	1510	N						-	-	-	-					
TW006	panhandle	0826P004	6/27/2008	1136	N	24.107		10.148	*10.255*	7.77	-	-	-	-	-1.9283	#B	13.799	*13.800*	8.76
TW006	panhandle	0826P005	6/27/2008	1142	C						0.192	U	0.48	10.0 / 0.840					
TW007	panhandle	0826P010	6/27/2008	1345	N	40.097		9.5582	*9.6736*	6.99	-	-	-	-	3.9199	B	5.4403	*5.4422*	5.97
TW008	panhandle	0827P025	6/30/2008	1453	N	9.5335	B	48.214	48.217	25.9	-	-	-	-	-45.829	#B	-131.60	-131.63	38.6
TW009	panhandle	0826P030	6/27/2008	1502	N	-0.97613	#B	285660	285660	17.8	-	-	-	-	44.573	F	43.380	43.451	18.9
TW010	panhandle	0827P022	6/30/2008	1047	N	36.068		32.066	*32.094*	23.2	-	-	-	-	60.772	#F	30.441	*30.524*	11.0
TW011	panhandle	0826P012	6/27/2008	1450	N	40.677		27.222	*27.264*	19.1	-	-	-	-	25.236	#	11.014	*11.054*	7.33
TW012	panhandle	0827E024 (a)	6/30/2008	1110	N	78.520		37.776	*37.889*	24.8	-	-	-	-	4.0544	#B	14.841	*14.842*	11.4

Table 1. Sample summary and analytical results for Cesium-137 and Cobalt-60 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Cesium-137: PAL = 111.9 pCi/L New World Technology Method					Cesium-137: PAL = 111.9 pCi/L EPA Method 901.0 Mod (Eberline)				Cobalt-60: PAL = 100 pCi/L New World Technology Method				
						New World Technology Method	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Result (pCi/L)	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)
TW013	panhandle	0827D018	6/30/2008	930	N	6.180	#B	19.979	19.982	10.2	-	-	-	-	29.997	#F	44.387	44.418	16.3
TW013	panhandle	0827D019	6/30/2008	935	C						0.037	U	0.41	10.0 / 0.761					
TW014	panhandle	0827D017	6/30/2008	920	N	11.318	B	43.707	43.711	23.2	-	-	-	-	-109.32	#B	-1156.0	-1156.0	33.5
TW015	panhandle	0826D016	6/27/2008	1500	N	41.368		29.772	*29.812*	20.8	-	-	-	-	4.2735	#B	11.104	*11.105*	10.7
TW016	panhandle	0826D015	6/27/2008	1440	N	39.511		33.611	*33.698*	24.6	-	-	-	-	26.633	F	24.627	*24.681*	18.1
TW017	panhandle	0826D014	6/27/2008	1420	N	11.253	B	35.853	35.859	18.8	-	-	-	-	13.806	#B	10.547	10.575	38.9
TW018	panhandle	0826D012	6/27/2008	1358	N	29.995		23.553	*23.624*	16.0	-	-	-	-	-0.34037	#B	9.4510	*9.4510*	28.2
	panhandle	0826D013	6/27/2008	1403	FD	19.928	F	34.863	34.881	17.2	-	-	-	-	-92.997	#B	432.87	432.90	37.6
TW019	panhandle	0826D011	6/27/2008	1345	N	22.314	F	40.823	40.842	20.7	-	-	-	-	6.6136	#F	11.854	11.860	5.11
TW020	panhandle	0826D007	6/27/2008	1148	N	12.950		16.832	16.848	8.94	-	-	-	-	22.273		19.285	19.325	8.70
TW020	panhandle	0826D008	6/27/2008	1153	C						0.613	U	0.57	10.0 / 0.941					
TW021	panhandle	0826D009	6/27/2008	1315	N	66.939		29.519	*29.624*	19.2	-	-	-	-	14.937	#B	31.965	*31.969*	16.9
TW022	panhandle	0826D010	6/27/2008	1330	N	8.9152	F	16.494	16.501	8.85	-	-	-	-	1.1012	B	2.1662	2.1671	10.5
TW023	panhandle	0827E022	6/30/2008	1050	N	1.2916	#B	9.5125	*9.5128*	8.8	-	-	-	-	4.6857	#B	219.32	*219.32*	68.0
TW024	panhandle	0826E014	6/27/2008	1455	N	29.474	B	59.833	59.855	31.2	-	-	-	-	23.449	#F	35.910	35.933	20.7
TW025	panhandle	0826E015	6/27/2008	1505	N	84.095	#	93.800	93.916	29.2	-	-	-	-	15.561	#B	18.148	18.168	17.7
TW026B	metal slag	0827P015	6/30/2008	906	N	20.361	F	39.135	39.151	19.5	-	-	-	-	6.4450	#B	12.439	12.444	15.3
TW027B	metal slag	0827P014	6/30/2008	850	N	30.129	F	31.256	*31.276*	23.0	-	-	-	-	11.387	#B	31.341	*31.344*	18.6

