HUMAN HEALTH RISK ASSESSMENT

Beverly Hills Land Corporation Site
9315 Civic Center Drive
Beverly Hills, California

May 2007

Prepared on behalf of:

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Acronyms and Abbreviations

µg/L	micrograms per liter
amsl	above mean sea level
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
Cal-EPA	California Environmental Protection Agency
COPC	chemical of potential concern
CSM	Conceptual Site Model
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
ELCR	excess lifetime cancer risk
EPA	United States Environmental Protection Agency
EPC	exposure point concentration
GI	gastrointestinal
HHRA	human health risk assessment
HQ	hazard quotient
IRIS	Integrated Risk Information System
MCL	maximum concentration level
mg/kg	milligram per kilogram
mg/L	milligrams per liter
MTBE	methyl tertiary butyl ether
NCP	National Contingency Plan
OEHHA	Office of Environmental Health Hazard Assessment
PCB	polychlorinated biphenyls
PEF	particulate emission factor
PID	photoionization detector
PRG	preliminary remediation goal
QA/QC	quality assurance/quality control

RI	Remedial Investigation
RME	reasonable maximum exposure
RW&G	Richards, Watson & Gershon
STLC	soluble threshold limit concentration
SVOC	semivolatile organic carbon
TPH	total petroleum hydrocarbon
TPH-d	total petroleum hydrocarbon as diesel
TPH-g	total petroleum hydrocarbon as gasoline
TRPH	total recoverable petroleum hydrocarbon
TTLC	total threshold limit concentration
UCL	upper confidence limit
UPRR	Union Pacific Railroad
USCS	Unified Soil Classification System
VCA	Voluntary Cleanup Agreement
VOC	volatile organic carbon

SECTION 1

Introduction

1.1 Purpose of the Human Health Risk Assessment

The Union Pacific Railroad Company (UPRR) has entered into a Voluntary Cleanup Agreement (VCA) with the State of California Department of Toxic Substances Control (DTSC) for the site located at 9315 Civic Center Drive in Beverly Hills, California (site). The VCA stipulates that a health-based risk assessment be executed and a report be prepared to present the results. This report satisfies the requirements of the VCA.

In accordance with the VCA, this human health risk assessment (HHRA) presents the following information:

- A description of the onsite contamination
- An exposure assessment
- A toxicology assessment
- A risk characterization
- Risk assessment conclusions and recommendations
- A summary of the soil remediation goals

This report only addresses human exposure pathways at the Beverly Hills site. Based on the urbanization of the area, and the low quality habitat, ecological resources are absent and, as agreed upon with DTSC (DTSC, 2007), are not considered in this risk assessment.

1.2 Human Health Risk Assessment Organization

On behalf of UPRR, CH2M HILL has prepared this HHRA in accordance with the scope of work specified in the VCA. This document is organized into the following sections:

- **Section 1: Introduction** describes the purpose of the HHRA and the organization of the document.
- **Section 2: Site Description** presents the physical and environmental characteristics of the site.
- **Section 3: Human Health Risk Assessment** presents the HHRA approach and results for the site for established land use scenarios.
- Section 4: References provides the bibliographical information on references cited in the HHRA.

SECTION 2

Site Description

This section describes the physical and environmental characteristics of the site.

2.1 Physical Description

2.1.1 Site Location and Configuration

The site address is 9315 Civic Center Drive, Beverly Hills, California. The site is south, and adjacent to, Santa Monica Boulevard from Alpine Drive to Doheny Drive (Figure 2-1). The site is approximately 3,600 feet long and 60 feet wide and covers approximately 5 acres. It is divided into two parcels: Lots 12 and 13. In general, the majority of the site is unpaved. Several mature trees line the north and south sides of Lot 13. There is a chain-link fence around the entire site.

2.1.2 Site Uses

Both parcels are currently vacant, open space. Historically, the site was occupied by the railroad right-of-way from 1926 to approximately 1998. Aerial photographs indicate that the railroad, operated by the Pacific Electric Railway Company, was active from 1928 to sometime between 1971 and 1979 (Lindmark, 1998a). UPRR, the successor in interest to Pacific Electric Railway Company, transferred the site to the Beverly Hills Land Corporation in 1998.

CH2M HILL previously reviewed a series of aerial photographs from the years 1952, 1969, 1970, 1979, 1986, 1988, 1990, 1993, 1995, and 1998, and found no evidence that the site had been used for any purpose other than a railroad right-of-way (either active or inactive).

Land use in the vicinity of the site is commercial, residential, and light industrial.

2.1.3 Topography

Ground elevations generally follow Santa Monica Boulevard and range from approximately 255 feet above mean sea level (amsl) at the southern end to 235 feet amsl at the northern end.

2.1.4 Climate

The region has a semiarid Mediterranean-type climate characterized by long, dry summers and relatively short, mild winters. The annual average temperature in the valley is 62 degrees Fahrenheit (°F), with extremes ranging from as low as 10°F to as high as 116°F. Precipitation in the region is highly variable depending on location and elevation. The historical annual average rainfall of the watershed is approximately 12.79 inches.

2.2 Environmental Setting

2.2.1 Hydrology

The site is located within the Ballona Creek watershed, which is 9 miles long and drains the Los Angeles Basin from the Santa Monica Mountains on the north, the Harbor Freeway (110) on the east, and the Baldwin Hills on the south. The watershed totals about 130 square miles, composed of all or parts of the cities of Beverly Hills, Culver City, Inglewood, Los Angeles, Santa Monica, West Hollywood, and unincorporated Los Angeles County. The major tributaries to Ballona Creek include Centinela Creek, Sepulveda Canyon Channel, Benedict Canyon Channel, and numerous storm drains. Ballona Creek empties into the Santa Monica Bay at the Ballona Wetlands.

Surface water leaving the site will likely flow into the Santa Monica Boulevard storm drain system located adjacent to the site.

2.2.2 Hydrogeology

2.2.2.1 Regional Hydrogeology

The site is located within the Coastal Plain of Los Angeles County, in the northwestern portion of the Central Groundwater Basin. The Central Basin is bounded on the north and east by the Hollywood Basin and a series of low-lying hills, on the west by the Santa Monica Basin, and on the south by the Los Angeles-Orange County line (State of California Department of Water Resources [DWR], 1961).

The principal body of fresh groundwater beneath the site occurs primarily in deposits of recent and Pleistocene age, and possibly in underlying Pliocene rocks. Discontinuous, perched or semi-perched groundwater within the Bellflower aquiclude may also be present beneath the site. DWR (1961) describes the Bellflower aquiclude as a heterogeneous mixture of fine-grained continental marine and wind-blown sediments, present throughout most of the Central Basin. The Bellflower aquiclude can be as thick as 200 feet and is approximately 40 feet thick at the site (DWR, 1961).

Groundwater in sediments underlying the site is replenished by percolation of precipitation and by subsurface flow from alluvial channels originating in the Santa Monica Mountains to the north. The regional groundwater flow near the site is generally to the south-southeast, due to the orientation of the alluvial channels and general slope of the watershed from the Santa Monica Mountains in the area (DWR, 1961).

2.2.2.2 Local Hydrogeology

Groundwater was encountered at approximately 45 to 52 feet below ground surface (bgs) during the Stage 2 – Phase II investigation (Lindmark, 2003). Groundwater flow direction was not established by direct measurement at the site, but was inferred by Lindmark, based on a nearby groundwater remediation effort, to be to the south-southeast (Lindmark, 1998b).

2.2.3 Drinking Water

According to Lindmark, the City of Beverly Hills has curtailed pumping of wells due to degraded water quality (Lindmark, 1998b). These municipal water-supply wells formerly produced from the confined aquifers underlying the Bellflower aquiclude. None of the municipal water wells produced water from the perched groundwater zone within the Bellflower aquiclude. Three municipal water wells were previously in use within a 1-mile radius of the site, but all were abandoned in 1976 (Lindmark, 1998b).

The shallow, unconfined aquifer is not used for municipal water supply, and the municipal water wells were likely screened at depths much greater than the approximate 50 feet below grade where the unconfined groundwater is encountered beneath the site. Since the groundwater encountered at 50 feet below grade at the site is in the Bellflower aquiclude, a geologic unit that will tend to restrict infiltration of surface water, and the Silverado aquifer—the shallowest water supply aquifer in the Beverly Hills area—extends to a depth of 450 feet below grade (DWR, 1961), water infiltrating from the surface of the site would not likely impact the drinking water supply wells 1 mile from the site.

2.2.4 Ecological Populations

The wildlife observed at and in the immediate vicinity of the site appears to be limited to common avian species. Further, the urban setting of the site is not believed to sustain any significant wildlife.

SECTION 3

Human Health Risk Assessment

This section presents the results of the HHRA for the site, conducted in accordance with the *Risk Assessment Work Plan* (CH2M HILL, 2006b) and applicable federal and state guidance. This work is being conducted under the VCA, Docket No. HAS-A 04/05-066, between UPRR and DTSC.

This HHRA addresses pathways associated with direct contact with onsite soil containing arsenic. The objective of this risk assessment is to provide an indication of the nature, magnitude, and probability of actual or potential harm to human health, safety, or welfare or to the environment posed by the presence of arsenic in soils at the site under the assumed absence of any remedial action.

This HHRA consists of the following components:

- **Human Health Risk Assessment Guidance (Section 3.1).** Lists the guidance documents consulted during preparation of the HHRA.
- **Contaminant Identification (Section 3.2).** Presents a discussion of the previous investigations conducted at the site and the resulting understanding of the source, nature, and extent of arsenic. Describes the process for identifying which data will be used for the HHRA and identifies which soil data were used for the HHRA.
- **Exposure Assessment (Section 3.3).** Identifies the pathways by which potential human exposures could occur; describes how they are evaluated; and evaluates the magnitude, frequency, and duration of these exposures.
- **Toxicity Assessment (Section 3.4).** Summarizes the toxicity of arsenic and the relationship between the magnitude of exposure and the occurrence of adverse health effects.
- **Risk Characterization (Section 3.5).** Integrates information from the exposure and toxicity of arsenic to characterize the risks to human health posed by potential exposure to constituents in environmental media.
- **Soil Remediation Goals (Section 3.6).** Presents remediation goals for soil at the site.
- **Risk Assessment Limitations and Uncertainties (Section 3.7).** Discusses the limitations and uncertainties associated with the risk assessment.
- **Conclusions and Recommendations (Section 3.8).** Presents the conclusions of the HHRA and recommendations for future steps.

3.1 Human Health Risk Assessment Guidance

The procedures used for the HHRA are consistent with those described in the following state and federal guidance documents:

- *Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities* (Cal-EPA, 1996) http//www.dtsc.ca.gov/AssessingRisk/Supplemental Guidance.cfm
- *Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities, Final Policy* (DTSC, 1997)
- *Risk Assessment Guidance for Superfund* (RAGS), *Volume I: Human Health Evaluation Manual, Part A (Interim Final)* (EPA, 1989)
- *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors* (EPA, 1991)
- *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)* (EPA, 2004b)
- *California EPA Toxicity Criteria Database* (OEHHA, 2007) http://www.oehha.ca.gov/risk/chemicalDB/index.asp

3.2 Contaminant Identification

This section includes a discussion of the previous investigations conducted at the site. Information collected during previous investigations was used to develop an understanding of the source, nature, and extent of contamination. A conceptual site model, developed based on this information, is contained in the *Remedial Investigation* (RI) (CH2M HILL, 2006a).

3.2.1 Previous Investigations

Several investigations have been performed during due diligence for property transfers and, more recently, in compliance with the VCA.

The following documents pertaining to the site have been prepared:

- *Proposed Phase I and II Environmental Investigation, Railroad Right-of-Way between North Doheny and Alpine Drives, Beverly Hills, California 90210* (Lindmark, 1998a)
- *Phase I and II Environmental Investigation, Railroad Right-of-Way between North Doheny and Alpine Drives, Beverly Hills, California 90210* (Lindmark, 1998b)
- *Stage 2 – Phase II Environmental Site Investigation, Lots 12 and 13 of the Beverly Hills Land Corporation Rights-of-Way, Beverly Hills, California* (Lindmark, 2003)
- *Results of Arsenic Reanalysis and Arsenic Investigation Performed Subsequent to the Stage 2 – Phase II Environmental Site Investigation* (Richards, Watson & Gershon [RW&G], 2003)

- *Evaluation of Off-site Dust Impacts, Union Pacific Right-of-Way, Beverly Hills Land Corporation, Beverly Hills, California* (Geomatrix, 2004)
- *Remedial Investigation, Beverly Hills Land Corporation Site, 9315 Civic Center Drive, Beverly Hills, California* (CH2M HILL, 2006a)

A summary of the previous investigations performed at the site is presented in the following sections.

3.2.1.1 1998 Phase I and Phase II

The Phase I and Phase II investigations performed in 1998 did not identify environmental concerns or contamination at the site, based on the records search and the soil sampling and analyses performed. The following paragraphs summarize the investigation and findings presented in the Phase II report (Lindmark, 1998b).

Two exploratory trenches were excavated (one trench was excavated at each end of the right-of-way), and 35 soil borings were advanced during the Phase II investigation. The trenches were excavated to 8 feet bgs to determine if "railroad spurs or ties" were present in the near-surface soils. No evidence of railroad ties or other material related to the former railroad was observed in either trench. Thirty-five soil borings were advanced, at approximately 100-foot intervals along the right-of-way. Samples, both composite and discrete samples, collected from these borings were analyzed for total petroleum hydrocarbons (TPH) by Environmental Protection Agency (EPA) Method 8015M, for halogenated and aromatic volatile organic compounds (VOCs) by EPA Method 8010/8020, and for pH by EPA Method 9045. One composite soil sample was also analyzed for semivolatile organic compounds (SVOCs) by EPA Method 8270 and for herbicides by EPA Method 8150 (Lindmark, 1998b). None of the samples that were analyzed contained detectable levels of VOCs or SVOCs. Three of the 35 soil boring samples (composite samples collected at 0.5 foot bgs) contained detectable levels of TPH (quantified as heavy oil) at 220 milligrams per kilogram (mg/kg). Laboratory analysis of soil samples indicated that pH ranged from 6.91 to 8.73.

Groundwater samples were collected in four of the soil borings advanced during the Phase II investigation. The groundwater samples were analyzed for TPH as gasoline (TPH-g) by EPA Method 8015M; for benzene, toluene, ethylbenzene, and xylenes (BTEX) with methyl tertiary butyl ether (MTBE) by EPA Method 8020; and for halogenated VOCs by EPA Method 8010. The compounds listed above were not detected in the groundwater samples, with the exception of xylenes (0.9 microgram per liter [μg/L]) and chloroform (1.2 μg/L).

No soil or groundwater samples were analyzed for metals or polychlorinated biphenyls (PCBs) during the 1998 Phase II investigation.

3.2.1.2 2003 Stage 2 – Phase II Investigation

A Stage 2 – Phase II environmental site investigation was performed in 2003 (Lindmark, 2003). The following paragraphs summarize the investigation scope and findings presented in the Phase II report. The analytes detected during the Phase II investigation are presented in Tables 3-1 to 3-4. Sample location and results are shown in Figures 3-1 and 3-2a through 3-2g.

During the Stage 2 – Phase II investigation, Lindmark installed 36 soil borings and 8 temporary groundwater monitoring wells. A total of 28 borings were installed to a depth of 5 feet bgs. The remaining 8 borings, also known as the "deep borings," were installed to depths ranging from 48 to 55 feet.

Soil samples were collected at a range of depths in the borings. The samples were submitted to an analytical laboratory for analysis for the following analytes (not all samples were analyzed for all analytes):

- Petroleum hydrocarbons by EPA Method 8015M
- VOCs (including TPH-g) by EPA Methods 8260B and 418.1
- SVOCs by EPA Method 8270
- Herbicides by EPA Method 8151A
- PCBs by EPA Method 8082
- Title 22 Metals (total threshold limit concentration [TTLC]) by EPA Method 6010B/7471A
- Creosote by EPA Method 8015

The following analytes were not detected at or above the respective method reporting limits in any sample analyzed: TPH-g, TPH as diesel (TPH-d), VOCs, SVOCs, herbicides, PCBs, and creosote (see Table 3-1).

Total recoverable petroleum hydrocarbons (TRPHs) were detected in 12 soil samples (see Table 3-1). Two samples, LE-19-2 and LE-19-5, contained concentrations of 492 and 172 mg/kg, respectively. Concentrations for TRPH were at or below 48 mg/kg in the remaining 10 samples where TRPH was detected.

Title 22 metals were analyzed in four soil samples collected during the investigation (see Table 3-2). A number of metals were detected in the soil samples. However, only arsenic concentrations exceeded the preliminary remediation goals (PRGs) for residential sites (EPA, 2004a). Arsenic was detected in each of the four samples at concentrations ranging from 16.7 to 107 mg/kg. The residential soil (cancer endpoint) PRG for arsenic is 0.39 mg/kg.

Based on the results from the four samples initially tested for arsenic, all of the soil samples collected during the Stage 2 – Phase II investigation were analyzed again for arsenic. Arsenic was detected in all of the soil samples at concentrations ranging from 5.3 to 229 mg/kg (RW&G, 2003) (see Table 3-2).

In October 2003, Lindmark collected 66 additional soil samples and analyzed each for arsenic (EPA Method 6010B) (see Table 3-3). The detected arsenic concentrations ranged from nondetect (0.25 mg/kg) to 996 mg/kg. With the exception of a single nondetect sample, all the soil samples analyzed during the October 2003 arsenic investigation exceeded the residential soil PRG of 0.39 mg/kg (RW&G, 2003).

Groundwater samples collected during the Stage 2 – Phase II investigation were analyzed for TPH-g and VOCs (see Table 3-4). TPH-g was not detected in any of the groundwater samples. Acetone was detected at a concentration of 58.1 µg/L in groundwater sample LE19-GW and was not detected in any other groundwater sample. Chloroform was detected in groundwater samples LE10-GW and LE25-GW at concentrations of 1.8 and 1.5 µg/L and was not detected in any other groundwater samples. No other VOCs were detected in any of the groundwater samples collected during the Stage 2 – Phase II investigation (Lindmark, 2003). None of the groundwater samples were analyzed for metals.

3.2.1.3 2006 Remedial Investigation

The primary objectives of the RI were as follows:

- Characterize the nature and extent of soil contamination at the site. Specifically, assess the lateral and vertical extent of soil contamination at impacted areas identified during the 2003 Phase II investigation; assess the possible impact to shallow groundwater from the chemicals identified during the Phase II investigation, and collect site-specific arsenic bioavailability and solubility data.
- Establish ambient concentrations for the chemicals identified during the 2003 Phase II investigation.
- Collect analytical data to supplement existing data sufficient to perform a risk assessment for the site.

A total of 12 soil borings (SB01 to SB12) were continuously cored from the ground surface to approximately 50 feet bgs at locations throughout the site. Generally, soil samples were collected at 2.5, 5, 10, 20, 30, 40, and 50 feet bgs and subjected to laboratory analysis. A total of five soil boring locations (BK01 to BK05) were advanced into undisturbed native soil adjacent to the site along Civic Center Drive to determine ambient concentrations of metals in the soil. Soil samples were collected from each of the ambient sample locations from 2 to 2.5 feet bgs and 5 to 5.5 feet bgs. Soil sampling was conducted using a direct-push drill rig. Groundwater samples were collected from four locations (SB01, SB05, SB08, and SB11).

The analysis methods for soil included EPA Method 6010B for total metals and a method for assessing bioavailability developed by the CH2M HILL laboratory in Corvallis, Oregon. Table 3-5 includes a summary of the analytical methods for each sample collected. Figures 3-1 and 3-2a through 3-2g show the RI sample locations and present data. Tables 3-6 through 3-10 summarize the results, primarily detected compounds, from soil samples collected for this investigation.

Ambient Metals Concentrations. Data on ambient metals concentrations are summarized in Table 3-7. Site soil arsenic concentrations below 27.3 mg/kg are defined as ambient conditions using DTSC guidance.

Metals. Table 3-8 summarizes the metals detected in soil samples collected during the RI. Twenty metals were detected: aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, thallium, vanadium, and zinc; however, antimony, silver, and sodium were not detected. The maximum detected results were aluminum at 26,800 mg/kg, arsenic at 160 mg/kg, barium at 185 mg/kg, beryllium at 0.85 mg/kg, cadmium at 1.5 mg/kg, calcium at 37,700 mg/kg, chromium at 87.3 mg/kg, cobalt at 18.1 mg/kg, copper at 60.6 mg/kg, iron at 40,800 mg/kg, lead at 34.9 mg/kg, magnesium at 13,000 mg/kg, manganese at 1,300 mg/kg, molybdenum at 5.2 mg/kg, nickel at 36.8 mg/kg, potassium at 6,890 mg/kg, selenium at 2.7 mg/kg, thallium at 2.6 mg/kg, vanadium at 98.7 mg/kg, and zinc at 97.5 mg/kg.

Most of the 20 metals detected had one or more result that exceeds the maximum ambient metal concentrations shown in Table 3-8. However, arsenic is the only metal that exceeds the industrial PRG of 1.6 mg/kg (cancer endpoint concentration) for soil. Also, no detections of metals meet or exceed the respective TTLCs (other than one arsenic result of 996 mg/kg, which out of 429 samples analyzed, was the only result to exceed the TTLC of 500 mg/kg), indicating that the concentrations of metals would not likely cause the soil to be classified as hazardous waste.

Groundwater Results for Metals. Table 3-9 summarizes the metals detected in groundwater samples collected during the remedial investigation. The groundwater samples were not filtered, so the results presented in Table 3-5 represent total metals rather than dissolved metals in groundwater. Eighteen metals were detected: aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, sodium, vanadium, and zinc. The maximum detected results were aluminum at 29.4 milligrams per liter (mg/L), arsenic at 0.035 mg/L, barium at 0.8 mg/L, cadmium at 0.03 mg/L, calcium at 282 mg/L, chromium at 0.39 mg/L, cobalt at 0.29 mg/L, copper at 0.74 mg/L, iron at 84.5 mg/L, lead at 0.011 mg/L, magnesium at 108 mg/L, manganese at 9.5 mg/L, molybdenum at 0.082 mg/L, nickel at 0.61 mg/L, potassium at 10.9 mg/L, sodium at 125 mg/L, vanadium at 0.15 mg/L, and zinc at 23.6 mg/L.

Arsenic Solubility and Bioavailability Results. Eleven samples were preselected for arsenic solubility and bioavailability analyses. The 11 samples were taken from borings SB02, SB05, SB08, and SB11. These borings were selected because the tracks were in the center of the right-of-way, and this is where elevated concentrations of arsenic in soil have been observed in previous studies. The samples were collected from 2 to 2.5 feet bgs and 5 to 5.5 feet bgs because the highest arsenic concentrations are observed in the upper 5 feet of soil. One sample was collected at 10 feet bgs to test the solubility and bioavailability of arsenic in native material.

Arsenic solubility was assessed using the soluble threshold limit concentration (STLC) test on the same material as the total metals analysis. Arsenic bioavailability was assessed by the CH2M HILL laboratory in Corvallis, Oregon, on similar material.

Table 3-10 summarizes the results of the STLC test for arsenic performed on the 11 preselected soil samples collected during the RI. One of the 11 samples, SB05-02, had a detection of 2.1 mg/L for arsenic that is less than the STLC hazardous waste limit of 5.0 mg/L. The corresponding arsenic concentration in the soil for this sample is 84.5 mg/kg. Arsenic was not detected in the leachate from any of the other soil samples tested.

Table 3-10 also summarizes test results for the bioavailability of arsenic from selected soil samples collected during the RI. A discussion of the significance of these results is provided in Section 3.5.4.

Site Soil Classification. A soil log was maintained during the RI field investigation to record visual field observations including a lithologic description of soil encountered during drilling and collection of surface soil samples.

The Unified Soil Classification System (USCS) was used to describe lithology. Figure 3-1 shows the cross-section location map and Figure 3-3 shows a geological cross-section developed based on the soil log data. The cross-section was drawn based on soil boring logs developed from this investigation and from the previous investigation performed by Lindmark (2003). Borings from the center of the right-of-way were used to create the cross-section.

Non-native fill material was identified throughout the site. The thickness of the fill material ranged from approximately 5 feet bgs at SB11 (on the northeast portion of the site) to 10 feet bgs at SB02 (on the southwest portion of the site).

The soil, including both fill and native material, was described as primarily silty or clayey sand, with a few isolated clay lenses. The soil beneath the site is consistent with deposits in the recent alluvium, which is known to be present throughout the Central Groundwater Basin (DWR, 1961).

