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TECHNICAL REPORT

PRELIMINARY ENDANGERMENT ASSESSMENT

VOLUME II

PHOENIX 800
800 CEDAR STREET
OAKLAND, CALIFORNIA

Cypress Reconstruction - Phase 2
Contract No. 53S515
Task Order No. 04-192201-03

Prepared for:

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LIST OF ACRONYMS

Abbreviation	Definition
ACTA	Alameda County Tax Assessor
ACPD	Alameda County Planning Department
USEPA	United States Environmental Protection Agency
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
HWDMS	Hazardous Waste Data Management System (EPA)
DHS	State of California Department of Health Services
TSCP	Toxic Substances Control Program (DHS)
HWIS	Hazardous Waste Information System (TSCP)
USGS	United States Geologic Survey
COPL	City of Oakland Planning Department
RWQCB	State of California Regional Water Quality Control Board
ACEHD	Alameda County Environmental Health Division
COFD	City of Oakland Fire Department
EBMUD	East Bay Municipal Utilities District
SCS	State of California Soil Conservation Service
CDMG	State of California-Resources Agency-Department of Conservation-Division of Mines and Geology
DWR	State of California Department of Water Resources
ACFCD	Alameda County Flood Control District
ACWD	Alameda County Water District
CDFG	State of California Department of Fish & Game
SWRCB	State Water Resources Control Board
NOAA	United States National Oceanic and Atmospheric Administration
NWSO	National Weather Service Office (NOAA)
FAD	State of California Department of Food & Agriculture
OST	On-Site Technologies, Inc.
USBR	United States Bureau of Reclamation
BAAQMD	Bay Area Air Quality Management District
USFS	United States Forest Service
USDA	United States Department of Agriculture
DPR	State of California Department of Parks and Recreation
FPSI	First Phase Site Investigation
SPSI	Second Phase Site Investigation
PEA	Preliminary Endangerment Assessment

PRELIMINARY ENDANGERMENT ASSESSMENT

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November 1993

1.0 INTRODUCTION

This document presents the results of a Preliminary Endangerment Assessment (PEA) conducted by On-Site Technologies, Inc. (OST) for the California Department of Transportation (Caltrans) at 800 Cedar Street, Oakland, Alameda County, California (Site).

The site is located along a portion of the proposed reconstruction alignment of the I-880 Cypress Structure. Caltrans is in the process of designing the replacement of the Cypress Structure which collapsed in the 1989 Loma Prieta Earthquake and was subsequently demolished.

The State of California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) in consultation with Caltrans established the need for preparing PEA Reports for properties located along the proposed reconstruction alignment.

1.1 Preliminary Endangerment Assessment

The PEA is defined in Section 25319.5, Chapter 6.8, Division 20 of the California Health and Safety Code. The PEA is an activity which is performed to determine whether current or past waste management practices have resulted in the release or threatened release of hazardous substances which pose a threat to public health or the environment. The PEA is designed as a standard approach for evaluating sites contaminated or potentially contaminated with hazardous substances/wastes to determine if a removal or remedial action is required to protect public health and the environment. The basic objectives of the PEA include:

- Determine if a release of hazardous substances/wastes has occurred.

- Determine if the potential for a release of hazardous substances/wastes exists.

- Assess the threat to public health and the environment posed by the site.

- Determine if an emergency removal action is required to reduce the (potential) threat to public health and the environment.

- Determine if remediation actions are required at the site.

- Provide recommendations on the additional data that must be collected to further evaluate the site and how the site should be addressed in order to stabilize and remediate the long-term threats.

The PEA Report presented herein has been prepared in accordance with the DTSC's Interim Guidance for Preparation of a Preliminary Endangerment Assessment Report (June 22, 1990).

The PEA Report also includes a Baseline Risk Assessment (BRA) and Remedial Action Options Report (RAO).

1.2 Baseline Risk Assessment

The BRA has been prepared in accordance with the USEPA's Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim Final (December 1989). The BRA is essentially an analysis of the potential adverse human health effects (current and future) caused by hazardous substances releases from the site in the absence of any actions to control or mitigate the releases. BRA's are site-specific. The BRA consists of five basic steps:

- Data collection and analysis
- Exposure assessment
- Toxicity assessment
- Risk characterization
- BRA Report preparation

1.3 Remedial Action Options Report

The RAO Report has been prepared in accordance with Article XXIV - Statement of Work, Part II - Site Investigations, pages 13 and 14, Remedial Action Options of Caltrans Statewide Contract Number 53S515. The RAO Report presents a review of

d) Michael Bondi Metal Design and Michael Bondi Wrought Edge Designs
e) Cypress Used Auto Parts
f) Ivan's Auto Body

Collectively, these businesses will be referred to as Phoenix 800.

Source: City of Oakland, Fictitious Names, Site visit

2.1.2 Street Address

The Assessor's Parcel Number (APN) for the site is defined in Section 2.1.8. Within the site boundaries as defined by the APN, the following addresses were found:

a) 800 Cedar Street
b) 888 Cedar Street
c) 1812 Shorey Street
d) 1818 Shorey Street
e) 821 Pine Street
f) 1819 9th Street

Oakland, Alameda County, California 94607

Source: Site visit, Phoenix Properties

2.1.3 Mailing Address

a) 800 Cedar Street, Oakland, CA 94607
b) Post Office Box 24129, Oakland, CA 94623
c) unknown
d) 1818 Shorey Street, Oakland, CA 94607
e) 821 Pine Street, Oakland, CA 94607
f) 1819 9th Street, Oakland, CA 94607

Source: a,b,d,e, and f obtained from operators at each business

2.1.4 Phone Number

a) (510) 835-4118
b) (510) 465-9900
c) (510) 465-1648
d) (510) 763-1327
e) (510) 462-4534 and 451-3034
f) (510) 271-0138

Source: a,b,c,d,e,f - Pacific Bell

2.1.5 Other Site Names

1) Beginning date unknown through 1970 - entire parcel/building was occupied by Phoenix Iron Works; after 1970 building was split into 7 bays.

2) Date unknown, at 1823 Cedar Street (Bay 7) - "Terminal Manufacturing Company".

3) Date unknown (prior to 1970); at Bay 3 (address unknown) -"Vennell Steel".

4) Date unknown; at Bay 5 (address unknown) - plastic bag company

5) Up until 1951, Independent Iron Works occupied the entire building/parcel.

6) Sometime between and/or including 1912 and 1931, Independent Iron Works occupied the southern half of the parcel; California Fireworks Company occupied a portion of the northwest portion of the parcel; 3 dwellings occupied a portion of the northeast section of the parcel; and a soap factory occupied an area on the southern middle boundary of the parcel.

7) Sometime between and/or including 1902 and 1912, California Bedding & Upholstering Company occupied the southwest portion of the parcel; 14 dwellings occupied the northeast quarter of the parcel; The Dunn Cracker Company occupied the northwest area of the parcel. Chase Street bisected the center of the parcel between and perpendicular to Cedar and Pine Streets and New Street bisected the northern-half of the parcel perpendicular to and intersecting 9th Street.

Source: Site visit, Insurance Maps of Oakland, California, Sanborn Map Company (SIM). BEC Phase I and Phase II Site Assessment, September 1990

2.1.6 EPA Identification Number

EPA Identification Number CAL000010990. This number has been assigned to Pine Iron Works, 800 Cedar Street, Oakland, California.

Source: Department of Toxic Substances Control (DTSC)

2.1.7 DTSC Abandoned Site Program Information System (ASPIS) Database Number

The ASPIS Database is currently referred to as CALSITES. The site is listed on the CALSITES Database as number 01330037.

Source: Cal-EPA Department of Toxic Substances Control (DTSC)

2.1.8 Assessor's Parcel Number (APN) and Map

The Alameda County Tax Assessor's Office (ATCA) identifies the APN for the site as 6-47-1. The ACTA's plat map for the site is illustrated on Figure 2.1.8.

Source: Alameda County Tax Assessor's Office (ACTA)

2.1.9 Township, Range, Section, and Meridian

No township, range, section and meridian has been assigned to the site by the United States Geological Survey (USGS). The site is included within part of the VND Peralta Spanish Land Grant. Approximate longitude is 122° 18' 30". Approximate latitude is 37° 48' 30".

Source: United States Geologic Survey - Menlo Park (USGS)

2.1.10 Map of Site Location

Figure 2.1.10 illustrates the location of the site and vicinity within a one mile radius of the site.

Source: USGS 7.5 Minute West Oakland Quadrangle

2.2 Past and Current Site Activities

2.2.1 Business Type

The type of current and past businesses which have operated on the site are listed on Table 2.2.1.

Source: ACTA, SIM, OPL, historic Pacific Telephone and Telegraph directories (PT&T), Oakland Tribune (1945), Buyers Guide for Metropolitan Oakland 1938, 1942 and 1943

2.2.2 Years of Operation

Table 2.2.1 lists the operating dates for the current business operating on the site, and for businesses that operated on the site in the past.

Source: ACTA, SIM, OPL, historic PT&T directories

2.2.3 Facility Ownership/Operators

Table 2.2.1 lists the persons or corporations which currently own/operate the current business on the site, and those persons or corporations which owned/operated businesses that operated on the site in the past.

Source: ACTA

2.2.4 Property Owners

The current and past owners of the property are listed on Table 2.2.1.

Source: ACTA, SIM, OPL

2.2.5 Site Business Activities or Manufacturing Processes

A summary description of the type of business activities and manufacturing processes undertaken at the site by past and current businesses operating on the site is presented on Table 2.2.5. Figures 2.2.5.a, 2.2.5.b, 2.2.5.c, and 2.2.5.d illustrate features on the site with respect to past and current business activities.

Several 55-gallon, black metal drums were observed in two separate areas along the west side of the building. These drums were not labeled and the contents are unknown.

Source: Site visit, Bay Area Air Quality Management District (BAAQMD)

2.3 Hazardous Substance/Waste Management

2.3.1 Hazardous Substances/Wastes Identification and Quantities

A summary description of hazardous substances/wastes utilized currently and in the past on the site is listed on Table 2.3.1. Amounts of hazardous wastes generated are unknown.

Source: ACDEH, SIM, OPL, Regional Water Quality Control Board (RWQCB)

2.3.2 On-Site Storage, Treatment, Disposal

Two underground diesel storage tanks (1,000 gallon and 300 gallon) are located on the site. Hazardous waste treatment or disposal activities undertaken on the site currently or in the past are unknown. A summary description of on-site storage of hazardous substances/wastes/treatment and disposal is presented on Table 2.3.2.

Figure 2.3.2 illustrates the location of the underground storage tanks on the site. Additionally, approximately 13 filled 55-gallon tanks are currently stored against the southwestern side of the building. One drum was open and appeared to contain black medium grained sand-sized material.

Source: ACDEH, RWQCB, BEC Phase I and Phase II Site Assessment, September 1990

2.3.3 Regulatory Status

No record of hazardous substances/waste permits held by businesses on the site were found.

Source: ACDEH, RWQCB

2.3.4 Inspection Results

A summary of regulatory inspections undertaken at the Site is presented on Table 2.3.4.

Source: ACDEH, BAAQMD

3.0 APPARENT PROBLEM

During May 1990, the site owner (Phoenix Properties) contracted Baseline Environmental Consulting (BEC) to conduct a Phase I and Phase II Site Assessment at the subject site. A complete description of the investigations and results attained is presented in Section 5.1 - Past Sampling Activities.

Soil at the site was found to be contaminated with total concentrations of lead at greater than ten times the Soluble Threshold Limit Concentration (STLC) for lead as established in Title 22 California Code of Regulations. Analyses to determine soluble lead concentrations using CalEPA Waste Extraction Test (WET) methods resulted in detecting soluble lead concentrations less than the STLC for lead. Ground water underlying the site was not sampled.

In June 1992, Caltrans contracted Geo/Resource Consultants, Inc. (GRC) to conduct a limited First Phase Site Investigation (FPSI), specifically in the immediate vicinity of the two existing underground storage tanks (Section 2.3.2). A complete description of the investigation and results attained is presented in Section 5.1 - Past Sampling Activities.

Soil in the immediate vicinity of the two underground storage tanks was found to be contaminated with total petroleum hydrocarbons as gasoline (TPH-G) and diesel (TPH-

D). Ground water underlying the site was not found to be contaminated with TPH-G or TPH-D.

GRC concluded that additional soil borings be drilled to fully characterize the extent of the soil contamination in the immediate vicinity of the two underground storage tanks so remedial alternatives could be determined.

The primary human and environmental resources of concern on and in the immediate vicinity of the site are:

- Residential neighborhoods in the immediate vicinity of the site.
- Workers on-site.

The pathways of exposure to the primary and environmental resources of concern on and in the immediate vicinity of the site in consideration of the existing physical setting of the site may include:

- Incidental ingestion of contaminated soil.
- Dermal contact with contaminated soil.

Ingestion of contaminated ground water by humans is not an exposure pathway because ground water in the region is not used for drinking water purposes. This is further detailed in Section 4.2 - Factors Related to Water Pathways. The likely exposure pathways for this site are described in Section 6.3.

Source: Baseline Environmental Consulting (BEC), Phase I and Phase II Site Assessment, September 1990

Geo/Resource Consultants, Inc., (GRC), Site Investigation Report - Area 4, August 1992

Site visit; ACTA

Final Environmental Impact Statement/Report, I-880/Cypress Replacement, Alameda County, California, Caltrans, 1991

4.0 ENVIRONMENTAL SETTING

4.1 Factors Related to Soil Pathways

There is a documented release of metals and petroleum hydrocarbons to the underlying soil profile.

The site assessment conducted by BEC found elevated concentrations of barium, lead and zinc with respect to the other heavy metals analyzed.

No soil contamination remediation activities have been undertaken at the site.

Source: BEC Phase I & Phase II Site Assessment, September 1990. GRC Site Investigation Report - Area 4, August 1992

4.1.1 Topography of the Site and Surrounding Areas

The topography of the site and surrounding areas is generally flat. The topography of the site and vicinity is illustrated on Figure 4.1.1.

The site is located on Cedar Street between Shorey and Goss Streets. It is rectangular in plan, and occupies an area of approximately 77,400 square feet. Currently, the site is occupied by a large metal warehouse from which the various businesses operate. The property is not fenced. The property was part of the historic Independent Iron Works operation dating from the 1950's.

Source: USGS 7.5 Minute West Oakland Quadrangle, ACTA, Site visit

4.1.2 Land Use and Zoning for Site

The site is zoned M-30, General Industrial.

Source: Alameda County Planning Department (ACPD)

4.1.3 Environmental Impacts of Releases from the Site

Evidence of environmental impact from releases at the site were unable to be identified due to the restrictions of the Permit To Entry between Caltrans and the property owner. As stated in Section 4.1.1. the site presently is occupied by a warehouse which is underlain, at least in part, by an earthen floor.

Source: Site visit, ACDEH

4.1.4 Predominant Hydrologic Soil Group

The soil underlying the site is the Urban Land-Baywood Complex. This soil is classified under Hydrologic Soil Group A. Group A soils have a high infiltration rate when thoroughly wet and have a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. This soil consists of approximately 60 percent Urban land, 35 percent Baywood loamy sand, and 5 percent other soils, including drained loams. Also included are small areas of a very deep, loamy sand that is weakly cemented below a depth of 30 inches.

Urban Land consists of areas that are covered by buildings and other structures. The soil material has been altered or mixed, but it closely resembles Baywood soil.

The Baywood soil is very deep and somewhat excessively drained. It formed in eolian sediment that derived from old beach deposits. Typically the surface layer is grayish brown and brown, slightly acidic loamy sand about 32 inches thick. The underlying material is pale brown and light yellowish brown, slightly acidic loamy sand and extends to a depth of 60 inches or more.

Permeability is rapid. The available water capacity is 0.06 to 0.10 inches. The root zone is more than 60 inches deep. Runoff is slow to medium. Wind erosion is substantial if this soil is left bare.

This soil has few limitations for urban development.

Source: United States Department of Agriculture (USDA); Soil Conservation Service (SCS) Soil Survey of Alameda County, California, Western Part 1981

4.1.5 Soil Permeability

Table 4.1.5 lists the permeability characteristics of the Urban Land - Baywood Complex underlying the site. The least permeable continuous layer under the site is the Older Bay Mud. Table 4.2.2 describes the lithology, depth, and thickness of this formation.

Source: USDA, SCS Soil Survey of Alameda County, California, Western Part 1981

4.1.6 Surface Slope

The surface slope at the site is to the southwest at approximately 0.003 percent and continues to the west towards the Oakland Middle Harbor approximately 1 mile from the site.

Source: USGS 7.5 Minute West Oakland Quadrangle

4.1.7 Soil Stability and Seismic Conditions

The soil underlying the site is stable and shows little to no liquefaction potential.

The maximum earthquake intensity predicted for the site assuming a 8.0 or greater Richter magnitude earthquake along the San Andreas or Hayward Fault is very strong.

Very strong has the capability of:

- Brickwork and masonry badly cracked with occasional collapse.
- Brick and masonry gables thrown down.
- Frame buildings lurched or listed on fair or weak underpinning structures with occasional falling from underpinning or collapse.
- General destruction of chimneys and of masonry, brick, or cement veneers.
- Considerable cracking or crushing of foundation walls.

Source: USGS Miscellaneous Field Studies Map MF-709.

4.1.8 Site Access

The entire site is occupied by a metal warehouse. Access to the structure is limited to the various businesses that operate within the structure. Access to the interior of the structure was restricted due to the Permit To Entry between Caltrans and the property owner. In addition, because of the type of activities being undertaken by the various businesses, access may be restricted to persons wearing appropriate health and safety gear. Partial visual access was only obtained at the various businesses exterior openings.

Source: Site visit

4.1.9 Measures to Prevent Exposures to Contaminated Soil

There are numerous drums stored on the western exterior of the warehouse, which are unmarked and sealed. These drums are placed directly on the asphalt on the exterior of the site. The drums are not on pallets, not fenced, and not covered. An earthen floor underlies at least part of the warehouse. Therefore hazardous materials or wastes have the potential to leak, spill or leach to underlying soil within the warehouse.

The remainder of the surficial soil at the site is covered with asphalt concrete pavement.

Source: Site visit, ACDEH-Hazardous Materials Management Plan

4.1.10 Nearby Residential Areas, Schools, Businesses, Day Care Centers, Nursing Homes, Senior Citizen Communities, or Hospitals Within One Mile of the Site

Figure 4.1.10 illustrates the locations of schools, day care centers, nursing homes, senior citizen communities and hospitals within one mile of the site.