Table 1. Sample summary and analytical results for Cesium-137 and Cobalt-60 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Cesium-137: PAL = 111.9 pCi/L New World Technology Method					Cesium-137: PAL = 111.9 pCi/L EPA Method 901.0 Mod (Eberline)				Cobalt-60: PAL = 100 pCi/L New World Technology Method				
						New World Technology Method	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Result (pCi/L)	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)
TW028B	metal slag	0827P018	6/30/2008	936	N	12.014	B	38.382	38.388	20.0	-	-	-	-	4.7167	#B	30.470	30.471	10.2
TW029	metal slag	0827P016	6/30/2008	917	N	14.832	#B	37.084	37.094	16.7	-	-	-	-	0.15327	#B	7.0637	7.0637	6.19
TW029	metal slag	0827P017	6/30/2008	922	FD	13.055	B	49.349	49.354	26.3	-	-	-	-	-106.95	#B	-847.02	-847.04	36.0
TW030B	metal slag	0826P002	6/27/2008	1108	N	30.476	F	52.405	52.432	26.5	-	-	-	-	-7.6818	#B	-54.046	-54.048	15.4
TW030B	metal slag	0826P003	6/27/2008	1115	C						0.699	U	0.52	10.0 / 0.846					
TW031	landfill area	0826E008	6/27/2008	1135	N	12.611	B	56.914	56.918	30.5	-	-	-	-	60.839	#	43.999	44.129	22.9
TW031	landfill area	0826E009	6/27/2008	1140	FD	42.204	#	57.605	57.653	21.9	-	-	-	-	-1.3518	#B	-6.8997	-6.9001	15.7
TW032	landfill area	0826E007	6/27/2008	1125	N	16.872	B	42.872	42.882	22.3	-	-	-	-	185.94	#B	0.39743	0.39757	38.0
TW033	landfill area	0826E006	6/27/2008	1115	N	-1.0038	#B	251870	251870	21.5	-	-	-	-	52.660		37.502	37.617	22.1
TW034	PCB Hot Spot	0826D002 (a)	6/27/2008	951	N	19.760	B	47.140	47.153	24.4	-	-	-	-	10.766	#B	21.993	22.001	12.5
TW035	PCB Hot Spot	0826E001 (a)	6/27/2008	931	N	6.9257	B	35.563	35.565	19.0	-	-	-	-	-104.49	#B	-644.19	-644.22	35.0
			6/30/2008	942	N						-	-	-	-					
TW036	PCB Hot Spot	0826E002	6/27/2008	955	N	40.488		36.718	*36.749*	27.2	-	-	-	-	-0.45815	#B	-9.3880	*-9.3881*	9.97
TW037	PCB Hot Spot	0826P001 (a)	6/27/2008	929	N	55.786		32.785	*32.850*	21.8	-	-	-	-	51.040	#F	28.322	*28.386*	10.8
			6/30/2008	1130	N						-	-	-	-					

Table 1. Sample summary and analytical results for Cesium-137 and Cobalt-60 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Cesium-137: PAL = 111.9 pCi/L New World Technology Method					Cesium-137: PAL = 111.9 pCi/L EPA Method 901.0 Mod (Eberline)				Cobalt-60: PAL = 100 pCi/L New World Technology Method				
						New World Technology Method	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Result (pCi/L)	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)
TW038	PCB Hot Spot	0826D001 (a)	6/27/2008	924	N	31.596		39.743	39.781	18.9	-	-	-	-	6.4163	#B	12.843	12.848	10.5
			6/30/2008	836	N						-	-	-	-					
TW039	landfill area	0826E011	6/27/2008	1335	N	43.476		53.482	53.537	26.4	-	-	-	-	51.589	#F	57.180	57.252	20.3
TW040	landfill area	0826E010	6/27/2008	1320	N	41.725		30.302	*30.341*	20.9	-	-	-	-	25.419	#F	30.271	*30.286*	16.6
TW041	landfill area	0826E012	6/27/2008	1400	N	29.621	F	47.363	47.391	23.8	-	-	-	-	51.401	#F	67.228	67.289	23.4
TW042	panhandle	0826E013	6/27/2008	1430	N	62.508		28.468	*28.563*	18.4	-	-	-	-	11.953	#F	8.4854	*8.4970*	6.76
TW043	panhandle	0827E027	6/30/2008	1425	N	32.116	B	42.787	*42.804*	33.1	-	-	-	-	7.3907	#F	7.3612	*7.3663*	5.99
TW044	panhandle	0827E025	6/30/2008	1130	N	44.877		39.042	*39.077*	28.8	-	-	-	-	-1.7968	#B	-11.353	*-11.354*	8.57
TW045	panhandle	0826P008 (a)	6/27/2008	1325	N	73.220		29.820	*29.944*	18.6	-	-	-	-	6.6128	#B	12.049	*12.052*	8.70
			6/30/2008	1521	N						-	-	-	-					
TW046	panhandle	0827D020	6/30/2008	1000	N	14.060	B	58.598	58.603	31.4	-	-	-	-	33.168	#F	44.129	44.167	24.8
TW047	panhandle	0827D021	6/30/2008	1025	N	21.259	B	42.751	42.767	21.7	-	-	-	-	23.002	#F	23.011	23.046	6.00
TW048	panhandle	0827D022	6/30/2008	1040	N	7.4253	B	42.727	42.729	29.9	-	-	-	-	7.7341	#B	22.935	22.939	20.1
TW049	panhandle	0827E020	6/30/2008	1020	N	13.841	B	52.762	52.768	28.1	-	-	-	-	-15.624	#B	-227.32	-227.32	15.3
TW050	panhandle	0827E023	6/30/2008	1100	N	1.7069	B	37.088	37.088	20.3	-	-	-	-	60.819	#F	50.292	50.405	18.0
TW051	panhandle	0826D003	6/27/2008	1014	N	72.047	#	64.700	64.824	21.7	-	-	-	-	-18.497	#B	-15.061	-15.096	41.7
TW051	panhandle	0826D004	6/27/2008	1019	C						0.276	U	0.42	10.0 / 0.750					
TW052	panhandle	0826D006	6/27/2008	1124	N	20.522	F	38.152	38.170	19.1	-	-	-	-	46.147	#F	59.200	59.256	19.2