Arsenic concentration data are posted on the cross-section in Figure 3-3 and in Figures 3-2a to 3-2g. In general, elevated arsenic concentrations occur in the shallow soil, primarily in the fill material. Some arsenic concentrations are observed above the maximum ambient concentration of 27.3 mg/kg throughout the right-of-way. However, there are only a few isolated soil sample results from greater than 5 feet bgs where the arsenic concentrations exceed the maximum ambient arsenic concentration. Also, the STLC test results indicate that the elevated arsenic is not leaching from the shallow soil to the deeper soil. The arsenic concentrations observed in the deeper (native) soil are believed to be from ambient conditions rather than related to previous site activities or due to the fill material.

Photoionization Monitoring. During the field investigation, photoionization detector (PID) readings were collected to assess the presence of volatile hydrocarbons and provide an indication that non-native fill material is present at the site. No petroleum hydrocarbons were detected by the PID during the RI.

Groundwater Levels. Groundwater was encountered throughout the site at depths ranging from approximately 32 feet bgs at SB11 to 55 feet bgs at SB02. Figure 3-3 also shows the depth to groundwater noted during the investigation performed in 2003. The groundwater elevation measured in August 2005 is approximately 10 feet higher than the elevation observed in 2003. The increase in groundwater elevation is likely due to the near-record rainfall experienced throughout Los Angeles in 2005.

3.2.2 Source, Nature, and Extent of Arsenic Contamination

The site was previously used as a railroad right-of-way. The types of compounds typically associated with former railroad operations at the site include PCBs, metals, petroleum hydrocarbons, and potentially low levels of volatile aromatics (for example, BTEX). However, based on the previous investigations, only metals (arsenic, in particular) were detected at the site.

The source of the elevated arsenic is unknown. Arsenic detected at the site may be associated with the fill material or historic herbicide use. A portion of the arsenic occurring onsite is recognized as being naturally occurring.

Elevated arsenic concentrations have been observed in soil samples collected throughout the right-of-way. The data collected during the RI were very similar to those collected by Lindmark (2003). These data are shown in Figures 3-2a to 3-2g. Based on the previous investigations, arsenic was identified as the only chemical of potential concern. Arsenic levels above the maximum ambient concentration of 27.3 mg/kg are observed in fill and native material throughout the site. However, the highest concentrations are observed in the shallow soil (coincident with the fill material), primarily from 0 to 5 feet bgs along the center of the right-of-way.

Arsenic also was detected in groundwater samples collected at the site; however, the total arsenic in groundwater concentrations was below the current maximum concentration level (MCL) of 0.05 mg/L. The arsenic in groundwater likely is due to the relatively high ambient concentration of arsenic in the native soil. This observation is supported by the STLC tests, which showed that arsenic is not leaching from the shallow soils.

The results of prior investigations show that the nature and extent of the elevated arsenic, above the maximum ambient concentration of 27.3 mg/kg, has been delineated both horizontally and vertically and are of sufficient quality and quantity to support the human health risk assessment for the site.

3.2.3 Data Used for the Risk Assessment

The analytical data used in this risk assessment include data from soil samples collected during the following investigations:

- *Stage Two – Phase II Environmental Site Investigation, Lots 12 and 13 of the Beverly Hills Land Corporation Rights-of-Way, Beverly Hills, California* (Lindmark, 2003)
- *Results of Arsenic Reanalysis and Arsenic Investigation Performed Subsequent to the Stage 2 - Phase II Environmental Site Investigation* (RW&G, 2003)
- *Remedial Investigation, Beverly Hills Land Corporation Site (Lots 12 and 13).* (CH2M HILL, 2006a).

A summary of soil samples used in this risk assessment is presented in Table 3-11 by sample identification (ID), sampling depth, and date of collection. A total of 310 soil samples collected at the site from 0 to 10 feet bgs were used for this HHRA, in accordance with DTSC guidance (Cal-EPA, 1996).

Due to the size of the site, professional judgment was used to break the site into eight smaller parcels (representing exposure areas) that would be more representative of likely future exposure scenarios, and allow some spatial characterization of potential risk. Therefore, data were segregated into eight exposure areas of approximately equal size along the length of Lots 12 and 13. That is, data from within eight exposure areas of approximately 400 feet in length along the former right-of-way were aggregated and used for the risk calculations. It is plausible that areas of this size could be used for future commercial or hypothetical residential (for example, apartments) developments.

3.2.3.1 Data Processing Procedures

Prior to data evaluation, the data were processed to produce a "working" data set with which to prepare the risk assessment. The following rules were used to identify and process data to be used in the risk assessment:

- Estimated values flagged with a "J" qualifier were treated as detected concentrations.
- For samples with field duplicates, the maximum detection between the parent sample and the duplicate was used.

3.2.4 Constituents of Potential Concern

As discussed in the RI report (CH2M HILL, 2006a), only arsenic concentrations in soil at the site warranted further evaluation as part of a risk assessment. Previous investigations evaluated multiple target analytes that were found to be below concern in site soil. Therefore, arsenic is the only chemical of potential concern identified for this HHRA. The source of arsenic is unknown, although it may be associated with the fill material used to construct the right of way, or from herbicides historically used for weed control. A portion of the arsenic is also recognized as being naturally occurring.

3.3 Exposure Assessment

The exposure assessment component of the HHRA identifies the means by which individuals on or near the property may contact chemicals in environmental media. It addresses exposures that may result under current site conditions and from reasonably anticipated potential uses of the site and the surrounding areas in the future. The exposure assessment also identifies the populations that may be exposed; the routes by which these individuals may become exposed; and the magnitude, frequency, and duration of potential exposures. The exposure assessment step of the HHRA includes the following tasks:

- Development of conceptual site model (CSM) (Section 3.3.1)
- Computation of exposure point concentrations (Section 3.3.2)
- Development of exposure assumptions (Section 3.3.3)
- Calculation of chemical intake for chemicals of potential concern (COPCs) (Section 3.3.4)

The methodologies and results of these tasks are discussed in the following subsections.

3.3.1 Conceptual Site Model

This section presents the CSM for the site. This CSM provides a current understanding of the sources of arsenic, physical setting, current and future land use, and local groundwater use, and identifies potentially complete human exposure pathways for the site. Information generated during the previous site investigations has been incorporated into this CSM to identify potential exposure scenarios. A diagram representing the CSM for potential current and future human exposures for the property is presented in Figure 3-4.

The following subsections summarize the site characteristics that influence the exposure potential for human receptors, including land use and groundwater beneficial use. Section 2 provides a more detailed description of the physical setting and characteristics for the site.

3.3.1.1 Physical Setting

The general physical setting of the site is described in Section 2.1. Lots 12 and 13 are currently vacant. The majority of the site is unpaved, and the entire site is enclosed by a chain-link fence. Based on this, the urbanization of the area, and the low quality habitat, ecological resources are absent and, as agreed upon with DTSC (DTSC, 2007), are not considered in this risk assessment.

3.3.1.2 Characterization of Land Use

Based on the historical and current land use near the site, the most likely future land use will involve continued commercial and light industrial use. DTSC commented (DTSC, 2007) that it would be appropriate to highlight the likelihood of future commercial/industrial use of the site for risk management purposes. However, the City of Beverly Hills is considering residential use in the general area and has requested risk of residential use to also be evaluated. Therefore, in order to determine whether future land use restrictions or other institutional controls may be needed at the site, a hypothetical future residential scenario has been included as part of this HHRA.

3.3.1.3 Characterization of Groundwater Beneficial Use

A description of the regional and local hydrogeology at the site and associated groundwater beneficial use is provided in Section 2-2. A brief description of the groundwater beneficial use is provided here.

According to Lindmark, the City of Beverly Hills has curtailed pumping of wells due to degraded water quality (Lindmark, 1998b). These municipal water supply wells formerly produced from the confined aquifers underlying the Bellflower aquiclude. None of the municipal water wells produced water from the perched groundwater zone within the Bellflower aquiclude. Three municipal water wells were previously in use within a 1-mile radius of the site, but all were abandoned in 1976 (Lindmark, 1998b).

The shallow, unconfined aquifer is not used for municipal water supply, and the municipal water wells were likely screened at depths much greater than the approximate 50 feet below grade where the unconfined groundwater is encountered beneath the site. Since the groundwater encountered at 50 feet below grade at the site is in the Bellflower aquiclude, a geologic unit that will tend to restrict infiltration of water from the surface, and the Silverado aquifer (the shallowest water supply aquifer in the Beverly Hills area) extends to a depth of 450 feet below grade (DWR, 1961), water infiltrating from the surface of the site would not likely impact drinking water supply wells located a mile or more from the site.

Exposure to groundwater currently is not considered a complete exposure pathway for this site based on the following:

- Arsenic in soil is unlikely to migrate down to groundwater because depth to a drinking water source is greater than 100 feet bgs.
- The relatively low concentrations of arsenic detected in the unfiltered groundwater samples (CH2M HILL, 2006a) indicate that the arsenic in groundwater is likely due to the presence of relatively high levels of ambient concentrations of arsenic in native soil in the area.

- Concentrations of arsenic in soil near the water table are at ambient levels.

3.3.1.4 Potential Human Exposure Pathways

Based on the current and potential future land use at the site, it is anticipated that potentially complete human exposure pathways exist for the following receptors and exposure routes:

- **Future occupational workers:** Potential exposure of future occupational workers to constituents in soil to 10 feet bgs by incidental ingestion, dermal contact, and inhalation of dust.
- **Future excavation/construction workers:** Potential exposure of excavation/construction workers to constituents in soil to 10 feet bgs by incidental ingestion, dermal contact, and inhalation of dust.
- **Hypothetical future residents:** Potential exposure of hypothetical future residents to constituents in soil to 10 feet bgs by incidental ingestion, dermal contact, and inhalation of dust. As previously mentioned, because the site is reasonably anticipated to remain commercial/industrial in the foreseeable future, the risk estimates under unrestricted land use assumptions do not reflect likely future expectations, but are evaluated here to assess the need for land use controls or other institutional controls.

These exposure pathways are the focus of the quantitative HHRA.

3.3.2 Exposure Point Concentrations

Exposure point concentrations (EPCs) are estimated constituent concentrations with which a receptor may come into contact, and are specific to each exposure medium. For direct contact routes of exposure to soil (incidental ingestion and dermal contact), EPCs are represented by concentrations directly measured in soil samples collected at the site. For the inhalation route, EPCs were estimated using modeling approaches consistent with risk assessment guidance. Dust concentrations in ambient air were estimated using particulate emission factors (PEFs), derived as described in Section 3.3.4.

3.3.2.1 EPCs Calculation Approach

Arsenic EPCs for soil were estimated by aggregating concentration data from soil samples collected from within each of the eight exposure areas. The EPCs for aggregate risk estimation were calculated by using the best statistical estimate of an upper bound on the average exposure concentrations, in accordance with EPA guidance for statistical analysis of monitoring data (EPA, 1989, 1992, 2002). The 95 percent upper confidence limit (UCL) on the mean concentration is considered by these guidance documents as a conservative upper bound estimate that is not likely to underestimate the mean concentration and most likely overestimates that concentration. EPCs were calculated for arsenic using EPA's statistical program ProUCL, Version 3.00.02 (EPA, 2007a). This program identifies the statistical distribution type (that is, normal, lognormal, or non-parametric) for arsenic for a data set and computes the corresponding 95 percent UCL for the identified distribution type. The maximum detected concentration is used in place of the 95 percent UCL if the calculated 95 percent UCL is greater than the maximum detected value.

Summary statistics and soil arsenic EPCs for each of the exposure areas are summarized in Table 3-12.

3.3.3 Human Exposure Assumptions

The estimation of exposure requires numerous assumptions to describe potential exposure situations. Upper-bound exposure assumptions are used to estimate "reasonable maximum exposure" (RME) conditions to provide a bounding estimate on exposure. The exposure assumptions used are specific to the identified exposure scenarios at the site. The scenarios evaluated were selected based on the CSM (Figure 3-4) and are consistent with the current and reasonably anticipated future land uses.

The exposure parameters used for generating RME risk estimates are listed in Table 3-13. Most of the exposure assumptions for ingestion, dermal contact, and inhalation are provided by California Environmental Protection Agency (Cal-EPA) and EPA guidance documents (listed in Section 3.2.3).

3.3.4 Calculation of Chemical Intake

Exposure that is normalized over time and body weight is termed intake (expressed as milligrams of chemical per kilogram body weight per day [mg/kg-day]). The RME case is defined as the highest exposure that is reasonably expected to occur at a site. The intent of the RME scenario is to estimate a conservative exposure case that is still within the range of possibilities. The computation of intake for the site exposure scenarios is described in the following subsections, and the results are provided in the risk calculation tables (Appendix A).

3.3.4.1 Incidental Ingestion of Soil

The following equation is used to calculate the intake associated with the incidental ingestion of arsenic in soil for the future occupational worker and excavation/construction worker scenarios:

$$Intake = \frac{C_s \times IRS \times 10^{-6} kg / mg \times EF \times ED}{BW \times AT}$$

Where:

Cs	=	Arsenic concentration in soil (mg/kg)
IRS	=	Soil ingestion rate (mg/day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

The following equation is used to calculate the intake associated with the incidental ingestion of arsenic in soil by hypothetical future residents:

$$Intake = \frac{C_s \times IRS_{adj} \times 10^{-6} kg / mg \times EF}{AT}$$

Where:

$$IRS_{adj} = \frac{ED_c \times IRS_c}{BW_c} + \frac{ED_a \times IRS_a}{BW_a}$$

Where:

C_S	=	Arsenic concentration in soil (mg/kg)
IRS_{adj}	=	Age-adjusted soil ingestion rate [(year-mg)/(kg-day)]
IRS_a	=	Adult soil ingestion rate (mg/day)
IRS_c	=	Child soil ingestion rate (mg/day)
ED_a	=	Adult exposure duration (years)
ED_c	=	Child exposure duration (years)
BW_a	=	Adult body weight (kg)
BW_c	=	Child body weight (kg)

The exposure assumptions for estimating arsenic intake from the ingestion of constituents in soil are presented in Table 3-13.

3.3.4.2 Dermal Contact with Soil

Arsenic intake from dermal contact with soil for the future occupational worker and excavation/construction worker scenarios is estimated using the following equation:

$$Intake = \frac{C_S \times SA \times ABS \times AF \times EF \times ED \times 10^{-6} kg/mg}{BW \times AT}$$

Where:

C_S	=	Arsenic concentration in soil (mg/kg)
SA	=	Exposed skin surface area (cm^2)
ABS	=	Fraction of constituent absorbed from soil to skin (unitless)
AF	=	Skin adherence factor (mg/cm^2)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

The following equation is used to calculate the chemical intake associated with dermal contact with arsenic in soil by hypothetical future residents:

$$Intake = \frac{C_s \times SFS_{adj} \times ABS \times EF \times 10^{-6} kg/mg}{AT \times 365 days/year}$$

Where:

$$SFS_{adj} = \frac{ED_c \times SA_c \times AF_c}{BW_c} + \frac{ED_a \times SA_a \times AF_a}{BW_a}$$

Where:

C_S	=	Arsenic concentration in soil (mg/kg)
SFS_{adj}	=	Age-adjusted dermal exposure factor for soil [(year-mg)/(kg-day)]
AF_a	=	Adult soil-to-skin adherence factor (mg/cm²)
AF_c	=	Child soil-to-skin adherence factor (mg/cm²)
SA_a	=	Adult skin surface area (square centimeters [cm²])
SA_c	=	Child skin surface area (cm²)

The exposure assumptions used to estimate exposure from dermal contact with soil are presented in Table 3-13. The dermal absorption fraction (ABS) value for arsenic of 0.03 is derived from the EPA's *Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004a), and is presented in Table 3-14.

3.3.4.3 Inhalation of Ambient Dust from Soil

Arsenic intake from inhalation of dust from ambient air for the future occupational worker and excavation/construction worker scenarios is estimated using the following equation:

$$Intake = \frac{C_s \times INH \times \left(\frac{1}{PEF}\right) \times EF \times ED}{BW \times AT}$$

Where:

C_S	=	Arsenic concentration in soil (mg/kg)
INH	=	Inhalation rate (m³/day)
PEF	=	Particulate emissions factor (m³/kg)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Adult body weight (kg)
AT	=	Averaging time (days)

The following equation is used to calculate the intake associated with the inhalation of ambient dust from soil by hypothetical future residents:

$$Intake = \frac{C_s \times INH_{adj} \times \left(\frac{1}{PEF}\right) \times EF}{AT}$$

Where:

$$IN_{adj} = \frac{ED_c \times INH_c}{BW_c} + \frac{ED_a \times INH_a}{BW_a}$$

Where:

C_S	=	Arsenic concentration in soil (mg/kg)
INH_{adj}	=	Age-adjusted inhalation rate [(year-m³)/(kg-day)]
INH_a	=	Adult inhalation rate (m³/day)
INH_c	=	Child inhalation rate (m³/day)

The PEF used for the occupational and hypothetical residential scenarios was the default value recommended by EPA (EPA, 2004a). The PEF for the excavation/construction worker scenario was the default value recommended by DTSC (DTSC, 2005).

3.4 Toxicity Assessment

This toxicity assessment evaluates the relationship between the magnitude of exposure to arsenic at the property and the likelihood of adverse health effects to potentially exposed populations. This assessment provides a numerical estimate of the increased likelihood of adverse effects associated with arsenic exposure (EPA, 1989). The toxicity assessment contains two steps: hazard characterization and dose-response evaluation. These two components are discussed in the following subsections.

3.4.1 Hazard Characterization

Hazard characterization identifies the types of toxic effects a chemical can exert. For the toxicity assessment, chemicals can be divided into two broad groups on the basis of their effects on human health: carcinogens and noncarcinogens. These classifications have been selected because health risks are calculated quite differently for carcinogenic and noncarcinogenic effects, and separate arsenic toxicity values have been developed for them.

Carcinogens are those chemicals suspected of causing cancer following exposure; noncarcinogenic effects cover a wide variety of systemic effects, such as liver toxicity or developmental effects. Arsenic is capable of eliciting both carcinogenic and noncarcinogenic responses; therefore, arsenic is evaluated for both carcinogenic and systemic (noncarcinogenic) effects.

For cancer effects, EPA has developed a carcinogen classification system (EPA, 1989) that is a weight-of-evidence approach to classify the likelihood that a chemical is a human carcinogen. Information considered in developing the classification includes human studies of the association between cancer incidence and exposure, as well as long-term animal studies under controlled laboratory conditions. Other supporting evidence considered includes short-term tests for genotoxicity, metabolic and pharmacokinetics properties, toxicological effects other than cancer, structure-activity relationships, and physical and chemical properties of the chemical. A description of the weight-of-evidence classification is presented in Table 3-15. Arsenic has been classified by EPA as a known (Group A) human carcinogen shown to cause liver, skin, lung, bladder, and kidney cancers.

For noncancer effects, toxicity values are derived on the basis of the critical toxic endpoint (that is, the most sensitive adverse effect following exposure). Arsenic has been documented to produce systemic effects (skin hyperpigmentation, skin lesions, adverse developmental effects, and so on).

3.4.2 Dose-response Evaluation

The magnitude of toxicity of a chemical depends on the dose to a receptor. Dose refers to exposure to a constituent concentration over a specified period of time. Human exposures are generally classified as acute (typically less than 2 weeks), subchronic (about 2 weeks to 7 years), or chronic (usually 7 years to a lifetime). This HHRA addresses exposures that are considered chronic for each receptor, since no agency-derived subchronic toxicity values are available for arsenic (which, if available, would be applied to the short duration excavation/construction worker scenario). A dose-response curve describes the relationship between the degree of exposure (the dose) and the incidence of the adverse effects (the response) in the exposed population. Cal-EPA and EPA use this dose-response information to establish toxicity values for arsenic (OEHHA, 2007; EPA, 2007b), as described in the following subsections.

3.4.2.1 Arsenic Toxicity Values

Toxicity values (cancer slope factors and noncancer reference doses) used in this HHRA were obtained from the following sources:

- Cal-EPA Toxicity Criteria Database from the Office of Environmental Health Hazard Assessment (OEHHA, 2007) http://www.oehha.ca.gov/risk/chemicalDB/index.asp
- The Integrated Risk Information System (IRIS) database available through the EPA Environmental Criteria and Assessments Office in Cincinnati, Ohio. IRIS, prepared and maintained by EPA, is an electronic database containing health risk and EPA regulatory information on specific chemicals (EPA, 2007b).

Reference Doses for Noncancer Effects. The toxicity value describing the dose-response relationship for noncancer effects is the reference dose value. For noncarcinogenic effects, the body's protective mechanisms must be overcome before an adverse effect is manifested. If exposure is high enough and these protective mechanisms (or thresholds) are exceeded, adverse health effects can occur. EPA attempts to identify the upper boundary of this tolerance range in the development of noncancer toxicity values. EPA uses the apparent toxic threshold value, in conjunction with uncertainty factors based on the strength of the toxicological evidence, to derive a reference dose value. EPA defines a reference dose value as follows:

> In general, the reference dose value is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The reference dose value is generally expressed in units of milligram per kilogram of body weight each day (mg/kg-day). (EPA, 1989)

This HHRA uses the EPA arsenic chronic reference dose value for the oral exposure route and the OEHHA chronic reference dose for the inhalation route. Because Cal-EPA or EPA have derived no toxicity values specific to skin contact, oral reference dose values were used as dermal reference dose values.

Slope Factors for Cancer Effects. The dose-response relationship for cancer effects is expressed as a cancer slope factor that converts estimated intake directly to excess lifetime cancer risk. Slope factors are presented in units of risk per level of exposure (or intake). The data used for estimating the dose-response relationship for arsenic are taken from human occupational and epidemiological studies where excess cancer risk has been associated with exposure to the chemical. However, because risk at low intake levels cannot be directly measured in animal or human epidemiological studies, a number of mathematical models and procedures have been developed to extrapolate from the high doses used in the studies to the low doses typically associated with environmental exposures. The model choice leads to uncertainty. EPA assumes linearity at low doses and uses the linearized multistage procedure when uncertainty exists about the mechanism of action of a carcinogen and when information suggesting nonlinearity is absent.

It is assumed, therefore, that if a cancer response occurs at the dose levels used in the study, then there is some probability that a response will occur at all lower exposure levels (that is, a dose-response relationship with no threshold is assumed). Moreover, the dose-response slope chosen is usually the UCL on the dose-response curve observed in the laboratory studies. As a result, uncertainty and conservatism are built into the EPA risk extrapolation approach. EPA has stated that cancer risks estimated by this method produce estimates that "provide a rough but plausible upper limit of risk." In other words, it is not likely that the true risk would be much more than the estimated risk, but "the true value of the risk is unknown and may be as low as zero" (EPA, 1986).

Because DTSC or EPA have not derived toxicity values for arsenic specific to skin contact, the arsenic oral slope factor was used for dermal slope factor.

3.5 Risk Characterization

Risk is quantified by combining the results of the exposure assessment with the results of the dose-response assessment to provide numerical estimates of potential health effects. The quantification approach differs for potential noncancer and cancer effects, as described in the following subsections. Interpretation of the risk estimates provided should consider the nature and weight of evidence supporting these estimates, as well as the magnitude of uncertainty surrounding them.

Although this HHRA produces numerical estimates of risk, these numbers might not predict actual health outcomes because they are based largely on hypothetical assumptions to provide a frame of reference for risk management decisionmaking. Any actual risks are likely to be lower than these estimates, and they might even be zero. Interpretation of the risk estimates provided should consider the nature and weight of evidence supporting these estimates, as well as the magnitude of uncertainty surrounding them.

3.5.1 Noncarcinogenic Hazard Estimation

For noncancer effects, the likelihood that a receptor will develop an adverse effect is estimated by comparing the predicted level of exposure for a particular chemical with the highest level of exposure that is considered protective (that is, its reference dose value or RfD). The ratio of the chronic daily intake divided by the reference dose value is termed the hazard quotient (HQ):

$$HQ = \frac{Intake}{RfD}$$

Where:

HQ	=	Hazard quotient (unitless probability)
Intake	=	Chronic daily intake averaged over a lifetime (mg/kg-day)
RfD	=	Noncancer reference dose (mg/kg-day)

When the HQ for a chemical exceeds 1.0 (that is, exposure exceeds RfD), there is a concern for potential noncancer health effects.[1]

3.5.2 Cancer Risk Estimation

The potential for cancer effects is evaluated by estimating excess lifetime cancer risk (ELCR). This risk is the incremental increase in the probability of developing cancer during one's lifetime in addition to the ambient probability of developing cancer (that is, if no exposure to site chemicals occurs). For example, a 2×10^{-6} ELCR means that, for every 1 million people exposed to the carcinogen throughout their lifetimes, the average incidence of cancer may increase by two cases of cancer. In the U.S., the ambient probability of developing cancer for men is a little less than one in two, and for women a little more than one in three (American Cancer Society, 2003). As previously mentioned, cancer slope factors developed by the EPA represent upper-bound estimates, so any cancer risks generated in this assessment should be regarded as an upper boundary on the potential cancer risks rather than accurate representations of true cancer risk. The true cancer risk is likely to be less than that predicted (EPA, 1989). ELCRs were estimated using the following formula:[1]

$$Risk = Intake \times SF$$

Where:

Risk	=	Excess lifetime cancer risk (unitless probability)
Intake	=	Chronic daily intake averaged over a lifetime (mg/kg-day)
SF	=	Cancer slope factor $(mg/kg\text{-}day)^{-1}$

3.5.3 Summary of Risk Estimates by Exposure Scenario

This subsection summarizes the risk estimates for the three potential exposure scenarios at the site:

- Future occupational worker scenario

[1] Because only arsenic is identified as the only COPC, cumulative (that is, summation of multiple chemical HQ and ELCR risks) noncancer and cancer risk estimates are not applicable for this HHRA.