Source: Final Environmental Impact Statement/Report, I-880/Cypress Replacement, Alameda County, California, Caltrans, 1991

4.1.11 Nearest Critical Habitat for Sensitive, Threatened, or Endangered Species within one mile of the Site

There are no sensitive, threatened, or endangered species within one mile of the site.

There are no flora, fauna, or sensitive ecosystems in the vicinity of the site known to be affected by contaminants emanating from or attributable to the site.

Source: Natural Diversity Data Base (NDDB), California Department of Fish and Game (CDFG)

4.2 Factors Related to Water Pathways

4.2.1 Net Seasonal Precipitation and One Year, 24-hour Rainfall Collection

The average annual net precipitation at the site is 18.69 inches based on average monthly and annual precipitation data measured over the period 1941 to 1970 at the Oakland International Airport.

The one year, 24-hour rainfall level at the site is approximately 0.10 inches over the period 1951 to 1960.

Source: United States Department of Commerce (USDC) - National Oceanic and Atmospheric Administration (NOAA)

4.2.2 Site Geology and Hydrogeology

The geology of the site is presented on Table 4.2.2. The hydrogeology of the site is presented on Table 4.2.2.a. Figure 4.2.2 illustrates the surficial geology of the site and vicinity.

Source: USGS Miscellaneous Geologic Investigation Map I-239

4.2.3 Aquifer Contamination

Ground water occurring within the soil profile (Urban Land - Baywood Complex) underlying the site is contaminated based on the results of PEA sampling activities described in Section 5.3 -PEA Sampling Activities.

Ground water occurring in the Merritt Sand at depth is threatened as a result of contamination of ground water in the soil profile underlying the site. This is because the site and surrounding vicinity are located within the recharge area for ground water occurring at depth in the Merritt Sand.

Ground water occurring in permeable sediment intervals within the Older Bay Mud may be hydraulically interconnected with ground water occurring in the Merritt Sand. As a result, ground water occurring in the Older Bay Mud may also be threatened. However, there is no data available for determining the direction of ground water movement between the Merritt Sand and the Older Bay Mud.

Source: BEC Phase I & Phase II Site Assessment, September 1990

GRC Site Assessment- Area 4, August 1992

Initial Site Assessment for the Alternative Corridor Study, Route 880/Cypress Replacement, Caltrans, 1990

4.2.4 Aquifer Usage

Table 4.2.4 lists the usage characteristics for aquifers identified in Table 4.2.2.a.

Ground water in the vicinity and region of the site is not used for drinking water purposes or for municipal water supply (i.e. firefighting, industrial/manufacturing uses, etc.). Water for drinking and municipal supply is drawn from surface water supplies stored in reservoirs located east of the region which capture precipitation and snowmelt runoff derived from the Sierra Nevada foothills and mountains.

The water purveyor in the region is the East Bay Municipal Utilities District (East Bay MUD).

Source: East Bay Municipal Utility District (EBMUD)

Alameda County Flood Control and Water Conservation District (ACFCWCD)

Initial Site Assessment for the Alternative Corridor Study, Route 880/Cypress Replacement, Caltrans, 1990

4.2.5 Possible Migration Routes to Surface Waters and Critical Habitats

Surface water at the site drains off of the warehouse roof onto the asphalt pavement surrounding the building and either evaporates to the atmosphere or infiltrates into three subsurface drains identified adjacent to the site. These drains are located at: 1) the southwest corner; 2) the northwest corner; and 3) the southeast corner of the building exterior. It is unknown, if there are storm drains existing within the building. It is unknown as to where the existing drains flow. Table 2.2.5.d illustrates the storm drain locations. There is no discernable surface water runoff collection and conveyance system on the site.

Source: Site visit

4.2.6 Surface Waters

Figure 4.2.6 illustrates the locations of surface water, marshlands, wetlands, and critical habitats nearest the site. Table 4.2.6 lists the distances to surface water, marshlands, wetlands, and critical habitats nearest the site.

Source: National Wetlands Inventory, United States Department of the Interior, Department of Fish and Game, 1985; NDDB-CDF&G, 1993

4.2.7 Surface Water Body Intakes

There are no uses of water from San Francisco Bay for drinking water and/or municipal supply.

Source: EBMUD

4.2.8 Site Surface Water Runoff Mitigation Measures

There are no structures mitigating surface water runoff from the site.

Source: Site visit, ACDEH Hazardous Materials Management Plan (HMMP)

4.2.9 Location of Flood Plains

The site is not located within a flood plain. Figure 4.2.9 illustrates 100 year flood plains in the vicinity of the site.

Source: USGS Water Resources Investigation 37-73

4.2.10 Population Served by Surface Water Supplies

Water from San Francisco Bay is not used for any beneficial purpose other than to support salt and freshwater marine life and ecosystems. Surface water for drinking water, municipal supply (i.e. firefighting, industrial/manufacturing uses, etc.), irrigation of agricultural lands, and livestock watering in the region of the site is drawn from surface water supplies stored in reservoirs located east of the region which capture precipitation and snowmelt runoff derived from the Sierra Nevada foothills and mountains.

The water purveyor in the region is the EBMUD.

Source: EBMUD

4.2.11 Locations and Populations of Schools, Day Care Centers, Hospitals, Nursing Homes, or Retirement Centers Which Use Surface Water Supplies

Water from San Francisco Bay is not used for any beneficial purpose other than to support salt and freshwater marine life and ecosystems. Surface water for drinking water use by these facilities is drawn from surface water supplies stored in reservoirs located east of the region which capture precipitation and snowmelt runoff derived from the Sierra Nevada foothills and mountains.

The water purveyor in the region is the EBMUD.

Source: EBMUD

4.3 Factors Related to Air Pathways

No record of a release to the atmosphere from the site has been documented. Disturbance of the soil profile underlying the site may result in the release of contaminants to the atmosphere.

Source: Site visit, Bay Area Air Quality Management District (BAAQMD)

4.3.1 Potential Source and Mechanism of Release

A potential source of release would be the soil profile underlying the site should the soil profile be disturbed by excavation. The mechanism would be the release of dust contaminated with heavy metals from the soil to the atmosphere.

Source: Site visit

4.3.2 Prevailing Daily Wind Direction and Average Velocity at the Site

Table 4.3.2 lists the prevailing daily wind direction and average wind velocity at the site. Wind direction and velocity data was collected at the Oakland International Airport.

Source: United States Department of Commerce (USDC) - National Oceanic and Atmospheric Administration (NOAA)

4.3.3 Local Climactic Factors

Table 4.3.3 lists the local climactic factors for the site.

Source: USDC - NOAA

4.3.4 Timing of Potential Threatened Release

The potential release and mechanism could occur during excavation of the soil profile underlying the site by heavy equipment.

Source: Site visit

4.3.5 Possible Dispersion Routes for Potential Threatened Release

The possible dispersion routes would include:

- Transport from the site and dispersion with the prevailing wind
- Settlement of heavy metal impregnated dust downwind of the site

Source: USEPA Superfund Exposure Assessment Manual, 1988
USEPA Exposure Factors Handbook, 1987

4.3.6 Population Possibly Exposed to Potential Release from Site

The population possibly exposed to a potential release from the site as outlined in Section 4.3.1 is approximately 20,000 within 1 mile of the site, and approximately 200,000 within 5 miles of the site.

Source: United States Census Bureau, 1990

4.3.7 Schools, Day Care Centers, Hospitals, Nursing Homes, Retirement Communities, and Senior Citizen Communities Possibly Exposed to Potential Release from Site

Figure 4.1.10 illustrates the locations of schools, day care centers, hospitals, nursing homes, retirement communities, and senior citizen communities within one mile of the site that may be exposed to a potential release from the site borne by air pathway. Table 4.3.7 lists the distances from the site to these facilities.

Source: Thomas Guide for Alameda County

Final Environmental Impact Statement/Report, I880/Cypress Replacement, Alameda, California, Caltrans, 1991

4.3.8 Additional Areas Possibly Exposed to a Potential Release from the Site

Figures 4.3.8.a and 4.3.8.b illustrate the following areas that may be possibly exposed to a potential release from the site:

- Commercial/industrial areas
- Residential areas
- Historic/landmark sites

Titles shown on Figure 4.3.8a (e.g., Peralta Villa, etc.) represent distinct neighborhoods within the project area. Land use within each neighborhood is variable as commercial activities abut residential property; however, commercial/industrial areas are located within the following neighborhoods: Clawson, McClymonds, Ralph Bunche, Prescott and Phoenix. There are no prime and/or non-prime agricultural lands within 1/2 mile of the site.

Source: Final Environmental Impact Statement/Report, I-80/Cypress Replacement, Alameda County, California, Caltrans, 1991

4.3.9 Sensitive Areas Possibly Exposed to a Potential Release from the Site

Figure 4.2.6 illustrates the locations of surface water, marshlands, wetlands, and critical habitats nearest the site. Table 4.2.6 lists the distances to surface water, marshlands, wetlands, and critical habitats nearest the site.

Source: National Wetlands Inventory, United States Department of the Interior, Department of Fish and Game, 1985

NDDB-CDF&G, 1993

5.0 SAMPLING ACTIVITIES AND REQUIREMENTS

5.1 Past Sampling Activities

During May 1990, the property owner (Phoenix Properties) contracted BEC to conduct a Phase I and Phase II Site Assessment at the subject site. The sampling objective was to determine if hazardous substances are present in the shallow subsurface soil and/or ground water. Five soil borings were drilled and sampled. Soil borings PP-4, PP-5, and PP-6 were each drilled to 5.5 feet below ground surface (BGS). PP-7 was drilled to 6.0 feet BGS. PP-8 was drilled to 11.5 feet BGS. PP-9 was drilled to 8.5 feet BGS. Eleven soil samples were collected from the five soil borings and submitted for analyses. Laboratory results indicated the presence of lead at 52 milligrams per kilogram (mg/kg) in a soil sample from PP-6. The concentration exceeded ten times the Soluble Threshold Level Concentration (STLC), therefore, a Waste Extraction Test (WET) was performed. The results from the WET test indicate an STLC of 2.26 mg/l which is below the STLC of 5 milligrams per liter (mg/l) for lead. Petroleum hydrocarbon compounds, including semivolatile hydrocarbons, were not detected in any of the soil samples analyzed. Tables 5.1.a, 5.1.b, and 5.1.c summarize the analytical results.

In June 1992, Caltrans contracted GRC to conduct a limited FPSI. The sampling objective was estimated the areal and vertical extent of contamination in the soil and ground water. Two soil borings and one HydroPunch boring were drilled from 8 to 27 FBGS. One boring was converted to a ground water monitoring well. Ground water was measured at approximately 7 feet BGS. Soil and ground water samples were submitted for analyses. Soil samples were found to contain various concentrations of TPH-D (the highest at 2,400 mg/kg) and TPH-G (the highest at 17 mg/kg). Ground water samples did not contain analytically detectable concentrations of TPH-G or TPH-D. GRC concluded that additional soil borings be drilled to fully characterize the extent of the soil contamination so remedial alternatives could be determined. Table 5.1.d summarizes the analytical results.

Copies of BEC's Site Investigation Report, and GRC's FPSI Report - as submitted to Caltrans, are presented in Appendix B.

5.2 PEA Sampling Activities

PEA sampling activities were conducted by OST at the site during the week of March 22 - 26, 1993.

The PEA Sampling and Analyses Plan (SAP) for the site is presented in Appendix C.

5.2.1 PEA Sampling Objectives

The objective of the PEA SAP is to bound the extent of soil and ground water contamination on the site that was discovered during the conduct of First Phase Site

Investigations (FPSI's) by BEC and GRC, to generate data and information to recommend appropriate remedial action options, and to prepare a PEA report for the site.

5.2.2 Standard and Guidance

The SAP was prepared in accordance with USEPA Preparation of a USEPA Region 9 Sampling Plan, (memorandum from Tom Huetteman-Remedial Project Manager to Sample Plan Writers and Remedial Project Managers, November 18, 1987).

Each SAP consists of a Field Sampling Plan, a Quality Assurance/Quality Control Plan, and a Site Safety Plan.

The Field Sampling Plan describes the investigative methods and procedures to be utilized to ensure the collection of representative soil and ground water samples for analyses. In general, field activities included drilling and collecting soil samples from soil borings, collecting grab ground water samples from the soil borings using HydroPunch apparatus, and analyzing the collected soil and ground water samples in accordance with the analytical protocol.

Both the field activities and the analytical protocol were developed by Caltrans, and are specified in Task Order Number 04-192201-03. Soil and well bore drilling were conducted in accordance with the provisions of Article XXIV - Statement of Work, Part II - Site Investigations, pages 19 through 21 "Drilling", Caltrans Statewide Contract Number 53S515. Soil sampling from soil and well borings will be conducted in accordance with the provisions of Article XXIV -Statement of Work, Part II - Site Investigations, page 21 "Sampling", Caltrans Statewide Contract Number 53S515. HydroPunch grab ground water sampling were conducted in accordance with the methods and procedures outlined in the SAP for each property where HydroPunch sampling will take place.

The Site Safety Plan outlines methods and procedures for protecting personnel and the general public during the conduct of the SAPs. The Site Safety Plan was prepared in accordance with the provisions of Article XXIV - Statement of Work, Part II - Site Investigations, pages 15 through 17, "Health and Safety Plans", Caltrans Statewide Contract Number 53S515.

Quality Assurance/Quality Control describes the analytical methods and procedures utilized to analyze the samples collected, and to ensure that the analytical data generated are accurate, precise and complete. Quality Assurance/Quality Control was conducted in accordance with the provisions of Article XXIV - Statement of Work, Part II - Site Investigations, pages 22 through 23, "Quality Assurance/Quality Control", Caltrans Statewide Contract Number 53S515.

5.2.3 Sample Collection and Analyses

Three soil borings were drilled at the site. The SAP called for installing three ground water monitoring wells to collect ground water samples. However, Caltrans opted to collect ground water samples from all three borings using a HydroPunch sampling tool. Figure 5.2.3 illustrates the locations of soil borings for the PEA sampling activities conducted. Table 5.2.3 summarizes the soil boring identification, sampling depths, and general soil classifications.

Soil samples were collected to a depth of 8 feet below grade at each soil sample boring and HydroPunch location based on encountering ground water at a depth of approximately 8 feet below grade. The SAP outlined soil sampling to be conducted to a depth of 6 feet below grade assuming depth to ground water at 6 feet below grade based on the results of the FPSI's conducted at the site.

Subsequent to approval of the Plan, Caltrans requested that selected soil samples (at 2 feet BGS and immediately above ground water) and all ground water samples be analyzed for volatile organic compounds (VOC's).

With the exception of the collection of ground water samples, the soil sampling methods and procedures were conducted in accordance with the SAP. Soil boring logs are presented in Appendix D.

5.3 Evaluation of PEA Sampling Results

5.3.1 Sample Analyses

Soil and ground water samples were submitted to Chromalab, Inc., for analyses. Table 5.3.1.a lists the soil analytical protocol. Table 5.3.1.b lists the ground water analytical protocol. Table 5.3.1.c lists the soil analytical results. Table 5.3.1.d lists the ground water analytical results. Laboratory analytical results, including QA/QC data, are presented in Appendix D. TPHg in ground water was not analyzed in this phase of the investigation because during the Phase I sampling no TPHg was detected in ground water.

5.3.2 Discussion

Based on the analytical results, which indicated that a release has occurred at the site, and on our review of spike and duplicate spike recoveries, the sampling and data quality objectives have been met. Soil sample analyses detected all metals, except for cadmium. None of the metals detected exceeded ten times their respective STLC; therefore, determination of soluble metal's concentrations using CalEPA WET was not conducted. Petroleum hydrocarbon compounds, including semivolatile and volatile organic compounds, were not detected in any of the soil samples in excess of their respective analytical detection limits. All spike and duplicate spike recoveries are within the respective USEPA Method range.

Ground water sample analyses detected all metals except for cadmium. Concentrations of total chromium and lead exceeded their respective USEPA Maximum Contaminant Levels (MCLs). Total petroleum hydrocarbons as diesel (TPH-D) were detected in all three samples. However, no semivolatile or volatile organic compounds were detected. All spike and duplicate spike recoveries are within the respective USEPA Method range. The data appears to be valid and appropriate methods and QA/QC measures were implemented to ensure data quality.

6.0 BASELINE RISK ASSESSMENT

6.0.1 Introduction

The purpose of this BRA is to evaluate potential public health risks associated with heavy metals and petroleum hydrocarbons detected at the site in soil and ground water samples, in consideration of the existing physical setting of the site and land use conditions, and prior to the implementation of any remedial action.

This BRA evaluates the environmental fate, transport, and toxicological properties of selected indicator chemicals detected in soil and ground water samples during the PEA sampling and analyses activities and earlier FPSI's conducted at the site. Exposure routes via soil and ground water, human populations potentially at risk, and potential carcinogenic and noncarcinogenic health risks relevant to the site are characterized. This BRA evaluates human health risks associated only with those heavy metals and petroleum hydrocarbon compounds identified in the soil and ground water samples collected during the conduct of the PEA sampling and analyses activities and earlier FPSI's.

6.0.2 Methodology

The sections, as outlined below, correspond to steps in the BRA:

- Chemicals of Potential Concern (Section 6.1). This section reviews soil and ground water analytical data to determine the chemicals of concern at the site (indicator chemicals) to be evaluated in the BRA. The methods used to establish indicator chemicals are discussed in this section.
- Exposure Assessment (Section 6.2). Routes of exposure of the indicator chemicals via soil and ground water to human receptors are identified.

- Toxicity Assessment (Section 6.3). Toxicological properties of the indicator chemicals and potential human health risks resulting from exposure to the indicator chemicals via soil and ground water are reviewed.

- Exposure Analysis (Section 6.4). Receptor populations evaluated in the BRA are identified. Exposure routes and intake assumptions for the exposure routes are discussed.

- Risk Characterization (Section 6.5). For chemicals identified in Section 6.1, intakes (doses) are estimated for the routes of exposure via soil and ground water.

- Sources of Uncertainty and Error (Section 6.6). Potential uncertainties in the BRA process are discussed.

- Summary and Conclusions (Section 6.7). The conclusions of this BRA are summarized.

6.0.3 Background

A complete description of the historical background of the site is presented in Section 2.0. The environmental setting of the site is presented in Section 4.0.