Table 1. Sample summary and analytical results for Cesium-137 and Cobalt-60 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Cesium-137: PAL = 111.9 pCi/L New World Technology Method					Cesium-137: PAL = 111.9 pCi/L EPA Method 901.0 Mod (Eberline)				Cobalt-60: PAL = 100 pCi/L New World Technology Method				
						New World Technology Method	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Result (pCi/L)	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)
TW053	panhandle	0826D005	6/27/2008	1038	N	43.899		30.527	*30.570*	21.9	-	-	-	-	9.8766	#F	9.2152	*9.2225*	7.37
TW054	panhandle	0827P024	6/30/2008	1435	N	83.760	#	36.385	*36.518*	17.0	-	-	-	-	7.7725	#F	8.2430	*8.2481*	5.90
TW055	panhandle	0827P003	6/30/2008	1425	N	22.737	B	46.430	46.447	23.8	-	-	-	-	-93.085	#B	-319.74	-319.78	37.2
TW056	panhandle	0827P028	7/1/2008	925	N	31.354	#F	48.363	48.395	18.7	-	-	-	-	25.820	#F	27.042	27.081	9.13
TW056	panhandle	0827P029	7/1/2008	930	FD	-1.1755	#B	219.44	219.440	23.7	-	-	-	-	14.820	#B	23.037	23.051	15.9
TW057B	panhandle	0827P026	7/1/2008	913	N	23.227	B	59.185	59.199	31.1	-	-	-	-	14.369	#F	22.566	22.580	8.55
TW057B	panhandle	0827P027	7/1/2008	918	FD	59.237		29.517	*29.599*	19.6	-	-	-	-	0.97905	#B	2.1957	*2.1960*	6.21
TW058	panhandle	0827P021	6/30/2008	1027	N	69.810		32.969	*33.071*	22.1	-	-	-	-	30.280	#F	31.554	*31.574*	15.0
TW059	panhandle	0827P013	6/30/2008	835	N	39.243		36.783	36.848	16.4	-	-	-	-	-93.472	#B	-540.45	-540.48	41.6
TW060	panhandle	0827D025	6/30/2008	1400	N	51.112		29.476	*29.537*	20.2	-	-	-	-	10.831	#F	10.457	*10.465*	5.85
TW061	panhandle	0827D024	6/30/2008	1345	N	11.104	B	35.766	35.772	18.7	-	-	-	-	-44.868	#B	-147.48	-147.50	37.5
Piezometer Wells																			
PZ131F	landfill area	0827E026 (a)	6/30/2008	1320	N	68.266	#	64.027	64.139	20.9	-	-	-	-	-17.001	#B	-171.72	-171.72	14.9
PZ138E	landfill area	0826E005	6/27/2008	1050	N	51.702		34.935	34.987	24.5	-	-	-	-	4.4505	#B	16.441	16.441	12.1
PZ138F	landfill area	0826E003	6/27/2008	1025	N	11.210	F	16.930	16.941	9.1	-	-	-	-	-96.984	B	-426.75	-426.78	14.6
PZ138F	landfill area	0826E004	6/27/2008	1030	C						0.2	U	0.31	10.0 / 0.552					

Table 1. Sample summary and analytical results for Cesium-137 and Cobalt-60 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Cesium-137: PAL = 111.9 pCi/L New World Technology Method					Cesium-137: PAL = 111.9 pCi/L EPA Method 901.0 Mod (Eberline)				Cobalt-60: PAL = 100 pCi/L New World Technology Method				
						New World Technology Method	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Result (pCi/L)	Data Qualifier	Uncertainty Counting (pCi/L)	3 Sigma Total (*italics* = 2 Sigma Total) (pCi/L)	MDA (pCi/L)
PZ144E	landfill area	0827E016	6/30/2008	920	N	52.521		29.784	29.848	20.4	-	-	-	-	27.233	F	16.102	16.134	22.1
PZ144E	landfill area	0827E017	6/30/2008	925	C						0.171	U	0.30	10.0 / 0.523					
PZ150D	landfill area	0827D023	6/30/2008	1110	N	26.680	F	47.934	47.957	24.4	-	-	-	-	47.463	#F	66.498	66.550	23.3
PZ150E	landfill area	0827E030	7/1/2008	1417	N	59.347		31.469	31.546	21.5	-	-	-	-	28.356	#F	29.296	29.315	15.8
PZ150E	landfill area	0827E031	7/1/2008	1421	FD	18.931	B	40.678	40.691	20.7	-	-	-	-	56.871	#F	59.363	59.447	17.9
PZ161D	landfill area	0827E028	7/1/2008	1030	N	39.899		34.201	34.287	24.8	-	-	-	-	-8.7522	#B	976.69	976.69	73.4
PZ161D	landfill area	0827E029	7/1/2008	1035	FD	31.489	F	31.892	31.913	23.4	-	-	-	-	8.0314	#B	15.321	15.324	10.6

Notes:

(a) Well exhibited low recharge; sample containers filled on two or more days with same sample ID. Results shown adjacent to sampling date listed on analytical report. New World Technology performed and reported separate analyses for the three sampling dates for TW004.