- Future excavation/construction worker scenario
- Hypothetical future resident scenario

The cancer and noncancer risk estimates for the site are summarized in the following subsections. Risk estimates are provided for the ingestion, dermal, and inhalation routes, as well as cumulative risks across all exposure routes. The risk calculation data sheets used to develop the risk summary tables for each exposure scenario described below are in Appendix A.

3.5.3.1 Future Occupational Worker Exposure Scenario

Potential exposure to arsenic in soil (0 to 10 feet bgs) was evaluated under the occupational scenario. Potential routes of exposure to soil include incidental ingestion, dermal contact, and inhalation of fugitive dust in ambient air. For future occupational workers, a 70-kg adult was assumed to be exposed to soil for 250 days per year over a duration of 25 years. The ELCR and HQ estimates for the future occupational worker exposure scenario are summarized in Table 3-16. The risk calculation worksheets are provided in Appendix A, Tables A-1 and A-2.

For the eight exposure areas, the potential ELCR estimates for occupational workers range from 2×10^{-4} to 2×10^{-3}, which are above the DTSC regulatory point of departure value of 1×10^{-6} and above the EPA target risk range of 1×10^{-6} to 1×10^{-4}. For noncarcinogenic effects, the arsenic HQ estimates range from 0.2 to 2. Only one of the eight exposure areas (Partition 8) had an HQ slightly above the DTSC regulatory point of departure value of 1.

The potential risk to future occupational workers attributable to ambient concentrations was calculated using the maximum ambient arsenic level of 27.3 mg/kg. The potential ELCR and HQ estimates for ambient arsenic are 1×10^{-4} and 0.1, respectively, for the occupational exposure scenario. This indicates that from 8 to 55 percent of the ELCR and HQ for this scenario could be attributable to naturally occurring ambient levels of arsenic.

3.5.3.2 Excavation/Construction Worker Exposure Scenario

Potential exposure to arsenic in soil (0 to 10 feet bgs) was evaluated under the excavation/construction scenario. Potential routes of exposure to soil include incidental ingestion, dermal contact, and inhalation of fugitive dust in ambient air. For future excavation/construction workers, a 70-kg adult was assumed to be exposed to soil for 250 days per year over a duration of 1 year. The ELCR and HQ estimates for the future excavation/construction worker exposure scenario are summarized in Table 3-16. The risk calculation worksheets are provided in Appendix A, Tables A-3 and A-4.

For the eight exposure areas, the potential ELCR estimates for excavation/construction workers range from 3×10^{-5} to 2×10^{-4}, which are above the DTSC regulatory point of departure value of 1×10^{-6}. Only one of the eight exposure areas (Partition 8) had an ELCR above the EPA target risk range of 1×10^{-6} to 1×10^{-4}. For noncarcinogenic effects, the arsenic HQ estimates range from 2 to 14, above the DTSC regulatory point of departure value of 1.

The potential risk to future excavation/construction workers attributable to ambient concentrations was calculated using the maximum ambient arsenic level of 27.3 mg/kg. The potential ELCR and HQ estimates for ambient arsenic are 2×10^{-5} and 1, respectively, for the excavation/construction exposure scenario. This indicates that from 8 to 55 percent of the

ELCR and HQ for this scenario could be attributable to naturally occurring ambient levels of arsenic.

3.5.3.3 Hypothetical Future Resident Exposure Scenario

Potential exposure to arsenic in soil (0 to 10 feet bgs) was evaluated under the hypothetical future resident scenario. Potential routes of exposure to soil include incidental ingestion, dermal contact, and inhalation of fugitive dust in ambient air. A hypothetical future resident was assumed to be exposed for 350 days per year over a duration of 30 years (for the first 6 years as a 15-kg child, followed by 24 years as a 70-kg adult). The ELCR and HQ estimates for the hypothetical future resident exposure scenario are summarized in Table 3-16. The risk calculation worksheets are provided in Appendix A, Tables A-5 and A-6.

For the eight exposure areas, the potential ELCR estimates for hypothetical future residents range from 8×10^{-4} to 6×10^{-3}, which are above the DTSC regulatory point of departure value of 1×10^{-6} and above the EPA target risk range of 1×10^{-6} to 1×10^{-4}. For noncarcinogenic effects, the arsenic HQ estimates range from 0.7 to 5. All but one of the eight exposure areas (Partition 4) had an HQ above the DTSC regulatory point of departure value of 1.

The potential risk to hypothetical future residential attributable to ambient concentrations was calculated using the maximum ambient arsenic level of 27.3 mg/kg. The potential ELCR and HQ estimates for ambient arsenic are 4×10^{-4} and 0.4, respectively, for the hypothetical future residential exposure scenario. This indicates that from 8 to 55 percent of the ELCR and HQ for this scenario could be attributable to naturally occurring ambient levels of arsenic.

3.5.4 Arsenic Bioavailability Analysis and Discussion

Oral bioavailability is a measure of the amount of a constituent that is absorbed into the body after ingestion exposure. Some constituents are absorbed almost completely (100 percent bioavailability) when ingested in their pure, soluble form. Others may pass through the body largely unabsorbed. Oral bioavailability of soil-bound arsenic largely depends on the rate at which it dissociates from the soil matrix in the gastrointestinal (GI) tract. Soil-bound metals are usually absorbed by the GI tract to a lesser degree than metal salts in their pure, soluble form (Paustenbach, 1987). This reduced absorption results from the affinity between the constituent and soil matrix, the low solubility of the constituent form associated with the soil, or both. Thus, the bioavailability of arsenic in soil from UPRR is expected to be low for constituents that are tightly bound within the soil matrix and/or are in a form that is insoluble in the GI tract under physiological conditions.

A physiologically-relevant extraction procedure was used to estimate the bioaccessible fraction of arsenic in site soil. The procedure and results were provided in Appendix A of the RI Report (CH2M HILL, 2006a). Nine soil samples (including two duplicates) collected August 1 through 3, 2005 were extracted to provide a conservative estimate of the bioavailability of arsenic at the site. Total arsenic in the sieved samples ranged from 16 to 356 mg/kg. The extractable fraction of arsenic ranged from 5.6 percent to 42.1 percent, with an average of 23.3 percent. The extractable (bioaccessible) fraction appeared to be lower in samples with lower total arsenic (for example, samples SB02-05 and SB11-02). Samples with greater than 100 mg/kg total arsenic were 30 to 40 percent extractable. The similarities between the results of the two duplicate samples relative to their respective parent samples (5.6 versus 6.2 percent and 29.0 versus 32.6 percent) indicate that a high level of confidence in the results of these extractions is justified. These results indicate that, for total arsenic levels greater than 100 mg/kg at the site, only about 30 to 40 percent of the arsenic is in a form that is biologically available, and that the risk estimates for total arsenic in these soils would be proportionately lower if the site-specific bioavailability is accounted for in the risk calculations.

3.6 Soil Remediation Goals

Risk-based concentrations of arsenic in soil that equate to an excess cancer risk of 1x10-5 for the excavation/construction worker, occupational worker, and hypothetical residential exposure scenarios are less than the reported ambient background level of arsenic (27.3 mg/kg). Therefore, the soil remedial goal is set at the reported ambient background level of 27.3 mg/kg, as an average concentration on an areal-wide basis (as represented by the 95 percent UCL).

Because the remedial goal is based on the average ambient background level, not every sampling location at the site with arsenic exceeding background necessarily requires action in order to meet the area-wide goal of 27.3 mg/kg. It is possible to achieve this goal with a few locations slightly exceeding this level. Following remediation and confirmation sampling and analysis, an evaluation of residual concentrations will be conducted to document that the area-wide remedial goal has been achieved.

3.7 Risk Assessment Limitations and Uncertainties

Full characterization of human risks requires that numerical estimates of health risks must be accompanied by a discussion of the uncertainties inherent in the assumptions used to estimate risks. Several sources of uncertainty affect the overall risk estimates as presented in this HHRA. This risk assessment is subject to uncertainty with regard to a variety of factors:

- Environmental sampling and analysis
- Exposure assessment
- Toxicity assessment
- Risk estimation

Uncertainties associated with the results of this risk assessment are a function of both the state of the practice of risk assessment in general and the uncertainties specific to the site. General and site-specific uncertainties, as well as their potential effects on the results of the risk assessment, are summarized in the following subsections.

3.7.1 Environmental Sampling and Analysis

Uncertainties associated with sampling and analysis include the inherent variability (standard error) in the analyses, the representativeness of the samples, sampling errors, and heterogeneity of the sample matrix. The quality assurance/quality control (QA/QC) program used in the investigation serves to reduce these errors, but it cannot eliminate all errors associated with sampling and analysis. The degree to which sample collection and analysis reflect real EPCs partly determines the reliability of the risk estimates.

3.7.2 Exposure Assessment

The estimation of exposure requires many assumptions to describe potential exposure situations. There are uncertainties regarding the likelihood of exposure, the frequency of contact with contaminated media, the concentrations of constituents at exposure points, and the time period of exposure. The default agency-derived exposure assumptions used are intended to be conservative and yield an overestimate of the true risk or hazard.

Due to uncertainty regarding actual future site development, the site was partitioned into eight parcels to estimate exposure areas for this HHRA, and to provide spatial representation of risk. If future exposure areas are larger or smaller than those assumed, risk estimates could be different than reported here. However, the relatively uniform distribution of arsenic seen across the site would tend to minimize this concern.

The soil depth interval considered in this risk assessment (0 to 10 feet bgs) was used in accordance with DTSC guidance (Cal-EPA, 1996). Future exposure to soil from shallower depths is more likely if deeper soil is not brought to the surface during future site development. Most of the sampling data were collected from 5 feet bgs or shallower, and maximum arsenic levels were roughly the same for samples from 0.5, 2, and 5 feet bgs.

The default particulate emission factor used for the excavation/construction worker scenario assumes that very dusty conditions would result during these intrusive activities. It is likely that this assumed level of dust emission overestimates what would actually occur at this site during development because dust suppression techniques are typically used during construction activities. In addition, it is likely that development of any of the exposure areas at the site would be accomplished in less than the 250 days assumed as a default exposure frequency for this scenario. To the extent that dust levels and exposure frequency are less than the default values used for the excavation/construction worker scenario, risk estimates would also be proportionately reduced.

3.7.3 Toxicity Assessment

Uncertainties in toxicological data can influence the reliability of risk management decisions. The toxicity values used for quantifying risk in this assessment have varying levels of confidence that affect the usefulness of the resulting risk estimates. Sources of uncertainty associated with toxicity values used in toxicity assessments include the following:

- Extrapolation of dose-response data derived from high-dose exposures to adverse health effects that may occur at the low levels seen in the environment
- Extrapolation of dose-response data derived from short-term tests to predict effects of chronic exposures
- Extrapolation of dose-response data derived from animal studies to predict effects on humans (this factor does not exist for arsenic, since based on human studies)

- Extrapolation of dose-response data from homogeneous populations to predict effects on the general population.

Dermal exposures are different from oral exposures because not all of a constituent that comes into contact with a person's skin travels across the various layers of epidermal tissue, as indicated by a skin permeability factor, and because the toxic effects produced from this route of exposure may not be the same as when the constituent is ingested. In lieu of available toxicity values for the dermal route, this HHRA uses oral toxicity values to estimate the effects of dermally available arsenic. This may result in an underestimate or an overestimate of risks, depending on whether the form of arsenic in soil at the site is more or less toxic by the dermal route versus by ingestion.

No available subchronic reference dose values exist for arsenic; therefore, the chronic toxicity factors were used for the excavation/construction worker scenario (a relatively short duration exposure). This likely results in an overestimation of noncancer risk, possibly up to an order of magnitude.

3.7.4 Risk Estimation

The risk estimates provided in Table 3-16 conservatively assume that ingested and inhaled arsenic from soil is completely bioavailable. As discussed in Section 3.5.4, results suggest that only a portion of the arsenic is bioavailable. These results indicate that, for total arsenic levels greater than 100 mg/kg at the site, about 30 to 40 percent of the arsenic is in a form that is biologically available, and that the risk estimates for total arsenic in these soils would be proportionately lower.

3.8 Risk Assessment Conclusions and Recommendations

This HHRA was conducted in accordance with Cal-EPA and EPA risk assessment guidance. Risks were estimated for the most plausible potential pathways of human exposure, based on reasonably anticipated land uses at and surrounding the site. The HHRA results, summarized in Table 3-16, indicate that ELCR and HQ estimates for exposure to arsenic in soil are above the DTSC regulatory point of departure value of 1×10^{-6} and 1, respectively, for all human health exposure scenarios evaluated. As shown in Table 3-16, naturally occurring ambient arsenic levels may be responsible for as much as 8 to 55 percent of the risk at the site.

These results support the recommendation that the site be evaluated for remedial options for average arsenic concentrations above ambient concentrations, 27.3 mg/kg as part of a subsequent *Removal Action Work Plan*. In addition, the results of the hypothetical residential scenario support the need for evaluation of potential land use controls or other institutional controls for the property.

SECTION 4

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Tables

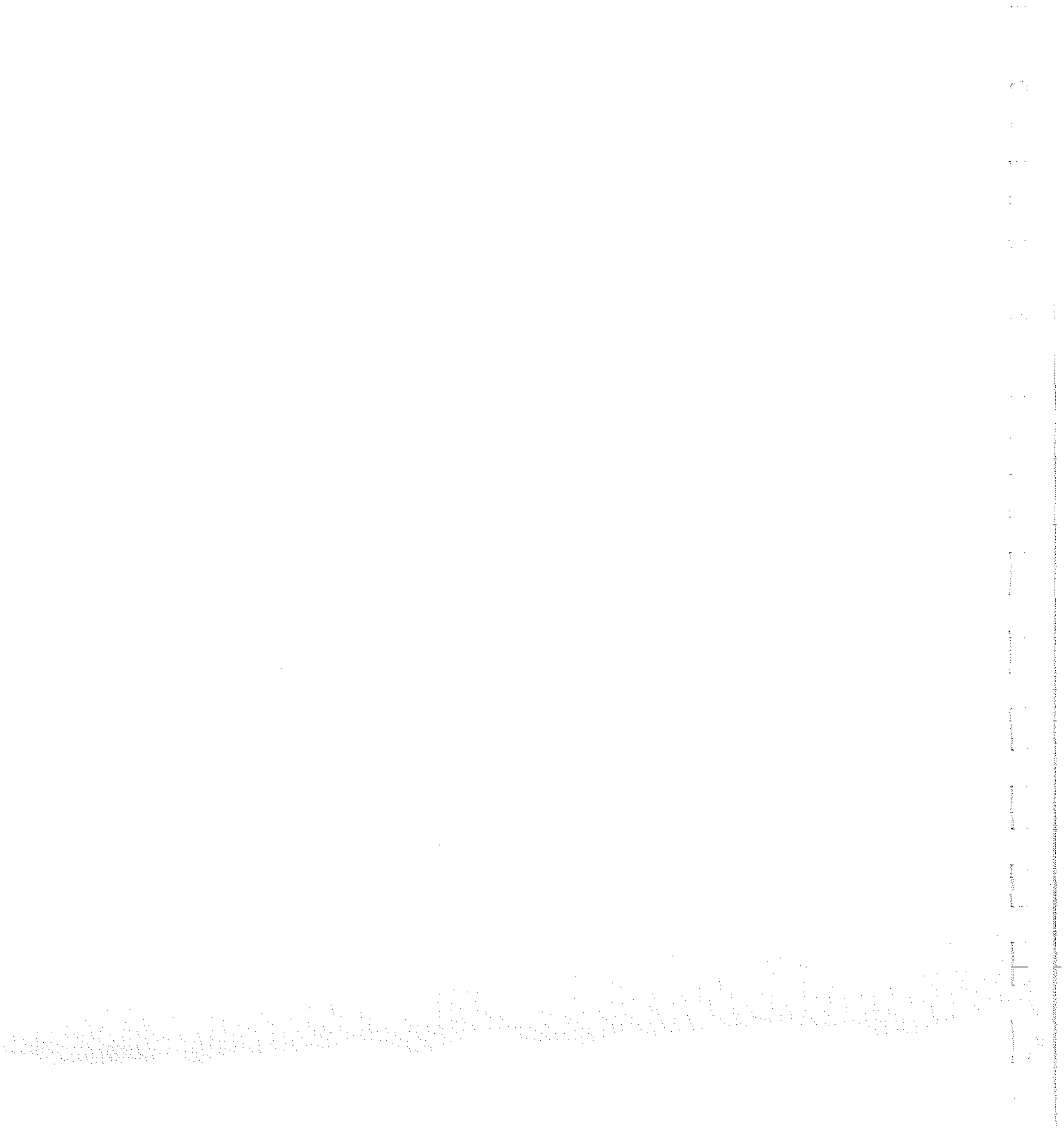


TABLE 3-1

Summary of Phase II Analytical Data - Non-COCs

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	TPH (g) mg/kg	TPH (d) mg/kg	TRPH mg/kg	VOCs µg/kg	SVOCs µg/kg	PCB µg/kg	Herbicides µg/kg	Creosote µg/kg
PQL	0.5	10	10					50
Sample ID								
LE1-5			ND					
LE1-15		ND						
LE1-25	ND			ND				
LE2-5		ND	ND					
LE3-5	ND	ND	ND	ND				
LE4-5			ND					
LE4-15		ND						
LE4-25	ND			ND	ND			
LE5-5		ND	21					
LE6-5		ND	ND			ND		
LE7-5			ND				ND	
LE7-15		ND						
LE7-25	ND			ND				
LE8-2								ND
LE8-5		ND	ND					
LE9-5	ND	ND	26	ND				
LE10-5			ND					
LE10-15		ND						
LE10-35	ND			ND				
LE11-5	ND	ND	ND	ND				
LE12-2							ND	
LE12-5			ND					
LE13-5			ND					
LE13-15		ND						
LE13-25					ND			
LE13-35	ND			ND				
LE14-5		ND	ND			ND		
LE15-5	ND	ND	27	ND				
LE16-5		ND	ND					
LE17-5	ND	ND	ND	ND				
LE18-2								ND
LE18-5		ND	ND				ND	
LE19-2			492					
LE19-5			172					
LE19-15		ND	ND					ND
LE19-25	ND			ND	ND			
LE20-5		ND	ND			ND		
LE21-5	ND	ND	ND	ND				
LE22-5			ND					
LE22-15		ND						
LE22-35	ND			ND				
LE23-5		ND	ND					
LE24-5		ND	ND					
LE25-5			17					
LE25-15		ND						
LE25-25	ND			ND				
LE26-5		ND	38					

TABLE 3-1

Summary of Phase II Analytical Data - Non-COCs

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	TPH (g) mg/kg	TPH (d) mg/kg	TRPH mg/kg	VOCs µg/kg	SVOCs µg/kg	PCB µg/kg	Herbicides µg/kg	Creosote µg/kg
PQL	0.5	10	10					50
Sample ID								
LE27-2								ND
LE27-5		ND	32					
LE28-5			ND					
LE28-15		ND						
LE28-25					ND			
LE28-35	ND			ND				
LE29-5		ND	ND					
LE30-5		ND	48					
LE31-5	ND	ND	42	ND				
LE32-5		ND	22					
LE33-2							ND	
LE33-5		ND	ND			ND		
LE34-5	ND	ND	ND	ND				
LE35-2								ND
LE35-5		ND	ND					
LE36-5	ND	ND	28	ND				

TABLE 3-2
Summary of Phase II Analytical Data - Metals
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Cadmium mg/kg	Total Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Molybdenum mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg
ECCM (range)	0.50 (0.15-1.95)	2.8 (0.6-11.0)	468 (133-1,400)	0.26 (0.05-1.70)	76 (23-1579)	12.6 (2.7-46.9)	24.0 (9.1-96.4)	44.6 (14.3-107.9)	0.9 (0.1-9.6)	36 (9-5009)	101 (39-288)	145 (88-236)
PRG/SSI	31	0.39	5,400	37	210	900	3,100	150	390	1,600	550	23,000
Sample ID												
LE5-2	1.14	16.7	137	0.97	37.5	12.4	24.6	5.05	1.73	27.0	59.0	66.6
LE13-2	1.50	53.6	1,129	3.70	30.6	11.0	37.3	21.4	3.83	38.3	60.4	85.6
LE16-2	1.00	107	94.6	3.36	32.1	11.1	22.3	6.01	1.48	23.0	46.9	46.9
LE35-2	ND	23.1	27.7	0.62	12.9	3.12	7.07	2.56	ND	7.51	14.0	14.0

TABLE 3-3

Summary of Phase II Analytical Data - Arsenic

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	0.5 ft bgs µg/kg	2 ft bgs µg/kg	5 ft bgs µg/kg	10 ft bgs µg/kg	15 ft bgs µg/kg	25 ft bgs µg/kg	35 ft bgs µg/kg	45 ft bgs µg/kg
Background		20	18		12	15	15	20
PQL				0.25				
ECCM (range)				2.8 (0.6-11.0)				
PRG/SSI				0.39				
Sample ID								
LE1		36.2	26.2		21.9	16.3	18.0	14.5
A32	39.5	23.1	62					
A30	132	27.1	23.2					
A28	25.3	171	79.7					
A21	158			18.7	16.1			
LE2		188	120					
A27	27.6	224	169					
A29	88.1	124	22.2					
A31	16.0	156	23.5					
A57	14.7	19.9	102					
LE3		130	22.6					
SS1	199							
A1	25.6	120	21.6					
LE4		25.8	25.3		5.03	13.3	12.0	16.7
A62	10.1	18.4	27.3					
A2		66.1	21.0					
LE5		16.7	38.8					
A3	137	54.2	10.4					
A4	150	36.0	14.4					
LE6		25.2	23.2					
LE7		196	21		19.4	14.4	16.4	20.0
LE8		146	18.6					
SS2	14.0							
LE9		194	15.6					
SS3	25.2							
A58	17.6	12.6	15.5					
LE10								
SS4	30.7							
LE11		168	17.2					
SS5	21.3							
SS6	38.5							
A37	18.4	15.4	71.9					
A36	251	22.9	18.5					
A33	296	18.8	17.0					
LE12		201	25.4					
A34	23.8	108	19.9					
A35	15.4	25.5	68.2					
A38	39.8	78.7	19.7					
A63	17.4	20.6	203					
LE13		53.6	23.0		12.4	16.4	10.3	17.6
SS7	16.3							
LE14		187	13.4					
SS8	13.4							
A64	44.7	15.5	11.9					
A5	71.7	97.6	16.5					
LE15		18.5	13.1					
A6	14.8	22.1	12.6					
LE16		107	15.5					
SS9	15.6							
A7	15.2	24.3	11.1					
A59	15.6	119	20.0					

TABLE 3-3

Summary of Phase II Analytical Data - Arsenic

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	0.5 ft bgs µg/kg	2 ft bgs µg/kg	5 ft bgs µg/kg	10 ft bgs µg/kg	15 ft bgs µg/kg	25 ft bgs µg/kg	35 ft bgs µg/kg	45 ft bgs µg/kg
Background		20	18		12	15	15	20
PQL				0.25				
ECCM (range)				2.8 (0.6-11.0)				
PRG/SSI				0.39				
Sample ID								
LE17		30.1	17.6					
A8	14.2	26.9	21.0					
LE18		18.6	18.6					
A9	173	84.8	34.6					
A44	24.8	22.3	141					
A42	190	296	223					
A40	126	223	114					
A22	37.0			20.3	6.58			
LE19		191	229		10.7	15.3	16.2	11.3
A39	16.7	169	336					
A41	48.4	67.0	13.8					
A43	85.7	118	60.7					
A23	123			13.3	8.23			
LE20		63.7	143					
LE21		98.4	21.0					
SS10	25.5							
A10	38.7	83.3	5.52					
LE22		12.7	22.0		8.62	22.1	12.7	17.0
A65	17.5	9.8	19.7					
A11	74.9	75.0	146					
A50	16.7	0.55	5.24					
A48	ND	46.4	13.9					
A46	94.8	108	164					
A24	101			6.54	5.11			
LE23		114	208					
A45	92.9	114	19.2					
A47	94.3	135	20.7					
A49	39.9	41.1	19.8					
LE24		142	17.6					
SS11	24.2							
A60	16.3	5	5.92					
LE25		92.3	6.84		7.51	19.1	16.0	43.2
SS12	46.3							
A12	426	198	11.2					
LE26		29.0	10.7					
A13	171	264	7.39					
LE27		1.04	9.57					
A14	ND	59.9	14.3					
LE28		9.03	8.40		7.13	10.2	20.1	20.7
A15	130	118	9.11					
LE29		54.2	10.9					
SS13	26.8							
A61	61.7	36.7	5.07					
A25	104			6.31	5.80			
LE30		155	95.7					
A16	6.67	58.9	73.3					
LE31		7.8	12.8					
A66	21.8	14.6	6.45					
A17	163	94.9	6.16					
LE32		67.6	10.1					
SS14	82.0							