6.1 Chemicals of Potential Concern

The analytical data generated by the PEA sampling and analyses activities and earlier FPSI's are reviewed in this section, and indicator chemicals used in the risk characterization are selected. In identifying indicator chemicals the following information is considered:

- Concentrations of detected chemicals
- Detection frequency
- Chemical/physical properties and persistence
- Toxicities

6.1.1 Investigated Media

This section reviews the analytical data for soil and ground water samples collected at the site.

6.1.1.1 Soil

Soil samples were collected from areas on the site as described in Section 5.0. Figure 5.2.3 illustrates the soil sampling locations. Tables 5.1.a, 5.1.b, 5.1.c, and 5.1.d summarize the soil sampling activities and analytical results generated by FPSI's conducted at the site. Table 5.2.3 summarizes the PEA soil boring identification, sampling depths, and general soil classification. Table 5.3.1.c summarizes the soil analytical results generated by the PEA sampling and analyses activities.

The underlying soil profile is contaminated with elevated levels of heavy metals and total petroleum hydrocarbon compounds. The petroleum hydrocarbons are diesel and gasoline fuel compounds.

6.1.1.2 Ground Water

Ground water samples were collected during the FPSI's from one location on the site, and during the PEA sampling and analyses activities from three locations on the site. These locations are illustrated on Figure 5.2.3. Ground water samples collected during the FPSI's were collected from a ground water monitoring well. Samples collected during the PEA sampling and analyses activities were collected using a HydroPunch sampling tool. Table 5.1.d summarizes the ground water analytical results generated by the FPSI's. Table 5.3.1.d summarizes the ground water analytical results generated by the PEA sampling and analyses activities.

Uppermost ground water beneath the site is contaminated with elevated levels of heavy metals and TPH-G and TPH-D.

6.1.2 Selection of Indicator Chemicals

The indicator chemicals that will be used in the BRA are limited to those that were analytically detectable and identifiable by the FPSI and the PEA sampling and analyses activities. These chemicals include heavy metals detected in soil and ground water by the FPSI and the PEA sampling and analyses activities.

The indicator chemical suite does not include petroleum hydrocarbons compounds. Although TPH-G and TPH-D were detected in the FPSI's, and TPH-D in the PEA sampling and analyses activities, the concentrations detected represent only the total mass of diesel and/or gasoline fuel constituents present in the soil and/or ground water samples which were analyzed, and gives no identity as to what type, or types, of constituents were detected. The common gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX) were not detected. As a result, only the heavy metals that were analytically detected in soil and ground water samples will be considered as the indicator chemicals.

An indicator chemical screening process is used which permits a focused study of the heavy metals at the site which pose the greatest potential risk to human health. The heavy metals used for indicator chemicals were selected based on concentrations, frequency, persistence, and toxicity that are most likely to contribute significantly to human health risks calculated for exposure scenarios involving soil and/or ground water. The method for selecting the indicator chemicals for this BRA is presented Risk

Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim Final (RAGS; United States Environmental Protection Agency [USEPA], 1989).

Each heavy metal detected in soil and ground water is first scored according to its high and low concentration and toxicity to obtain a risk factor using:

Rij = (Cij)(Tij)

where:
- Rij risk factor for heavy metal i in medium j;
- Cij Ratio of high to low concentrations of heavy metal i in medium j; and
- Tij toxicity value for heavy metal i in medium j.

The toxicity factors used are oral slope factors for carcinogens, and the inverse of the oral Chronic Reference Dose (RfD) for noncarcinogens. Separate scores are calculated for each medium and are presented in Table 6.1.2.

Heavy metal-specific risk factors are summed to obtain the total risk factor for all heavy metals of potential concern in soil and ground water using:

Rj = R1j + R2j + R3j + . . . + Rij

where:
- Rj = total risk factor for medium j; and
- R1j + . . . + Rij = risk factors for heavy metals 1 through i in medium j.

Separate scores are calculated for each medium and are presented in Table 6.1.2.

The ratio of the risk factor for each heavy metal (Rij) to the total risk factor (Rj) approximates the relative risk for each heavy metal in each medium. These ratios (Rij/Rj) are listed on Table 6.1.2.

6.1.3 Selected Indicator Chemicals

Heavy metals with Rij/Rj ratios greater than 0.05 were selected as the indicator chemicals. These are listed on Table 6.1.3.

Section 6.3 summarizes the toxicological information for each indicator chemical.

6.2 Exposure Assessment

This section identifies the potential human receptors, fate and transport of the indicator chemicals, and exposure pathways associated with the existing land use and physical setting of the site.

6.2.1 Human Receptor Populations

A human receptor population is a person or set of people who can be exposed to the indicator chemicals at the site at a specific exposure point at which human contact with an indicator chemical, or chemicals, can occur.

The primary human receptors at and in the immediate vicinity of the site are:

- Residents in the immediate vicinity of the site.
- Workers at the site.

All of the human receptors are considered sensitive human populations.

6.2.2 Fate and Transport of the Indicator Chemicals in Soil and Ground Water

The indicator chemicals are heavy metals which are considered to be mobile in the underlying soil profile because of the lack of clay or organic matter within the soil profile and geologic material comprising the uppermost aquifer.

6.2.2.1 Soil

A description of the soil profile underlying the site is presented in Section 4.1.4.

The fate and transport of the indicator chemicals in the soil profile underlying the site are governed by several physical and chemical factors including:

- soil moisture
- leaching
- aeration
- mineralogy
- clay content
- organic matter content
- pH
- biological activity and soil chemical composition

These factors influence the fate-controlling processes of precipitation and dissolution of solids, acid-base reactions, complex formations, redox reactions, exchange and adsorption, and mass transfer.

Soil chemical reactions that may possibly shift the equilibrium in favor of the aqueous solution, such as decreased pH and complex or chelate formation or the presence of reducing conditions, greatly increase the mobility of the indicator chemicals. Lack of information of the chemical form of the heavy metals detected in the underlying soil profile, in addition to soil chemistry, makes it difficult to infer their possible fate. However, because of the lack of organic matter in the soil profile underlying the site, and based on the soil conditions described in Section 4.1.4, and those conditions encountered during the FPSI's and PEA sampling and analyses activities, it can be expected that the indicator chemicals are mobile in the soil profile underlying the site.

Surface water runoff at the site occurs only during storm events. Runoff from the site is captured and conveyed by storm drain to the Oakland Inner Harbor. Some off site transport of the indicator chemicals with runoff may occur in the form of sorbed species in suspended sediment.

6.2.2.2 Ground Water

A description of the hydrogeology of the site and contamination of the uppermost aquifer is presented in Sections 4.2.2 and 4.2.3, respectively.

The fate and transport of the indicator chemicals in uppermost ground water underlying the site are governed by several physical and chemical factors including, adsorption-desorption, ion exchange, complexing, pH, ion filtration, gas generation, precipitation-dissolution, biodegradation, and chemical degradation. These factors influence the fate-controlling processes of molecular diffusion and hydrodynamic dispersion (transverse, longitudinal, and vertical).

Chemical reactions that increase the likelihood of transport, such as decreased pH and complex or chelate formation or the presence of reducing conditions, greatly increase the mobility of the indicator chemicals in aqueous environments. Lack of information of the chemical form of the indicator chemicals detected in the uppermost ground water samples, in addition to ground water chemistry, makes it difficult to infer their possible fate. However, because the indicator chemicals were detected in ground water samples collected from uppermost ground water beneath the site, the lack of organic matter in the aquifer material, the soil conditions described in Section 4.1.4, and those conditions encountered during the FPSI's and PEA sampling and analyses activities, it can be expected that the indicator chemicals are mobile in the uppermost ground water underlying the site with the potential for off site migration.

6.2.3 Potential Exposure Pathways

Soil and ground water may serve as transport media for the indicator chemicals to migrate from the site to human receptors. The potential exposure pathways are identified on the basis of information on the indicator chemicals and their environmental fate.

Potential exposure routes include inhalation, ingestion, and dermal adsorption. Generally, exposure to the indicator chemicals could occur through one or more of the following potential pathways:

- Soil
- Inhalation of soil particles
- Ingestion of soil
- Dermal adsorption resulting from skin contact with soil laden with the indicator chemicals.
- Ground Water
- Ingestion of ground water
- Dermal adsorption of water containing the indicator chemicals during household use (bathing. showering)
- Surface Water
- Ingestion of surface water
- Dermal adsorption of water containing the indicator chemicals during household use (bathing. showering)

Additionally, ingestion of contaminated fish and game or ingestion of plants irrigated with contaminated surface or ground water may be potential exposure pathways.

Not all of these pathways are important at the site. The relative importance of each is discussed below, and are based on information presented in the PEA, site conditions, and fate and transport information on the indicator chemicals..

6.2.3.1 Soil

Potential exposure to soil laden with the indicator chemicals at the site may occur by three possible routes: inhalation of particulates, ingestion of soil, or dermal contact with soil.

6.2.3.1.1 Inhalation

Winds and vehicular traffic can suspend particulates in the air which may subsequently be inhaled. However, vehicular activity takes place around the periphery of the site on asphalt paved roads, and no vehicular traffic currently takes place at or inside the warehouse on the site. In addition, the warehouse structure restricts wind movement and therefore restricts wind erosion of the earthen floor of the warehouse and subsequent particulate suspension.

No surficial soil (top 0.5 foot) sampling was performed. Sampling of shallow soils (approximately 2 feet depth) indicates the presence of the indicator chemicals. However, no air sampling has been conducted at the site.

Because of the physical setting of the site, and the lack of air sampling and analyses data, this exposure pathway is not considered in this BRA.

6.2.3.1.2 Ingestion of Soil

Direct and incidental ingestion of soil laden with the indicator chemicals by adult workers is considered a potential pathway of exposure at the site, as limited work-related activities do take place at the site. Residents who live in the immediate vicinity of the site, particularly children, are also susceptible. Children are expected to ingest more soil than adults, because they are more susceptible to the abnormal craving to ingest substances not fit for food (i.e. soil). This is particularly of concern for children 1 to 6 years old.

Access to the site is restricted to the various businesses that operate within the structure on the site. Because access to the site is restricted incidental soil ingestion by children is not considered in this BRA.

6.2.3.1.3 Dermal Contact with Soil

The indicator chemicals are present in the surface soil at the site. The warehouse on the site has an earthen floor. Work takes place inside the warehouse. Therefore, direct skin contact is considered. The extent of dermal exposure is determined in part by the nature and concentrations of the indicator chemicals, the duration of the exposure, the surface area of the body in direct contact with the soil, and the presence of abrasions on the skin. Such abrasions provide easy access to the indicator chemicals that may be adsorbed into the bloodstream and circulated to target organs in the body. Because limited work-related activities take place at the site, dermal contact with soil is considered in this BRA.

6.2.3.2 Ground Water

As described in Section 4.2.4, Ground water in the vicinity and region of the site is not used for drinking water purposes or for municipal water supply (i.e. firefighting, industrial/manufacturing uses, etc.).

Water for drinking and municipal supply is drawn from surface water supplies stored in reservoirs located east of the region which capture precipitation and snowmelt runoff derived from the Sierra Nevada foothills and mountains.

For this reason, exposure to the uppermost ground water containing the indicator chemicals underlying the site is not considered an exposure pathway in this BRA.

6.2.3.3 Surface Water

Surface water runoff from the site is limited to storm events. Runoff is captured and conveyed by storm drain to Oakland Middle Harbor where it discharges into San Francisco Bay.

Potential exposure to chemicals in surface water may occur both directly or indirectly. Direct pathways include incidental ingestion, inhalation, and dermal absorption, which could occur during public participation in recreational activities (i.e. swimming, boating, playing). Indirect pathways include consumption of fish, animals, or plants that have been exposed to surface water containing chemicals.

Surface water at the site was not sampled. In addition, runoff from the site would commingle with runoff generated from other locales in the immediate vicinity and region as it travels down the storm drain system to the outlet at Oakland Middle Harbor. This action would result in diluting soluble indicator chemicals in the runoff, or adsorbed to sediment included with the runoff, to concentrations that would not likely represent a threat to human health. For these reasons, exposure pathways related to surface water are not considered in this BRA.

6.2.3.4 Summary of Exposures

Two exposure pathways require further evaluation. these are:

- Direct and incidental soil ingestion
- Dermal contact with soil

Exposure pathways specific to the site are identified and discussed in the following sections.

6.2.3.4.1 Direct and Incidental Ingestion of Soil

Ingestion of contaminated soil is a route of exposure. Adults are far less likely to be exposed from direct ingestion of contaminated soil than children. However, workers at the site may ingest soil incidentally. Standard soil ingestion rates for adults have been established by the USEPA (Human Health Evaluation Manual, Supplemental

Guidance: "Standard Default Exposure Factors" [SDEF]. Memorandum, OSWER Directive 9285.6-03, March 25, 1991.). These values serve as the basis for quantifying ingestion exposures. Concentrations of the indicator chemicals detected at 0 to 3 FBGS were used to estimate adverse health effects from exposure through this pathway.

6.2.3.4.2 Dermal Contact

Direct dermal contact with soil laden with the indicator chemicals may occur at the site.

Dermal exposure may result in uptake through the skin membranes. The skin is the largest organ of the body, and therefore, more surface area is available for uptake. Uptake through the skin allows the indicator chemicals to cross directly into the circulatory system, where they travel to the target organ(s) to exert their effects. Large open sores or abrasions on the skin allow uptake more readily.

Standard soil dermal exposure rates for adults have been established by the USEPA in RAGS. These values serve as the basis for quantifying the dermal exposures. Concentrations of the indicator chemicals detected at 0 to 3 FBGS were used to estimate adverse health effects from exposure through this pathway.

6.3 Toxicity Assessment

The toxicological properties of each indicator chemical are summarized below (MERCK, Eleventh Edition, 1989).

6.3.1 Arsenic

Most forms of arsenic are toxic. Acute symptoms following ingestion relate to irritation of the gastrointestinal tract. These include nausea, vomiting, and diarrhea. All of these can progress to shock and death. Chronic poisoning can result in exfoliation and pigmentation of skin, herpes, polyneuritis, altered hematopoieses, and degeneration of liver and kidneys.

Arsenic is a known carcinogen.

6.3.2 Antimony

Antimony and its compounds have been reported to cause dermatitis, keratitis, conjunctivitis, and nasal septal ulceration by contact, fumes, or dust. Hydrogen will react with antimony to form stibine (SbH_3) which is extremely toxic (nausea, vomiting, headache, hemolysis, hematuria, abdominal pain, death). Stibine can be liberated from storage batteries when hydrogen is present, in an acid medium, with antimony present in the battery plates.

6.3.3 Chromium

Irritant effects on the skin and respiratory passages lead to ulceration. Oral ingestion may lead to severe irritation of the gastrointestinal tract, circulatory shock, and renal damage.

6.3.4 Lead

Lead poisoning is most common in young children. Acute symptoms include anorexia, vomiting, malaise, convulsions due to increased intracranial pressure. May leave permanent brain damage. Chronic symptoms show weight loss, weakness, and anemia. A blood lead content of > 0.05% and of urine > 0.08 milligrams/liter support a diagnosis of lead poisoning.

6.3.5 Thallium

Symptoms of acute toxicity include nausea, vomiting, diarrhea, tingling, pain in extremities, weakness, coma, convulsions, death. Chronic symptoms include weakness and pain in the extremities (polyneuritis) and loss of hair.

Human systemic effects by ingestion. Nerve or sheath structural changes. Extra-ocular muscle changes.

6.4 Exposure Analysis

This section presents a discussion of the rationale used in selecting the receptor human populations to evaluate potential public health risks and a discussion of the intake assumptions for each exposure route.

6.4.1 Receptor Populations

This section quantifies potential health risks to on-site workers and residents living in the vicinity of the site.

6.4.1.1 On-Site Workers

Analytical results show that the indicator chemicals are present between 0 and 3 FBGS, from which it may be inferred that workers on-site can be exposed to soil laden with the indicator chemicals. On-site workers ranging in age from 20 to 65 may incidentally ingest soil in the course of normal hand-to-mouth activities, and may come into direct contact with soil. Worker exposure times are limited to those times when they are working on the site.

6.4.2 Routes of Exposure

This section evaluates the routes of exposure to soil laden with the indicator chemicals via ingestion and dermal contact. For both pathways, indicator chemicals in soil between 0 and 3 FBGS are considered because soil disturbance at the site is unlikely to exceed 3 feet under current land use and existing site activities.

To evaluate potential exposures a typical exposure using maximum concentrations of the indicator chemicals detected in the soil between 0 and 3 FBGS was used. This scenario was evaluated for adult worker on-site.

The exposure scenario was used to estimate the potential adverse health effects to the receptor populations. The following sections discuss the assumptions used to estimate these potential health effects.

6.4.2.1 Ingestion

The rate of soil ingestion is based on the quantity of soil a given population might ingest in a given day. Typical estimates of soil ingestion rates range from 100 to 200 milligrams per day, depending on age (SDEF). Soil ingestion exposures to receptor populations were calculated on the basis of these rates. The assumptions used in the ingestion exposure scenarios are summarized below.

6.4.2.1.1 Typical Exposure

For a typical exposure the maximum concentrations of the indicator chemicals from soil samples collected from 0 to 3 FBGS were used to estimate exposures resulting from ingestion of soil at the site.

6.4.2.1.2 Ingestion Exposure Equation

Using these assumptions, potential ingestion routes were calculated using the following equation (RAGS):

$$I = \frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where:

I	Intake (mg/kg day^{-1})
CS	Indicator chemical concentration in soil (mg/kg)
IR	Ingestion Rate (mg soil/day)
CF	Conversion Factor (10^{-6} kg/mg)
FI	Fraction Ingested from Contaminated Source (unitless)
EF	Exposure Frequency (days/years)

ED Exposure Duration (years)
BW Body Weight (kg)
AT Average Time (period over which exposure is averaged -- days)

The standard default values are:

IR 50 mg (adult worker) [SDEF]
FI 1 [SDEF]
EF 250 days/year (adult worker) [SDEF]
ED 25 years (adult worker) [SDEF]
BW 70 kg (adult worker) [SDEF]
AT ED x 365 days/year [SDEF]
9,125 days (adult worker)

The results of these calculations are presented in Section 6.5 (Risk Characterization).

6.4.2.2 Dermal Contact

For the indicator chemicals sorption to soil particles is an important environmental fate mechanism. Therefore, exposure via direct skin contact with soil laden with the indicator chemicals was estimated.