Laboratory Qualifiers:

# = New World Technology data qualifier; "All peaks for activity calculation had bad shape."
B = New World Technology data qualifier; "Activity <MDA and failed test."
F = New World Technology data qualifier; "Failed fraction or key line test."
U = Result is less than the sample detection limit

Abbreviations:

C = Confirmation sample
FD = Field Duplicate
MDA = Minimum detectable activity
N = Normal sample
PAL = Project action limit
pCi/L = picoCuries/liter
PZ = Piezometer
RDL = Reportable detection limit
TW = Temporary well

Table 2. Sample summary and analytical results for radium-226 and strontium-90 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (TestAmerica)					Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (Eberline)				Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (TestAmerica)					Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (Eberline)			
						Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)
Temporary Wells																							
TW001	panhandle	0827E021	6/30/2008	1035	N	Yes	1.06		0.23	1.00 / 0.14	-	-	-	-	Yes	0.1	U	0.15	3.00 / 0.26	-	-	-	-
TW002	panhandle	0826P009	6/27/2008	1338	N	Yes	0.14	U	0.12	1.00 / 0.18	-	-	-	-	Yes	0.03	U	0.26	3.00 / 0.46	-	-	-	-
TW003	panhandle	0826P006	6/27/2008	1153	N	No	0.18	J	0.10	1.00 / 0.13	-	-	-	-	Yes	0.28	U	0.54	3.00 / 0.91	-	-	-	-
TW004	panhandle	0826P011 (a)	6/27/2008	1424	N	No	11.0		1.1	1.0 / 0.2	-	-	-	-	Yes	-1.2	U	1.3	3.0 / 2.4	-	-	-	-
			6/30/2008	1500	*N*						-	-	-	-						-	-	-	-
			7/1/2008	945	*N*						-	-	-	-						-	-	-	-
TW005	panhandle	0826P007 (a)	6/27/2008	1317	N						-	-	-	-						-	-	-	-
			6/30/2008	1510	N	Yes	0.40	J	0.13	1.00 / 0.11	-	-	-	-	Yes	0.15	U	0.16	3.00 / 0.26	-	-	-	-
TW006	panhandle	0826P004	6/27/2008	1136	N	Yes	0.42	J	0.14	1.00 / 0.12	-	-	-	-	Yes	-0.8	U	1.2	3.0 / 2.2	-	-	-	-
TW006	panhandle	0826P005	6/27/2008	1142	C						0.288	U	0.30	1.00 / 0.480						0	U	0.22	2.00 / 0.426
TW007	panhandle	0826P010	6/27/2008	1345	N	Yes	0.16	U	0.12	1.00 / 0.18	-	-	-	-	Yes	0.24	U	0.21	3.00 / 0.34	-	-	-	-
TW008	panhandle	0827P025	6/30/2008	1453	N	Yes	0.58	J	0.20	1.00 / 0.20	-	-	-	-	Yes	0.25	U	0.18	3.00 / 0.28	-	-	-	-
TW009	panhandle	0826P030	6/27/2008	1502	N	Yes	0.16	U	0.11	1.00 / 0.16	-	-	-	-	Yes	-0.69	U	0.81	3.00 / 1.5	-	-	-	-
TW010	panhandle	0827P022	6/30/2008	1047	N	Yes	0.24	J	0.11	1.00 / 0.12	-	-	-	-	Yes	-1.09	U	0.86	3.00 / 1.7	-	-	-	-
TW011	panhandle	0826P012	6/27/2008	1450	N	Yes	0.43	J	0.14	1.00 / 0.12	-	-	-	-	Yes	0.009	U	0.92	3.0 / 1.6	-	-	-	-
TW012	panhandle	0827E024 (a)	6/30/2008	1110	N	No	6.08		0.81	1.00 / 0.28	-	-	-	-	Yes	0.55	U	0.76	3.0 / 1.3	-	-	-	-