TABLE 3-3

Summary of Phase II Analytical Data - Arsenic

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	0.5 ft bgs µg/kg	2 ft bgs µg/kg	5 ft bgs µg/kg	10 ft bgs µg/kg	15 ft bgs µg/kg	25 ft bgs µg/kg	35 ft bgs µg/kg	45 ft bgs µg/kg
Background		20	18		12	15	15	20
PQL				0.25				
ECCM (range)				2.8 (0.6-11.0)				
PRG/SSI				0.39				
Sample ID								
A18	74.9	996	8.81					
LE33		9.08	7.65					
A19	141	109	43.9					
LE34		45.1	7.34					
LE35		23.1	7.49					
A20	68.4	33.9	5.57					
A56	99.5	44.7	13.0					
A54	266	148	9.89					
A52	134	4.96	4.33					
A26	164			2.34	1.98			
LE36		8.21	122					
A51	86.1	12.4	5.00					
A53	258	180	5.69					
A55	68.0	137	5.51					

TABLE 3-4

Summary of Phase II Analytical Data - Groundwater

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	TPH (g) µg/L	Acetone µg/L	Chlorofrom µg/L	Other VOCs µg/L
PQL	50	5.0	1.0	
Sample ID				
LE10-GW	ND	ND	1.8	ND
LE19-GW	ND	58.1	ND	ND
LE22-GW	ND	ND	ND	ND
LE25-GW	ND	ND	1.5	ND
LE28-GW	ND	ND	ND	ND

TABLE 3-5
Remedial Investigation - Sample Summary
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

					Analyses		
Sample Location	Sample ID	Sample Type	Depths (ft bgs)	Number of Samples	Total Metals (EPA Method 6010B)	STLC ("STLC-As")	Bioavaliability
Soil Samples							
Sample Container					Acetate sleeve 6 inches	Lab took sample from "Total Metals" sample	8-ounce glass jar
SB01	SB01-02 *	target	2	1	X		
SB01	SB01-02D	duplicate	2	1	X		
SB01	SB01-05	target	5	1	X		
SB01	SB01-10	target	10	1	X		
SB01	SB01-20	target	20	1	X		
SB01	SB01-30	target	30	1	X		
SB01	SB01-39	target	39	1	X		
SB01	SB01-50	target	50	1	X		
SB02	SB02-02	target	2	1	X	X	X
SB02	SB02-05 *	target	5	1	X	X	X
SB02	SB02-05D	duplicate	5	1	X	X	X
SB02	SB02-10	target	10	1	X		
SB02	SB02-20	target	20	1	X		
SB02	SB02-30	target	30	1	X		
SB02	SB02-40	target	40	1	X		
SB02	SB02-50	target	50	1	X		
SB03	SB03-02	target	2	1	X		
SB03	SB03-05	target	5	1	X		
SB03	SB03-10	target	10	1	X		
SB03	SB03-20 *	target	20	1	X		
SB03	SB03-20D	duplicate	20	1	X		
SB03	SB03-30	target	30	1	X		
SB03	SB03-40	target	40	1	X		
SB03	SB03-50	target	50	1	X		
SB04	SB04-02	target	2	1	X		
SB04	SB04-05	target	5	1	X		
SB04	SB04-10	target	10	1	X		
SB04	SB04-20	target	20	1	X		
SB04	SB04-30	target	30	1	X		
SB04	SB04-40	target	40	1	X		
SB04	SB04-50	target	50	1	X		
SB05	SB05-02 *	target	2	1	X	X	X
SB05	SB05-02D	duplicate	2	1	X	X	X
SB05	SB05-05	target	5	1	X	X	X
SB05	SB05-10	target	10	1	X		
SB05	SB05-20	target	20	1	X		
SB05	SB05-30	target	30	1	X		
SB05	SB05-40	target	40	1	X		
SB05	SB05-50	target	50	1	X		

TABLE 3-5
Remedial Investigation - Sample Summary
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

					Analyses		
Sample Location	**Sample ID**	**Sample Type**	**Depths (ft bgs)**	**Number of Samples**	**Total Metals (EPA Method 6010B)**	**STLC ("STLC-As")**	**Bioavaliability**
Soil Samples							
Sample Container					**Acetate sleeve 6 inches**	**Lab took sample from "Total Metals" sample**	**8-ounce glass jar**
SB06	SB06-02	target	2	1	X		
SB06	SB06-05 *	target	5	1	X		
SB06	SB06-05D	duplicate	5	1	X		
SB06	SB06-10	target	10	1	X		
SB06	SB06-20	target	20	1	X		
SB06	SB06-30	target	30	1	X		
SB06	SB06-38	target	38	1	X		
SB06	SB06-50	target	50	1	X		
SB07	SB07-02	target	2	1	X		
SB07	SB07-05	target	5	1	X		
SB07	SB07-10 *	target	10	1	X		
SB07	SB07-10D	duplicate	10	1	X		
SB07	SB07-20	target	20	1	X		
SB07	SB07-30	target	30	1	X		
SB07	SB07-40	target	40	1	X		
SB08	SB08-02	target	2	1	X	X	X
SB08	SB08-05	target	5	1	X	X	
SB08	SB08-10	target	10	1	X		
SB08	SB08-20 *	target	20	1	X		
SB08	SB08-20D	duplicate	20	1	X		
SB08	SB08-30	target	30	1	X		
SB08	SB08-40	target	40	1	X		
SB09	SB09-02	target	2	1	X		
SB09	SB09-05	target	5	1	X		
SB09	SB09-10	target	10	1	X		
SB09	SB09-20	target	20	1	X		
SB09	SB09-30	target	30	1	X		
SB09	SB09-40	target	40	1	X		
SB10	SB10-02	target	2	1	X		
SB10	SB10-05	target	5	1	X		
SB10	SB10-10	target	10	1	X		
SB10	SB10-20 *	target	20	1	X		
SB10	SB10-20D	target	20	1	X		
SB10	SB10-30	target	30	1	X		
SB11	SB11-02	target	2	1	X	X	X
SB11	SB11-05	target	5	1	X	X	X
SB11	SB11-10.5 *	target	10.5	1	X		
SB11	SB11-10.5D	duplicate	10 5	1	X		
SB11	SB11-20	target	20	1	X		
SB11	SB11-30	target	30	1	X		
SB12	SB12-02	target	2	1	X		
SB12	SB12-05	target	5	1	X		
SB12	SB12-10	target	10	1	X		
SB12	SB12-19	target	19	1	X		
SB12	SB12-30	target	30	1	X		

TABLE 3-5
Remedial Investigation - Sample Summary
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

					Analyses		
Sample Location	Sample ID	Sample Type	Depths (ft bgs)	Number of Samples	Total Metals (EPA Method 6010B)	STLC ("STLC-As")	Bioavaliability
Soil Samples							
Sample Container					**Acetate sleeve 6 inches**	**Lab took sample from "Total Metals" sample**	**8-ounce glass jar**
BK01	BK01-02 *	target	2	1	X		
BK01	BK01-02D	duplicate	2	1	X		
BK01	BK01-05	target	5	1	X		
BK02	BK02-02	target	2	1	X		
BK02	BK02-05	target	5	1	X		
BK03	BK03-02	target	2	1	X		
BK03	BK03-05	target	5	1	X		
BK04	BK04-02	target	2	1	X		
BK04	BK04-05	target	5	1	X		
BK05	BK05-02	target	2	1	X		
BK05	BK05-05	target	5	1	X		
Total Target Soil Samples				95			
Duplicate Samples (separate sample)				10			
MS/MSD Samples (not a separate sample)				5			
TOTAL SOIL SAMPLES				110			
Water Samples							
Sample Container					**500 mL poly bottle with nitric acid**	**Not Applicable**	**Not Applicable**
NA	EB080105	equipment blank	NA	1	X		
NA	EB080105-2	equipment blank	NA	1	X		
NA	EB080205-1	equipment blank	NA	1	X		
NA	EB080205-2	equipment blank	NA	1	X		
NA	EB080305-1	equipment blank	NA	1	X		
NA	EB080305-2	equipment blank	NA	1	X		
NA	EB080405	equipment blank	NA	1	X		
SB01	SB01-54	target	NA	1	X		
SB05	SB05-54 *	target	NA	1	X		
SB05	SB05-54D	duplicate	NA	1	X		
SB08	SB08-45	target	NA	1	X		
SB11	SB11-35	target	NA	1	X		
Total Target Water Samples				12			
Duplicate Samples (separate sample)				1			
MS/MSD Samples (not a separate sample)				1			
Equipment Rinsate Samples (at least one per day)				7			
TOTAL Water SAMPLES				21			

Notes:
* Indicates a duplicate sample was collected

TABLE 3-6
Remedial Investigation - Data Validation Flags
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Sample Name	Analysis Method	Analyte	Result Value Units	Result Value	Project Qualifier Code	Comments
BK01-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK01-02D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK01-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK02-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK02-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK03-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK03-02	6010B	Barium	mg/kg	109	J	MS>UCL,MSD>UCL
BK03-02	6010B	Cadmium	mg/kg	0.5	UJ	MS<LCL,MSD<LCL
BK03-02	6010B	Chromium	mg/kg	47.6	J	MSD<LCL
BK03-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK04-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK04-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK05-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
BK05-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
EB080405	6010B	Antimony	mg/L	0.06	UJ	MSGLOBAL
SB01-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB01-02D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB01-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB01-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB01-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB01-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB01-39	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB01-50	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-02	6010B	Chromium	mg/kg	44.9	J	MSD<LCL
SB02-02	6010B	Vanadium	mg/kg	75.9	J	MSD<LCL
SB02-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-05D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-40	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB02-50	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-20	6010B	Barium	mg/kg	142	J	MS>UCL,MSD>UCL
SB03-20	6010B	Calcium	mg/kg	4,770	J	MS>UCL,MSD>UCL
SB03-20	6010B	Chromium	mg/kg	38	J	MS>UCL,MSD>UCL
SB03-20	6010B	Magnesium	mg/kg	6,780	J	MSD>UCL
SB03-20	6010B	Potassium	mg/kg	3700	J	MSD>UCL
SB03-20	6010B	Vanadium	mg/kg	64.4	J	MSD>UCL
SB03-20	6010B	Zinc	mg/kg	73.7	J	MSD>UCL
SB03-20D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-20D	6010B	Barium	mg/kg	101	J	MS>UCL,MSD>UCL
SB03-20D	6010B	Calcium	mg/kg	5,360	J	MS>UCL,MSD>UCL

TABLE 3-6

Remedial Investigation - Data Validation Flags

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

Sample Name	Analysis Method	Analyte	Result Value Units	Result Value	Project Qualifier Code	Comments
SB03-20D	6010B	Chromium	mg/kg	28.5	J	MS>UCL,MSD>UCL
SB03-20D	6010B	Magnesium	mg/kg	5,380	J	MSD>UCL
SB03-20D	6010B	Potassium	mg/kg	2,140	J	MSD>UCL
SB03-20D	6010B	Vanadium	mg/kg	43.8	J	MSD>UCL
SB03-20D	6010B	Zinc	mg/kg	49.4	J	MSD>UCL
SB03-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-40	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB03-50	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB04-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB04-02	6010B	Cadmium	mg/kg	0.5	UJ	MS<LCL,MSD<LCL
SB04-02	6010B	Chromium	mg/kg	30.6	J	MS<LCL
SB04-02	6010B	Lead	mg/kg	14.3	J	MS<LCL,MSD<LCL
SB04-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB04-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB04-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB04-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB04-40	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB04-50	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-02D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-40	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-50	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB05-54	6010B	Arsenic	mg/L	0.022	J	FDRPD
SB05-54	6010B	Chromium	mg/L	0.26	J	FDRPD
SB05-54	6010B	Cobalt	mg/L	0.2	J	FDRPD
SB05-54	6010B	Copper	mg/L	0.42	J	FDRPD
SB05-54	6010B	Iron	mg/L	57.6	J	FDRPD
SB05-54	6010B	Lead	mg/L	0.0067	J	FDRPD
SB05-54	6010B	Manganese	mg/L	7.7	J	FDRPD
SB05-54	6010B	Zinc	mg/L	8.6	J	FDRPD
SB05-54D	6010B	Arsenic	mg/L	0.035	J	FDRPD
SB05-54D	6010B	Chromium	mg/L	0.39	J	FDRPD
SB05-54D	6010B	Cobalt	mg/L	0.092	J	FDRPD
SB05-54D	6010B	Copper	mg/L	0.74	J	FDRPD
SB05-54D	6010B	Iron	mg/L	84.5	J	FDRPD
SB05-54D	6010B	Lead	mg/L	0.011	J	FDRPD
SB05-54D	6010B	Manganese	mg/L	4	J	FDRPD
SB05-54D	6010B	Zinc	mg/L	23.6	J	FDRPD
SB06-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB06-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB06-05	6010B	Arsenic	mg/kg	25.4	J	FDRPD
SB06-05	6010B	Chromium	mg/kg	71.8	J	FDRPD
SB06-05	6010B	Copper	mg/kg	43.2	J	FDRPD

TABLE 3-6
Remedial Investigation - Data Validation Flags
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Sample Name	Analysis Method	Analyte	Result Value Units	Result Value	Project Qualifier Code	Comments
SB06-05	6010B	Lead	mg/kg	11.3	J	FDRPD
SB06-05	6010B	Nickel	mg/kg	45	J	FDRPD
SB06-05D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB06-05D	6010B	Arsenic	mg/kg	13.4	J	FDRPD
SB06-05D	6010B	Chromium	mg/kg	30.6	J	FDRPD
SB06-05D	6010B	Copper	mg/kg	19.3	J	FDRPD
SB06-05D	6010B	Lead	mg/kg	2.5	J	FDRPD
SB06-05D	6010B	Nickel	mg/kg	16.8	J	FDRPD
SB06-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB06-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB06-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB06-38	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB06-50	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB07_02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB07_05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB07_10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB07_10	6010B	Calcium	mg/kg	9,050	J	FDRPD
SB07_10D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB07_10D	6010B	Calcium	mg/kg	4,070	J	FDRPD
SB07_20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB07_30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB07_40	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-05	6010B	Barium	mg/kg	151	J	MS<LCL
SB08-05	6010B	Manganese	mg/kg	481	J	MSD>UCL
SB08-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-20	6010B	Arsenic	mg/kg	13.2	J	FDRPD
SB08-20	6010B	Lead	mg/kg	2.9	J	FDRPD
SB08-20D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-20D	6010B	Arsenic	mg/kg	51.9	J	FDRPD
SB08-20D	6010B	Lead	mg/kg	15.8	J	FDRPD
SB08-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-40	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB08-45	6010B	Zinc	mg/L	0.4	U	EB>RL
SB09-02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB09-05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB09-10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB09-20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB09-30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB09-40	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB10_02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB10_02	6010B	Cadmium	mg/kg	0.5	UJ	MS<LCL,MSD<LCL
SB10_02	6010B	Manganese	mg/kg	175	J	MS>UCL,MSD<LCL
SB10_05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB10_10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL

TABLE 3-6

Remedial Investigation - Data Validation Flags

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

Sample Name	Analysis Method	Analyte	Result Value Units	Result Value	Project Qualifier Code	Comments
SB10_20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB10_20D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB10_30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB11_02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB11_05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB11_10.5	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB11_10.5D	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB11_20	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB11_30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB11-35	6010B	Zinc	mg/L	0.078	U	EB>RL
SB12_02	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB12_05	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB12_10	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB12_19	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL
SB12_30	6010B	Antimony	mg/kg	6	UJ	MSGLOBAL

Notes:

MSD<LCL = The associated matrix spike duplicate recovery was less than laboratory established QC limits.

MS>UCL = The associated matrix spike recovery was greater than laboratory established QC limits

MSD>UCL = The associated matrix spike duplicate recovery was greater than laboratory established QC limits

FDRPD = The RPD between the native and field duplicate result exceeds 50 percent.

EB>RL = Analyte detected in the associated equipment blank greater than the laboratory reporting limit.

MS<LCL = The associated matrix spike recovery was less than laboratory established QC limits.

TABLE 3-7
Remedial Investigation - Ambient Soil Results
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

	Aluminum		Antimony		Arsenic		Barium		Beryllium		Cadmium		Calcium		Chromium	
Industrial PRG	100,000 mg/kg		410 mg/kg		1.6 mg/kg		67,000 mg/kg		1,900 mg/kg		7.4 * kg/mg		NA		450 mg/kg	
TTLC	NA		500 mg/kg		500 mg/kg		10,000 mg/kg		75 mg/kg		100 kg/mg		NA		2,500 mg/kg	
Sample ID	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**
BK01-02	23,600		6	UJ	**27.3**		142		0.78		0.5	U	6,280		55.6	
BK01-02D	22,000		6	UJ	**26.8**		120		0.71		0.5	U	5,590		50	
BK01-05	24,000		6	UJ	**23.6**		135		0.77		0.5	U	6,320		55.1	
BK02-02	16,800		6	UJ	**20.9**		96.6		0.53		0.5	U	4,380		41.2	
BK02-05	14,000		6	UJ	**17.4**		83.4		0.5	U	0.5	U	3,290		34	
BK03-02	19,300		6	UJ	**21.5**		109	J	0.61		0.5	UJ	4,490		47.6	J
BK03-05	15,400		6	UJ	**14.4**		129		0.72		0.5	U	37,700		30.7	
BK04-02	7,980		6	UJ	**8.5**		69.1		0.5	U	0.5	U	2,720		19.5	
BK04-05	15,300		6	UJ	**7.5**		128		0.5	U	0.5	U	3,990		40.2	
BK05-02	24,200		6	UJ	**10.6**		155		0.7		0.5	U	4,920		60.3	
BK05-05	26,700		6	UJ	**10.6**		173		0.74		0.5	U	5,350		62.9	
Average Concentration	19,025		6		17.2		121.8		0.6		0.5		7,730		45.2	
Minimum Concentration	7,980		6		7.5		69.1		0.5		0.5		2,720		19.5	
Maximum Concentration	26,700		6		27.3		173.0		0.8		0.5		37,700		62.9	

PRG = preliminary remediation goal
NA = not available
Bold = concentration exceeds PRG
* = CAL Modified PRG

TABLE 3-7
Remedial Investigation - Ambient Soil Results
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

	Cobalt		Copper		Iron		Lead		Magnesium		Manganese		Molybdenum		Nickel	
Industrial PRG	1,900 mg/kg		41,000 mg/kg		100,000 mg/kg		750 mg/kg		NA		19,000 mg/kg		5,100 mg/kg		20,000 mg/kg	
TTLC	8,000 mg/kg		2,500 mg/kg		NA		1,000 mg/kg		NA		NA		3,500 mg/kg		2,000 mg/kg	
Sample ID	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**
BK01-02	14.8		33.6		37,900		5.3		9,460		581		4	U	30.9	
BK01-02D	13.3		31.7		34,600		4.9		8,770		498		4	U	27.8	
BK01-05	15.1		34.3		37,400		5.1		9,450		580		4	U	33	
BK02-02	11.1		24.3		28,500		3.6		6,880		417		4	U	23.3	
BK02-05	9.9		21.5		24,300		3.3		5,650		334		4	U	19.7	
BK03-02	12.9		30.3		32,600		4.3		8,000		474		4	U	25.4	
BK03-05	7.9		25		25,500		3.3		6,810		1330		4	U	18.3	
BK04-02	5.1		12.6		13,100		2.2		3,360		188		4	U	11.3	
BK04-05	11		23.7		24,000		3.3		6,350		465		4	U	21.3	
BK05-02	15		34.4		35,900		5		8,590		568		4	U	25.7	
BK05-05	14.8		36.9		37,600		5.3		9,130		480		4	U	26	
Average Concentration	11.9		28.0		30,127		4.1		7,495		538		4.0		23.9	
Minimum Concentration	5.1		12.6		13,100		2.2		3,360		188		4.0		11.3	
Maximum Concentration	15.1		36.9		37,900		5.3		9,460		1,330		4.0		33.0	

PRG = preliminary remediation goal
NA = not available
Bold = concentration exceeds PRG
* = CAL Modified PRG

TABLE 3-7
Remedial Investigation - Ambient Soil Results
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

	Potassium		Selenium		Silver		Sodium		Thallium		Vanadium		Zinc	
Industrial PRG	NA		5,100 mg/kg		5,100 mg/kg		NA		670 mg/kg		7,200 mg/kg		100,000 mg/kg	
TTLC	NA		100 mg/kg		500 mg/kg		NA		700 mg/kg		2,400 mg/kg		5,000 mg/kg	
Sample ID	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**	**mg/kg**	**Qual**
BK01-02	4,140		2.4		1	U	500	U	2.4		96.2		83.1	
BK01-02D	3,850		2.4		1	U	500	U	2.5		88.1		74.5	
BK01-05	3,920		2.4		1	U	500	U	2.5		98.3		82.8	
BK02-02	4,540		2.3		1	U	500	U	2.2		68.4		61.2	
BK02-05	3,240		2.2		1	U	500	U	2		56.3		54.2	
BK03-02	6,070		2.7		1	U	500	U	2.3		78.9		73.8	
BK03-05	2,970		1.3		1	U	500	U	1.3		53.1		48.8	
BK04-02	2,130		0.5		1	U	500	U	1		30.6		32.4	
BK04-05	5,160		0.93		1	U	500	U	1.2		56.8		55	
BK05-02	6,070		0.57		1	U	500	U	1	U	88.4		68.8	
BK05-05	2,490		0.55		1	U	500	U	1.4		93.4		68.2	
Average Concentration	4,053		1.7		1		500		1.8		73.5		63.9	
Minimum Concentration	2,130		0.5		1		500		1.0		30.6		32.4	
Maximum Concentration	6,070		2.7		1		500		2.5		98.3		83.1	

PRG = preliminary remediation goal
NA = not available
Bold = concentration exceeds PRG
* = CAL Modified PRG