The dermal exposure scenario assumes that on-site workers may come into direct contact with soil laden with the indicator chemicals. It is assumed that workers would be wearing long-sleeved coveralls, thus exposing only their hands.

6.4.2.2.1 Typical Exposure

For a typical exposure the maximum concentrations of the indicator chemicals from soil samples collected from 0 to 3 FBGS were used to estimate exposures resulting from dermal contact with soil at the site.

6.4.2.2.2 Dermal Contact Exposure Equation

Using these assumptions, potential dermal exposure routes were calculated using the following equation (RAGS):

$$AD = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

where: AD Adsorbed dose (mg/kg-day)
CS Indicator chemical concentration in soil (mg/kg)
CF Conversion Factor (10^{-6} kg/mg)

SA	Skin surface area available for contact (cm^2/event)
AF	Soil to skin adherence factor (mg/cm^2)
ABS	Absorption factor (unitless)
EF	Exposure Frequency (events/year)
ED	Exposure Duration (years)
BW	Body Weight (kg)
AT	Average Time (period over which exposure is averaged -- days)

The standard default values are:

SA	820 (adult worker) [RAGS]
AF	1.45 mg/cm^2 (RAGS)
ABS	1% (RAGS)
EF	208 events/year (RAGS)
ED	25 years (adult worker) [SDEF]
BW	70 kg (adult worker) [SDEF]
AT	ED x 365 days/year (RAGS) 9,125 days (adult worker)

The results of these calculations are presented in Section 6.5 (Risk Characterization).

6.4.3 Summary

The methodologies suggested by USEPA (RAGS and SDEF) were used to estimate potential noncarcinogenic health risks and carcinogenic risks. Potential soil ingestion and dermal risks were quantified for adult workers. Potential exposures to the indicator chemicals via ingestion and dermal absorption were estimated. Maximum concentrations of the indicator chemicals detected in the soil profile underlying the site from 0 to 3 FBGS were used.

6.5 Risk Characterization

This section discusses the methodologies used to evaluate potential adverse noncarcinogenic health effects and carcinogenic risks to the receptor populations that may results from ingestion and dermal contact pathways.

Noncarcinogenic risk is evaluated by comparing the daily dose to the USEPA established Chronic Reference Dose (RfD) for chronic exposure to noncarcinogenic chemicals.

To evaluate carcinogenic effects, the daily dose is multiplied by a USEPA established slope factor, formerly called the carcinogenic potency factor. The estimated carcinogenic risk is compared to the acceptable risk range from 10^{-4} to 10^{-7}

established by the USEPA (RAGS). These ranges translate to one excess cancer in 10,000 exposed individuals to one in 10,000,000 individuals, respectively. A 10^{-6} (or one in 1,000,000) risk is the level most often used by USEPA as the guideline for acceptable risk to protect public health and will be used in this BRA. An estimate of 10^{-6} means that over a lifetime of exposure to a carcinogen (70 years), a person experiences a maximum increased chance of one-in-a-million that he or she will develop cancer from exposure to that carcinogen.

6.5.1 Noncarcinogenic Health Effects

Noncarcinogenic health effects resulting from exposure to a single indicator chemical were evaluated through the calculation of a Chronic Hazard Quotient (CHQ). The indicator chemicals were collectively evaluated through the calculation of a Chronic Hazard Index (CHI). Both are described in RAGS. The CHQ is calculated from a ratio of estimated chemical intake to an established RfD for each indicator chemical (representing an "acceptable dose"). An RfD is a USEPA established value that represents the concentration of indicator chemical that a receptor may be exposed for 70 years without experiencing adverse health effects.

The estimated chemical intake specific to each exposure scenario is referred to as the Intake (for ingestion) or the Absorbed Dose (for dermal contact). For the purposes of this discussion, both of these values will be collectively referred to as the Chronic Daily Intake (CDI). Both CDI's were calculated using equations presented in Section 6.4.2. The CDI's represent an estimated "dose" of a chemical through ingestion or dermal pathway to receptor populations. The CDI is then divided by the respective RfD to derive the respective CHQ. The sum of the CHQ's represents the CHI.

Where the CHI exceeds unity (1.0) there may be concern for potential health risks. The results of the calculations for CHQIs and CHIs are presented in Tables 6.5.1.a and 6.5.1.b for ingestion and dermal exposure, respectively.

RfDs for oral routes were used to calculate CHQs for both exposure routes (ingestion and dermal). This is a conservative approach.

6.5.1.1 Exposure from Ingestion

The calculated CHIs for the ingestion pathway are presented in Table 6.5.1.a. Because the CIH value is less than unity (1.0), chronic exposure through the ingestion pathway does not appear to pose a noncarcinogenic health risk to adult workers on the site.

6.5.1.2 Exposure from Dermal Contact

The calculated CHIs for the dermal pathway are presented in Table 6.5.1.b. Because the CIH value is less than unity (1.0), chronic exposure through the dermal absorption pathway does not appear to pose a noncarcinogenic health risk to adult workers on the site.

6.5.2 Carcinogenic Health Risks

The carcinogenic health risks for arsenic, the single potential carcinogen at the site (LIST), are calculated as follows:

Carcinogenic Risk (CR) = CDI x Slope Factor (SF)

As discussed previously, the CDI of a chemical is based on its concentration at the exposure point, the duration of the exposure, and standard intake assumptions. Also, the CDI is a chemical-specific value for each particular exposure route. The CR values for arsenic for the exposure pathways are presented in Table 6.5.2.a for the ingestion pathway, and Table 6.5.2.b for the dermal pathway.

The Slope Factor (SF) is a value established by the USEPA. This value was formerly referred to as the Cancer Potency Factor (CPF) by the USEPA. This value represents the relative carcinogenic "potency" of the chemical and is generally based on laboratory animal or epidemiological studies.

SFs for ingestion were used to calculate CRs for both exposure routes (ingestion and dermal). This is a conservative approach.

6.5.2.1 Exposure from Ingestion

The calculated CR for the ingestion pathway is presented in Table 6.5.2.a. The CR is greater than 1.0×10^{-6} (one-in-a-million). Therefore, there does appear to be an excess carcinogenic risk with exposure to arsenic via the ingestion pathway to adult workers on the site.

6.5.2.2 Exposure from Dermal Contact

The calculated CR for the dermal pathway is presented in Table 6.5.2.b. The CR is greater than 1.0×10^{-6} (one-in-a-million). Therefore, there does appear to be an excess carcinogenic risk with exposure to arsenic via the dermal absorption pathway to adult workers on the site.

6.5.3 Exposure Summary

In summary, detailed calculations using data generated from PEA sampling and analyses activities and FPSI's conducted at the site indicate that adverse noncarcinogenic health effects to workers on the site do not appear to exist from exposure to indicator chemicals via the ingestion and dermal absorption routes.

However, excess carcinogenic health effect risks appear to exist due to exposure via ingestion and dermal absorption routes.

6.6 Sources of Uncertainty

There are three broad areas where uncertainties may be found in the BRA process:

- Generation of chemical-specific human risk values by Federal agencies through animal tests and/or epidemiological studies.
- Collection of site-specific data.
- Merging chemical-specific risk estimates with site-specific data

For each area, a number of factors may increase or decrease the confidence in the accuracy of the BRA. These factors, as they may apply to this BRA, are as follows.

6.6.1 Animal Tests and/or Epidemiological Studies

- Choice of species, strain, age, and sex of animals
- The number of animals or persons in the study
- Similarity in the routes of exposure between tested species and route of interest in humans
- Purity of test compound
- Decay of test compound and vehicle contribution
- Selection of dose levels and use of control groups
- Distribution of animals among doses
- Similarity between test animals and humans in metabolism and pharmacokinetics
- Statistical noise; statistical methods used to analyze data
- Proper histopathological examination of animals
- Proper animal husbandry and dietary considerations
- Experimental surroundings

- Consideration of concurrent exposures in epidemiological studies

- Exposure measurements concurrent to the period being evaluated in epidemiological studies

- Selection of proper endpoint in animal or epidemiological studies

- Synergism/antagonism

- Animal to human extrapolism: high dose to low dose, choice of dose/response model, confidence intervals

- Use of most sensitive, inbred animals versus average, heterogeneous animals.

6.6.2 Collection of Site Data

- Rationale for sample locations

- Sample collection methods and QA/QC procedures

- Analytical methods, detection limits, and QA/QC procedures

- Accurate characterization of area geology and hydrogeology

- Representativeness and completeness of data

- Adequacy of data to describe site conditions

- Characterization of exposed or potentially exposed populations

6.6.3 Development of Site-Specific BRA

- Errors associated with numerical approximation methods

- Laboratory analyses errors

- Estimations of receptor population characterizations

- Interpretation of laboratory data

6.6.4 Strengths

Uncertainties in this BRA have been reduced because appropriate QA/QC methodologies were used in all field and laboratory activities, and all laboratory data have been validated. The techniques used in preparing this BRA are based upon

USEPA guidance, the current understanding of mechanisms of human exposure, and the toxicological properties of the chemicals identified through site sampling activities. Additionally, conservative assumptions regarding the toxicity of the indicator chemicals have also been used for all calculations. Therefore, any uncertainties in this area will tend to err, if at all, on the conservative side.

6.7 BRA Summary and Conclusions

This BRA was prepared to evaluate the potential adverse impacts to human health for chemicals detected at the site. Soil and ground water data and intake assumptions were used to estimate potential noncarcinogenic and carcinogenic health risks via the ingestion and dermal exposure pathways to identified receptor populations. The following discussion presents the conclusions of this BRA.

On the basis of available data, the indicator chemicals are:

- antimony, arsenic, lead, and thallium

The following receptor populations were defined:

- Adult workers on the site

The methodologies suggested by the USEPA (RAGS and SDEF) were used to estimate the potential noncarcinogenic and carcinogenic health risks of the indicator chemicals to these receptor populations. Ingestion and dermal intakes were estimated and compared to noncarcinogenic indicators of safe chronic daily intakes for each receptor population. For excess carcinogenic risks from exposures to potential carcinogens, slope factors established by the USEPA and average daily doses for each of the populations were used to estimate individual excess lifetime cancer risk.

Based on the results of this BRA, the following conclusions are made:

- Adverse noncarcinogenic health effects do not appear to exist from potential exposure to the indicator chemicals via the soil ingestion and dermal absorption pathway.

- Excess carcinogenic risks exist from potential exposure to arsenic via the ingestion and dermal absorption pathway.

7.0 PEA CONCLUSIONS AND RECOMMENDATIONS

7.1 Release or Threat of a Release at the Site

Current and past practices of handling and/or storing hazardous substances or waste on the site has resulted in the release of heavy metals and petroleum hydrocarbons to the soil profile and uppermost ground water underlying the site.

7.2 Threat to Public Health and the Environment

The BRA indicates that no adverse noncarcinogenic health effects exist from potential exposure via ingestion and dermal absorption to the heavy metals within the soil profile between 0 and 3 FBGS.

However, the BRA does indicate that excess carcinogenic risks exist from potential exposure via ingestion and dermal absorption to arsenic within the soil profile between 0 and 3 FBGS.

Ground water in the vicinity and region of the site is not used for drinking water purposes or for municipal water supply (i.e. firefighting, industrial/manufacturing uses, etc.).

No evidence of environmental impact from releases at the site are evident based on inspection of the site during the conduct of the PEA sampling and analyses program. However, additional investigation is needed to determine if contamination exists in the interior of the warehouse.

There are no flora, fauna, or sensitive ecosystems in the vicinity of the site known to be affected by contaminants that have or can potentially be released from or attributable to the site.

7.3 Need for Emergency Removal Action

Based on the results of the PEA and BRA, there is no need to conduct an emergency removal action of soil between 0 and 3 FBGS. Although cancer risk from ingestion and dermal absorption of arsenic-laden soil was shown to exist in the BRA, the exposure point would be the earthen floor at the base of the warehouse structure on the site. Access to the warehouse and the earthen floor is restricted only to employees of businesses that operate inside the structure.

The contaminated soil can be removed as part of demolishing the structure.

7.4 Additional Information

Additional information needed includes:

- Conduct a soil remedial investigation to determine the areal extent of heavy metals and petroleum hydrocarbons in the underlying soil profile from 0 to 3 FBGS, particularly those areas inside the structure where the earthen floor is exposed.

- Concomitant with the soil remedial investigation, conduct a ground water remedial investigation to determine the hydraulic characteristics of the uppermost aquifer, and determine the areal extent of heavy metals and petroleum hydrocarbons in uppermost ground water.

The structure on the site should be cleared to allow remedial investigation work to proceed inside the structure unimpeded.

8.0 RECOMMENDATIONS

It is recommended that the remedial investigations described be in Section 7.4 be implemented.

9.0 REMEDIAL ACTION OPTIONS REPORT

This report is based upon the findings of the PEA and previous FPSI's conducted at the site.

9.0.1 Underground Storage Tank Removal

Two underground storage tanks are present on the site. This is detailed in Section 2.3.2. For any remediation scheme, both tanks must be removed in accordance with ACDEH and State of California Water Resources Control Board requirements, and Title 22 California Code of Regulations. Remediation in the event the tanks have leaked must be conducted in accordance with the State of California Water Resources Control Board's Leaking Underground Fuel Tank Manual (LUFT), and the requirements of the State of California Regional Water Quality Control Board - San Francisco Region. Very limited information (Sanborn Insurance Map over 100 years old) is available on the 13,000-gallon oil tank used by the Dunn Cracker Company. Its fate is unknown. If located, the tank will have to be excavated.

9.1 Technical Objectives

The remedial action options proposed for this site are:

- Remove contaminated soil from the site
- Recover contaminated ground water from the site

9.2 Soil Remediation

9.2.1 No Further Action

The no further action scheme is not a viable alternative. This is because the BRA demonstrates that adverse noncarcinogenic health effects or excess cancer risks may exist from potential exposure via ingestion and dermal absorption to the heavy metals within the soil profile between 0 and 3 FBGS.

9.2.2 Ex-Situ Techniques

9.2.2.1 Removal and Disposal

The lateral extent of heavy metals and petroleum hydrocarbons in the soil profile underlying the site from 0 to 3 FBGS has not been determined. Further, the types of petroleum hydrocarbons detected by the PEA sampling and analyses activities and the FPSI's need to be determined to effect disposal and/or treatment. Based on the limited analytical data it appears that disposal in a Class III landfill is appropriate.

This technique involves removing the contaminated soil by excavation followed by disposal of the excavated soil at an off-site landfill facility. This technique offers a permanent solution with respect to remediating the contaminated soil profile and preventing environmental exposures. However, this technique merely moves the contaminated soil from one location to another without any treatment to reduce the toxicity or volume of the material. As a result, the liability of the soils still remains with Caltrans.

9.2.2.2 Removal and Treatment

This technique also involves removal of the contaminated soil by excavation, but the excavated soil is either treated on-site or off-site. The treatment techniques that are currently available include biodegradation, incineration (petroleum hydrocarbons), and chemical fixation (heavy metals).

All three treatment techniques would require open space on the site to treat the excavated soil. Typically, treatment by any technique requires a period of at least 6 months to a year or more to complete, considering the contaminant involved, the volumes of soil to be treated, and regulatory permitting requirements.

All three treatment techniques offer a permanent solution with respect to remediating the contaminated soil profile and preventing environmental exposures. In addition, these techniques eliminate continuing liability because the contaminants are irreversibly remedied by these techniques.

9.2.2.3 Biodegradation

Biodegradation is used exclusively to treat organic compounds, and basically involves uniformly spreading the organic contaminated soil, followed by the addition of nutrients on a regular basis to provide a favorable environment to enhance the proliferation of indigenous bacteria and micro-organisms in the soil being treated, which reduce the concentrations of the organic compound(s) within the spread soil pile metabolically. The treatment process is either further enhanced or initiated by the addition of contaminant-specific, genetically engineered micro-organisms to the spread soil pile. The spread soil pile is turned on a regular basis to allow reduction of the organic compounds in the soil through metabolic action. The effectiveness of the technique depends on the type of organic contaminants involved, the type of soil being treated, the type of indigenous, or introduced, bacteria or micro-organisms available, the volume of soil being treated, and the remediation goal. Biodegradation, generally, is more effective during the summer months when ambient air temperatures are high, thereby enhancing the growth and proliferation of bacteria and micro-organisms indigenous, or introduced to, the treated soil profile. Samples of the treated soil are collected on a regular basis to monitor the biodegradation environment, and the effectiveness of the technique.

9.2.2.4 Incineration

Incineration is used exclusively to destroy organic compounds. The process basically involves volatilizing the organic compounds using a high temperature thermal dryer, followed by destruction of the volatilized organics in an incinerator. The process proceeds until all fugitive volatilized organic material has been destroyed. The effectiveness of the technique depends on the organic contaminants to be incinerated, the type of soil being treated, the volume of soil being treated, the type of thermal drying/incineration equipment used, and the remediation goal.

9.2.2.5 Immobilization

Chemical fixation is used exclusively to treat heavy metals. Basically the process involves uniformly spreading the heavy metal-laden soil, followed by the addition of either a liquid or solid acid or base to precipitate the heavy metals as hydroxides, sulfides, carbonates, or other insoluble salts. Hydroxide precipitation with lime is most common. However, sodium sulfate is sometimes used to achieve lower heavy metal concentrations.

Limitations include that not all heavy metals have a common pH at which they precipitate. Chelating and complexing agents can interfere with the process. Organic compounds are not removed except through adsorptive carryover. The resulting mass may be hazardous by definition but often may be delisted The effectiveness of the technique depends on the type of heavy metals involved, the type of soil being treated, the type of liquid or soiled acid or base compounds available, the volume of soil being treated, and the remediation goal. Samples of the treated soil are collected on a regular basis to monitor the effectiveness of the technique.

9.2.2.6 Implementability

Implementability of excavation and disposal off-site is dependent upon the types of petroleum hydrocarbons and concentrations of heavy metals present in the soil profile underlying the site. Off-site disposal would be severely limited if restricted petroleum hydrocarbons, such as polychlorinated biphenyls (PCBs), are present in the soil, or if heavy metal concentrations exceed their respective STLC's. All of the ex-situ treatment techniques are feasible remediation options. Biodegradation is a feasible alternative but is lengthy in scope.