Table 2. Sample summary and analytical results for radium-226 and strontium-90 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (TestAmerica)					Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (Eberline)				Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (TestAmerica)					Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (Eberline)			
						Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)
TW013	panhandle	0827D018	6/30/2008	930	N	Yes	0.80	J	0.20	1.00 / 0.13	-	-	-	-	Yes	0.1	U	0.14	3.00 / 0.23	-	-	-	-
TW013	panhandle	0827D019	6/30/2008	935	C						0.375	U	0.36	1.00 / 0.566						-0.055	U	0.37	2.00 / 0.735
TW014	panhandle	0827D017	6/30/2008	920	N	Yes	0.52	J	0.16	1.00 / 0.13	-	-	-	-	Yes	0.17	U	0.16	3.00 / 0.25	-	-	-	-
TW015	panhandle	0826D016	6/27/2008	1500	N	Yes	0.52	J	0.16	1.00 / 0.13	-	-	-	-	Yes	-0.3	U	1.4	3.0 / 2.4	-	-	-	-
TW016	panhandle	0826D015	6/27/2008	1440	N	Yes	0.51	J	0.16	1.00 / 0.12	-	-	-	-	Yes	1.0	U	1.1	3.0 / 1.8	-	-	-	-
TW017	panhandle	0826D014	6/27/2008	1420	N	Yes	0.54	J	0.18	1.00 / 0.18	-	-	-	-	Yes	0.07	U	0.18	3.00 / 0.30	-	-	-	-
TW018	panhandle	0826D012	6/27/2008	1358	N	No	0.25	J	0.14	1.00 / 0.17	-	-	-	-	Yes	-0.28	U	0.9	3.00 / 1.6	-	-	-	-
	panhandle	0826D013	6/27/2008	1403	FD	No	0.36	J	0.14	1.00 / 1.3	-	-	-	-	Yes	0.29	U	0.43	3.00 / 0.72	-	-	-	-
TW019	panhandle	0826D011	6/27/2008	1345	N	Yes	0.30	J	0.13	1.00 / 0.14	-	-	-	-	Yes	-0.3	U	1	3.0 / 1.8	-	-	-	-
TW020	panhandle	0826D007	6/27/2008	1148	N	Yes	0.26	J	0.16	1.00 / 0.21	-	-	-	-	Yes	0.92	U	0.98	3.00 / 1.6	-	-	-	-
TW020	panhandle	0826D008	6/27/2008	1153	C						0.275	U	0.33	1.00 / 0.538						0.437	U	0.27	2.00 / 0.447
TW021	panhandle	0826D009	6/27/2008	1315	N	Yes	0.31	J	0.14	1.00 / 0.15	-	-	-	-	Yes	0.08	U	0.20	3.00 / 0.34	-	-	-	-
TW022	panhandle	0826D010	6/27/2008	1330	N	Yes	0.37	J	0.18	1.00 / 0.22	-	-	-	-	Yes	-0.5	U	1.2	3.0 / 2.2	-	-	-	-
TW023	panhandle	0827E022	6/30/2008	1050	N	No	0.28	J	0.16	1.00 / 0.20	-	-	-	-	Yes	0.84	U	0.98	3.00 / 1.6	-	-	-	-
TW024	panhandle	0826E014	6/27/2008	1455	N	Yes	0.21	J	0.11	1.00 / 0.13	-	-	-	-	Yes	0.5	U	1.3	3.0 / 2.1	-	-	-	-
TW025	panhandle	0826E015	6/27/2008	1505	N	No	0.25	J	0.11	1.00 / 0.11	-	-	-	-	Yes	0.03	U	0.91	3.00 / 1.6	-	-	-	-
TW026B	metal slag	0827P015	6/30/2008	906	N	No	0.58	J	0.17	1.00 / 0.13	-	-	-	-	Yes	0.02	U	0.83	3.00 / 1.4	-	-	-	-
TW027B	metal slag	0827P014	6/30/2008	850	N	Yes	0.53	J	0.16	1.00 / 0.12	-	-	-	-	Yes	0.48	U	0.84	3.00 / 1.4	-	-	-	-
TW028B	metal slag	0827P018	6/30/2008	936	N	Yes	0.20	J	0.12	1.00 / 0.16	-	-	-	-	Yes	0.09	U	0.21	3.00 / 0.36	-	-	-	-

Table 2. Sample summary and analytical results for radium-226 and strontium-90 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (TestAmerica)					Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (Eberline)				Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (TestAmerica)					Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (Eberline)			
						Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)
TW029	metal slag	0827P016	6/30/2008	917	N	No	0.56	J	0.17	1.00 / 0.14	-	-	-	-	Yes	-0.07	U	0.29	3.00 / 0.52	-	-	-	-
TW029	metal slag	0827P017	6/30/2008	922	FD	Yes	0.37	J	0.15	1.00 / 0.16	-	-	-	-	Yes	1.47	J	0.89	3.00 / 1.3	-	-	-	-
TW030B	metal slag	0826P002	6/27/2008	1108	N	Yes	0.15	J	0.11	1.00 / 0.15	-	-	-	-	Yes	0.17	U	0.16	3.00 / 0.25	-	-	-	-
TW030B	metal slag	0826P003	6/27/2008	1115	C						0.165	U	0.33	1.00 / 0.576						-0.018	U	0.37	2.00 / 0.638
TW031	landfill area	0826E008	6/27/2008	1135	N	Yes	0.62	J	0.19	1.00 / 0.15	-	-	-	-	Yes	-0.07	U	0.92	3.00 / 1.6	-	-	-	-
TW031	landfill area	0826E009	6/27/2008	1140	FD	No	0.43	J	0.14	1.00 / 0.13	-	-	-	-	Yes	-0.02	U	0.84	3.00 / 1.5	-	-	-	-
TW032	landfill area	0826E007	6/27/2008	1125	N	No	0.87	J	0.2	1.00 / 0.12	-	-	-	-	Yes	0.34	U	0.73	3.00 / 1.2	-	-	-	-
TW033	landfill area	0826E006	6/27/2008	1115	N	No	0.44	J	0.15	1.00 / 0.12	-	-	-	-	Yes	0.13	U	0.47	3.00 / 0.80	-	-	-	-
TW034	PCB Hot Spot	0826D002 (a)	6/27/2008	951	N	No	0.85	J	0.22	1.00 / 0.16	-	-	-	-	Yes	-0.26	U	0.98	3.00 / 1.7	-	-	-	-
TW035	PCB Hot Spot	0826E001 (a)	6/27/2008	931	N						-	-	-	-						-	-	-	-
			6/30/2008	942	N	No	2.42		0.35	1.00 / 0.15	-	-	-	-	Yes	-0.22	U	0.82	3.00 / 1.4	-	-	-	-
TW036	PCB Hot Spot	0826E002	6/27/2008	955	N	Yes	0.33	J	0.15	1.00 / 0.16	-	-	-	-	Yes	-0.15	U	0.21	3.00 / 0.39	-	-	-	-
TW037	PCB Hot Spot	0826P001 (a)	6/27/2008	929	N						-	-	-	-						-	-	-	-
			6/30/2008	1130	N	No	0.41	J	0.17	1.00 / 0.19	-	-	-	-	Yes	-0.36	U	0.67	3.00 / 1.2	-	-	-	-