TABLE 3-8

Remedial Investigation - Site Soil Results

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	Aluminum		Antimony		Arsenic		Barium		Beryllium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron	
Industrial PRG	100 000 mg/kg		410 mg/kg		1.6 mg/kg		67 000 mg/kg		1 900 mg/kg		7.4 ** mg/kg		NA		450 mg/kg		1 900 mg/kg		41 000 mg/kg		100 000 mg/kg	
TTLC	NA		500 mg/kg		500 mg/kg		10,000 mg/kg		75 mg/kg		100 mg/kg		NA		2,500 mg/kg		8,000 mg/kg		2,500 mg/kg		NA	
Background*	26,700 mg/kg		6 mg/kg		27.3 mg/kg		173.0 mg/kg		0.80 mg/kg		0.5 mg/kg		37,700 mg/kg		62.9 mg/kg		15.1 mg/kg		37 mg/kg		37,900 mg/kg	
Sample ID	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual
SB01-02	13,600		6	UJ	**37.4**		96		0.51		0.84		4,770		30.5		8.2		50.7		20,500	
SB01-02D	13,800		6	UJ	**31.3**		115		0.53		0.72		5,510		31.2		8.2		33.6		21,200	
SB01-05	17,400		6	UJ	17.3		112		0.64		1.3		5,990		38.3		10.5		26.4		26,200	
SB01-10	15,900		6	UJ	**41.9**		151		0.58		1		8,910		36.6		9.8		37.5		24,200	
SB01-20	19,300		6	UJ	**7.2**		142		0.61		0.5	U	4,540		28.7		8.2		19.3		21,600	
SB01-30	13,100		6	UJ	**16.8**		80.6		0.5	U	0.5	U	2,770		34.2		6.6		41.1		21,600	
SB01-39	21,500		6	UJ	**20**		117		0.75		0.76		3,520		51.1		12.6		34.6		29,800	
SB01-50	18,300		6	UJ	**15.5**		83.1		0.58		0.94		7,500		59.5		8.6		38.4		30,600	
SB02-02	20,700		6	UJ	**24**		130		0.74		0.92		4,560		44.9	J	11.8		29.3		29,700	
SB02-05	21,300		6	UJ	**29.5**		144		0.76		1.2		5,430		46.9		11.8		32.4		29,800	
SB02-05D	23,300		6	UJ	**22.2**		144		0.82		1.5		5,830		49.2		12.4		33.3		31,900	
SB02-10	18,800		6	UJ	**160**		138		0.66		0.5	U	3,200		51.3		8.4		47.2		29,900	
SB02-20	22,000		6	UJ	**9.9**		162		0.68		0.5	U	4,840		39.7		10.1		23		25,000	
SB02-30	17,400		6	UJ	**152**		112		0.62		0.5	U	3,520		44.2		8.7		45.6		27,400	
SB02-40	19,400		6	UJ	**25.7**		106		0.7		0.67		3,390		45		11.3		38.4		29,500	
SB02-50	17,100		6	UJ	**14.5**		90.3		0.61		0.5	U	2,740		44.6		7.6		47.1		29,800	
SB03-02	17,800		6	UJ	**44.9**		114		0.62		0.5	U	2,860		51.9		7.9		60.6		31,000	
SB03-05	12,200		6	UJ	**18.2**		77.5		0.5	U	0.73		3,400		28.3		6.1		20.9		18,300	
SB03-10	20,100		6	UJ	**23.2**		110		0.68		0.95		5,020		43.5		11.3		27		28,500	
SB03-20	21,700		6	UJ	**12.2**		142	J	0.7		0.63		4,770	J	38	J	9.8		24		26,700	
SB03-20D	15,100		6	UJ	**8**		101	J	0.5	U	0.5	U	5,360	J	28.5	J	7.5		17.9		19,100	
SB03-30	21,500		6	UJ	**21.5**		139		0.74		0.5	U	4,230		87.3		10.6		34.1		30,900	
SB03-40	16,100		6	UJ	**15.7**		89.1		0.56		0.5	U	2,700		34		8.7		25.8		22,400	
SB03-50	9,580		6	UJ	**12.9**		60.1		0.5	U	0.64		2,990		22.8		7.3		18.3		15,700	
SB04-02	12,400		6	UJ	**16.8**		79.8		0.5	U	0.5	UJ	3,540		30.6	J	8.7		25.2		21,600	
SB04-05	13,300		6	UJ	**19.2**		83.6		0.5		0.5	U	3,790		32.3		8.6		23.2		22,400	
SB04-10	21,200		6	UJ	**23.1**		118		0.79		0.5	U	4,910		46.4		11.9		31.2		33,100	
SB04-20	25,600		6	UJ	**15.4**		131		0.85		0.5	U	2,870		44.1		18.1		30.6		30,600	
SB04-30	19,900		6	UJ	**18.8**		104		0.68		0.5	U	3,660		40.8		10.2		27.5		29,800	
SB04-40	13,000		6	UJ	**13.1**		79.8		0.5	U	0.5	U	3,080		31.8		10.4		18.9		21,200	
SB04-50	12,400		6	UJ	**14.3**		70.1		0.5	U	0.5	U	2,740		34.5		6.9		22.5		20,500	
SB05-02	14,500		6	UJ	**84.5**		86.8		0.5	U	0.5	U	3,150		33.2		8.3		22		21,400	
SB05-02D	15,800		6	UJ	**90.5**		94.8		0.54		0.5	U	3,200		36		9.5		23.2		24,400	
SB05-05	16,100		6	UJ	**68**		106		0.56		0.5	U	4,050		39.1		9.7		33.6		24,500	
SB05-10	18,200		6	UJ	**16.6**		102		0.63		0.5	U	3,710		37.2		10		23.9		24,600	
SB05-20	26,800		6	UJ	**17.7**		111		0.8		0.5	U	3,230		44.8		11.2		27.3		31,800	
SB05-30	22,200		6	UJ	**21.5**		108		0.7		0.5	U	4,360		43.8		12.1		28.1		29,100	
SB05-40	11,100		6	UJ	**14.8**		67.3		0.5	U	0.5	U	2,360		30.3		5.1		20		16,000	
SB05-50	13,700		6	UJ	**13.6**		79.4		0.5	U	0.5	U	2,720		35.1		7.5		21.8		20,800	
SB06-02	14,100		6	UJ	**19.1**		85.7		0.57		0.5	U	4,610		35		8.5		23.2		23,600	
SB06-05	14,500		6	UJ	**25.4**	J	107		0.53		0.5	U	3,820		71.8	J	9.5		43.2	J	25,500	
SB06-05D	11,800		6	UJ	**13.4**	J	72.9		0.5	U	0.5	U	2,680		30.6	J	6.6		19.3	J	19,400	
SB06-10	22,800		6	UJ	**24.6**		142		0.86		0.5	U	5,570		56.7		13.9		36.5		35,900	
SB06-20	22,500		6	UJ	**16.7**		95.7		0.7		0.5	U	3,090		39.6		11		23.8		27,900	
SB06-30	13,200		6	UJ	**12.1**		110		0.5	U	0.5	U	2,970		56.5		6.7		21.3		23,400	
SB06-38	12,300		6	UJ	**11.3**		76.2		0.5	U	0.5	U	2,340		28.3		7		18.3		19,500	
SB06-50	14,300		6	UJ	**18.5**		98.3		0.58		0.5	U	2,910		34		9.3		28.6		23,500	
SB07-02	19,100		6	UJ	**34.3**		122		0.55		0.5	U	4,580		48.7		11.1		37.7		32,000	
SB07-05	24,400		6	UJ	**26.2**		152		0.77		0.5	U	5,770		56.3		14.4		36.5		37,400	
SB07-10	25,500		6	UJ	**16.9**		183		0.67		0.5	U	9,050	J	62.4		14		37.7		36,600	
SB07-10D	23,400		6	UJ	**15.8**		147		0.63		0.5	U	4,070	J	47.8		10.1		27.5		32,000	
SB07-20	17,000		6	UJ	**16.4**		93		0.53		0.5	U	3,010		39.4		6.2		31.3		23,100	
SB07-30	11,400		6	UJ	**12.1**		63.7		0.5	U	0.5	U	2,510		26.2		6.3		17.2		17,100	
SB07-40	21,200		6	UJ	**22**		120		0.61		0.5	U	4,020		51		11.6		35.8		33,400	
SB08-02	22,600		6	UJ	**55.5**		175		0.65		0.5	U	4,640		57		14.5		24.3		35,100	
SB08-05	23,300		6	UJ	**23.5**		151	J	0.75		0.5	U	5,570		51.5		13.1		34		34,300	
SB08-10	22,100		6	UJ	**16.3**		136		0.56		0.5	U	5,940		50.1		12.1		33.5		33,000	
SB08-20	17,900		6	UJ	**13.2**	J	108		0.5		0.5	U	2,560		47.4		8.2		30.6		25,600	
SB08-20D	18,200		6	UJ	**51.9**	J	125		0.5	U	0.5	U	4,790		48.5		9.4		31.2		28,500	
SB08-30	12,800		6	UJ	**13.4**		69.2		0.5	U	0.5	U	2,950		35.6		5.9		20.4		20,800	
SB08-40	23,800		6	UJ	**28.3**		149		0.77		0.5	U	4,770		60.2		15.3		38.5		40,000	
SB09-02	15,100		6	UJ	**52.6**		112		0.5		0.5	U	4,220		35.1		11.3		35.1		25,400	
SB09-05	18,900		6	UJ	**23.2**		112		0.68		0.5	U	4,250		43.6		12		29.8		30,100	
SB09-10	23,300		6	UJ	**14.9**		169		0.69		0.5	U	4,410		55.7		14		36.2		34,600	
SB09-20	13,700		6	UJ	**14.8**		75.1		0.5	U	0.5	U	2,410		27.7		6.7		18.5		18,700	
SB09-30	15,400		6	UJ	**14.4**		76.1		0.55		0.5	U	3,430		32.6		9.4		20.2		23,200	
SB09-40	19,100		6	UJ	**17.9**		104		0.61		0.5	U	3,870		41		12.7		25.9		29,700	
SB10-02	18,600		6	UJ	**17.6**		96.4		0.56		0.5	UJ	4,150		44.6		8.9		27.9		28,600	
SB10-05	25,300		6	UJ	**11.2**		138		0.6		0.5	U	5,300		61.2		15.5		32		37,300	

	Lead		Magnesium		Manganese		Molybdenum		Nickel		Potassium		Selenium		Silver		Sodium		Thallium		Vanadium		Zinc	
Industrial PRG	750 mg/kg		NA		19 000 mg/kg		5 100 mg/kg		20 000 mg/kg		NA		5 100 mg/kg		5 100 mg/kg		NA		670 mg/kg		7 200 mg/kg		100 000 mg/kg	
TTLC	1 000 mg/kg		NA		NA		3 500 mg/kg		2,000 mg/kg		NA		100 mg/kg		500 mg/kg		NA		700 mg/kg		2,400 mg/kg		5,000 mg/kg	
Background*	5.3 mg/kg		9,460 mg/kg		1,330 mg/kg		4 mg/kg		33.0 mg/kg		6,070 mg/kg		2.70 mg/kg		1 mg/kg		500 mg/kg		2.5 mg/kg		98.3 mg/kg		83.1 mg/kg	
Sample ID	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual
SB01-02	10.7		5,370		320		4	U	19.9		4,430		0.75		1	U	500	U	1	U	50.7		75.2	
SB01-02D	11.7		5,550		328		4	U	20		3,590		0.9		1	U	500	U	1	U	50.9		79.5	
SB01-05	4.4		7,110		380		4	U	25.2		3,130		0.52		1	U	500	U	1	U	67.3		66.8	
SB01-10	17.8		6,660		391		4	U	23.5		4,040		1.2		1	U	500	U	1	U	58.2		113.0	
SB01-20	4		5,650		544		4	U	20.2		3,430		0.71		1	U	500	U	1	U	44.9		62.6	
SB01-30	3.5		4,670		248		4	U	21.2		2,500		0.81		1	U	500	U	1	U	49.8		47.2	
SB01-39	4.3		7,060		425		5.2		30.7		4,180		0.5	U	1	U	500	U	1	U	81.5		75.1	
SB01-50	2		8,250		337		4	U	32.3		4,270		0.98		1	U	500	U	1	U	74.3		73.1	
SB02-02	4.6		7,590		494		4	U	26.3		6,370		1.4		1	U	500	U	1	U	75.9	J	81.1	
SB02-05	7.8		8,020		457		4	U	29.8		3,940		0.82		1	U	500	U	1	U	81.2		81.9	
SB02-05D	5.1		8,510		491		4	U	30.4		4,050		0.83		1	U	500	U	1	U	88.3		80.8	
SB02-10	17.4		8,340		328		4	U	32.5		4,810		0.68		1	U	500	U	1	U	66.2		97.4	
SB02-20	4.3		6,650		564		4.4		23.7		3,710		0.81		1	U	500	U	1	U	58.3		74.9	
SB02-30	19		7,750		342		4	U	28.3		4,130		0.5	U	1	U	500	U	1	U	58.8		116.0	
SB02-40	4.5		6,650		401		4	U	30		4,010		1.3		1	U	500	U	1	U	77.9		69.7	
SB02-50	2.8		7,420		266		4	U	28.4		4,780		0.94		1	U	500	U	1	U	66.6		69.1	
SB03-02	7.4		8,390		326		4	U	31		4,860		1.3		1	U	500	U	1	U	63.6		70.6	
SB03-05	3.1		4,820		175		4	U	19.1		2,190		1		1	U	500	U	1	U	50.6		48.0	
SB03-10	4.5		7,450		427		4	U	26.9		3,440		1.5		1	U	500	U	1	U	77.6		66.5	
SB03-20	4.2		6,780	J	443		4	U	25		3,700	J	1.4		1	U	500	U	1	U	64.4	J	73.7	J
SB03-20D	3.1		5,380	J	287		4	U	17.2		2,140	J	1		1	U	500	U	1	U	43.8	J	49.4	J
SB03-30	2.1		10,200		315		4	U	36.8		6,550		1.2		1	U	500	U	1	U	93.0		80.7	
SB03-40	3.6		5,290		294		4	U	22.5		3,210		0.81		1	U	500	U	1	U	59.7		53.4	
SB03-50	2.3		3,750		241		4	U	20.5		1,870		0.7		1	U	500	U	1	U	41.1		38.4	
SB04-02	14.3	J	5,090		329		4	U	18.1		3,990		1.9		1	U	500	U	1.5		50.1		57.1	
SB04-05	5.1		5,580		314		4	U	18.4		3,140		1.3		1	U	500	U	1.5		53.4		55.2	
SB04-10	4.8		8,400		401		4	U	27		3,350		1.7		1	U	500	U	1.9		81.7		72.0	
SB04-20	5.2		6,660		665		4	U	26.4		4,250		1.6		1	U	500	U	1.7		70.0		63.7	
SB04-30	4.1		7,120		291		4	U	22.5		3,230		1.2		1	U	500	U	1.4		69.8		61.8	
SB04-40	2.8		5,720		305		4	U	17.5		2,640		1.2		1	U	500	U	1	U	50.3		43.9	
SB04-50	2.5		5,010		212		4	U	17.7		2,740		1.3		1	U	500	U	1.7		50.5		44.3	
SB05-02	3.8		5,840		324		4	U	18.3		3,990		0.59		1	U	500	U	1	U	53.2		49.8	
SB05-02D	3.9		6,270		375		4	U	20.4		4,660		1.4		1	U	500	U	1	U	57.6		58.4	
SB05-05	8.3		6,590		352		4	U	23.6		3,310		0.82		1	U	500	U	1	U	61.1		65.7	
SB05-10	4.1		6,310		418		4	U	22.1		3,690		0.74		1	U	500	U	1	U	63.2		59.4	
SB05-20	5.5		7,100		378		4	U	25.9		3,840		0.5	U	1	U	500	U	1	U	77.1		64.8	
SB05-30	4.4		7,550		387		4	U	23.1		2,290		0.54		1	U	500	U	1	U	73.6		58.7	
SB05-40	2.1		4,080		190		4	U	17.3		2,660		0.51		1	U	500	U	1	U	42.7		37.5	
SB05-50	3		5,230		242		4	U	18.3		2,950		0.5	U	1	U	500	U	1	U	51.8		47.2	
SB06-02	3.3		6,130		316		4	U	19.5		2,860		1.2		1	U	500	U	1	U	56.6		50.1	
SB06-05	11.3	J	6,040		377		4	U	45	J	3,550		1.6		1	U	500	U	1.3		57.8		77.4	
SB06-05D	2.5	J	4,830		256		4	U	16.8	J	2,840		1		1	U	500	U	1	U	44.6		43.0	
SB06-10	5.8		8,830		514		4	U	33.7		3,550		1.7		1	U	500	U	1	U	88.4		78.9	
SB06-20	4.2		6,350		359		4	U	22.2		3,450		1.1		1	U	500	U	1.6		65.5		52.8	
SB06-30	2.5		6,170		295		4	U	20.5		3,640		1.1		1	U	500	U	1		46.6		46.5	
SB06-38	2.8		4,610		234		4	U	17.5		2,840		1.2		1	U	500	U	1	U	45.2		40.9	
SB06-50	3.1		5,890		312		4	U	21.2		2,960		0.77		1	U	500	U	1	U	56.8		51.4	
SB07-02	14		8,440		424		4	U	27.3		4,830		2.2		1	U	500	U	1.6		77.5		74.7	
SB07-05	34.9		9,160		555		4	U	30.9		4,650		1.7		1	U	500	U	2.3		96.9		89.7	
SB07-10	7.4		9,380		502		4	U	30.1		3,880		1.8		1	U	500	U	1.2		92.8		78.8	
SB07-10D	5.4		7,810		470		4	U	23.9		5,010		2.3		1	U	500	U	1.8		76.0		73.8	
SB07-20	3.3		5,330		256		4	U	20.4		3,710		1.3		1	U	500	U	1.5		58.1		49.9	
SB07-30	2.3		4,080		219		4	U	14.8		2,800		1.3		1	U	500	U	1.1		41.9		37.4	
SB07-40	3.9		7,890		363		4	U	27.9		4,800		2.5		1	U	500	U	1.6		81.9		73.6	
SB08-02	3.6		13,000		498		4	U	25.9		5,740		0.5	U	1	U	500	U	1.4		93.5		74.2	
SB08-05	6		8,720		481	J	4	U	27.9		3,440		1.9		1	U	500	U	2		88.2		74.1	
SB08-10	4.6		7,890		490		4	U	27		3,780		2.1		1	U	500	U	2.4		79.0		74.7	
SB08-20	2.9	J	5,920		277		4	U	22.2		4,840		1.5		1	U	500	U	1.5		61.9		55.6	
SB08-20D	15.8	J	8,040		361		4	U	26.6		4,070		2.1		1	U	500	U	2		69.3		71.5	
SB08-30	3		4,880		236		4	U	17.1		3,270		1.7		1	U	500	U	1.6		51.1		45.1	
SB08-40	5		9,590		528		4	U	33.3		5,530		2.2		1	U	500	U	1.7		98.7		89.6	
SB09-02	8.8		7,430		383		4	U	19.8		3,940		1.1		1	U	500	U	1.2		59.6		70.6	
SB09-05	7.6		7,260		424		4	U	25.1		3,560		1.7		1	U	500	U	1.1		73.2		67.0	
SB09-10	5.1		8,220		504		4	U	29		4,770		1.8		1	U	500	U	1.3		84.0		75.5	
SB09-20	2.9		4,190		256		4	U	16.1		2,920		1.2		1	U	500	U	1	U	43.8		38.7	
SB09-30	3.3		6,000		296		4	U	17.3		2,970		1		1	U	500	U	1	U	52.7		45.7	
SB09-40	4		7,270		507		4	U	24.8		3,440		1.5		1	U	500	U	1		67.3		65.0	
SB10-02	3.3		7,540		175	J	4	U	21.4		3,650		1.8		1	U	500	U	1.6		70.4		62.6	
SB10-05	4.9		8,280		569		4	U	26.6		6,130		1.9		1	U	500	U	2.2		92.6		69.7	

TABLE 3-8

Remedial Investigation - Site Soil Results

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	Aluminum		Antimony		Arsenic		Barium		Beryllium		Cadmium		Calcium		Chromium	
Industrial PRG	100 000 mg/kg		410 mg/kg		1.6 mg/kg		67 000 mg/kg		1 900 mg/kg		7 4 ** mg/kg		NA		450 mg/kg	
TTLC	NA		500 mg/kg		500 mg/kg		10,000 mg/kg		75 mg/kg		100 mg/kg		NA		2,500 mg/kg	
Background*	26,700 mg/kg		6 mg/kg		27.3 mg/kg		173.0 mg/kg		0.80 mg/kg		0.5 mg/kg		37,700 mg/kg		62.9 mg/kg	
Sample ID	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual
SB10-10	20,900		6	UJ	**10.5**		185		0.5	U	0.5	U	4,940		47.7	
SB10-20	22,700		6	UJ	**12.1**		143		0.6		0.5	U	4,820		48.9	
SB10-20D	26,300		6	UJ	**13.6**		167		0.65		0.5	U	5,790		60.4	
SB10-30	26,600		6	UJ	**18.9**		133		0.73		0.5	U	4,260		62.1	
SB11-02	23,600		6	UJ	**10.2**		155		0.55		0.5	U	6,040		61.2	
SB11-05	25,000		6	UJ	**20.7**		143		0.59		0.5	U	5,790		62.7	
SB11-10.5	23,600		6	UJ	**21.6**		127		0.51		0.5	U	5,790		57.6	
SB11-10.5D	25,100		6	UJ	**12.1**		151		0.54		0.5	U	6,130		61.2	
SB11-20	21,900		6	UJ	**13.6**		142		0.55		0.5	U	3,610		47.5	
SB11-30	16,900		6	UJ	**14.1**		149		0.51		0.5	U	3,800		36.5	
SB12-02	25,700		6	UJ	**11.1**		173		0.57		0.5	U	6,200		67.8	
SB12-05	24,800		6	UJ	**10**		144		0.52		0.5	U	4,950		56.8	
SB12-10	25,700		6	UJ	**9.5**		157		0.51		0.5	U	6,150		62.3	
SB12-19	24,500		6	UJ	**12.6**		159		0.63		0.5	U	3,640		53.5	
SB12-30	26,000		6	UJ	**24.5**		131		0.8		0.5	U	4,500		55.2	

	Cobalt		Copper		Iron		Lead		Magnesium		Manganese		Molybdenum		Nickel	
Industrial PRG	1 900 mg/kg		41 000 mg/kg		100 000 mg/kg		750 mg/kg		NA		19 000 mg/kg		5 100 mg/kg		20 000 mg/kg	
TTLC	8,000 mg/kg		2 500 mg/kg		NA		1 000 mg/kg		NA		NA		3,500 mg/kg		2,000 mg/kg	
Background*	15.1 mg/kg		37 mg/kg		37,900 mg/kg		5.3 mg/kg		9,460 mg/kg		1,330 mg/kg		4 mg/kg		33.0 mg/kg	
Sample ID	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual
SB10-10	13.4		25.1		29,400		4.6		7,130		448		4	U	21.5	
SB10-20	12.1		29.8		32,900		4.2		7,880		479		4	U	23.9	
SB10-20D	16.2		36.7		39,100		4.7		9,610		667		4	U	28.7	
SB10-30	17.6		37.2		40,800		5.4		9,100		537		4	U	32.7	
SB11-02	16		33.6		37,000		4.6		8,560		651		4	U	27.1	
SB11-05	16		35.6		38,500		5.2		8,960		603		4	U	27.9	
SB11-10.5	13.8		37.8		36,500		4.3		9,140		454		4	U	25.4	
SB11-10.5D	15.5		31		37,900		4.5		9,380		621		4	U	27	
SB11-20	12.4		31.4		31,700		4		7,180		533		4	U	25.4	
SB11-30	9.6		21		24,400		3.5		5,470		307		4	U	20.7	
SB12-02	17.2		36.9		40,300		4.8		9,210		697		4	U	29.4	
SB12-05	11.3		25.4		33,800		4.4		7,490		330		4	U	22.9	
SB12-10	15.2		31.7		38,500		4.1		9,280		640		4	U	26.8	
SB12-19	13.6		35.8		34,300		4.5		7,720		539		4	U	27.7	
SB12-30	14.1		37.7		40,000		5.9		8,680		509		4	U	33.4	

	Potassium		Selenium		Silver		Sodium		Thallium		Vanadium		Zinc	
Industrial PRG	NA		5 100 mg/kg		5 100 mg/kg		NA		670 mg/kg		7 200 mg/kg		100 000 mg/kg	
TTLC	NA		100 mg/kg		500 mg/kg		NA		700 mg/kg		2,400 mg/kg		5,000 mg/kg	
Background*	6,070 mg/kg		2.70 mg/kg		1 mg/kg		500 mg/kg		2.5 mg/kg		98.3 mg/kg		83.1 mg/kg	
Sample ID	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual
SB10-10	2,690		1.5		1	U	500	U	1.8		72.0		56.1	
SB10-20	5,120		1.4		1	U	500	U	2.1		77.2		80.3	
SB10-20D	5,810		2.1		1	U	500	U	2.5		92.2		97.5	
SB10-30	6,030		2.2		1	U	500	U	2.1		96.9		84.4	
SB11-02	6,730		1.8		1	U	500	U	1.9		90.5		76.3	
SB11-05	5,990		1.8		1	U	500	U	2.1		94.9		72.9	
SB11-10.5	2,810		2.2		1	U	500	U	2		88.8		68.9	
SB11-10.5D	3,450		1.1		1	U	500	U	1.9		91.9		76.7	
SB11-20	5,270		1.3		1	U	500	U	1.6		73.3		75.5	
SB11-30	3,440		1.6		1	U	500	U	2.1		58.7		51.7	
SB12-02	6,890		2.5		1	U	500	U	2.1		101.0		76.4	
SB12-05	3,670		2.3		1	U	500	U	2.3		85.9		58.2	
SB12-10	3,750		1.8		1	U	500	U	2.6		94.7		76.4	
SB12-19	5,960		1.7		1	U	500	U	1.7		81.5		75.1	
SB12-30	4,820		2.2		1	U	500	U	2.4		94.5		83.7	

PRG = preliminary remediation goal

NA = not available

* = maximum background concentration based on samples collected offsite (see Table 3-3)

** = CAL Modified PRG

Bold = concentration exceeds PRG

TABLE 3-9

Remedial Investigation - Site Groundwater Results

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	Aluminum		Antimony		Arsenic		Barium		Beryllium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron		Lead		Magnesium	
Sample ID	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual
SB01-54	15.3		0.06	U	0.023		0.6		0.005	U	0.03		261		0.043		0.29		0.076		11		0.005	U	90.1	
SB05-54	29.4		0.06	U	0.022	J	0.72		0.005	U	0.01		282		0.26	J	0.2	J	0.42	J	57.6	J	0.0067	J	108	
SB05-54D	34.0		0.06	U	0.035	J	0.8		0.005	U	0.005	U	221		0.39	J	0.092	J	0.74	J	84.5	J	0.011	J	94.8	
SB08-45	13.1		0.06	U	0.01		0.53		0.005	U	0.005	U	227		0.034		0.083		0.06		12		0.005	U	96.9	
SB11-35	29.3		0.06	U	0.02		0.3		0.005	U	0.005	U	199		0.059		0.05	U	0.036		34.4		0.005	U	86	

TABLE 3-9

Remedial Investigation - Site Groundwater Results

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	Manganese		Molybdenum		Nickel		Potassium		Selenium		Silver		Sodium		Thallium		Vanadium		Zinc	
Sample ID	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual	mg/L	Qual
SB01-54	9.5		0.04	U	0.32		9.1		0.005	U	0.01	U	112		0.01	U	0.05	U	2.5	
SB05-54	7.7	J	0.04	U	0.61		10.1		0.005	U	0.01	U	125		0.01	U	0.15		8.6	J
SB05-54D	4	J	0.082		0.47		10.9		0.005	U	0.01	U	124		0.01	U	0.12		23.6	J
SB08-45	3.3		0.04	U	0.11		5.2		0.005	U	0.01	U	97.4		0.01	U	0.05	U	0.4	U
SB11-35	1.7		0.04	U	0.056		6.3		0.005	U	0.01	U	91.4		0.01	U	0.084		0.078	U

TABLE 3-10

Remedial Investigation - Arsenic Soil Leachate and Bioavailability Results

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

	Arsenic Soil Target (STL data)		Arsenic STLC Test (STL data)		Arsenic Bioavailability (CH2M HILL data)			
	Total				Total	Total	Bioavailable	Extractable Fraction
Sample ID	mg/kg wet wt	Qual	mg/L	Qual	mg/kg dry wt[a]	mg/kg wet wt[b]	mg/kg	%
SB02-02	24		1	U	58.4	50 8	9.53	16.3
SB02-05	29.5		1	U	30	26.1	1.69	5.6
SB02-05D	22.2		1	U	34	29.6	2.12	6 2
SB05-02	84.5		2.1		296	257.4	85.8	29
SB05-02D	90.5		2		356	309 6	116	32.6
SB05-05	68		1	U	175	152.2	72.6	41.5
SB05-10	16.6		1	U	NA	NA	NA	NA
SB08-02	55.5		1	U	88 8	77.2	37.4	42.1
SB08-05	23.5		1	U	NA	NA	NA	NA
SB11-02	10.2		1	U	16.2	14.1	1.85	11.4
SB11-05	20.7		1	U	34	29.6	8.59	25.3

[a] Sample was sieved to yield particles less than 500 μm for the bioavailability test.