9.2.3 In-Situ Techniques

These techniques involve treating the contaminated soil in place to physically, biologically, or chemically transform, reduce or remove, the contaminants in the soil. There are three common in-place treatment technologies that are currently available:

- Degradation
- Extraction
- Immobilization

Immobilization is principally applied to soil profiles contaminated with inorganic compounds. Typically, in-situ remediation requires a period of at least 6 months to a year or more to complete, considering the contaminants involved, the type of soils being remediated, the volumes of soil to be treated, regulatory permitting requirements, and the remediation goal.

9.2.3.1 Degradation

This technique is applicable to inorganic or organic compounds and essentially converts the contaminants in the soil into innocuous or less toxic compounds. There are two principal degradation techniques:

- Chemical
- Biological

9.2.3.1.1 Chemical Degradation

Chemical degradation techniques convert contaminants by promoting the natural capacity of the soil to support oxidation or reduction reactions or by adding suitable reagents to the contaminated soil profile through injection well systems. The effectiveness of chemical degradation depends on the types of contaminants in the soil profile, the type of soils comprising the contaminated soil profile, the volume of contaminated soil, the chemistry of the soil profile excluding the contaminants, the geotechnical and hydraulic properties of the affected soil, the ability to sustain a favorable chemical environment to allow degradation to proceed, and the remediation goal. Samples of the treated soil profile are collected on a regular basis to monitor the effectiveness of the treatment, and the treatment environment. Chemical degradation is generally utilized to remediate soils contaminated with inorganic compounds. The petroleum industry has demonstrated in the laboratory that organic compounds can also be chemically degraded in-situ.

9.2.3.1.2 Biological Degradation

Biological degradation techniques utilize the action of indigenous bacteria and/or micro-organisms to metabolize the contaminants into innocuous or less toxic compounds. In-situ biological degradation is utilized principally to remediate soil profiles contaminated with organic compounds. The technique involves enhancing the population growth of bacteria and/or micro-organisms in the contaminated soil profile through the introduction of nutrients into (including oxygen) the soil profile using injection well systems. The technique can be enhanced by introducing specific micro-organisms genetically engineered to metabolize the contaminants into the contaminated soil profile. Samples of the treated soil profile are collected on a regular basis to monitor the effectiveness of the in-situ biological technique and the treatment environment. The effectiveness of the technique depends on the types of contaminants in the soil profile, the type of soils comprising the contaminated soil profile, the volume of affected soils, the geotechnical and hydraulic properties of the contaminated soil profile, the ability to sustain a favorable environment in-situ to allow the bacteria/micro-organisms to flourish, and the remediation goal.

9.2.3.2 Extraction

This technique mobilizes the contaminants in the soil profile so that they can be removed by physical means. The removed constituents are then treated on the surface. Extraction techniques are principally applied to soil profiles that are contaminated with organic compounds exhibiting low to moderate boiling points and high to moderate vapor pressures. There are two principal extraction techniques:

- Heat or steam
- Vacuum

9.2.3.2.1 Heat or Steam Extraction

Heat or steam extraction involves injecting heated air or superheated steam into the contaminated soil profile to vaporize and/or mobilize the contaminants. The mobilized/volatilized contaminants are then either allowed to migrate vertically to ground water where the mobilized contaminants are recovered by ground-water extraction/treatment systems, or the volatilized contaminants are recovered from the soil profile by vacuum extraction/treatment systems. The effectiveness of heat or steam extraction depends on the types of contaminants in the soil profile, the chemical/physical characteristics of the contaminants, the type of soil comprising the contaminated soil profile, the hydraulic characteristics of the contaminated soil profile, the volume of soil to be treated, the efficiency of the injection/extraction system(s), and the remediation goal. Both techniques are monitored for effectiveness and control purposes through the use of monitoring wells completed within the treated soil profile. Samples of the contaminated soil profile are collected on a regular basis to determine decreases in contaminant concentrations in the soil profile being treated by this technique. More commonly, however, the effluent from the extraction system, prior to treatment at the surface, is sampled to determine the decrease in contaminant concentrations in the effluent, which is directly related to the amount of contaminant removed from the treated soil profile. Effectiveness and/or control can be adjusted through an increase or decrease of heat or superheated steam.

9.2.3.2.2 Vacuum Extraction

Vacuum extraction consists of applying a vacuum to the contaminated soil profile to draw off the contaminants for treatment at the surface. The technique is most applicable to organic compounds exhibiting low boiling points and high vapor pressures. The basic principle is that liquid organic compounds will vaporize to a state of equilibrium in the air spaces that surround soil particles, at ambient soil temperatures. If the air is not continuously replenished, the liquid organic compounds adsorbed on the soil particles will remain trapped on the surface of the soil particles until leached by percolating water, or removed by natural diffusion. Both of these natural processes are very slow, and may take many years to remove the organic compounds from the affected soil profile. Soil ventilation draws air between soil particles and thus accelerates the rate of vaporization of the adsorbed organic compounds. The contaminated air is then vented to a treatment system (capture media).

To achieve air flow through the contaminated soil profile, a vacuum is created through a network of well points distributed throughout the volume of contaminated soil. The well point network is connected to a control manifold, which in turn is connected to a fan or blower. The vacuum created by the fan or blower causes air to flow through the volume of contaminated soil, from the high pressure in the contaminated soil to the low pressure at the well point. The flow of air created due to the pressure differential (high to low pressure) causes the liquid organic compounds adsorbed on the soil particles to vaporize. Maintaining the flow of air and the pressure differential continually vaporizes the liquid organic compounds retained on the soil particles. Vaporization continues until all of the liquid organic compounds have been removed from the soil particles. The net effect is a decrease in the concentration of organic compounds within the soil profile.

The amount of vaporized organic compounds that can be vented is directly proportional to the volume of air moving through the zone of contaminated soil and the vacuum head created by the fan or blower. This in turn affects the pressure differential, resulting in increasing the vaporization rate. Enhanced recovery of organic compounds can be realized by increasing the temperature of the contaminated soil profile.

The effectiveness of vacuum extraction depends on the types of contaminants in the soil profile, the physical characteristics of the contaminants, the type of soil comprising the affected soil profile, the permeability of the soil profile, the volume of soil to be treated, the efficiency of the extraction system to maintain a constant air flow and vacuum head, and the remediation goal. The influence of the system on the volume of contaminated soil is determined by measuring the negative head (vacuum) at various distances from a well point. The mass removal rate of the system is determined by correlating the organic compound vapor concentrations measured at each well point, or at the discharge point at the fan or blower, and air flow rates generated by the fan or blower, to mass removal of liquid organic compounds in pounds per day from the volume of contaminated soil.

9.2.3.2.3 Immobilization

This process is basically the same as ex-stu chemical fixation, except that liquid acid or base solutions are injected into the soil profile to precipitate heavy metals.

9.2.3.3 Implementability

The advantage of in-situ techniques is that the remediation takes place within the contaminated soil profile. No removal of the soil profile (excavation) is required. Site closure to conduct in-situ treatment is not required. All of these techniques offer a permanent solution for remediating the contaminated soil profile. In addition, these techniques have the potential for eliminating continuing liability because the contaminants are irreversibly remedied by these techniques.

The disadvantages of in-situ techniques include the high probability that migration of contaminants outside the treatment zone may occur despite properly coordinated injection/extraction controls, thereby increasing the risk of environmental exposures, and the off-site disposal/treatment of capture media which, in all probability, would be regulatory restricted. Chemical reactions generated by these treatment methods may produce organic, or inorganic, compounds that are more toxic/hazardous than the contaminant(s) being targeted. In addition, some of the petroleum hydrocarbons may exhibit high boiling points and low vapor pressures, which would render heat and/or steam extraction techniques marginally suitable, and vapor extraction techniques unsuitable.

9.2.4 Capping

This technique essentially involves the placement of a cap over the contaminated soil profile. The objective is to prevent precipitation from sustaining any lateral and/or vertical migration of contaminants within, or from, the impacted soil profile, and to prevent environmental exposures from occurring. Capping is also considered an interim remedial measure in anticipation of the development, or refinement, of a more technologically and less regulatory restricted remediation.

9.3 Ground Water Remediation

9.3.1 No Further Action

The no further action scheme is not a viable alternative because the concentrations of heavy metals in uppermost ground water exceed Cal-EPA Maximum Contaminant Levels (MCLs). Although uppermost ground water beneath the site is not used for drinking water purposes, there is the potential that it may be used as such in the future. At that time it may be demonstrated that adverse noncarcinogenic health effects or excess cancer risks exist from potential exposure via ingestion and dermal absorption to the heavy metals and petroleum hydrocarbons in uppermost ground water beneath the site.

9.3.2 Extraction and Treatment

Prior to implementing this option it will be necessary to determine the geohydrology of the uppermost aquifer, and the lateral extent of heavy metals and petroleum hydrocarbons in uppermost ground water beneath the site. Further, the types of petroleum hydrocarbons detected by the PEA sampling and analyses activities need to be identified to determine treatment options.

Therefore, it will be necessary to conduct a ground water remedial investigation to determine the geohydrology of the uppermost aquifer beneath the site, and the areal extent of heavy metals and types of petroleum hydrocarbons in uppermost ground water prior to considering this option.

This option is lengthy in scope. However, the option can be built and operated to accommodate the construction of the 1-880 Cypress Replacement, and operated following completion of the freeway until remediation is complete.

9.3.2.1 Preliminary Treatment Options

The technologies available for remediating surface water all involve treatment to remove the contaminants, and disposal of the treated water. There are four common proven technologies that are available which are specifically used to remove organic compounds from ground water:

- Carbon adsorption
- Air stripping
- Biotreatment
- S.A.V.E.

All four treatment techniques have consistently demonstrated the ability to remove organic compounds from ground water to concentrations which meet or are below maximum contaminant levels or primary drinking water standards. Typically, treatment depends upon the contaminants involved, the volume amount of ground water to be treated, the flow rate at which surface water is being treated, and regulatory permitting requirements. Both techniques offer a permanent solution with respect to remediating petroleum hydrocarbons in the uppermost ground water beneath the site. In addition, these techniques eliminate continuing liability because the contaminants are irreversibly remedied by these techniques.

9.3.2.1.1 Carbon Adsorption

This physical treatment mechanism occurs when an organic molecule is brought to an activated carbon surface and held there by adsorptive forces, principally tension. The adsorption mechanism consists of diffusion of an organic molecule in the liquid phase to the carbon granule, diffusion through the pore space within the granule to the adsorption site, and adsorption of the organic molecule to the surface of the granule (adsorption site). The physical characteristics of the organic molecule will determine the rate of each step and, finally, the amount of time required for the entire adsorption processes. Less soluble organic molecules, for example, will diffuse rapidly to the carbon particle. Large organic molecules will move slowly through the pore space distribution of the carbon granule, thereby delaying adsorption. Organic compounds exhibiting low water solubilities and small molecular size are very amenable to activated carbon adsorption, enabling effective use of adsorption surface areas within the carbon granule. What makes activated carbon such an excellent adsorbent is the large degree of surface area contained within the carbon granule that is accessible for the adsorption process. Surface areas of granular carbons range up to 44,000 ft^2 per ounce of material. A wide variety of activated carbons are available, and properties such as surface area and pore size distribution will determine their applicability.

Activated carbon adsorption may be accomplished by utilizing fixed or moving carbon beds in upright cylindrical vessels, arranged in series or parallel to treat the influent.

The fixed beds may employ downflow or upflow of the influent through the static activated carbon bed. Moving beds employ upflow of the influent and downflow of loose activated carbon. The quantity of an organic compound or group of organic compounds that can be adsorbed by activated carbon is determined by a balance between the forces that keep the organic compound in solution and the adsorptive forces that attract the organic compound to the carbon surface. Factors that affect this balance include:

- Adsorptivity, which increases as contaminant solubility decreases.
- The class of the organic compound.
- Temperature - adsorption capacity decreases with increasing temperature, although the rate of adsorption may increase.

In addition, carbon adsorption system performance is sensitive to the variations in influent flow and chemical composition of the influent. When the adsorptive capacity of the activated carbon is maximized, the spent carbon is removed from the system and regenerated for subsequent reuse. The contaminants adsorbed are either recycled or effectively destroyed during the regeneration cycle.

9.3.2.1.2 Air Stripping

The basic concept of this technique is to bring the contaminated ground water into intimate contact with ambient air, so that the organic compounds in the ground water can undergo a phase change (liquid to vapor). The vaporized compounds are then vented directly to the atmosphere, or are discharged to a treatment system before being vented to the atmosphere, depending upon air quality regulatory requirements. The treated water can be discharged directly to waste, or may require further treatment to facilitate discharge to waste. An air stripping system typically consists of an upright cylindrical vessel containing a layer of loose or structured, high-efficiency packing material. Air and contaminated water are conducted counter-current to one another through the packing material. Typically, air is forced upward at the base of the cylinder utilizing a fan or blower, with contaminated water being passed downward through the cylinder utilizing a spray nozzle or distributor tray fitted at the top of the cylinder. The packing media enhances the air/liquid contact by exposing a greater amount of water to the air passing upward through the cylinder. The greater the surface area of the packing material exposed, the greater the opportunity for vaporization into the upward passing air of the organic compounds in the water being treated. The passing air carries the vaporized organic compounds out of the stripper vessel and into the atmosphere. The treated water passes out the base of the stripper vessel to be discharged directly, or to be treated, if necessary, to meet discharge requirements.

The effectiveness of an air stripping system depends on the flow rate of both water and air, the influent and effluent concentrations of both air and water, the packing media utilized, the height of the packing media, and the diameter of the cylindrical vessel.

9.3.2.1.3 Biotreatment

Biotreatment is a proven technology for reducing the concentrations of petroleum hydrocarbons in ground water. The relative cost effectiveness of this technology is usually best when diesel or heavier oils are involved which preclude the use of other competing technologies. Biotreatment is the most complex of all the listed treatment technologies to install, start-up, and operate, and requires frequent monitoring and care of the bioculture. The advantage over air stripping is that nearly all of the petroleum hydrocarbons are destroyed by decay and converted into harmless compounds, primarily CO_2 and H_2O, rather than simply being transferred to other media. To meet NPDES requirements, polishing the biotreatment effluent is required before discharge.

9.3.2.1.4 S.A.V.E.

The S.A.V.E. system (spray, aeration, vacuum, extraction) is manufactured and distributed by Remediation Service International (RSI). Since the system integrates three separate remediation methods, it purports to be more efficient than the individual systems for treating both soil and ground water. The three methods are: vapor extraction from soil, spray aeration treatment of ground water, and thermal oxidation using an internal combustion engine for burning hydrocarbon laden vapors. A catalytic convertor is used to control the exhaust emissions.

The soil vapor extraction system consists of a vacuum pump driven by the internal combustion engine. The vacuum on the soil causes the hydrocarbons to volatilize and migrate with the induced flow of air to the engine where they are burned as fuel.

Ground water is remediated using a spray aerator. The spray aerator tank makes use of both vacuum and heat. The reduced pressure caused by the partial vacuum results in a lower temperature at which the hydrocarbons will vaporize. This temperature increase caused by heating the water further increases vaporization. The process includes drawing gasoline contaminated water from an extraction well under a partial vacuum and sprayed in the spray aeration tank where the hydrocarbons are vaporized. The gas vapors are used as fuel in the engine. The water is recirculated in the tank until the level of gasoline removed meets discharge requirements.

9.3.2.2 Implementability

For the treatment methods, the principal disadvantage is the off-site disposal/treatment of capture media, i.e. carbon and stripping tower packing material which may be regulatory restricted. In addition, it is very probable that air stripping contaminated water and discharge to the atmosphere would also be restricted by the regulatory community. However, all of the treatment options are feasible.

10.0 CERTIFICATION

To the best of our knowledge, all statements and information provided in this report are true and correct.

Ronald W. Michelson
Registered Geologist (CA-3875)

REGISTERED GEOLOGIST
RONALD W. MICHELSON
No. 3375
Exp 6/94
STATE OF CALIFORNIA

TABLE 2.2.1

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California
Past and Current Site Activities

NAME OF BUSINESS	TYPE OF BUSINESS	DATES OF OPERATION	BUSINESS OPERATOR	PROPERTY OWNER
a) J & A Machine Shop	Auto Parts/Valve Manufacturer	1985 to Present	Tanya Skrabo	Phoenix Properties
b) Phoenix Iron Works	Structural Steel Molds Industrial Construction Castings/Bushings	Approximately 1970 to Present	Welden L. Russell	Phoenix Properties
c) Michael Bondi Metal Design	Constructs Wrought Iron Gates, Stairs, Railings, Furniture, & Assessories	1987 to Present	Michael Bondi	Phoenix Properties
d) Cypress Auto Parts	Buy/Sell Auto Parts	Approximately 1970 to Present	Michael K. Percey William S. Percey	Phoenix Properties
e) Ivan's Auto Body	Buy/Sell Auto Parts	Past (Unknown)	Unknown	Phoenix Properties
f) Pine Iron Works	Iron Works	Past (Unknown) to 1990	Arthur Hovack	Phoenix Properties
g) Unknown Plastic Bag Co.	Plastic Bags	Unknown	Unknown	Phoenix Properties
h) Vennell Steel	Steel	Unknown	Unknown	Unknown
i) Independent Iron Works	Manufacturer of Industrial Steel Products	1924 to approximately 1960	Henry Gede, Jr. W.G. Meagher	Henry Gede Jr. W.G. Meagher
j) California Fireworks	Manufacturer of Fireworks (Wholesale & Jobber)	Approximately 1923 to 1927	Henry Graft	Unknown
k) The Dunn Cracker Co.	Crackers	Approximately 1889 to 1902	Unknown	Unknown
l) Calif. Bedding & Upholstering Co.	Bedding/Upholstering	Approximately 1902 to 1912	Unknown	Unknown
m) Unknown	Soap Factory	Possibly between 1912-1931	Unknown	Unknown
n) Terminal Manufacturing	Unknown	Unknown	Unknown	Unknown

TABLE 2.2.5

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Site Business Activities or Manufacturing Processes