Table 2. Sample summary and analytical results for radium-226 and strontium-90 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (TestAmerica)					Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (Eberline)				Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (TestAmerica)					Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (Eberline)			
						Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)
TW038	PCB Hot Spot	0826D001 (a)	6/27/2008	924	N						-	-	-	-						-	-	-	-
			6/30/2008	836	N	No	0.50	J	0.19	1.00 / 0.19	-	-	-	-	Yes	0.28	U	0.67	3.00 / 1.1	-	-	-	-
TW039	landfill area	0826E011	6/27/2008	1335	N	Yes	0.72	J	0.20	1.00 / 0.16	-	-	-	-	Yes	0.28	U	0.19	3.00 / 0.29	-	-	-	-
TW040	landfill area	0826E010	6/27/2008	1320	N	Yes	0.93	J	0.24	1.00 / 0.15	-	-	-	-	Yes	1.0	U	1.1	3.0 / 1.9	-	-	-	-
TW041	landfill area	0826E012	6/27/2008	1400	N	No	0.44	J	0.16	1.00 / 0.15	-	-	-	-	Yes	0.63	U	0.51	3.00 / 0.82	-	-	-	-
TW042	panhandle	0826E013	6/27/2008	1430	N	No	0.80	J	0.19	1.00 / 0.12	-	-	-	-	Yes	0.89	U	0.67	3.00 / 1.0	-	-	-	-
TW043	panhandle	0827E027	6/30/2008	1425	N	Yes	0.29	J	0.13	1.00 / 0.14	-	-	-	-	Yes	0.14	U	0.14	3.00 / 0.22	-	-	-	-
TW044	panhandle	0827E025	6/30/2008	1130	N	No	0.13	U	0.11	1.00 / 0.17	-	-	-	-	Yes	-1.5	U	1.2	3.0 / 2.2	-	-	-	-
TW045	panhandle	0826P008 (a)	6/27/2008	1325	N	No	1.72		0.28	1.00 / 0.13	-	-	-	-	Yes	0.04	U	0.45	3.00 / 0.77	-	-	-	-
			6/30/2008	1521	N						-	-	-	-						-	-	-	-
TW046	panhandle	0827D020	6/30/2008	1000	N	Yes	0.45	J	0.16	1.00 / 0.14	-	-	-	-	Yes	-0.3	U	1.0	3.0 / 1.9	-	-	-	-
TW047	panhandle	0827D021	6/30/2008	1025	N	Yes	0.25	J	0.12	1.00 / 0.14	-	-	-	-	Yes	0.22	J	0.14	3.00 / 0.21	-	-	-	-
TW048	panhandle	0827D022	6/30/2008	1040	N	Yes	0.072	U	0.085	1.00 / 0.13	-	-	-	-	Yes	0.21	U	0.23	3.00 / 0.37	-	-	-	-
TW049	panhandle	0827E020	6/30/2008	1020	N	Yes	0.31	J	0.15	1.00 / 0.18	-	-	-	-	Yes	0.28	U	0.19	3.00 / 0.29	-	-	-	-
TW050	panhandle	0827E023	6/30/2008	1100	N	Yes	0.24	J	0.12	1.00 / 0.15	-	-	-	-	Yes	0.24	U	0.23	3.00 / 0.36	-	-	-	-
TW051	panhandle	0826D003	6/27/2008	1014	N	Yes	0.33	J	0.17	1.00 / 0.21	-	-	-	-	Yes	0.06	U	0.94	3.00 / 1.6	-	-	-	-
TW051	panhandle	0826D004	6/27/2008	1019	C						0.416	U	0.35	1.00 / 0.525						0.278	U	0.35	2.00 / 0.627
TW052	panhandle	0826D006	6/27/2008	1124	N	Yes	0.23	J	0.13	1.00 / 0.16	-	-	-	-	Yes	-0.58	U	0.84	3.00 / 1.6	-	-	-	-
TW053	panhandle	0826D005	6/27/2008	1038	N	No	0.42	J	0.15	1.00 / 0.14	-	-	-	-	Yes	0.19	U	0.67	3.00 / 1.1	-	-	-	-