[b] Converted dry wt data to wet wt data assuming a moisture content of 15%.

TABLE 3-11
Summary of Soil Samples Used in the Risk Assessment
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Partition Area	Sample ID	Date Collected	Sample Depth (feet bgs)
1	A1	October-03	0.5
		October-03	2
		October-03	5
	A2	October-03	2
		October-03	5
	A21	October-03	0.5
		October-03	10
	A27	October-03	0.5
		October-03	2
		October-03	5
	A28	October-03	0.5
		October-03	2
		October-03	5
	A29	October-03	0.5
		October-03	2
		October-03	5
	A3	October-03	0.5
		October-03	2
		October-03	5
	A30	October-03	0.5
		October-03	2
		October-03	5
	A31	October-03	0.5
		October-03	2
		October-03	5
	A32	October-03	0.5
		October-03	2
		October-03	5
	A57	October-03	0.5
		October-03	2
		October-03	5
	A62	October-03	0.5
		October-03	2
		October-03	5
	LE1	June-03	2
		June-03	5
	LE2	June-03	2
		June-03	5
	LE3	June-03	2
		June-03	5
	LE4	June-03	2
		June-03	5
	LE5	June-03	2
		June-03	5
	SB1	01-Aug-05	2
		01-Aug-05	5
		01-Aug-05	10
	SB2	01-Aug-05	2
		01-Aug-05	5
		01-Aug-05	10

TABLE 3-11
Summary of Soil Samples Used in the Risk Assessment
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Partition Area	Sample ID	Date Collected	Sample Depth (feet bgs)
1	SB3	01-Aug-05	2
		01-Aug-05	5
		01-Aug-05	10
	SS1	October-03	0.5
2	A4	October-03	0.5
		October-03	2
		October-03	5
	A58	October-03	0.5
		October-03	2
		October-03	5
	LE10	June-03	2
		June-03	5
	LE6	June-03	2
		June-03	5
	LE7	June-03	2
		June-03	5
	LE8	June-03	2
		June-03	5
	LE9	June-03	2
		June-03	5
	SB4	02-Aug-05	2
		02-Aug-05	5
		02-Aug-05	10
	SB5	01-Aug-05	2
		01-Aug-05	5
		01-Aug-05	10
	SS2	October-03	0.5
	SS3	October-03	0.5
3	A33	October-03	0.5
		October-03	2
		October-03	5
	A34	October-03	0.5
		October-03	2
		October-03	5
	A35	October-03	0.5
		October-03	2
		October-03	5
	A36	October-03	0.5
		October-03	2
		October-03	5
	A37	October-03	0.5
		October-03	2
		October-03	5
	A38	October-03	0.5
		October-03	2
		October-03	5
	A5	October-03	0.5
		October-03	2
		October-03	5

TABLE 3-11
Summary of Soil Samples Used in the Risk Assessment
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Partition Area	Sample ID	Date Collected	Sample Depth (feet bgs)
3	A63	October-03	0.5
		October-03	2
		October-03	5
	A64	October-03	0.5
		October-03	2
		October-03	5
	LE11	June-03	2
		June-03	5
	LE12	June-03	2
		June-03	5
	LE13	June-03	2
		June-03	5
	LE14	June-03	2
		June-03	5
	SB6	02-Aug-05	2
		02-Aug-05	5
		02-Aug-05	10
	SS4	October-03	0.5
	SS5	October-03	0.5
	SS6	October-03	0.5
	SS7	October-03	0.5
	SS8	October-03	0.5
4	A59	October-03	0.5
		October-03	2
		October-03	5
	A6	October-03	0.5
		October-03	2
		October-03	5
	A7	October-03	0.5
		October-03	2
		October-03	5
	A8	October-03	0.5
		October-03	2
		October-03	5
	LE15	June-03	2
		June-03	5
	LE16	June-03	2
		June-03	5
	LE17	June-03	2
		June-03	5
	SB7	03-Aug-05	2
		03-Aug-05	5
		03-Aug-05	10
	SB8	02-Aug-05	2
		02-Aug-05	5
		02-Aug-05	10
	SB9	02-Aug-05	2
		02-Aug-05	5
		02-Aug-05	10
		October-03	0.5

TABLE 3-11
Summary of Soil Samples Used in the Risk Assessment
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Partition Area	Sample ID	Date Collected	Sample Depth (feet bgs)
5	A10	October-03	0.5
		October-03	2
		October-03	5
	A11	October-03	0.5
		October-03	2
		October-03	5
	A22	October-03	0.5
		October-03	10
	A23	October-03	0.5
		October-03	10
	A39	October-03	0.5
		October-03	2
		October-03	5
	A40	October-03	0.5
		October-03	2
		October-03	5
	A41	October-03	0.5
		October-03	2
		October-03	5
	A42	October-03	0.5
		October-03	2
		October-03	5
	A43	October-03	0.5
		October-03	2
		October-03	5
	A44	October-03	0.5
		October-03	2
		October-03	5
	A65	October-03	0.5
		October-03	2
		October-03	5
	A9	October-03	0.5
		October-03	2
		October-03	5
	LE18	June-03	2
		June-03	5
	LE19	June-03	2
		June-03	5
	LE20	June-03	2
		June-03	5
	LE21	June-03	2
		June-03	5
	LE22	June-03	2
		June-03	5
	SS10	October-03	0.5
6	A12	October-03	0.5
		October-03	2
		October-03	5
	A24	October-03	0.5
		October-03	10

TABLE 3-11
Summary of Soil Samples Used in the Risk Assessment
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Partition Area	Sample ID	Date Collected	Sample Depth (feet bgs)
6	A45	October-03	0.5
		October-03	2
		October-03	5
	A46	October-03	0.5
		October-03	2
		October-03	5
	A47	October-03	0.5
		October-03	2
		October-03	5
	A48	October-03	2
		October-03	5
	A49	October-03	0.5
		October-03	2
		October-03	5
	A50	October-03	0.5
		October-03	2
		October-03	5
	A60	October-03	0.5
		October-03	2
		October-03	5
	LE23	June-03	2
		June-03	5
	LE24	June-03	2
		June-03	5
	LE25	June-03	2
		June-03	5
	LE26	June-03	2
		June-03	5
	SS11	October-03	0.5
	SS12	October-03	0.5
7	A13	October-03	0.5
		October-03	2
		October-03	5
	A14	October-03	2
		October-03	5
	A15	October-03	0.5
		October-03	2
		October-03	5
	A16	October-03	0.5
		October-03	2
		October-03	5
	A17	October-03	0.5
		October-03	2
		October-03	5
	A25	October-03	0.5
		October-03	10
	A61	October-03	0.5
		October-03	2
		October-03	5

TABLE 3-11
Summary of Soil Samples Used in the Risk Assessment
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Partition Area	Sample ID	Date Collected	Sample Depth (feet bgs)
7	A66	October-03	0.5
		October-03	2
		October-03	5
	LE27	June-03	2
		June-03	5
	LE28	June-03	2
		June-03	5
	LE29	June-03	2
		June-03	5
	LE30	June-03	2
		June-03	5
	LE31	June-03	2
		June-03	5
	LE32	June-03	2
		June-03	5
	SB10	03-Aug-05	2
		03-Aug-05	5
		03-Aug-05	10
	SB11	03-Aug-05	2
		03-Aug-05	5
	SB12	03-Aug-05	2
		03-Aug-05	5
		03-Aug-05	10
	SS13	October-03	0.5
8	A18	October-03	0.5
		October-03	2
		October-03	5
	A19	October-03	0.5
		October-03	2
		October-03	5
	A20	October-03	0.5
		October-03	2
		October-03	5
	A26	October-03	0.5
		October-03	10
	A51	October-03	0.5
		October-03	2
		October-03	5
	A52	October-03	0.5
		October-03	2
		October-03	5
	A53	October-03	0.5
		October-03	2
		October-03	5
	A54	October-03	0.5
		October-03	2
		October-03	5
	A55	October-03	0.5
		October-03	2
		October-03	5

TABLE 3-11
Summary of Soil Samples Used in the Risk Assessment
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Partition Area	Sample ID	Date Collected	Sample Depth (feet bgs)
8	A56	October-03	0.5
		October-03	2
		October-03	5
	LE33	June-03	2
		June-03	5
	LE34	June-03	2
		June-03	5
	LE35	June-03	2
		June-03	5
	LE36	June-03	2
		June-03	5
	SS14	October-03	0.5
Background	BK-1	04-Aug-05	2
		04-Aug-05	5
	BK-2	04-Aug-05	2
		04-Aug-05	5
	BK-3	04-Aug-05	2
		04-Aug-05	5
	BK-4	04-Aug-05	2
		04-Aug-05	5
	BK-5	04-Aug-05	2
		04-Aug-05	5

TABLE 3-12
Soil Summary Statistics and Exposure Point Concentrations for Arsenic
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Exposure Area	Units	Number of Samples	Number of Detects	Frequency of Detection (%)	Minimum Nondetect Value	Maximum Nondetect Value	Minimum Detected Value	Maximum Detected Value	Arithmetic Mean	95% UCL	UCL Basis	EPC > Max	Final EPC (mg/kg)	EPC Basis
Partition 1	mg/kg	54	54	100%	-	-	10.1	224	64.5	100.0	Non-parametric	FALSE	100.0	Non-parametric
Partition 2	mg/kg	24	24	100%	-	-	12.6	197	57.3	115.9	Non-parametric	FALSE	115.9	Non-parametric
Partition 3	mg/kg	43	43	100%	-	-	11.9	296	58.3	105.3	Non-parametric	FALSE	105.3	Non-parametric
Partition 4	mg/kg	28	28	100%	-	-	11.1	119	28.5	50.0	Non-parametric	FALSE	50.0	Non-parametric
Partition 5	mg/kg	45	45	100%	-	-	5.5	336	90.6	213.1	Non-parametric	FALSE	213.1	Non-parametric
Partition 6	mg/kg	36	35	97%	1.0	1.0	0.6	426	71.1	101.2	Gamma	FALSE	101.2	Gamma
Partition 7	mg/kg	44	43	98%	1.0	1.0	1.0	264	46.6	135.8	Non-parametric	FALSE	135.8	Non-parametric
Partition 8	mg/kg	38	38	100%	-	-	2.3	996	90.6	359.8	Non-parametric	FALSE	359.8	Non-parametric

Notes:
UCL = upper confidence limit
EPC = exposure point concentration
Max = maximum detected value
mg/kg = milligrams per kilogram

TABLE 3-13
Summary of Exposure Assumptions
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Parameter	Units	Future Occupational Worker	Source	Excavation/ Construction Worker	Source	Hypothetical Future Resident	Source
Constituent Concentration	mg/kg (dry wt.)	95% UCL of mean	Calculated	95% UCL of mean	Calculated	95% UCL of mean	Calculated
Body Weight - adult	kg	70	a	70	a	70	a
Body Weight - child	kg	--	--	--	--	15	a
Carcinogenic Averaging Time	yrs	70	a	70	a	70	a
Noncarcinogenic Averaging Time	yrs	25	a	1	b	30	a
Exposure Frequency	day/yr	250	a	250	b	350	a
Exposure Duration - adult	yrs	25	a	1	b	24	a
Exposure Duration - child	yrs	--	--	--	--	6	a
Incidental Soil Ingestion Rate - adult	mg/day	100	a	330	b	100	a
Incidental Soil Ingestion Rate - child	mg/day	--	--	--	--	200	a
Skin Surface Area - adult	cm^2	5,700	b	5,700	b	5,700	c
Skin Surface Area - child	cm^2	--	--	--	--	2,900	c
Dermal Absorption Fraction	unitless	Chemical-specific	c	Chemical-specific	c	Chemical-specific	c
Soil-to-Skin Adherence Factor - adult	mg/cm^2	0.2	c	0.8	b	0.07	c
Soil-to-Skin Adherence Factor - child	mg/cm^2	--	--	--	--	0.2	c
Inhalation Rate - adult	m^3/day	14	b	20	a	20	a
Inhalation Rate - child	m^3/day	--	--	--	--	10	a
Particulate Emission Factor	m^3/kg	1.32E+09	d	1.00E+06	b	1.32E+09	d

Source:
a. Risk Assessment Guidance for Superfund, Vol I: Human Health Evaluation Manual. Supplemental Guidance: Standard Default Exposure Factors.OSWER 9285.6-03. (EPA, 1991).
b. Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Military Facilities. HERD HHRA Note Number 1 (DTSC, 2005).
c. Risk Assessment Guidance for Superfund, Vol I: Human Health Evaluation Manual. Part E, Supplemental Guidance for Dermal Risk Assessment, Interim. EPA/540/R/99/005. OSWER 9285.7-02EP (U.S. EPA, 2004).
d. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. (U.S.EPA 2002).

TABLE 3-14
Summary of Arsenic Toxicity Factors for Risk Estimates
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Carcinogenic Weight Of Evidence Classification	Dermal Permeability Coefficient K_p (cm/hr)	Dermal Absorption Coefficient ABSd	Oral Slope Factor SFo (mg/kg-day)	Source	Inhalation Slope Factor SFi (mg/kg-day)	Source	Chronic Oral Reference Dose RfDo (mg/kg-day)	Source	Chronic Inhalation Reference Dose RfDi (mg/kg-day)	Source
A	1.0E-03	0.03	9.5E+00	CA EPA - OEHHA, 2007	1.2E+01	CA EPA - OEHHA, 2007	3.0E-04	IRIS - EPA, 2007	8.6E-06	CA EPA - OEHHA, 2007

TABLE 3-15

U.S. Environmental Protection Agency Weight-of-Evidence Classification System for Carcinogenicity

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

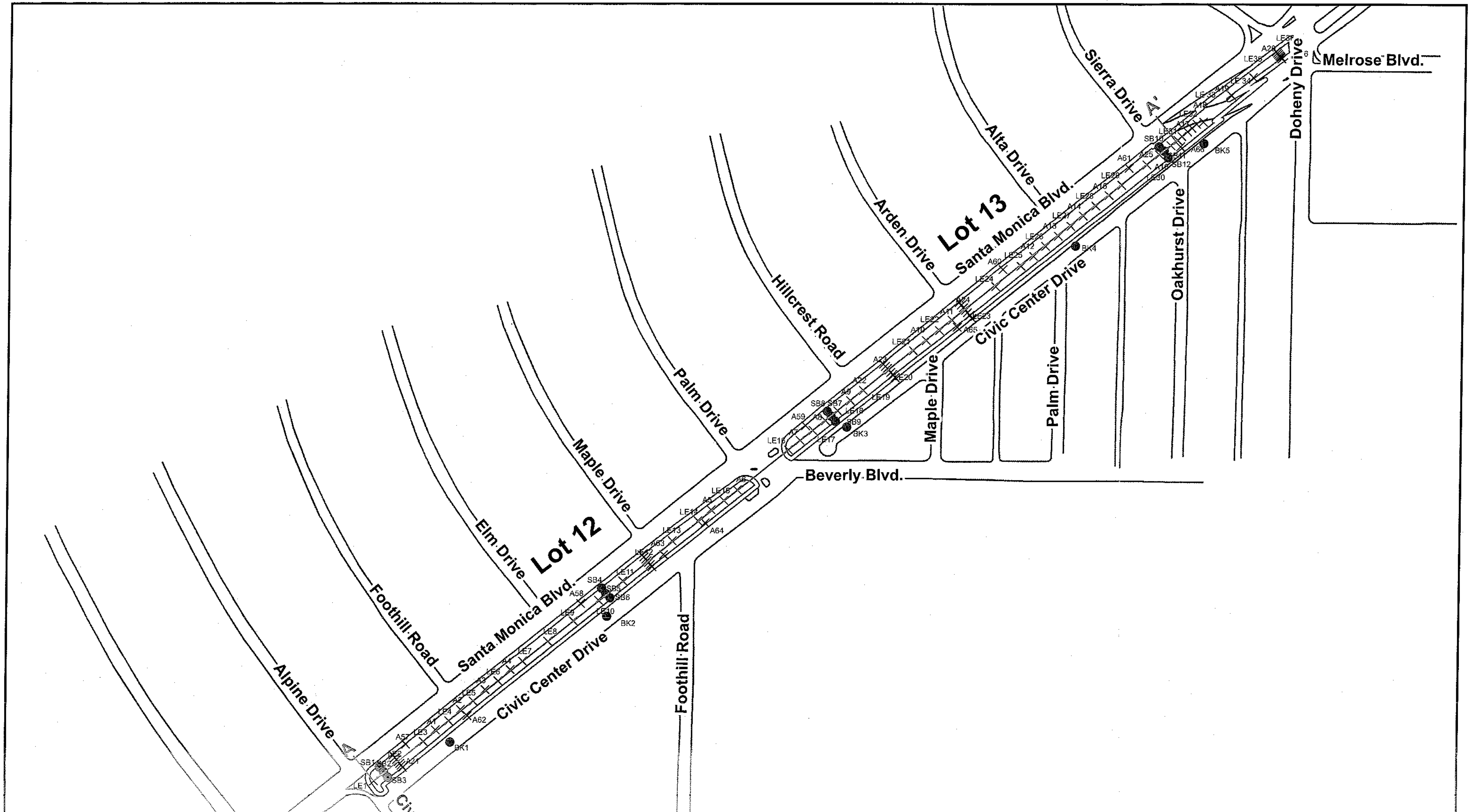
Group	Description
A	Human carcinogen, based on evidence from epidemiological studies
B1 or B2	Probable human carcinogen B1 indicates that limited human data are available. B2 indicates sufficient evidence in animals and inadequate or no evidence in humans.
C	Possible human carcinogen, based on limited evidence in animals
D	Not classifiable as to human carcinogenicity
E	Evidence of noncarcinogenicity for humans

Source:
U.S. Environmental Protection Agency, Guidelines for Carcinogen Risk Assessment (U.S. EPA, 1986)

TABLE 3-16
Summary of Risk Estimates
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

	Future Occupational Scenario		Excavation/Construction Scenario		Hypothetical Residential Scenario	
Chemical - Exposure Unit	Excess Cancer Risk	Hazard Quotient	Excess Cancer Risk	Hazard Quotient	Excess Cancer Risk	Hazard Quotient
Arsenic - Partition 1	4.4E-04	0.4	6.5E-05	3.8	1.6E-03	1.3
Arsenic - Partition 2	5.1E-04	0.5	7.5E-05	4.4	1.9E-03	1.6
Arsenic - Partition 3	4.7E-04	0.5	6.8E-05	4.0	1.7E-03	1.4
Arsenic - Partition 4	2.2E-04	0.2	3.3E-05	1.9	8.1E-04	0.7
Arsenic - Partition 5	9.4E-04	0.9	1.4E-04	8.1	3.5E-03	2.9
Arsenic - Partition 6	4.5E-04	0.4	6.6E-05	3.9	1.6E-03	1.4
Arsenic - Partition 7	6.0E-04	0.6	8.8E-05	5.2	2.2E-03	1.8
Arsenic - Partition 8	1.6E-03	1.6	2.3E-04	14	5.8E-03	4.8
Arsenic - Background	1.2E-04	0.1	1.8E-05	1.0	4.4E-04	0.4

Figures



Legend

- Streets
- Property Boundary
- × Previous Soil Boring
- Remedial Investigation Boring
- Geologic Cross-Section Location

N

0 300 600 Feet

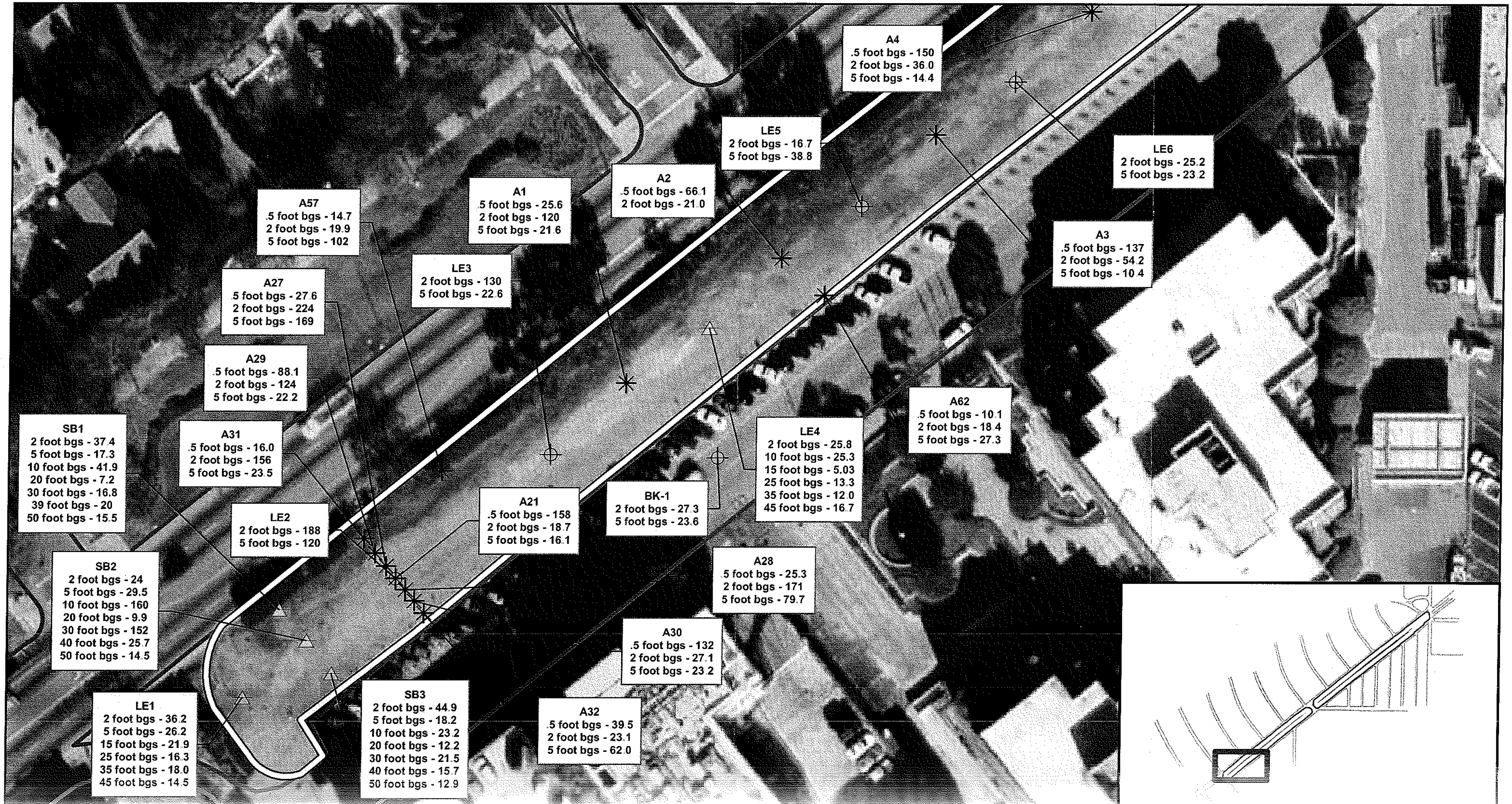
1 inch equals 300 feet

Figure 3-1
Sample and Cross-Section Location Map
Lots 12 and 13
Beverly Hills Land Corporation