TYPE OF BUSINESS	TYPES OF PRODUCTS SOLD	QUANTITIES OF PRODUCTS SOLD (ANNUAL)	PRIMARY CHEMICALS UTILIZED OR HANDLED	MAJOR CHEMICAL AND/OR PHYSICAL PROCESSES
a) Auto Parts Manufacturer	Auto Parts	Unknown	Unknown	Unknown
b) Iron Works	Structural Steel Molds Industrial Construction Castings/Bushings	Unknown	Iron/Aluminum	Crucible Furnace Coreless Induction Furnace
c) Wrought Iron Designs	Wrought Iron Gates Stairs, Railings, Furniture Accessories	Iron	Unknown	Unknown
d) Auto Parts Manufacturer	Auto Parts	Unknown	Unknown	Unknown
e) Auto Parts Sales	Buy/Sell Used Auto Parts	Unknown	Unknown	Unknown
f) Iron Works	Iron Products	Small quantity generator	Unknown	Unknown
g) Unknown Plastic Bag Company	Plastic Bags	Unknown	Unknown	Unknown
h) Steel Company	Unknown	Unknown	Unknown	Unknown
i) Manufacturer of Structural Steel	Steel Buildings Service Stations Tanks - Steel Boats/ Truck Tanks & Bodies/Bridges/Barges Cargo/Booms Bolts/Rods/Prefabricated Ship Parts	Unknown	Unknown	Unknown
j) Manufacturer of Fireworks	Fireworks	Unknown	Unknown	Unknown
k) Bake Crackers	Crackers	Unknown	Unknown	Unknown
l) Bedding/Upholstery	Bedding/Upholstery	Unknown	Unknown	Unknown
m) Soap Factory	Soap	Unknown	Unknown	Unknown
n) Unknown	Unknown	Unknown	Unknown	Unknown

TABLE 2.3.1

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Hazardous Substances/Wastes Identification and Quantities

NAME OF BUSINESS	TYPE OF BUSINESS	DATES OF OPERATION	HAZARDOUS SUBSTANCES UTILIZED AND AMOUNTS	HAZARDOUS WASTES GENERATED AND AMOUNTS
a) J & A Machine Shop	Auto Parts Valve Manufacturer	1985 to Present	Unknown	Unknown
b) Phoenix Iron Works	Structural Steel Molds Industrial Construction Castings/Bushings	Approximately 1970 Present	Unknown	Unknown
c) Michael Bondi Metal Design	Constructs Wrought Iron Gates, Stairs, Railings, Furniture, & Assessories	1987 to Present	Unknown	Unknown
d) Cypress Auto Parts	Buy/Sell Auto Parts	Unknown to Present	Oxygen & Acetylene (variable amounts)	Gasoline and Waste Oil (variable amounts)
e) Ivan's Auto Body	Buy/Sell Auto Parts	Past (Unknown)	Unknown	Unknown
f) Pine Iron Works	Iron Works	Past - 1990	Paint, Napthia (unknown amounts)	Paint, Paint Thinner, Waste Oil (unknown amounts)
g) Unknown Plastic Bag Co.	Plastic Bags	Unknown	Unknown	Unknown
h) Vennell Steel	Steel	Unknown	Unknown	Unknown
i) Independent Iron Works	Manufacturer of Industrial Steel Products	1924 to Approximately 1960	Unknown	Unknown
j) California Fireworks	Manufacturer of Fireworks (Wholesale/Jobber)	1923 - 1927	Unknown	Unknown
k) The Dunn Cracker Co.	Crackers	Approximately 1889 - 1901	Unknown	Unknown

TABLE 2.3.2

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Hazardous Substances/Wastes On-Site Storage, Treatment, Disposal

NAME OF BUSINESS	TYPE OF BUSINESS	TYPE OF STORAGE	NUMBER	CAPACITY	DATES OF OPERATION	CONTAINME AND/OR MONITORI
a) J & A Machine Shop	Auto Parts Valve Manufacturer	Unknown	Unknown	Unknown	Unknown	Unknown
b) Phoenix Iron Works	Structural Steel Molds Industrial Construction Castings and Bushings	Underground Storage Tanks	Two	Unknown	Unknown	Unknown
c) Michael Bondi Metal Design	Constructs Wrought Iron Gates, Stairs, Railings Furniture and Assessories	Unknown	Unknown	Unknown	Unknown	Unknown
d) Cypress Auto Parts	Buy/Sell Auto Parts	Unknown	Unknown	Unknown	Unknown	Unknown
e) Ivan's Auto Body	Buy/Sell Auto Parts	Unknown	Unknown	Unknown	Unknown	Unknown
f) Pine Iron Works	Iron Works	Unknown	Unknown	Unknown	Unknown	Unknown
g) Unknown Plastic Bag Company	Plastic Bags	Unknown	Unknown	Unknown	Unknown	Unknown
h) Vennell Steel	Steel	Unknown	Unknown	Unknown	Unknown	Unknown
i) Independent Iron Works	Manufacturer of Industrial Steel Products	Unknown	Unknown	Unknown	Unknown	Unknown
j) California Fireworks	Manufacturer of Fireworks	Unknown	Unknown	Unknown	Unknown	Unknown
k) The Dunn Cracker Company	Crackers	Unknown	Unknown	Unknown	Unknown	Unknown

TABLE 2.3.4

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Regulatory Status

BUSINESS	INSPECTION	REGULATORY AGENCY CONDUCTING INSPECTION	RESULTS OF INSPECTION
a) J & A Machine Shop	None	None	Not Applicable
b) Phoenix Iron Works	No Violations Between 1/1/89 - 3/11/93	BAAQMD	No Violations
c) Michael Bondi Metal Design	None	None	Not Applicable
d) Cypress Auto Parts	None	None	Not Applicable
e) Ivan's Auto Body	None	None	Not Applicable
f) Pine Iron Works	Air Emissions	BAAQMD	No Violations
g) Unknown Plastic Bag Company	None	None	Not Applicable
h) Vennell Steel	None	None	Not Applicable
i) Independent Iron Works	None	None	Not Applicable
j) California Fireworks	None	None	Not Applicable
k) The Dunn Cracker Company	None	None	Not Applicable

TABLE 4.1.5

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Permeability of Site Soils

SOIL TYPE	DEPTH (INCHES)	WATER CAPACITY (INCHES/INCHES)	PERMEABILITY (INCHES/HOUR)
Urban Land - Baywood Complex	0 to 16	0.07 to 0.10	6 to 20
Urban Land - Baywood Complex	16 to 60	0.06 to 0.09	6 to 20

TABLE 4.2.2

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Site Geology

UNIT	LITHOLOGY	DEPTH	THICKNESS
Merritt Sand (includes overlying Urban Land - Baywood Complex Soil)	Fine-grained silty, clayey sand, with lenses of sandy clay and clay. Yellowish-brown to dark yellowish-orange. Well-sorted. Contains small fragments of roots, twigs, grass. No bedding. Aeolian deposit, erratic distribution.	2.5 feet	2.5 to approximately 35 fe[illegible]
Older Bay Mud (includes Alameda Formation)	Predominately silty clay with varying thicknesses of interbedded sand and fine gravel. Dark greenish-gray. Frequent lateral and vertical grading of sand and gravel interbeds with surrounding silty clay. Occasional sharp contacts between sand and gravel interbeds and silty clay. Some crossbedding.	Approximately 35 to 50 feet	1 to 200 feet
Franciscan Formation (BEDROCK)	Fractured and sheared sandstone, shale, limestone, chert, and metavolcanic rock. Irregular erosional surface.	Greater than 350 feet	Unknown

TABLE 4.2.2.a

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Site Hydrogeology

GEOLOGIC UNIT	AQUIFER	AQUITARD	DEPTH TO GROUND WATER	MAGNITUDE AND DIRECTION OF HYDRAULIC GRADIENT	HYDRAULIC CONDUCTIVITY (CM/SEC)	FLOW VELOCITY (FEET/DAY)	WATER QUALITY	PRODUCTION WELL
Merritt Sand (Includes overlying Urban Land - Baywood Complex Soil)	Unconfined in overlying soil and within unit at depth.	Lenses of silty clay and clay. Probably laterally and vertically discontinuous.	6 to 8 feet	Southwest for ground water in soil. Unknown for deeper ground water in unit	Unknown for soil. Unit values range from 10^{-7} to 10^{-8}	Unknown for Soil. Unit values range from 10^{-3} to 10^{-5}	Regionally, portions of Unit contains ground water that meets California Secondary Drinking Water Quality Standards. Saltwater intrusion is possible.	No water supply well in vicinity or region (the site
Older Bay Mud (includes Alameda Formation)	Semi-confined to confined occurring in interbedded sand and gravels.	Silty clay which separates aquifers. Considered continuous laterally and vertically beneath the site.	200 to 500 feet	Unknown	Unknown	Unknown	Regionally, portions of Unit contains ground water that meets California Primary Drinking Water Quality Standards. Saltwater intrusion is possible.	No water supply wel in vicinity of the site Eight active industri water supply wells a located on the Alameda Naval Air Station approximatel mile west of the sit

TABLE 4.2.4

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Aquifer Usage

AQUIFER	USE	DISTANCE TO NEAREST WELL FROM SITE	GROUND WATER FLOW DIRECTION AND VELOCITY	SERVICE CONNECTIONS AND POPULATION SERVED BY WELLS	ACRES OF LAND IRRIGATED	LIVESTOCK CONSUMPTION
Merritt Sand (Includes overlying Urban Land - Baywood Complex Soil)	None	No production wells are completed in the Merritt Sand in the region of the site.	Unknown	None	None	None
Older Bay Mud (includes Alameda Formation)	Industrial water supply	Eight active industrial water supply wells are located on the Alameda Naval Air Station approximately 1 mile west of the site.	Unknown	None	None	None

TABLE 4.2.6

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Distance to Surface Water, Marshlands, Wetlands, and Critical Habitats Nearest the Site

TYPE	NAME	DISTANCE FROM SITE (MILES)
SURFACE WATER	Oakland Inner Harbor	0.95
	Oakland Outer Harbor	0.85
	Oakland Middle Harbor	1.05
MARSHLANDS	Emeryville Crescent	1.3
WETLANDS	Wetland A (see Figure 4.2.6)	1.1
	Wetland B (see Figure 4.2.6)	1.1
CRITICAL HABITATS		
Alameda Naval Air Station	California Least Tern	1.8
Alameda South Shore	California Clapper Rail	4.0
Lake Merritt	California Brackishwater Snail	1.5
	Tidewater Goby	2.2
Adeline Station (Berkeley)	Santa Cruz Tarplant	1.8
Emeryville Crescent	Salt Marsh Harvest Mouse	1.5
Berkeley (see Figure 4.2.6)	California Black Rail	1.6
Aquatic Park, Berkeley	Tidewater Goby	2.4
San Francisco Bay	Double Crested Cormorant	2.3

TABLE 4.3.2

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Daily Prevailing Wind Direction
and
Daily Average Wind Velocity

MONTH	MEAN WIND SPEED(MPH)	PREVAILING DIRECTION	FASTEST MILE (SPEED - MPH)	FASTEST MILE (DIRECTION)	YEAR
LENGTH OF RECORD (YEARS)	30	21	29	29	
January	6.7	SE	46	SW	1964
February	7.3	W	49	SW	1953
March	9.0	W	45	SW	1949
April	9.5	W	55	SW	1960
May	10.0	W	50	SW	1949
June	10.0	W	62	SW	1950
July	9.3	WNW	26	SW	1961
August	9.0	WNW	29	SW	1966
September	7.8	WNW	33	N	1959
October	6.8	WNW	43	SW	1950
November	6.3	WNW	46	N	1952
December	6.5	E	40	SW	1951
YEARLY AVERAGE	8.2	W	49	SW	2/93

TABLE 4.3.3

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Local Climatic Factors

MONTH	TEMP NORMAL DAILY MAXIMUM	TEMP NORMAL DAILY MINIMUM	TEMP MONTHLY NORMAL	PRECIP NORMAL	PRECIP MONTHLY MAX	PRECIP MONTHLY MIN	PRECIP 24 HR MAX	MEAN WIND SPEED (MPH)	PREVAILING DIRECTION	FASTEST MILE (SPEED - MPH)	FASTEST MILE (DIRECTION)	YEAR
LENGTH OF RECORD (YEARS)					49	49		30	21	29	29	
January	54.5	42.7	48.6	4.03	8.90	0.29	3.30	6.7	SE	46	SW	1964
February	58.0	45.7	51.9	2.83	8.85	0.02	2.41	7.3	W	49	SW	1953
March	60.2	47.2	53.7	2.32	5.69	0.04	2.76	9.0	W	45	SW	1949
April	62.8	49.4	56.1	1.50	4.60	T	2.21	9.5	W	55	SW	1960
May	65.4	52.4	58.9	0.14	1.21	T	1.45	10.0	W	50	SW	1949
June	68.5	55.2	61.9	0.14	1.21	0.00	1.03	10.0	W	62	SW	1950
July	69.7	56.4	63.1	0.01	0.60	0.00	0.78	9.3	WNW	26	SW	1961
August	70.2	56.8	63.5	0.03	0.74	0.00	0.42	9.0	WNW	29	SW	1966
September	72.3	56.6	64.5	0.18	3.27	0.00	3.23	7.8	WNW	33	N	1959
October	68.7	53.4	61.1	1.08	5.56	T	3.45	6.8	WNW	43	SW	1950
November	62.0	48.5	55.3	2.37	7.42	0.00	2.67	6.3	WNW	46	N	1952
December	55.5	44.2	49.9	3.87	11.29	0.28	3.21	6.5	E	40	SW	1961
YEARLY AVERAGE	64.0	50.7	57.4	18.69	11.29	0.00	3.45	8.2	W	49	SW	2/93

357 7ph8 rp1

TABLE 4.3.7

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Distance to Schools, Day Care Centers, Hospitals, Nursing Homes, Retirement Communities, and Senior Citizen Communities

TYPE	NAME	DISTANCE FROM SITE (MILES)
SCHOOL	Cole Elementary School	0.7
SCHOOL	Prescott Elementary	0.2
SCHOOL	Lowell Junior High School	1.0
SCHOOL	Lafayette High School	1.0
SCHOOL	Hoover Junior High School	2.75
SCHOOL	Durant School	2.75
SCHOOL	McClymond's High School	2.4
DAY CARE CENTER	Oakland Parent/Child Center	0.9
HOSPITAL	Hillhaven Convalescent Hospital	2.25
HOSPITAL	Peralta Hospital	2.1
HOSPITAL	Providence Hospital	2.25
HOSPITAL	Merritt Hospital	2.5
HOSPITAL	Kaiser Permanente Medical Center	2.7
HOSPITAL	Children's Hospital	2.7

TABLE 5.1.a

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Soil Analytical Results - Organics
Baseline Environmental Consultant's - First Phase Site Investigation

Boring	Sample Depth	TPH-D	TPH-G	Benzene	Toluene	EthylBenzene	Total Xylenes
	(FBGS)	(mg/kg)	(mg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
PP-4	4.5-5.0	ND	ND	ND	ND	ND	ND
PP-5	5.0-5.5	ND	ND	ND	ND	ND	ND
PP-6	5.0-5.5	ND	ND	ND	ND	ND	ND
PP-7	5.5-6.0	ND	ND	ND	ND	ND	ND
PP-9	4.5-5.0	ND	ND	ND	ND	ND	ND
REPORTING LIMIT		2.5	5.0	5.0	5.0	5.0	5.0

(FBGS) Feet below ground surface
TPH-D Total petroleum hydrocarbons as diesel
TPH-G Total petroleum hydrocarbons as gasoline
mg/kg milligrams/kilogram
µg/kg micrograms/kilogram
ND Not detected in excess of Reporting Limit

TABLE 5.1.b

Preliminary Endangerment Assessment
Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Soil Analytical Results - Metals
Baseline Environmental Consultant's - First Phase Site Investigation

Boring	PP-5 2.0-2.5 FT	PP-6 2.0-2.5 FT	PP-7 2.0-2.5 FT	PP-8 2.0-2.5 FT	PP-9 1.5-2.0 FT	Report Limit
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/k
Analyte						
Antimony	1	1	ND	1	2	1
Arsenic	4	4	3	5	ND	3
Barium	47	59	46	45	49	4
Beryllium	0.2	0.3	0.2	0.2	0.2	0.1
Cadmium	ND	0.2	ND	ND	0.2	0.2
Total Chromium	30	34	28	31	31	6
Cobalt	3.8	4.8	4.0	3.7	4.4	0.5
Copper	6	10	6	7	7	1
Lead	14	52 (2.26)	10	13	13	3
Mercury	ND	ND	ND	ND	ND	0.2
Molybdenum	0.7	0.8	0.7	0.7	0.8	0.5
Nickel	18	19	15	14	18	2
Selenium	3	2	ND	3	4	2
Silver	ND	ND	ND	ND	ND	0.5
Thallium	8	8	7	8	3	2
Vanadium	19	21	17	21	20	4
Zinc	18	56	15	19	19	2

mg/kg milligrams/kilogram
ND Not detected in excess of Reporting Limit
(2.26) Soluble concentration in mg/l

TABLE 5.1.c

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Soil Analytical Results - 601/8010 & 8270
Baseline Environmental Consultant's - First Phase Site Investigation

Boring	Sample Depth	EPA 601/8010	EPA 8270
	(FBGS)	(ug/kg)	(mg/kg)
PP-5	5.0-5.5	ND	ND
PP-6	5.0-5.5	ND	ND
PP-7	5.5-6.0	ND	ND
PP-8	4.5-5.0	ND	ND
PP-9	4.5-5.0	ND	ND
REPORTING LIMIT		5.0	0.5

(FBGS) Feet below ground surface
mg/kg milligrams/kilogram
ug/kg micrograms/kilogram
ND Not detected in excess of Reporting Limit

TABLE 5.1.d

Preliminary Endangerment Assessment
Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Soil and Ground Water Analytical Results - Organics
Geo/Resource Consultant's - First Phase Site Investigation

Boring	Sample Depth	TRPH	TPH-G	TPH-D
	(FBGS)	(mg/kg)	(mg/kg)	(mg/kg)
PP800/B-1	1.5	NA	NA	ND
	4.0	NA	ND	ND
	7.5	NA	ND	ND
PP800/H-1	1.5	NA	**10**	**1,600**
	4.0	NA	**17**	**2,400**
	7.5	NA	ND	ND
PP800/W-1	1.5	NA	ND	ND
	6.0	NA	ND	ND
	8.0	NA	ND	ND
PP800/W-1 (Ground Water Sample)			ND	ND
REPORTING LIMITS		5.0 (1.0)	5.0 (1.0)	5.0

(FBGS)	Feet below ground surface
TRPH	Total recoverable petroleum hydrocarbons
TPH-G	Total petroleum hydrocarbons as gasoline
TPH-D	Total petroleum hydrocarbons as diesel
mg/kg	milligrams/kilogram
NA	Not analyzed
ND	Not detected in excess of Reporting Limit
(1.0)	Reporting limit for ground water analyses