Table 2. Sample summary and analytical results for radium-226 and strontium-90 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (TestAmerica)					Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (Eberline)				Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (TestAmerica)					Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (Eberline)			
						Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)
TW054	panhandle	0827P024	6/30/2008	1435	N	No	0.93	J	0.25	1.00 / 0.21	-	-	-	-	Yes	-0.18	U	0.62	3.00 / 1.1	-	-	-	-
TW055	panhandle	0827P003	6/30/2008	1425	N	No	0.79	J	0.23	1.00 / 0.20	-	-	-	-	Yes	0.51	U	0.74	3.00 / 1.2	-	-	-	-
TW056	panhandle	0827P028	7/1/2008	925	N	No	0.28	J	0.14	1.00 / 0.16	-	-	-	-	Yes	0.6	U	1.1	3.0 / 1.8	-	-	-	-
TW056	panhandle	0827P029	7/1/2008	930	FD	No	0.45	J	0.16	1.00 / 0.15	-	-	-	-	Yes	0.53	U	0.93	3.00 / 1.6	-	-	-	-
TW057B	panhandle	0827P026	7/1/2008	913	N	No	0.33	J	0.14	1.00 / 0.13	-	-	-	-	Yes	0.57	U	0.71	3.00 / 1.2	-	-	-	-
TW057B	panhandle	0827P027	7/1/2008	918	FD	No	0.17	J	0.12	1.00 / 0.17	-	-	-	-	Yes	-0.43	U	0.91	3.00 / 1.7	-	-	-	-
TW058	panhandle	0827P021	6/30/2008	1027	N	Yes	0.41	J	0.16	1.00 / 0.16	-	-	-	-	Yes	0.40	J	0.23	3.00 / 0.35	-	-	-	-
TW059	panhandle	0827P013	6/30/2008	835	N	Yes	0.46	J	0.16	1.00 / 0.14	-	-	-	-	Yes	-0.3	U	1.0	3.0 / 1.8	-	-	-	-
TW060	panhandle	0827D025	6/30/2008	1400	N	No	0.171	J	0.098	1.00 / 0.12	-	-	-	-	Yes	0.59	J	0.35	3.00 / 0.52	-	-	-	-
TW061	panhandle	0827D024	6/30/2008	1345	N	No	0.23	J	0.14	1.00 / 0.19	-	-	-	-	Yes	1.82	J	0.75	3.00 / 1.0	-	-	-	-
Piezometer Wells																							
PZ131F	landfill area	0827E026 (a)	6/30/2008	1320	N	No	0.069	U	0.073	1.00 / 0.11	-	-	-	-	Yes	-0.16	U	0.87	3.00 / 1.6	-	-	-	-
PZ138E	landfill area	0826E005	6/27/2008	1050	N	No	0.26	J	0.12	1.00 / 0.12	-	-	-	-	Yes	0.17	U	0.69	3.00 / 1.2	-	-	-	-
PZ138F	landfill area	0826E003	6/27/2008	1025	N	Yes	0.15	U	0.12	1.00 / 0.17	-	-	-	-	Yes	0.2	U	1.1	3.0 / 1.8	-	-	-	-
PZ138F	landfill area	0826E004	6/27/2008	1030	C						0.324	U	0.31	1.00 / 0.498						0.362	U	0.34	2.00 / 0.582

Table 2. Sample summary and analytical results for radium-226 and strontium-90 in Parcel E-2 groundwater.

Temporary Well or Piezometer ID	Installation location area	Sample ID	Sample Date	Sample Time	Sample Type	Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (TestAmerica)					Radium-226: PAL = 5 pCi/L EPA Method 903.0 Mod (Eberline)				Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (TestAmerica)					Strontium-90: PAL = 8 pCI/L EPA Method 905 Mod (Eberline)			
						Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)	Filtered Yes/No (b)	Result (pCi/L)	Data Qualifier	± 2σ Error (pCi/L)	RL / MDC (pCi/L)	Result (pCi/L)	Data Qualifier	2σ Error (pCi/L)	RDL / MDA (pCi/L)
PZ144E	landfill area	0827E016	6/30/2008	920	N	Yes	0.63	J	0.19	1.00 / 0.17	-	-	-	-	Yes	0.4	U	1.0	3.0 / 1.7	-	-	-	-
PZ144E	landfill area	0827E017	6/30/2008	925	C						0.616		0.39	1.00 / 0.530						0.181	U	0.28	2.00 / 0.522
PZ150D	landfill area	0827D023	6/30/2008	1110	N	Yes	1.30		0.28	1.00 / 0.18	-	-	-	-	Yes	0.34	J	0.18	3.00 / 0.26	-	-	-	-
PZ150E	landfill area	0827E030	7/1/2008	1417	N	No	0.59	J	0.16	1.00 / 0.11	-	-	-	-	Yes	0.40	U	0.49	3.00 / 0.80	-	-	-	-
PZ150E	landfill area	0827E031	7/1/2008	1421	FD	No	0.54	J	0.16	1.00 / 0.14	-	-	-	-	Yes	0.08	U	0.35	3.00 / 0.60	-	-	-	-
PZ161D	landfill area	0827E028	7/1/2008	1030	N	No	0.64	J	0.17	1.00 / 0.13	-	-	-	-	Yes	-0.08	U	0.61	3.00 / 1.1	-	-	-	-
PZ161D	landfill area	0827E029	7/1/2008	1035	FD	No	0.73	J	0.18	1.00 / 0.12	-	-	-	-	Yes	0.10	U	0.48	3.00 / 0.83	-	-	-	-

Notes:

(a) Well exhibited low recharge; sample containers filled on two or more days with same sample ID.
Results shown adjacent to sampling date listed on analytical report.

(b) Filtering based on TestAmerica analytical report narrative. "Yes" indicates filtering was conducted by TestAmerica. "No" indicates no mention of sample being filtered by TestAmerica.

Laboratory Qualifiers:

J = Result is greater than sample detection limit but less than stated reporting limit
U = Result is less than the sample detection limit

Abbreviations:

C = Confirmation sample
COC = Chain of custody
FD = Field Duplicate
MDA = Minimum detectable activity
MDC = Minimum detectable concentration (per TestAmerica)
N = Normal sample
PAL = Project action limit

Plate

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Appendix A.
Project personnel sign-off sheets

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SAP Worksheet #4 -- Project Personnel Sign-Off Sheet

Name	Organization/Title/Role	Telephone Number (optional)	Signature/email receipt	SAP Section Reviewed	Date SAP Read
Hamide Kayaci	Navy / RPM	619-532-0930	9/9/09 —	complete SAP	6/26/08
Patrick Owens	RASO / Environmental Protection Manager	757-887-7644			
Edward Kilduff	CE2-Kleinfelder JV / Program Manager	925-463-7301			
Thomas Berry	CE2-Kleinfelder JV / Project Manager	925-463-7301			
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Stacie Wissler	CE2-Kleinfelder JV /Project Chemist	858-320-2263			
Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Bill Dougherty	TtECI	415-216-2731			
Paul Wall	New World Technology, Inc.	415-216-2739			
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
TBD[1]	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

[1] = Sampling personnel to be determined (TBD) by Field Manager at time of final work scheduling.