CH2MHILL

P:\318114 on 'Cheron\Projects\UnionPacificRailroad\RI Report\Figure 2

Sample Locations Approximated



Legend

- Streets
- Property Boundary
- Deep Boring
- Shallow Boring
- Boring (Arsenic Only)

A0 / 2 foot bgs - : Sample ID / Arsenic in mg/kg

N

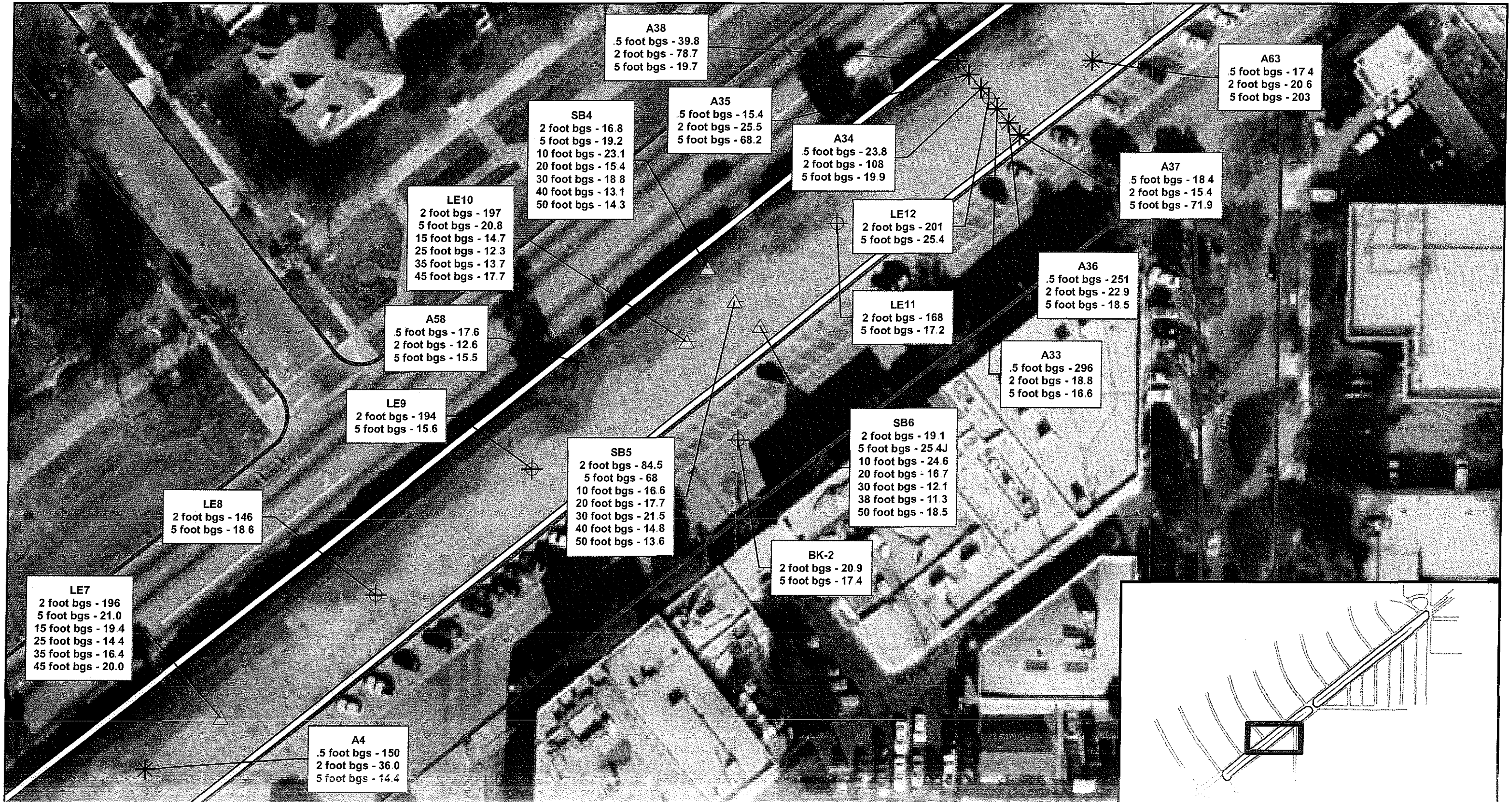
0 50 100 Feet

Figure 3-2a
Arsenic Data Summary
Lots 12 and 13
Beverly Hills Land Corporation

CH2MHILL

K:\BeverlyHills\plots\grids\Borings_A_v1.mxd September 12, 2005

Sample Locations Approximated



Legend

- Streets
- Property Boundary
- Deep Boring
- Shallow Boring
- Boring (Arsenic Only)

A0 / 2 foot bgs - : Sample ID / Arsenic in mg/kg

N

0 50 100 Feet

Figure 3-2b
Arsenic Data Summary
Lots 12 and 13
Beverly Hills Land Corporation

CH2MHILL

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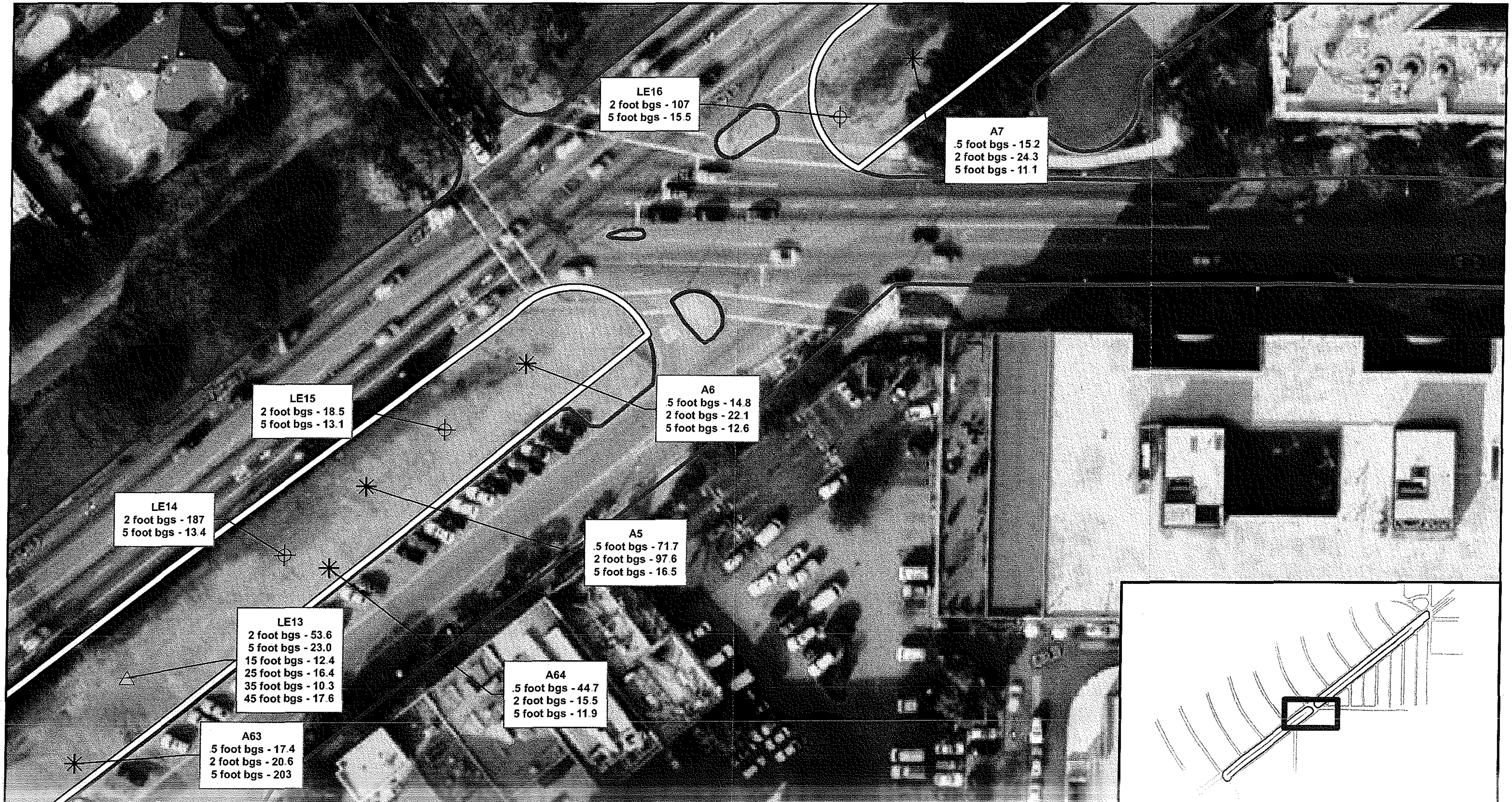
Sample Locations Approximated



Legend

- Streets
- Property Boundary
- Deep Boring
- Shallow Boring
- Boring (Arsenic Only)

A0 / 2 foot bgs - : Sample ID / Arsenic in mg/kg

N

0 50 100 Feet

Figure 3-2c
Arsenic Data Summary
Lots 12 and 13
Beverly Hills Land Corporation

CH2MHILL

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Sample Locations Approximated

Figure 3-2d
Arsenic Data Summary
Lots 12 and 13
Beverly Hills Land Corporation

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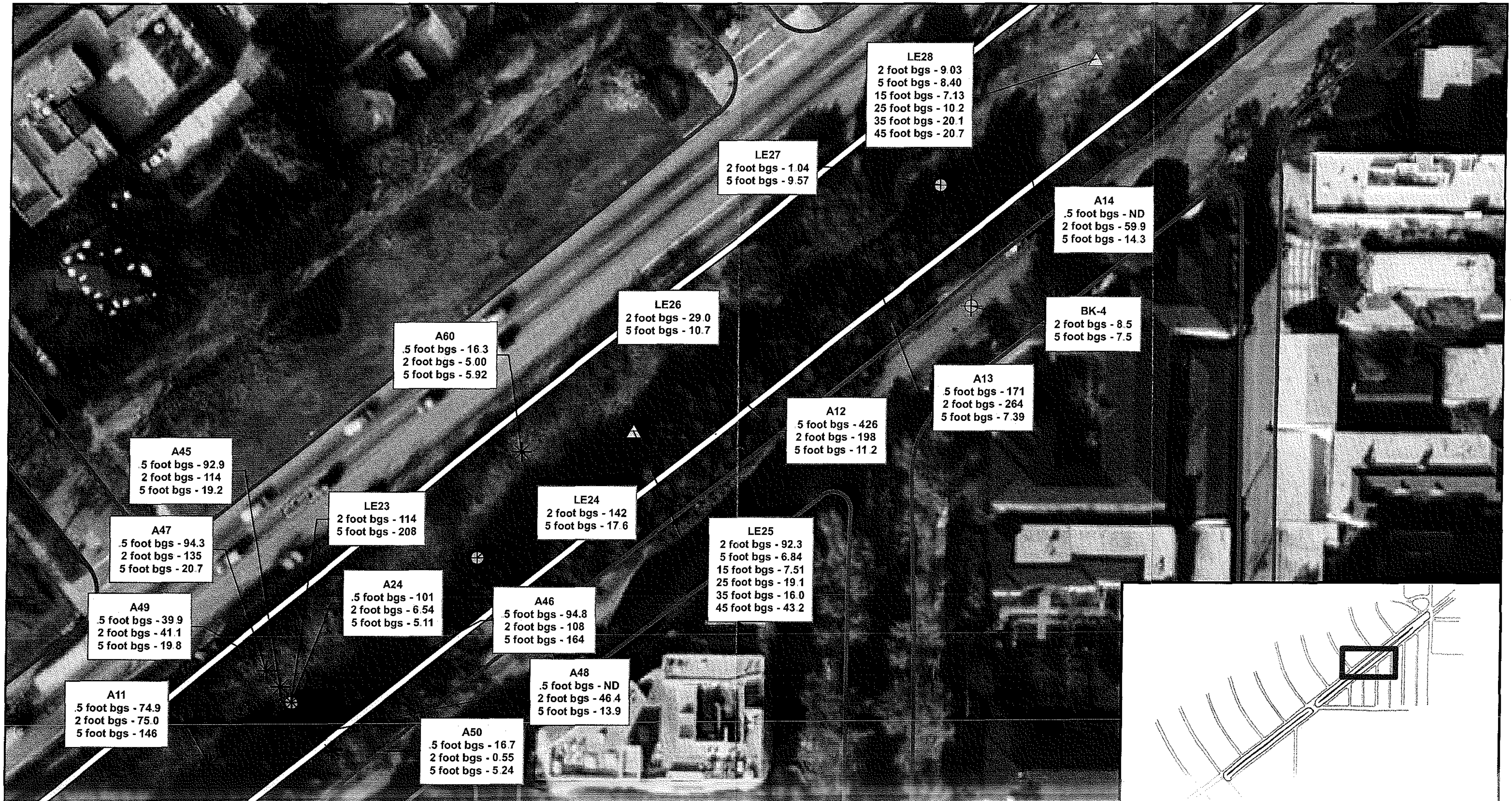

Legend

- Streets
- Property Boundary
- Deep Boring
- Shallow Boring
- Boring (Arsenic Only)

A0	Sample ID
2 foot bgs -	Arsenic in mg/kg

N

0 50 100 Feet

Figure 3-2e
Arsenic Data Summary
Lots 12 and 13
Beverly Hills Land Corporation

CH2MHILL

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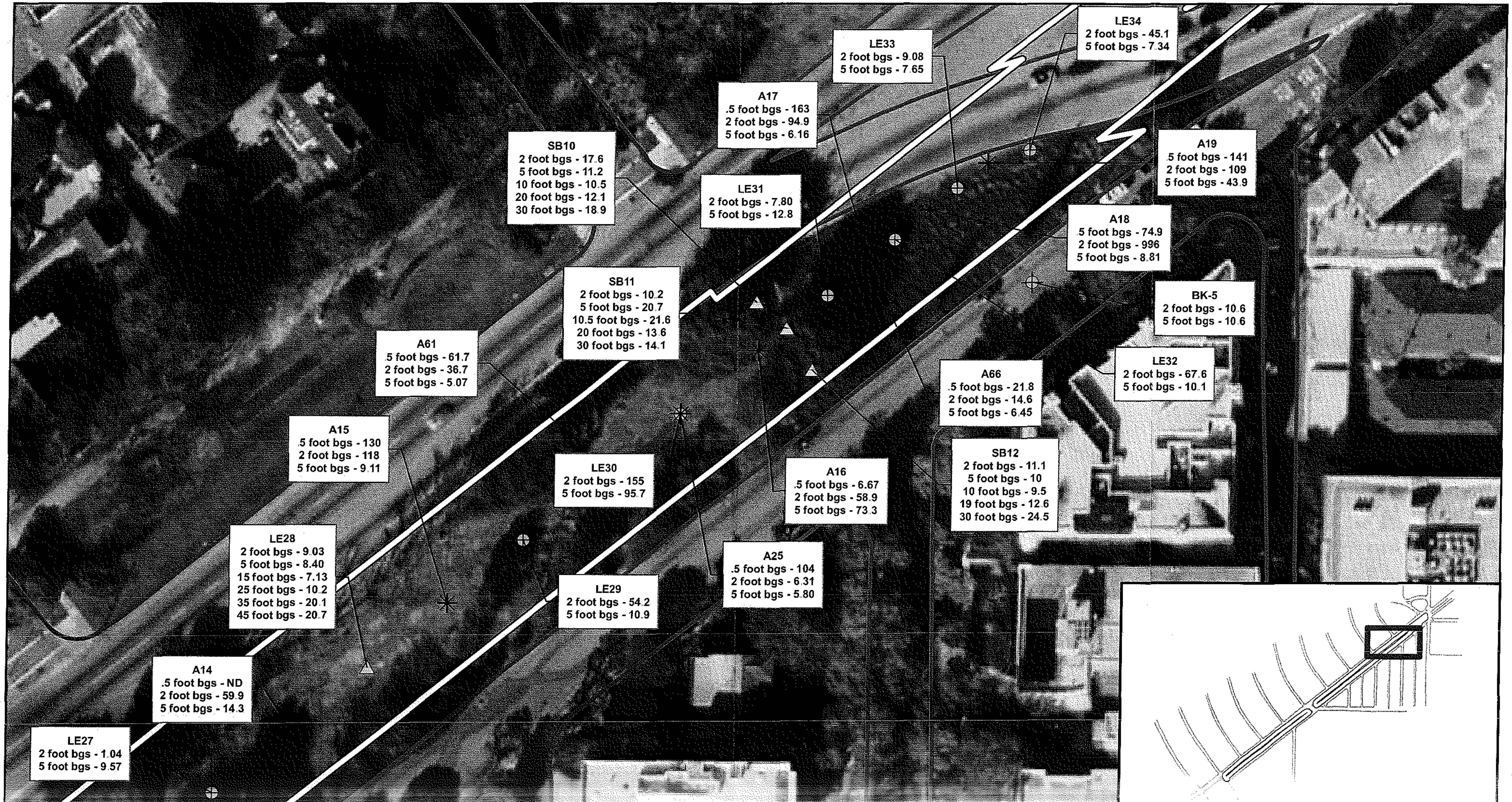
Sample Locations Approximated



Legend

- Streets
- Property Boundary
- Deep Boring
- Shallow Boring
- Boring (Arsenic Only)

A0 / 2 foot bgs - : Sample ID / Arsenic in mg/kg

N

0 50 100 Feet

Figure 3-2f
Arsenic Data Summary
Lots 12 and 13
Beverly Hills Land Corporation

CH2MHILL

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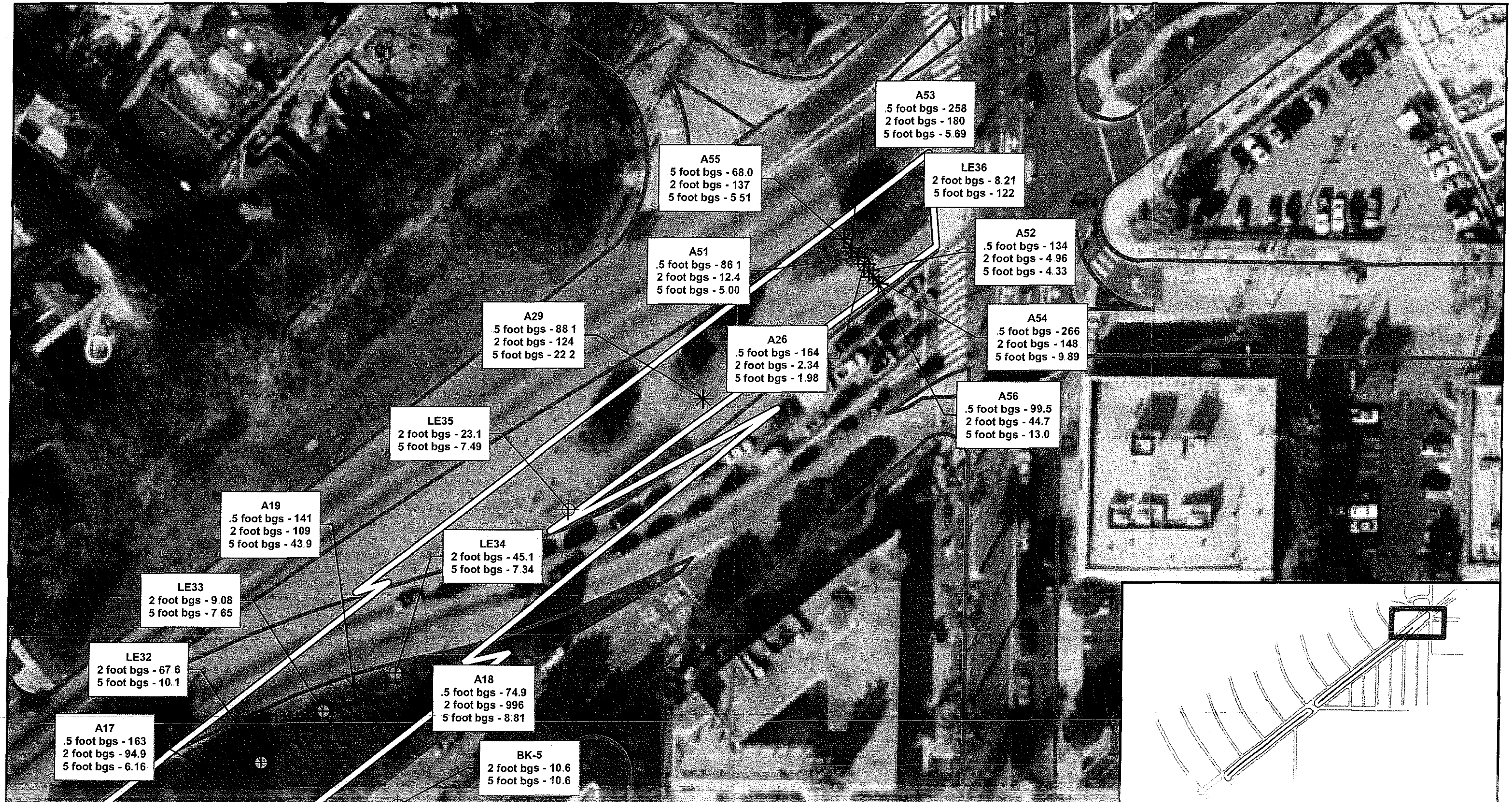
Sample Locations Approximated



Legend

- Streets
- Property Boundary
- Deep Boring
- Shallow Boring
- Boring (Arsenic Only)

A0 / 2 foot bgs - : Sample ID / Arsenic in mg/kg

N

0 50 100 Feet

Figure 3-2g
Arsenic Data Summary
Lots 12 and 13
Beverly Hills Land Corporation

CH2MHILL

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Sample Locations Approximated