TABLE 5.2.3

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Soil Sampling Summary

BORING	SAMPLE	DEPTH (FBGS)	CLASSIFICATION
SB1	SB1A	3.0	Sand
	SB1B	5.5	Sand
	SB1C	7.0	Silty Sand
	SB1D	9.0	Silty Sand
	SB1E	11.0	Silty Sand
SB2	SB2A	3.5	Silty Sand
	SB2B	5.5	Silty Sand
	SB2C	7.5	Sand
	SB2D	9.5	Sand
SB3	SB3A	3.0	Sand
	SB3B	5.5	Sand
	SB3C	7.0	Sand
	SB3D	9.5	Sand

FBGS Feet below ground surface

TABLE 5.3.1.a

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Soil Analytical Protocol

Analyses	USEPA Method	Sample Size	Container Size	Preservative	Holding Time (Days)	Reporting Limit (mg/kg)
TPH-D	3550-8015	1	2 x 6 Inch SS Tube	4 Degrees C	14	1
VOC	8240	1	2 x 6 Inch SS Tube	4 Degrees C	14	Various
SVO	8270	1	2 x 6 Inch SS Tube	4 Degrees C	14	Various
WET	CCR 667000					
TCLP	1311					
Metals	6010	1	2 x 6 Inch SS Tube	4 Degrees C	28	Various

TPH-G Total petroleum hydrocarbons as gasoline
TPH-D Total petroleum hydrocarbons as diesel
Metals lead, zinc, nickel, cadmium, total chromium
WET Waste Extraction Test
TCLP Toxicity characteristic leaching potential
CCR California Code of Regulations
SS Stainless steel
C Degrees centigrade
mg/kg milligrams/kilogram
SVO Semivolatile organic compounds
VOC Volatile organic compounds

TABLE 5.3.1.b

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Ground Water Analytical Protocol

Analyses	USEPA Method	Sample Size	Container Size	Preservative	Holding Time (Days)	Reporting Limit ($\mu g/l$)
TPH-D	3550-8015	2	1 liter	None	14	50
SVO	625	2	1 liter	None	14	Various
VOC	624	2	40 milliliter	None	14	Various
Metals	6010	1	200 milliliter	HNO_3 to pH < 2	28	Various

TPH-D Total petroleum hydrocarbons as diesel
SVO Semivolatile organic compounds
VOC Volatile organic compounds
Metals lead, zinc, cadmium, total chromium, nickel
HNO_3 Nitric acid
$\mu g/l$ micrograms/liter

TABLE 5.3.1.c

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Soil Analytical Results - Metals/Organics

ANALYTE		Cd	Cr	Pb	Ni	Zn	TPH-G	TPH-D	VOC	SV
CONCENTRATION		mg/kg							µg/kg	mg/
DETECTION LIMIT	**SAMPLE DEPTH**	0.05	0.50	0.50	0.50	0.50	1.0	1.0	VARIOUS	VARIO
SAMPLE ID										
SB1A	3.0	ND	24	2.7	18	14	ND	ND	ND	ND
SBIB	5.5							ND		
SBIC	7.0							ND		
SB1D	9.0							ND	ND	
SBIE	11.0							ND		
SB2A	3.5	ND	21	2.5	18	13	ND	ND	ND	ND
SB2B	5.5							ND		
SB2C	7.5							ND		
SB2D	9.5							ND	ND	
SB3A	3.0	ND	21	6.3	16	16	ND	ND	ND	ND
SB3B	5.5							ND		
SB3C	7.0							ND		
SB3D	9.5							ND	ND	

Cd Cadmium
Cr Total chromium
Pb Lead
Ni Nickel
Zn Zinc
TPH-D Total petroleum hydrocarbons as diesel
TPH-G Total petroleum hydrocarbons as gasoline
mg/kg Milligrams per kilogram
ND Not detected in excess of detection limit
VOC Volatile organic compounds
SVO Semivolatile organic compounds

TABLE 5.3.1.d

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

Ground Water Analytical Results - Metals/Organics

ANALYTE	Cd	Cr	Pb	Ni	Zn	TPH-D	VOC	SVO
CONCENTRATION	mg/l	mg/l	mg/l	mg/l	mg/l	µg/l	µg/l	mg/l
DETECTION LIMIT	0.001	0.01	0.01	0.02	0.005	50	VARIOUS	VARIOUS
SAMPLE ID								
HPSB1	ND	0.04	0.08	0.03	0.04	140	ND	ND
HPSB2	ND	0.04	0.10	0.02	0.02	260	ND	ND
HPSB3	ND	0.05	0.12	0.01	0.02	220	ND	ND

Cd Cadmium
Cr Total chromium
Pb Lead
Ni Nickel
Zn Zinc
TPH-D Total petroleum hydrocarbons as diesel
mg/l Milligrams per kilogram
µg/l micrograms per kilogram
ND Not detected in excess of detection limit
VOC Volatile organic compounds
SVO Semivolatile organic compounds

TABLE 6.1.2

Preliminary Endangerment Assessment
Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Selection of Indicator Chemicals

METAL	Sb	As	Ba	Be	Cd	Cr VI	Co	Cu	Pb	Hg	Mo	Ni	Se	Tl	V	Zn
VALUE																
A	2	5	59	0.3	0.2	34	4.8	10	52	ND	0.8	19	4	8	21	56
C	0.0004	NV	0.05	0.0005	0.0003	NV	NV	0.037	0.0014	0.0003	NV	0.01	0.003	0.0004	0.02	0.21
D	NV	15	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV
E	2,500		20	2,000	3,333	0		27	714	3,333		100	333	2,500	50	5
G	5,000		1,180	600	667			270	37,128			1,900	1,332	20,000	1,050	280
I		3.54														
K	69,441															
M	3.54															
O	0.07		0.02	0.009	0.01			0.004	0.53			0.03	0.02	0.29	0.02	0.004
Q		1														

KEY TO TABLE 6.1.2

VALUE DESCRIPTION

A	Highest Soil Concentration Detected (Cih) (mg/kg)
C	Chronic Reference Dose (RfD) (mg/kg day^{-1})
D	Slope Factor (SF) ($[mg/kg/day]^{-1}$)
E	Inverse of the Chronic Reference Dose (1/RfD)
G	(Cih)(1/RfD)
H	(Cil)(1/RfD)
I	(Cih)(SF)
K	Total Risk Factor (RfD basis) Rih(RfD) = Sum of (Cih)(1/RfD)
M	Total Risk Factor (SF basis) Rih(SF) = Sum of (Cih)(1/SF)
O	(Cih)(1/RfD) / Rih(RfD)
Q	(Cih)(1/SF) / Rih(SF)

METALS

Sb	Antimony
As	Arsenic
Ba	Barium
Be	Beryllium
Cd	Cadmium
Cr VI	Chromium VI
Co	Cobalt
Cu	Copper
Pb	Lead
Hg	Mercury
Mo	Molybdenum
Ni	Nickel
Se	Selenium
Ag	Silver
Tl	Thallium
V	Vanadium
Zn	Zinc

RfDs and SFs were obtained from the USEPA's Superfund Public Health Evaluation Manual, [SPHEAM] October 1986).

NV = No Value

TABLE 6.1.3

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

List of Indicator Chemicals

INDICATOR CHEMICAL	CHRONIC REFERENCE DOSE (RfD)	SLOPE FACTOR (SF)
Antimony	0.00004 mg/kg-day	NV
Arsenic	NV	15 $(mg/kg\text{-}day)^{-1}$
Chromium VI	NV	NV
Lead	0.0014 mg/kg-day	NV
Thallium	0.0004 mg/kg-day	NV

TABLE 6.5.1.a

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Chronic Hazard Quotient and Chronic Hazard Index

Ingestion

INDICATOR CHEMICAL	Antimony	Lead	Thallium	CHI (Adult)
MAXIMUM CONCENTRATION 0 - 3 FBGS (mg/kg)	2	52	8	
RfD (mg/kg-day)	0.0004	0.0014	0.0004	
I (mg/kg-day) [adult]	9.8×10^{-7}	2.5×10^{-5}	4.0×10^{-6}	
CHQ Adult	0.002	0.02	0.01	0.032

TABLE 6.5.1.b

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Chronic Hazard Quotient and Chronic Hazard Index

Dermal Contact

INDICATOR CHEMICAL	Antimony	Lead	Thallium	CHI (Adult)
MAXIMUM CONCENTRATION 0 - 3 FBGS (mg/kg)	2	52	8	
RfD (mg/kg-day)	0.0004	0.0014	0.0004	
AD (mg/kg-day) [adult]	1.9×10^{-7}	5.0×10^{-6}	7.7×10^{-7}	
CHQ Adult	4.7×10^{-4}	3.6×10^{-3}	1.9×10^{-3}	6.0×10^{-3}

TABLE 6.5.2.a

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Cancer Risk - Ingestion

POTENTIAL CARCINOGEN	MAXIMUM CONCENTRATION (0 - 3 FBGS) (mg/kg)	SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$	I [adult] (mg/kg/day)	CR (adult)
Arsenic	5	15	2.5×10^{-6}	3.7×10^{-5}

TABLE 6.5.2.b

Preliminary Endangerment Assessment

Phoenix 800
800 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Cancer Risk - Dermal Contact

POTENTIAL CARCINOGEN	MAXIMUM CONCENTRATION (0 - 3 FBGS) (mg/kg)	SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$	AD [adult] (mg/kg/day)	CR TOTAL
Arsenic	5	15	4.8×10^{-7}	7.2×10^{-6}

TABLE 2.2.1

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Past and Current Site Activities

NAME OF BUSINESS	TYPE OF BUSINESS	DATES OF OPERATION	BUSINESS OPERATOR	PROPERTY OWNER [1]
Oceanic Container Systems	Shipping Cargo Container Repair	March 1983 to Present	Tuan Forbes	Phoenix Properties
Unknown	Container Company	Approximately 1971	Unknown	Wendell Russell
Magnolia Manor War Dormitories	Housing	Before 1951	Unknown	Unknown (United States)
Unknown	Truct Steam Cleaning	Approximately 1950	Unknown	Unknown
Henry Dalton & Sons	Sash Weight Foundary	Between 1902 and 1911	Henry Dalton	Henry Dalton

[1] Alameda County Tax Assessor's records indicate that Phoenix Iron Works owned this parcel from 1969 - 1983; from 1983 to present, parcel is owned by Phoenix Properties.

TABLE 2.2.5

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Site Business Activities or Manufacturing Processes

TYPE OF BUSINESS	TYPES OF PRODUCTS SOLD	QUANTITIES OF PRODUCTS SOLD (ANNUAL)	PRIMARY CHEMICALS UTILIZED OR HANDLED	MAJOR CHEMICAL AND/OR PHYSICAL PROCESSES
Metal Container Storage and Sand-Blasting Operation	Restoration and Maintenance of Metal Shipping Containers	None	Acetylene gas, oxygen gas, Bar Rust 235 Epoxy, Silicate/mica liquid, methyl ethylketone liquid, >500 lbs., 55 gallons or 200 ft^3 hazardous materials handled on an annual basis	Sand-blast metal containers, steam clean metal containers, transportation of containers to and from site using forklift and/or trucks
Housing	Living Quarters	None	None	None
Foundry	Unknown	Unknown	Unknown	Unknown

TABLE 2.3.1

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Hazardous Substances/Wastes Identification and Quantities

NAME OF BUSINESS	TYPE OF BUSINESS	DATES OF OPERATION	HAZARDOUS SUBSTANCES UTILIZED AND AMOUNTS	USE	HAZARDOUS WASTES GENERATED AND AMOUNTS
Oceanic Container Systems	Shipping Cargo Container Repair	March 1983 to Present	Acetylene gas = 250 cu. ft/day, Oxygen gas = 170 cu.ft/day, mixture of epoxy resin, high flash aromatic naphtha/hydrocarbon, resin/magnesium, silicate/mica liquid = 35 gal/day, methyl ethyl ketone liquid = 30 gal/day	Oxygen & Acetylene (Welding), Resins, Naphtha, Magnesium Silicate (Unknown) Methylethylketone (Unknown)	Unknown
Magnolia Manor War Dormitories	Housing	Before 1951	Household cleaners	Household Maintenance	Unknown
Henry Dalton & Sons	Foundary	Between 1902 and 1911	Unknown	Unknown	Unknown

TABLE 2.3.2

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Hazardous Substances/Wastes On-Site Storage, Treatment, Disposal

NAME OF BUSINESS	TYPE OF BUSINESS	TYPE OF STORAGE	NUMBER	CAPACITY	DATES OF OPERATION	CONTAINMENT AND/OR MONITORING	PROCESSES/ ACTIVITIES
Oceanic Container Systems	Shipping Cargo Container Repair	Temporary Storage for Shipping Cargo Containers	Unknown	Unknown	March 1983 - present	55 gallon drums	Sand blasting, steam cleaning
Magnolia Manor War Dormitories	Housing	--	--	--	--	--	--
Henry Dalton & Sons	Sash Weight Foundry	Underground crude oil tank	At least 1	Unknown	Between 1902 and 1911	Unknown	--

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TABLE 2.3.4

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Regulatory Status

DATE	INSPECTION	REGULATORY AGENCY CONDUCTING INSPECTION	RESULTS OF INSPECTION
October 27, 1992	Hazardous Materials Inventory	Alameda County Department of Environmental Health	Notification to health department identifying types of hazardous substances and amounts that are stored at the site

TABLE 4.1.5

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Permeability of Site Soils

SOIL TYPE	DEPTH (INCHES)	WATER CAPACITY (INCHES/INCHES)	PERMEABILITY (INCHES/HOUR)
Urban Land - Baywood Complex	0 to 16	0.07 to 0.10	6 to 20
Urban Land - Baywood Complex	16 to 60	0.06 to 0.09	6 to 20

TABLE 4.2.2

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Site Geology

UNIT	LITHOLOGY	DEPTH	THICKNESS
Merritt Sand (includes overlying Urban Land - Baywood Complex Soil)	Fine-grained silty, clayey sand, with lenses of sandy clay and clay. Yellowish-brown to dark yellowish-orange. Well-sorted. Contains small fragments of roots, twigs, grass. No bedding. Aeolian deposit, erratic distribution.	2.5 feet	2.5 to approximately 35 feet
Older Bay Mud (includes Alameda Formation)	Predominately silty clay with varying thicknesses of interbedded sand and fine gravel. Dark greenish-gray. Frequent lateral and vertical grading of sand and gravel interbeds with surrounding silty clay. Occasional sharp contacts between sand and gravel interbeds and silty clay. Some crossbedding.	Approximately 35 to 50 feet	1 to 200 feet
Franciscan Formation (BEDROCK)	Fractured and sheared sandstone, shale, limestone, chert, and metavolcanic rock. Irregular erosional surface.	Greater than 350 feet	Unknown

TABLE 4.2.2.a

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Site Hydrogeology

GEOLOGIC UNIT	AQUIFER	AQUITARD	DEPTH TO GROUND WATER	MAGNITUDE AND DIRECTION OF HYDRAULIC GRADIENT	HYDRAULIC CONDUCTIVITY (CM/SEC)	FLOW VELOCITY (FEET/DAY)	WATER QUALITY	PRODUCTION WELLS
Merritt Sand (Includes overlying Urban Land - Baywood Complex Soil)	Unconfined in overlying soil and within unit at depth.	Lenses of silty clay and clay. Probably laterally and vertically discontinuous.	6 to 8 feet	Southwest for ground water in soil. Unknown for deeper ground water in unit. Hydraulic gradient unknown.	Unknown for soil. Unit values range from 10^{7} to 10^{11}	Unknown for soil. Unit values range from 10^{3} to 10^{5}	Regionally, portions of Unit contains ground water that meets California Secondary Drinking Water Quality Standards. Saltwater intrusion is possible.	No water supply wells in vicinity or region of the Site
Older Bay Mud (includes Alameda Formation)	Semi-confined to confined occurring in interbedded sand and gravels.	silty clay which separates aquifers. Considered continuous laterally and vertically beneath the site.	200 to 500 feet	Unknown	Unknown	Unknown	Regionally, portions of Unit contains ground water that meets California Primary Drinking Water Quality Standards. Saltwater intrusion is possible.	No water supply wells in vicinity of the site. Eight active industrial water supply wells are located on the Alameda Naval Air Station approximately 1 mile west of the site.