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Hamide Kayaci	Navy / RPM	619-532-0930			
Patrick Owens	RASO / Environmental Protection Manager	757-887-7644	Laura Spoonan for	Entire SAP	6/25/08
Edward Kilduff	CE2-Kleinfelder JV / Program Manager	925-463-7301			
Thomas Berry	CE2-Kleinfelder JV / Project Manager	925-463-7301			
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Stacie Wissler	CE2-Kleinfelder JV /Project Chemist	858-320-2263			
Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Bill Dougherty	TtECI	415-216-2731			
Paul Wall	New World Technology, Inc.	415-216-2739			
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
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Patrick Owens	RASO / Environmental Protection Manager	757-887-7644			
Edward Kilduff	CE2-Kleinfelder JV / Program Manager	925-463-7301		Complete SAP w/Addendum 1	6/24/08
Thomas Berry	CE2-Kleinfelder JV / Project Manager	925-463-7301		Complete SAP w/Addendum 1	6/23/08
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Stacie Wissler	CE2-Kleinfelder JV /Project Chemist	858-320-2263			
Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000			
Diane Anderson	APPL	559-275-2175			
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Paul Wall	New World Technology, Inc.	415-216-2739			
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Thomas Berry	CE2-Kleinfelder JV / Project Manager	925-463-7301			
Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000	Gary Goodemote	complete	6/25/08
Stacie Wissler	CE2-Kleinfelder JV /Project Chemist	858-320-2263		Complete	6/25/08
Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Bill Dougherty	TtECI	415-216-2731			
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Gary Goodemote	CE2-Kleinfelder JV / Project QAO	510-628-9000			
Stacie Wissler	CE2-Kleinfelder JV /Project Chemist	858-320-2263			
Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000	Patricia Walters	Entire SAP	6/26/08
Diane Anderson	APPL	559-275-2175			
Bill Dougherty	TtECI	415-216-2731			
Paul Wall	New World Technology, Inc.	415-216-2739			
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633			
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Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000			
Diane Anderson	APPL	559-275-2175	Diane Anderson	3,4,5,6,7,14,15,16,20-29 30,34	6/25/08
Bill Dougherty	TtECI	415-216-2731			
Paul Wall	New World Technology, Inc.	415-216-2739			
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
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Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Bill Dougherty	TtECI	415-216-2731	[signature]	A1	5/19/08
Paul Wall	New World Technology, Inc.	415-216-2739			
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
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Patricia Walters	CE2-Kleinfelder JV / Data Manager	510-628-9000			
Diane Anderson	APPL	559-275-2175			
Bill Dougherty	TtECI	415-216-2731			
Paul Wall	New World Technology, Inc.	415-216-2739	Paul Wall	5/28/08 (ADD A1)	6/26/08
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633			
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
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Paul Wall	New World Technology, Inc.	415-216-2739			
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633	Rodney Melgard	SAP Addendum # 1	6/27/08
Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
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Bill Dougherty	TtECI	415-216-2731			
Paul Wall	New World Technology, Inc.	415-216-2739			
Rod Melgard	Eberline Services / Laboratory Director	510-235-2633			
Richard Amano	LDC	760-634-0437	[illegible]	WS #34, 35 & 36	6/25/08
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000			
TBD[1]	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

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Richard Amano	LDC	760-634-0437			
Tom Sayre	CE2-Kleinfelder JV / Field Manager, On-Site H&S Officer	510-628-9000		Complete SAP	06/26/2008
TBD[1]	CE2-Kleinfelder JV / Sampling personnel	Not applicable			

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Appendix B.
Analytical reports and chain-of-custody records
(CD only)

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DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

5070
Ser BPMOW.hk/0083

Mr. Mark Ripperda (SFD 8-3)
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Mr. Tom Lanphar
Department of Toxic Substances Control
700 Heinz Avenue, Bldg. F, Suite 200
Berkeley, CA 94710-2721

Mr. Erich Simon
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear BCT Members:

Enclosure (1), *Final Technical Memorandum for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California*, dated February 2009, is provided for your information. Per our discussions at the May and June BCT meetings, implementing this work is critical to preparation of the Parcel E-2 Feasibility Study. This memo presents the results of groundwater radioisotope analysis along with chemical analysis from the temporary wells installed in Parcel E-2.

Should you have any concerns regarding the enclosed report, please contact Ms. Hamide Kayaci at (619) 532-0930 or myself at (619) 532-0913.

Sincerely,

KEITH FORMAN
BRAC Environmental Coordinator
by direction of the Director

Enclosure: 1. *Final Technical Memorandum for Groundwater Investigation at Parcel E-2, Hunters Point Shipyard, San Francisco, California* (February 2009)

5070
Ser BPMOW.hk/0083
FEB 13 2009

Copy to:
Ms. Amy Brownell (CD only)
SF Department of Public Health
1390 Market Street, Suite 210
San Francisco, CA 94102

Stan DeSouza (CD only)
SF Dept. of Public Works
1680 Mission Street, First Floor
San Francisco, CA 94103-2414

Karla Brasaemle (hard copy and CD)
Tech Law, Inc.
90 New Montgomery Street, Suite 1010
San Francisco, CA 94105

Paisha Jorgensen, PG (hard copy and CD)
CRWQCB SF Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Ms. Diane Silva (3 hard & CD)
Records Manager (EVR.DS)
NAVFAC Southwest
1220 Pacific Highway, Bldg 128 Mail Room
San Diego, CA 92132