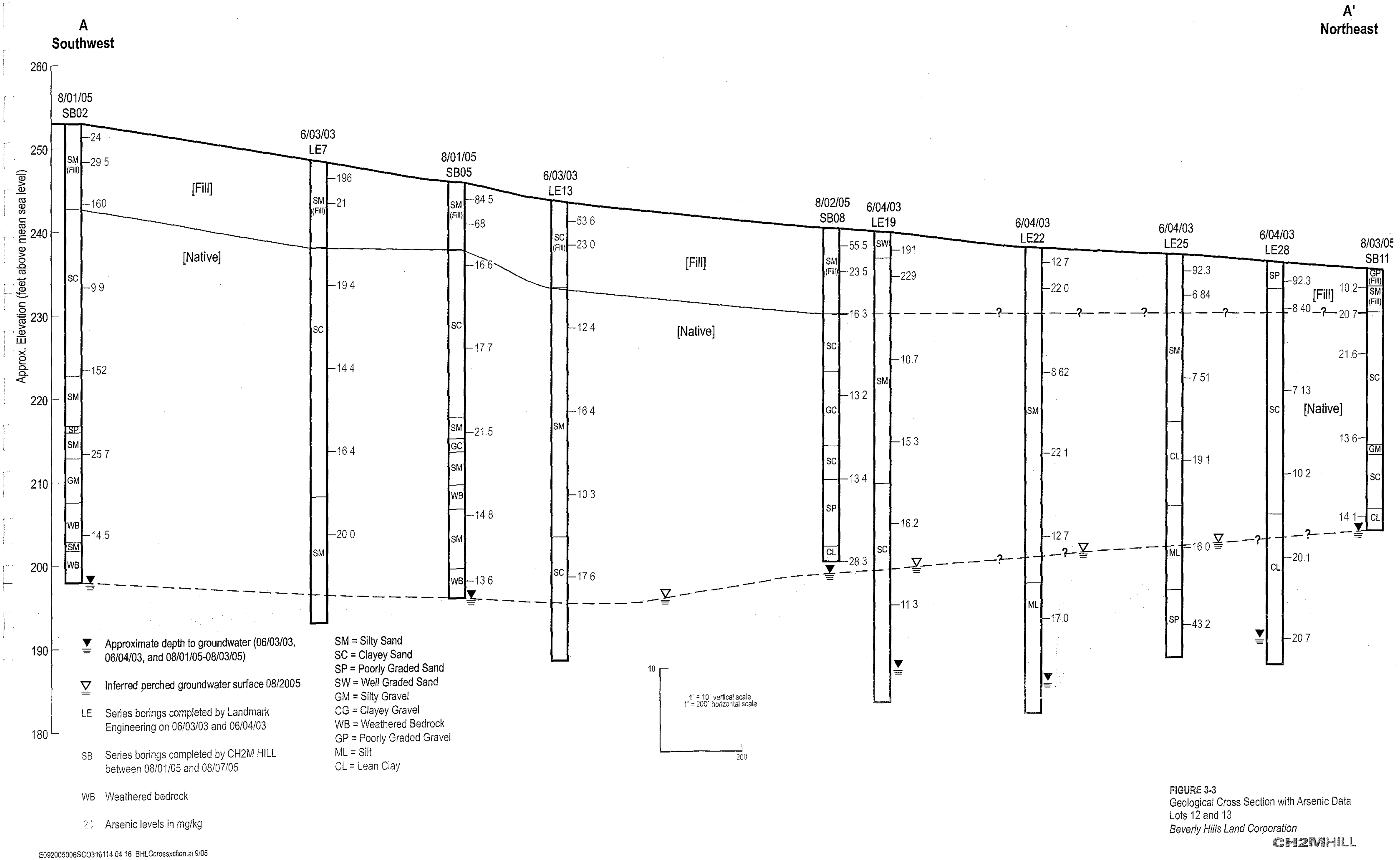
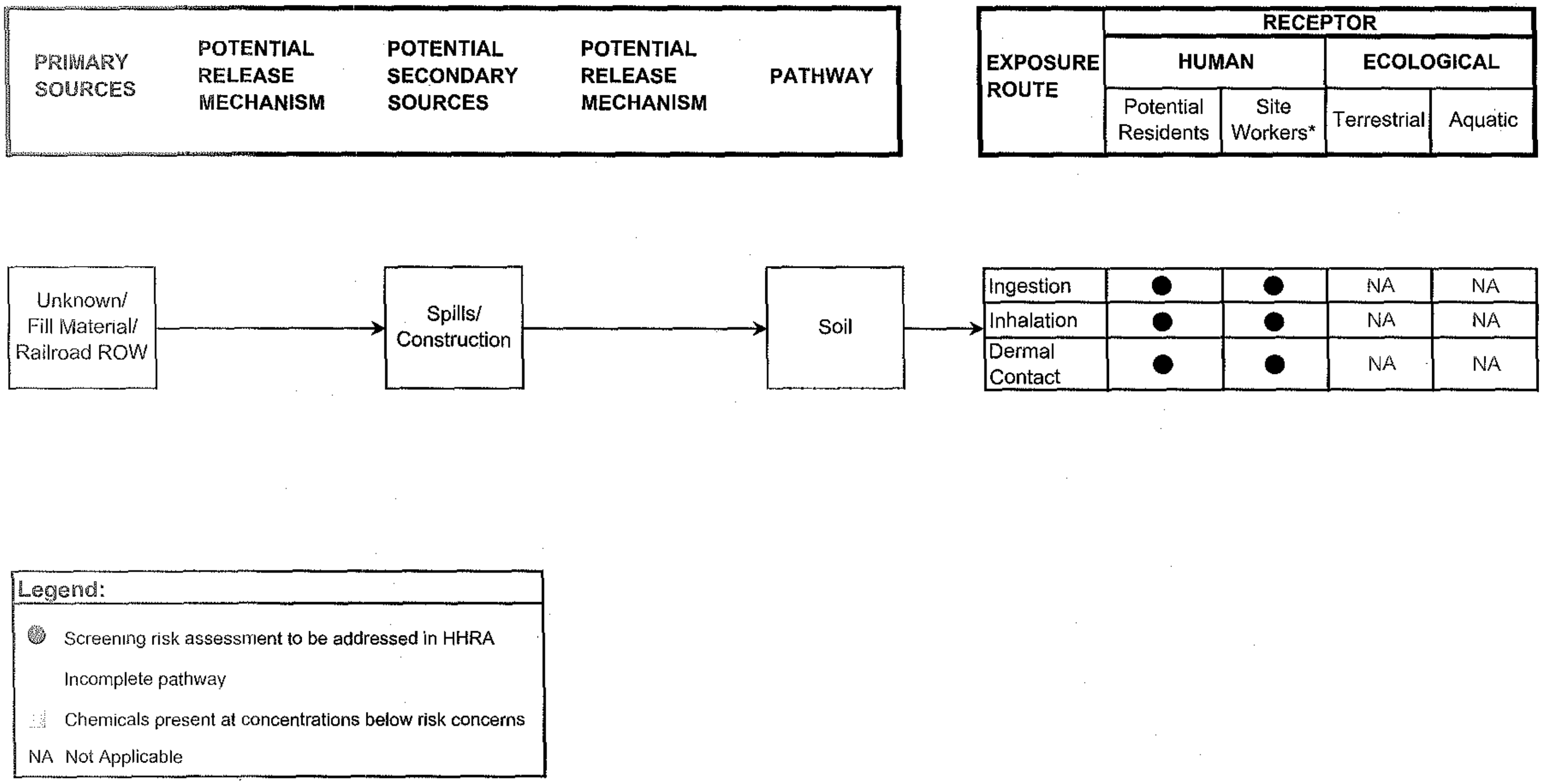


FIGURE 3-3
Geological Cross Section with Arsenic Data
Lots 12 and 13
Beverly Hills Land Corporation
CH2MHILL



* Site Workers include occupational and excavation/construction workers

Figure 3-4
Site Conceptual Model
Beverly Hills Land Corporation

APPENDIX A

Risk Calculation Worksheets

TABLE A-1
Future Occupational Worker Scenario - Potential Excess Lifetime Cancer Risk
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

								Ingestion		Dermal		Inhalation		
Chemical	WOE	SF_o (mg/kg-day)$^{-1}$	SF_d (mg/kg-day)$^{-1}$	SF_i (mg/kg-day)$^{-1}$	EPC (mg/kg)	ABS_d	ABS_{gi}	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	Total ELCR
Arsenic - Partition 1	A	9.45E+00	9.45E+00	1.20E+01	1.00E+02	3.00E-02	1.00E+00	3.49E-05	3.3E-04	1.19E-05	1.1E-04	3.70E-09	4.4E-08	4.43E-04
Arsenic - Partition 2	A	9.45E+00	9.45E+00	1.20E+01	1.16E+02	3.00E-02	1.00E+00	4.05E-05	3.8E-04	1.39E-05	1.3E-04	4.30E-09	5.2E-08	5.14E-04
Arsenic - Partition 3	A	9.45E+00	9.45E+00	1.20E+01	1.05E+02	3.00E-02	1.00E+00	3.68E-05	3.5E-04	1.26E-05	1.2E-04	3.90E-09	4.7E-08	4.67E-04
Arsenic - Partition 4	A	9.45E+00	9.45E+00	1.20E+01	5.00E+01	3.00E-02	1.00E+00	1.75E-05	1.7E-04	5.98E-06	5.7E-05	1.85E-09	2.2E-08	2.22E-04
Arsenic - Partition 5	A	9.45E+00	9.45E+00	1.20E+01	2.13E+02	3.00E-02	1.00E+00	7.45E-05	7.0E-04	2.55E-05	2.4E-04	7.90E-09	9.5E-08	9.45E-04
Arsenic - Partition 6	A	9.45E+00	9.45E+00	1.20E+01	1.01E+02	3.00E-02	1.00E+00	3.54E-05	3.3E-04	1.21E-05	1.1E-04	3.75E-09	4.5E-08	4.49E-04
Arsenic - Partition 7	A	9.45E+00	9.45E+00	1.20E+01	1.36E+02	3.00E-02	1.00E+00	4.74E-05	4.5E-04	1.62E-05	1.5E-04	5.03E-09	6.0E-08	6.02E-04
Arsenic - Partition 8	A	9.45E+00	9.45E+00	1.20E+01	3.60E+02	3.00E-02	1.00E+00	1.26E-04	1.2E-03	4.30E-05	4.1E-04	1.33E-08	1.6E-07	1.59E-03
Arsenic - Background	A	9.45E+00	9.45E+00	1.20E+01	2.73E+01	3.00E-02	1.00E+00	9.54E-06	9.0E-05	3.26E-06	3.1E-05	1.01E-09	1.2E-08	1.21E-04

Notes:
Cancer WOE Classifications:
Group A: Human carcinogen
ABS_d = Dermal Absorption Factor
ABS_{gi} = Gastrointestinal Aborption Factor
CDI = Chronic Daily Intake
ELCR = Excess Lifetime Cancer Risk
EPC = Exposure Point Concentration
mg/kg-day = milligrams per kilogram per day
SF_d = Dermal Slope Factor
SF_o = Oral Slope Factor
SF_i = Inhalation Slope Factor
WOE = Weight of Evidence

TABLE A-2

Future Occupational Worker Scenario - Potential Noncarcinogenic Risk

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

							Ingestion		Dermal		Inhalation		
Chemical	RfD_o (mg/kg-day)	RfD_d (mg/kg-day)	RfD_i (mg/kg-day)	EPC (mg/kg)	ABS_d	ABS_{gi}	CDI (mg/kg-day)	HQ	CDI (mg/kg-day)	HQ	CDI (mg/kg-day)	HQ	Total HI
Arsenic - Partition 1	3.00E-04	3.00E-04	8.57E-06	1.00E+02	3.00E-02	1.00E+00	9.78E-05	0.326	3.35E-05	0.1115	1.04E-08	0.0012	0.44
Arsenic - Partition 2	3.00E-04	3.00E-04	8.57E-06	1.16E+02	3.00E-02	1.00E+00	1.13E-04	0.378	3.88E-05	0.1293	1.20E-08	0.0014	0.51
Arsenic - Partition 3	3.00E-04	3.00E-04	8.57E-06	1.05E+02	3.00E-02	1.00E+00	1.03E-04	0.344	3.52E-05	0.1175	1.09E-08	0.0013	0.46
Arsenic - Partition 4	3.00E-04	3.00E-04	8.57E-06	5.00E+01	3.00E-02	1.00E+00	4.90E-05	0.163	1.67E-05	0.0558	5.19E-09	0.0006	0.22
Arsenic - Partition 5	3.00E-04	3.00E-04	8.57E-06	2.13E+02	3.00E-02	1.00E+00	2.09E-04	0.695	7.13E-05	0.2377	2.21E-08	0.0026	0.94
Arsenic - Partition 6	3.00E-04	3.00E-04	8.57E-06	1.01E+02	3.00E-02	1.00E+00	9.90E-05	0.330	3.39E-05	0.1129	1.05E-08	0.0012	0.44
Arsenic - Partition 7	3.00E-04	3.00E-04	8.57E-06	1.36E+02	3.00E-02	1.00E+00	1.33E-04	0.443	4.54E-05	0.1515	1.41E-08	0.0016	0.60
Arsenic - Partition 8	3.00E-04	3.00E-04	8.57E-06	3.60E+02	3.00E-02	1.00E+00	3.52E-04	1.174	1.20E-04	0.4014	3.73E-08	0.0044	1.58
Arsenic - Background	3.00E-04	3.00E-04	8.57E-06	2.73E+01	3.00E-02	1.00E+00	2.67E-05	0.089	9.14E-06	0.0305	2.83E-09	0.0003	0.12

Notes:

ABS_d = Dermal Absorption Factor

ABS_{gi} = Gastrointestinal Aborption Factor

CDI = Chronic Daily Intake

EPC = Exposure Point Concentration

HI = Hazard Index

HQ = Hazard Quotient

mg/kg-day = milligrams per kilogram per day

RfC = Reference Concentration

RfD_d = Dermal Reference Dose

RfD_o = Oral Reference Dose

RfD_i = Inhalation Reference Dose

TABLE A-3

Future Excavation/Construction Worker Scenario - Potential Excess Lifetime Cancer Risk

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

								Ingestion		Dermal		Inhalation		
Chemical	WOE	SF_o (mg/kg-day)$^{-1}$	SF_d (mg/kg-day)$^{-1}$	SF_i (mg/kg-day)$^{-1}$	EPC (mg/kg)	ABS_d	ABS_{gi}	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	Total ELCR
Arsenic - Partition 1	A	9.45E+00	9.45E+00	1.20E+01	1.00E+02	3.00E-02	1.00E+00	4.61E-06	4.4E-05	1.91E-06	1.8E-05	2.79E-07	3.4E-06	6.50E-05
Arsenic - Partition 2	A	9.45E+00	9.45E+00	1.20E+01	1.16E+02	3.00E-02	1.00E+00	5.35E-06	5.1E-05	2.22E-06	2.1E-05	3.24E-07	3.9E-06	7.54E-05
Arsenic - Partition 3	A	9.45E+00	9.45E+00	1.20E+01	1.05E+02	3.00E-02	1.00E+00	4.86E-06	4.6E-05	2.01E-06	1.9E-05	2.94E-07	3.5E-06	6.85E-05
Arsenic - Partition 4	A	9.45E+00	9.45E+00	1.20E+01	5.00E+01	3.00E-02	1.00E+00	2.31E-06	2.2E-05	9.57E-07	9.0E-06	1.40E-07	1.7E-06	3.25E-05
Arsenic - Partition 5	A	9.45E+00	9.45E+00	1.20E+01	2.13E+02	3.00E-02	1.00E+00	9.83E-06	9.3E-05	4.08E-06	3.9E-05	5.96E-07	7.1E-06	1.39E-04
Arsenic - Partition 6	A	9.45E+00	9.45E+00	1.20E+01	1.01E+02	3.00E-02	1.00E+00	4.67E-06	4.4E-05	1.94E-06	1.8E-05	2.83E-07	3.4E-06	6.58E-05
Arsenic - Partition 7	A	9.45E+00	9.45E+00	1.20E+01	1.36E+02	3.00E-02	1.00E+00	6.26E-06	5.9E-05	2.60E-06	2.5E-05	3.80E-07	4.6E-06	8.83E-05
Arsenic - Partition 8	A	9.45E+00	9.45E+00	1.20E+01	3.60E+02	3.00E-02	1.00E+00	1.66E-05	1.6E-04	6.88E-06	6.5E-05	1.01E-06	1.2E-05	2.34E-04
Arsenic - Background	A	9.45E+00	9.45E+00	1.20E+01	2.73E+01	3.00E-02	1.00E+00	1.26E-06	1.2E-05	5.22E-07	4.9E-06	7.63E-08	9.2E-07	1.77E-05

Notes:

Cancer WOE Classifications:

Group A: Human carcinogen

ABS_d = Dermal Absorption Factor

ABS_{gi} = Gastrointestinal Aborption Factor

CDI = Chronic Daily Intake

ELCR = Excess Lifetime Cancer Risk

EPC = Exposure Point Concentration

mg/kg-day = milligrams per kilogram per day

SF_d = Dermal Slope Factor

SF_o = Oral Slope Factor

SF_i = Inhalation Slope Factor

WOE = Weight of Evidence

TABLE A-4
Future Excavation/Construction Worker Scenario - Potential Noncarcinogenic Risk
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

Chemical	RfD_o (mg/kg-day)	RfD_d (mg/kg-day)	RfD_i (mg/kg-day)	EPC (mg/kg)	ABS_d	ABS_{gi}	Ingestion CDI (mg/kg-day)	Ingestion HQ	Dermal CDI (mg/kg-day)	Dermal HQ	Inhalation CDI (mg/kg-day)	Inhalation HQ	Total HI
Arsenic - Partition 1	3.00E-04	3.00E-04	8.57E-06	1.00E+02	3.00E-02	1.00E+00	3.23E-04	1.076	1.34E-04	0.4460	1.96E-05	2.28	3.80
Arsenic - Partition 2	3.00E-04	3.00E-04	8.57E-06	1.16E+02	3.00E-02	1.00E+00	3.74E-04	1.248	1.55E-04	0.5173	2.27E-05	2.65	4.41
Arsenic - Partition 3	3.00E-04	3.00E-04	8.57E-06	1.05E+02	3.00E-02	1.00E+00	3.40E-04	1.134	1.41E-04	0.4700	2.06E-05	2.41	4.01
Arsenic - Partition 4	3.00E-04	3.00E-04	8.57E-06	5.00E+01	3.00E-02	1.00E+00	1.62E-04	0.539	6.70E-05	0.2233	9.79E-06	1.14	1.90
Arsenic - Partition 5	3.00E-04	3.00E-04	8.57E-06	2.13E+02	3.00E-02	1.00E+00	6.88E-04	2.294	2.85E-04	0.9509	4.17E-05	4.87	8.11
Arsenic - Partition 6	3.00E-04	3.00E-04	8.57E-06	1.01E+02	3.00E-02	1.00E+00	3.27E-04	1.089	1.35E-04	0.4515	1.98E-05	2.31	3.85
Arsenic - Partition 7	3.00E-04	3.00E-04	8.57E-06	1.36E+02	3.00E-02	1.00E+00	4.38E-04	1.461	1.82E-04	0.6058	2.66E-05	3.10	5.17
Arsenic - Partition 8	3.00E-04	3.00E-04	8.57E-06	3.60E+02	3.00E-02	1.00E+00	1.16E-03	3.873	4.82E-04	1.6056	7.04E-05	8.22	13.70
Arsenic - Background	3.00E-04	3.00E-04	8.57E-06	2.73E+01	3.00E-02	1.00E+00	8.82E-05	0.294	3.65E-05	0.1218	5.34E-06	0.62	1.04

Notes:
ABS_d = Dermal Absorption Factor
ABS_{gi} = Gastrointestinal Aborption Factor
CDI = Chronic Daily Intake
EPC = Exposure Point Concentration
HI = Hazard Index
HQ = Hazard Quotient
mg/kg-day = milligrams per kilogram per day
RfC = Reference Concentration
RfD_d = Dermal Reference Dose
RfD_o = Oral Reference Dose
RfD_i = Inhalation Reference Dose

TABLE A-5
Hypothetical Future Residential Scenario - Potential Excess Lifetime Cancer Risk
Human Health Risk Assessment
Beverly Hills Land Company Lots 12 and 13

								Ingestion		Dermal		Inhalation		
Chemical	WOE	SF_o (mg/kg-day)$^{-1}$	SF_d (mg/kg-day)$^{-1}$	SF_i (mg/kg-day)$^{-1}$	EPC (mg/kg)	ABS_d	ABS_{gi}	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	CDI (mg/kg-day)	ELCR	Total ELCR
Arsenic - Partition 1	A	9.45E+00	9.45E+00	1.20E+01	1.00E+02	3.00E-02	1.00E+00	1.56E-04	1.5E-03	1.52E-05	1.4E-04	1.13E-08	1.4E-07	1.62E-03
Arsenic - Partition 2	A	9.45E+00	9.45E+00	1.20E+01	1.16E+02	3.00E-02	1.00E+00	1.81E-04	1.7E-03	1.76E-05	1.7E-04	1.31E-08	1.6E-07	1.88E-03
Arsenic - Partition 3	A	9.45E+00	9.45E+00	1.20E+01	1.05E+02	3.00E-02	1.00E+00	1.65E-04	1.6E-03	1.60E-05	1.5E-04	1.19E-08	1.4E-07	1.71E-03
Arsenic - Partition 4	A	9.45E+00	9.45E+00	1.20E+01	5.00E+01	3.00E-02	1.00E+00	7.84E-05	7.4E-04	7.59E-06	7.2E-05	5.64E-09	6.8E-08	8.12E-04
Arsenic - Partition 5	A	9.45E+00	9.45E+00	1.20E+01	2.13E+02	3.00E-02	1.00E+00	3.34E-04	3.2E-03	3.23E-05	3.1E-04	2.40E-08	2.9E-07	3.46E-03
Arsenic - Partition 6	A	9.45E+00	9.45E+00	1.20E+01	1.01E+02	3.00E-02	1.00E+00	1.58E-04	1.5E-03	1.53E-05	1.4E-04	1.14E-08	1.4E-07	1.64E-03
Arsenic - Partition 7	A	9.45E+00	9.45E+00	1.20E+01	1.36E+02	3.00E-02	1.00E+00	2.13E-04	2.0E-03	2.06E-05	1.9E-04	1.53E-08	1.8E-07	2.20E-03
Arsenic - Partition 8	A	9.45E+00	9.45E+00	1.20E+01	3.60E+02	3.00E-02	1.00E+00	5.63E-04	5.3E-03	5.45E-05	5.2E-04	4.05E-08	4.9E-07	5.84E-03
Arsenic - Background	A	9.45E+00	9.45E+00	1.20E+01	2.73E+01	3.00E-02	1.00E+00	4.27E-05	4.0E-04	4.14E-06	3.9E-05	3.08E-09	3.7E-08	4.43E-04

Notes:
Cancer WOE Classifications:
Group A: Human carcinogen
ABS_d = Dermal Absorption Factor
ABS_{gi} = Gastrointestinal Aborption Factor
CDI = Chronic Daily Intake
ELCR = Excess Lifetime Cancer Risk
EPC = Exposure Point Concentration
mg/kg-day = milligrams per kilogram per day
SF_d = Dermal Slope Factor
SF_o = Oral Slope Factor
SF_i = Inhalation Slope Factor
WOE = Weight of Evidence

TABLE A-6

Hypothetical Future Residential Scenario - Potential Noncarcinogenic Risk

Human Health Risk Assessment

Beverly Hills Land Company Lots 12 and 13

							Ingestion		Dermal		Inhalation		
Chemical	RfD_o (mg/kg-day)	RfD_d (mg/kg-day)	RfD_i (mg/kg-day)	EPC (mg/kg)	ABS_d	ABS_{gi}	CDI (mg/kg-day)	HQ	CDI (mg/kg-day)	HQ	CDI (mg/kg-day)	HQ	Total HI
Arsenic - Partition 1	3.00E-04	3.00E-04	8.57E-06	1.00E+02	3.00E-02	1.00E+00	3.65E-04	1.217	3.54E-05	0.1178	2.63E-08	0.0031	1.34
Arsenic - Partition 2	3.00E-04	3.00E-04	8.57E-06	1.16E+02	3.00E-02	1.00E+00	4.23E-04	1.412	4.10E-05	0.1367	3.05E-08	0.0036	1.55
Arsenic - Partition 3	3.00E-04	3.00E-04	8.57E-06	1.05E+02	3.00E-02	1.00E+00	3.85E-04	1.283	3.72E-05	0.1242	2.77E-08	0.0032	1.41
Arsenic - Partition 4	3.00E-04	3.00E-04	8.57E-06	5.00E+01	3.00E-02	1.00E+00	1.83E-04	0.609	1.77E-05	0.0590	1.32E-08	0.0015	0.67
Arsenic - Partition 5	3.00E-04	3.00E-04	8.57E-06	2.13E+02	3.00E-02	1.00E+00	7.79E-04	2.595	7.54E-05	0.2512	5.60E-08	0.0065	2.85
Arsenic - Partition 6	3.00E-04	3.00E-04	8.57E-06	1.01E+02	3.00E-02	1.00E+00	3.70E-04	1.232	3.58E-05	0.1193	2.66E-08	0.0031	1.35
Arsenic - Partition 7	3.00E-04	3.00E-04	8.57E-06	1.36E+02	3.00E-02	1.00E+00	4.96E-04	1.653	4.80E-05	0.1601	3.57E-08	0.0042	1.82
Arsenic - Partition 8	3.00E-04	3.00E-04	8.57E-06	3.60E+02	3.00E-02	1.00E+00	1.31E-03	4.382	1.27E-04	0.4242	9.46E-08	0.0110	4.82
Arsenic - Background	3.00E-04	3.00E-04	8.57E-06	2.73E+01	3.00E-02	1.00E+00	9.97E-05	0.332	9.65E-06	0.0322	7.18E-09	0.0008	0.37

Notes:

ABS_d = Dermal Absorption Factor
ABS_{gi} = Gastrointestinal Aborption Factor
CDI = Chronic Daily Intake
EPC = Exposure Point Concentration
HI = Hazard Index
HQ = Hazard Quotient
mg/kg-day = milligrams per kilogram per day
RfC = Reference Concentration
RfD_d = Dermal Reference Dose
RfD_o = Oral Reference Dose
RfD_i = Inhalation Reference Dose