TABLE 4.2.4

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Aquifer Usage

AQUIFER	USE	DISTANCE TO NEAREST WELL FROM SITE	GROUND WATER FLOW DIRECTION AND VELOCITY	SERVICE CONNECTIONS AND POPULATION SERVED BY WELLS	ACRES OF LAND IRRIGATED	LIVESTOCK CONSUMPTION
Merritt Sand (Includes overlying Urban Land - Baywood Complex Soil)	None	No production wells are completed in the Merritt Sand in the region of the site.	Unknown	None	None	None
Older Bay Mud (includes Alameda Formation)	Industrial water supply	Eight active industrial water supply wells are located on the Alameda Naval Air Station approximately 1 mile west of the site.	Unknown	None	None	None

TABLE 4.2.6

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Distance to Surface Water, Marshlands, Wetlands, and Critical Habitats Nearest the Site

TYPE	NAME	DISTANCE FROM SITE (MILES)
SURFACE WATER	Oakland Inner Harbor	0.95
	Oakland Outer Harbor	0.85
	Oakland Middle Harbor	1.05
MARSHLANDS	Emeryville Crescent	1.3
WETLANDS	Wetland A (see Figure 4.2.6)	1.1
	Wetland B (see Figure 4.2.6)	1.1
CRITICAL HABITATS		
Alameda Naval Air Station	California Least Tern	1.8
Alameda South Shore	California Clapper Rail	4.0
Lake Merritt	California Brackishwater Snail	1.5
	Tidewater Goby	2.2
Adeline Station (Berkeley)	Santa Cruz Tarplant	1.8
Emeryville Crescent	Salt Marsh Harvest Mouse	1.5
Berkeley (see Figure 4.2.6)	California Black Rail	1.6
Aquatic Park, Berkeley	Tidewater Goby	2.4
San Francisco Bay	Double Crested Cormorant	2.3

TABLE 4.3.2

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Daily Prevailing Wind Direction and Daily Average Wind Velocity

MONTH	MEAN WIND SPEED (MPH)	PREVAILING DIRECTION	FASTEST MILE (SPEED - MPH)	FASTEST MILE (DIRECTION)	YEAR
LENGTH OF RECORD (YEARS)	30	21	29	29	
January	6.7	SE	46	SW	1964
February	7.3	W	49	SW	1953
March	9.0	W	45	SW	1949
April	9.5	W	55	SW	1960
May	10.0	W	50	SW	1949
June	10.0	W	62	SW	1950
July	9.3	WNW	26	SW	1961
August	9.0	WNW	29	SW	1966
September	7.8	WNW	33	N	1959
October	6.8	WNW	43	SW	1950
November	6.3	WNW	46	N	1952
December	6.5	E	40	SW	1951
YEARLY AVERAGE	8.2	W	49	SW	2/93

TABLE 4.3.4

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Local Climatic Factors

MONTH	TEMP NORMAL DAILY MAXIMUM	TEMP NORMAL DAILY MINIMUM	TEMP MONTHLY NORMAL	PRECIP NORMAL	PRECIP MONTHLY MAX	PRECIP MONTHLY MIN	PRECIP 24 HR MAX	MEAN WIND SPEED (MPH)	PREVAILING DIRECTION	FASTEST MILE (SPEED - MPH)	FASTEST MILE (DIRECTION)	YEAR
LENGTH OF RECORD (YEARS)					49	49		30	21	29	29	
January	54.5	42.7	48.6	4.03	8.90	0.29	3.30	6.7	SE	46	SW	1964
February	58.0	45.7	51.9	2.83	8.85	0.02	2.41	7.3	W	49	SW	1953
March	60.2	47.2	53.7	2.32	5.69	0.04	2.76	9.0	W	45	SW	1949
April	62.8	49.4	56.1	1.50	4.60	T	2.21	9.5	W	55	SW	1960
May	65.4	52.4	58.9	0.14	1.21	T	1.45	10.0	W	50	SW	1949
June	68.5	55.2	61.9	0.14	1.21	0.00	1.03	10.0	W	62	SW	1950
July	69.7	56.4	63.1	0.01	0.60	0.00	0.78	9.3	WNW	26	SW	1961
August	70.2	56.8	63.5	0.03	0.74	0.00	0.42	9.0	WNW	29	SW	1966
September	72.3	56.6	64.5	0.18	3.27	0.00	3.23	7.8	WNW	33	N	1959
October	68.7	53.4	61.1	1.08	5.56	T	3.45	6.8	WNW	43	SW	1950
November	62.0	48.5	55.3	2.37	7.42	0.00	2.67	6.3	WNW	46	N	1952
December	55.5	44.2	49.9	3.87	11.29	0.28	3.21	6.5	E	40	SW	1951
YEARLY AVERAGE	64.0	50.7	57.4	18.69	11.29	0.00	3.45	8.2	W	49	SW	2/93

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TABLE 4.3.8

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Distance to Schools, Day Care Centers, Hospitals, Nursing Homes, Retirement Communities, and Senior Citizen Communities

TYPE	NAME	DISTANCE FROM SITE (MILES)
SCHOOL	Cole Elementary School	0.7
SCHOOL	Prescott Elementary	0.2
SCHOOL	Lowell Junior High School	1.0
SCHOOL	Lafayette High School	1.0

TABLE 5.1.a

Preliminary Endangerment Assessment
Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Soil Analytical Results - Organics
First Phase Site Investigations

Boring	Sample Depth	TRPH	TPH-D	TPH-G	Benzene	Toluene	Ethylbenzene	Total Xylenes
	(FBGS)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
PP-1	4.5 - 5.0		ND	ND	ND	ND	ND	ND
PP-2	4.5 - 5.0		ND	ND	ND	ND	ND	ND
PP-3	4.5 - 5.0		ND	ND	ND	ND	ND	ND
PP524/B-1	2	7						
	6	31						
PP524/B-2	6	6						
	15	10						
PP524/B-3	1.5	8						
	6	14						
PP524/B-4	1.5	210						
	6	1,200						
PP524/B-5	1.5	250						
	6	31						
REPORTING LIMIT		5.0	2.5	5.0	5.0	5.0	5.0	5.0

FBGS = Feet below ground surface
TRPH = Total recoverable petroleum hydrocarbons
TPH-D = Total petroleum hydrocarbons as diesel
TPH-G = Total petroleum hydrocarbons as gasoline

mg/kg = milligrams/kilogram
ug/kg = micrograms/kilogram
ND = Not detected in excess of Reporting Limit

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TABLE 5.1.b

Preliminary Endangerment Assessment
Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Soil Analytical Results - Metals/First Phase Site Investigations

Boring	PP-1 1.5-2.0 FT	PP-2 2.0-2.5 FT	PP-3 2.5-3.0 FT	B-1 2.0 FT	B-1 6.0 FT	B-2 1.5 FT	B-2 6.0 FT	B-3 1.5 FT	B-3 6.0 FT	B-4 1.5 FT	B-4 6.0 FT	B-5 1.5 FT	B-5 6.0 FT	Reporting Limits
Analyte	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Antimony	1.0	1.0	3.0	ND	5.6	6.5	ND	6.0	6.1	7.9	55	12	6	5.0
Arsenic	5.0	ND	7.0	ND	21	ND	12	ND	10	19	22	15	12	10
Barium	160	42	120	30	67	47	68	51	73	160	970	540	51	2.5
Beryllium	0.3	0.2	0.3	ND	0.81	ND	0.64	0.51	0.65	0.55	0.55	0.55	0.55	0.50
Cadmium	0.5	0.2	1.0	2	5.2	2.1	4	2.8	4.8	9.7	30	12	4.3	0.50
Total Chromium	34	28	49	27	57	28	44	29	52	120	150	75	36	0.50
Cobalt	6.1	3.5	12	3.3	2.9	4.5	7.4	4.9	5.4	7.3	11	9	5.9	1.0
Copper.	25	7.0	110	5.7	8.4	8.5	14	11	11	120	250	130	9.3	0.50
Lead	180 (1.47)	12	750 (2.89)	9.5	25	13	17	18	18	1,100	3,500 (1.3)	23,000	20	1,000
Mercury	0.3	ND	ND	ND	0.09	ND	ND	ND	ND	0.24	0.66	1	ND	0.05
Molybdenum	0.9	1.1	3.0	ND	ND	ND	ND	ND	0.70	2.8	5.6	1.7	ND	0.50
Nickel	24	16	31	14	27	15	40	18	42	30	57	40	33	2.5
Selenium	ND	4.0	7.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.0
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.50
Thallium	10	6.0	30	ND	ND	ND	ND	ND	16	ND	ND	ND	13	10
Vanadium	19	17	25	21	47	21	35	23	41	32	37	29	29	1.0
Zinc	110	17	210	15	21	17	29	23	31	500	2,300	1,400	26	0.5

mg/kg = milligrams/kilogram
ND = Not detected in excess of Reporting Limit
(123) Soluble concentration in mg/l

Borings PP-1, PP-2, and PP-3 were drilled on 5/14/90.
Borings B-1, B-2, B-3, B-4, and B-5 were drilled on 6/23/92.

TABLE 5.2.3

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Soil Sampling Summary

BORING	SAMPLE	DEPTH (FBGS)	CLASSIFICATION
SB1	SB1A	3.5	Sand
	SB1B	5.0	Sand
	SB1C	7.5	Sand
SB2	SB2A	3.5	Silty Sand
	SB2B	5.5	Silty Sand
	SB2C	7.5	Sand
	SB2D	9.5	Sand
	SB2E	11.0	Sand
SB3	SB3A	3.5	Sand
	SB3B	6.5	Sand
	SB3C	8.5	Sand

FBGS = Feet below ground surface

TABLE 5.3.1.a

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Soil Analytical Protocol

Analyses	USEPA Method	Sample Size	Container Size	Preservative	Holding Time	Reporting Limit
					(Days)	(mg/kg)
TPH-G	5030-8015	1	2 x 6 Inch SS Tube	4 Degrees C°	14	1
TPH-D	3550-8015	1	2 x 6 Inch SS Tube	4 Degrees C°	14	1
VOC	8240	1	2 x 6 Inch SS Tube	4 Degrees C°	14	Various
SVO	8270	1	2 x 6 Inch SS Tube	4 Degrees C°	14	Various
WET	CCR 667000					
TCLP	1311					
Metals	6010	1	2 x 6 Inch SS Tube	4 Degrees C°	28	Various

TPH-G = Total petroleum hydrocarbons as gasoline
TPH-D = Total petroleum hydrocarbons as diesel
Metals = lead, zinc, nickel, cadmium, total chromium
WET = Waste Extraction Test
TCLP = Toxicity characteristic leaching potential
CCR = California Code of Regulations
SS = Stainless steel
C° = Degrees centigrade
mg/kg = milligrams/kilogram
SVO = Semivolatile organic compounds
VOC = Volatile organic compounds

TABLE 5.3.1.b

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Ground Water Analytical Protocol

Analyses	USEPA Method	Sample Size	Container Size	Preservative	Holding Time	Reporting Limit
					(Days)	($\mu g/\ell$)
TPH-G	5030-8015	2	40 milliliter	HCL to pH < 2	14	50
TPH-D	3550-8015	2	1 liter	None	14	50
SVO	625	2	1 liter	None	14	Various
VOC	624	2	40 milliliter	None	14	Various
Metals	6010	1	200 milliliter	HNO_3 to pH < 2	28	Various

TPH-G = Total petroleum hydrocarbons as gasoline
TPH-D = Total petroleum hydrocarbons as diesel
SVO = Semivolatile organic compounds
VOC = Volatile organic compounds
Metals = lead, zinc, cadmium, total chromium, nickel
HCL = Hydrochloric acid
HNO_3 = Nitric acid
$\mu g/\ell$ = micrograms/liter

TABLE 5.3.1.c

Preliminary Endangerment Assessment
Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Soil Analytical Results - Metals/Organics

ANALYTE	Sample Depth (FBGS)	Cd	Cr	Pb	Ni	Zn	TPHG	TPHD	B	T	E	X	VOC	SVO
CONCENTRATION		mg/kg							µg/kg					mg/kg
DETECTION LIMIT		0.05	0.50	0.50	0.50	0.50	1.0	1.0	5.0	5.0	5.0	5.0	VARIOUS	VARIOUS
SAMPLE I.D.														
SB1A	3.5	ND	31	7.0	22	550	ND	ND	ND	ND	ND	ND	ND	ND
SBIB	5.0	ND	39	8.2	17	19								
SBIC	7.5	ND	32	6.8	34	18							ND	
SB2A	3.5	ND	24	206	17	14	ND	ND	ND	ND	ND	ND	ND	ND
SB2B	5.5	ND	19	230	31	250								
SB2C	7.5	ND	25	22	17	25								
SB2D	9.5	10 (4.5)	9.6	12	17	12							ND	ND
SB2E	11.0	ND	24	150	17	71								
SB3A	3.5	ND	25	8.0	17	15	ND	ND	ND	ND	ND	ND	ND	ND
SB3B	6.5	ND	38	8.7	27	21								
SB3C	8.5	ND	42	9.5	44	20							ND	

Cd Cadmium
Cr Total chromium
Pb Lead
Ni Nickel
Zn Zinc
TPHG Total petroleum hydrocarbons as gasoline
TPHD Total petroleum hydrocarbons as diesel
BTEX Benzene, toluene, ethylbenzene, total xylenes

mg/kg Milligrams per kilogram
µg/kg micrograms per kilogram
ND Not detected in excess of detection limit
VOC Volatile organic compounds
SVO Semivolatile organic compounds

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TABLE 5.3.1.d

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

Ground Water Analytical Results - Metals/Organics

ANALYTE	Cd	Cr	Pb	Ni	Zn	TPHG	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPHD	VOC	SVO
CONCENTRATION	mg/ℓ	mg/ℓ	mg/ℓ	mg/ℓ	mg/ℓ	μg/ℓ	μg/ℓ	μg/ℓ	μg/ℓ	μg/ℓ	μg/ℓ	μg/ℓ	mg/ℓ
DETECTION LIMIT	0.001	0.01	0.01	0.02	0.005	50	0.5	0.5	0.5	0.5	50	VARIOUS	VARIOUS
SAMPLE ID													
HPSB1	ND	ND	0.03	0.02	0.05	ND	ND	ND	ND	ND	ND	ND	ND
HPSB2	ND	0.02	1.4	0.03	1.2	ND	ND	ND	ND	ND	66	ND	ND
HPSB3	ND	ND	ND	ND	ND	1,900	ND	ND	6.2	19	110,000	ND	SEE BELOW

Cd Cadmium
Cr Total chromium
Pb Lead
Ni Nickel
Zn Zinc
TPHG Total petroleum hydrocarbons as gasoline
TPHD Total petroleum hydrocarbons as diesel
mg/ℓ Milligrams per kilogram
μg/ℓ Micrograms per kilogram
ND Not detected in excess of detection limit
VOC Volatile organic compounds
SVO Semivolatile organic compounds

SVO's detected in sample HPSB3:

Fluorene 0.0038 mg/ℓ
Phenanthrene 0.010 mg/ℓ
2-methylnapthalene 0.011 mg/ℓ

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Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Selection of Indicator Chemicals

METAL	Sb	As	Ba	Be	Cd	Cr VI	Co	Cu	Pb	Hg	Mo	Ni	Se	Tl	V	Zn
VALUE																
A	55	22	970	0.81	30	150	11	250	23,000	10	5.6	57	7.0	30	47	2,300
C	0.0004	NV	0.05	0.0005	0.0003	NV	NV	0.037	0.0014	0.0003	NV	0.01	0.003	0.0004	0.02	0.21
D	NV	15	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV
E	2,500		20	2,000	3,333	0		27	714	3,333		100	333	2,500	50	5
G	137,500		19,400	1,620	99,900	0		6,750	16,422,000	33,330		5,700	2,331	75,000	2,350	11,500
I		330														
K	16,817,381															
M	330															
O	0.01		0.0012	0.0001	0.006	0		0.0004	0.98	0.002		0.0003	0.00014	0.004	0.00014	0.0007
Q		1														

KEY TO TABLE 6.1.2

VALUE	DESCRIPTION
A	Highest Soil Concentration Detected (Cih) (mg/kg)
C	Chronic Reference Dose (RfD) (mg/kg day^{-1})
D	Slope Factor (SF) ($[mg/kg/day]^{-1}$)
E	Inverse of the Chronic Reference Dose (1/RfD)
G	(Cih)(1/RfD)
I	(Cih)(SF)
K	Total Risk Factor (RfD basis) Rih(RfD) = Sum of (Cih)(1/RfD)
M	Total Risk Factor (SF basis) Rih(SF) = Sum of (Cih)(1/SF)
O	(Cih)(1/RfD) / Rih(RfD)
Q	(Cih)(SF) / Rih(SF)

METALS

Sb	Antimony
As	Arsenic
Ba	Barium
Be	Beryllium
Cd	Cadmium
Cr VI	Chromium VI
Co	Cobalt
Cu	Copper
Pb	Lead
Hg	Mercury
Mo	Molybdenum
Ni	Nickel
Se	Selenium
Ag	Silver
Tl	Thallium
V	Vanadium
Zn	Zinc

RfDs and SFs were obtained from the USEPA's Superfund Public Health Evaluation Manual, [SPHEAM] October 1986.

NV = No Value

TABLE 6.1.3

Preliminary Endangerment Assessment

Phoenix 524
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Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

List of Indicator Chemicals

INDICATOR CHEMICAL	CHRONIC REFERENCE DOSE (RfD)	SLOPE FACTOR (SF)
Antimony	0.00004 mg/kg-day	NV
Arsenic	NV	15 $(mg/kg\text{-}day)^{-1}$
Cadmium	0.0003 mg/kg-day	NV
Cr VI	NV	NV
Lead	0.0014 mg/kg-day	NV

TABLE 6.5.1.a

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Chronic Hazard Quotient and Chronic Hazard Index

Ingestion

INDICATOR CHEMICAL	Antimony	Cadmium	Lead	CHI (Child)	CHI (Adult)
MAXIMUM CONCENTRATION 0 - 3 FBGS (mg/kg)	12	12	23,000		
RfD (mg/kg-day)	0.0004	0.0003	0.0014		
I (mg/kg-day) [child]	1.5×10^{-4}	1.6×10^{-4}	0.3		
CHQ Child	0.4	0.5	214	216	
I (mg/kg-day) [adult]	5.9×10^{-6}	5.9×10^{-6}	1.1×10^{-2}		
CHQ Adult	0.02	0.02	8		8

TABLE 6.5.1.b

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Chronic Hazard Quotient and Chronic Hazard Index

Dermal Contact

INDICATOR CHEMICAL	Antimony	Cadmium	Lead	CHI (Child)	CHI (Adult)
MAXIMUM CONCENTRATION 0 - 3 FBGS (mg/kg)	12	12	23,000		
RfD (mg/kg-day)	0.0004	0.0003	0.0014		
AD (mg/kg-day) [female child]	4.7×10^{-5}	4.7×10^{-5}	9×10^{-2}		
AD (mg/kg-day) [male child]	4.8×10^{-5}	4.8×10^{-5}	9×10^{-2}		
CHQ Child (Female)	0.12	0.16	64.3	**64.6**	
CHQ Child (Male)	0.12	0.16	64.3	**64.6**	
AD (mg/kg-day) [adult]	1.1×10^{-6}	1.1×10^{-6}	2.1×10^{-3}		
CHQ Adult	0.0027	0.0036	1.5		**1.51**

TABLE 6.5.2.a

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Cancer Risk - Ingestion

POTENTIAL CARCINOGEN	MAXIMUM CONCENTRATION 0 - 3 FBGS (mg/kg)	SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$	I [child] (mg/kg-day)	CR (child)	I [adult] (mg/kg/day)	CR (adult)
Arsenic	19	15	2.4×10^{-4}	3.6×10^{-3}	9.3×10^{-6}	1.4×10^{-4}

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TABLE 6.5.2.b

Preliminary Endangerment Assessment

Phoenix 524
524 Cedar Street
Oakland, Alameda County, California

BASELINE RISK ASSESSMENT

Cancer Risk - Dermal Contact

POTENTIAL CARCINOGEN	MAXIMUM CONCENTRATION (0 - 3 FBGS) (mg/kg)	SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$	AD [Female child] (mg/kg-day)	AD [Male child] (mg/kg-day)	CR (child) (average)	AD [adult] (mg/kg/day)	CR (adult)
Arsenic	19	15	7.4×10^{-5}	7.6×10^{-5}	1.5×10^{-4}	1.8×10^{-6}	2.7×10^{-5}