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Record of Decision:

LORENTZ BARREL & DRUM CO.
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SAN JOSE, CA
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RECORD OF DECISION

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LORENTZ BARREL & DRUM

SUPERFUND SITE

SAN JOSE, CA

August 26, 1993

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

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LIST OF ACRONYMS

ADI	Acceptable Daily Intake
AL	Action Level
AOC	Administrative Order on Consent or Area of Contamination
ARARs	Applicable or Relevant and Appropriate Requirements
BAAQMD	Bay Area Air Quality Management District
BDAT	Best Demonstrated Available Technology
bgs	below ground surface
BHRA	Baseline Health Risk Assessment
BNA	Base/Neutral and Acid Extractables
Cal-EPA	California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
CFR	Code of Federal Regulations
CCR	California Code of Regulations
CCS	Current Conditions Scenario
CD	Consent decree
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Cleanup Liability Information System
COCs	Contaminants of concern
CPFs	Cancer Potency Factors
CRP	Community Relations Plan
CRQL	Contract Required Quantitation Limit
DCA	Dichloroethane
DCE	Dichloroethene
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DHS	Department of Health Services (State of California)
DRE	Destruction Rate of Efficiency
DTSC	Department of Toxic Substances Control (formerly part of DHS; now part of Cal-EPA)
EE/CA	Engineering Evaluation/Cost Analysis
EETB	Environmental Epidemiology and Toxicology Branch (part of State of California Department of Health Services)
FR	Federal Register
FS	Feasibility Study
FUS	Future Use Scenario
GAC	Granulated Activated Carbon
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HOC	Halogenated Organic Compound
IDLs	Instrument Detection Limits
IRIS	Integrated Risk Information System
kg	Kilogram
LB&D	Lorentz Barrel & Drum
LDR	Land Disposal Restriction
LSGTF	Lorentz Shallow Groundwater Task Force
LSP/PHE	Limited Sample Plan/Public Health Evaluation
MCL	Maximum Contaminant Levels
mg	milligram
msl	mean sea level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU-1	Operable Unit One
OU-2	Operable Unit Two
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PCDD	Polychlorinated Dibenzodioxin
PCDFs	Polychlorinated Dibenzofuran

PCE	Tetrachloroethene
PCP	Pentachlorophenol
ppb	parts per billion
ppm	parts per million
PRPs	Potentially Responsible Parties
PSS	Pacific Sandblast Services
RD/RA	Remedial Design/Remedial Action
RfDs	Chronic Reference Doses
RFI	Recycled Fibers, Inc.
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act of 1986
SCVWD	Santa Clara Valley Water District
SIP	State Implementation Plan
SJSU	San Jose State University
SJWC	San Jose Water Company
SVE	Soil Vapor Extraction
TBC	To-Be-Considered
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCDFs	Tetrachlorodibenzofurans
TCE	Trichloroethene
TSCA	Toxic Substances Control Act
TTLC	Total threshold limit concentration
URS	URS Consultants, Inc.
USC	United States Code
VOC	Volatile Organic Compound

PART I: DECLARATION

1.0 SITE NAME AND LOCATION

Lorentz Barrel & Drum Superfund Site
South Tenth Street and East Alma Avenue
San Jose, California 95112

EPA ID# CAD 029295706

2.0 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedial actions for Operable Unit One (OU-1) at the Lorentz Barrel & Drum (LB&D) Superfund site in San Jose, California. This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. 9601 et seq., and, to the extent practicable, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 (National Contingency Plan [NCP]). The attached administrative record index (Attachment A) identifies the documents upon which the selection of the remedial action is based.

The State of California, through the California Environmental Protection Agency's (Cal-EPA) Department of Toxic Substances Control (DTSC), concurs with the selected remedy.

3.0 ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the LB&D site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

4.0 DESCRIPTION OF THE REMEDY

This operable unit (OU-1) addresses all remaining sources of contamination not already addressed by the removal of barrels, drums, and soils completed in 1988; the removal of structures, sumps, drums, and debris scheduled for 1993 and 1994; and the Operable Unit 2 (OU-2) shallow groundwater extraction and treatment system. Therefore, the OU-1 remedy selected in this ROD is considered and referred to as the "final remedy" for the LB&D site. While this remedy addresses contaminated soil, one of the principal threats at the LB&D site, OU-2 will continue to address the principal threat posed by contaminated shallow groundwater.

The selected remedy, which addresses soil, groundwater, vadose zone soil gas in residential areas, vertical and horizontal conduits, structures, debris, and residues, consists of the following major components:

(1) Treatment by soil vapor extraction (SVE) of principal threat soil containing volatile organic compounds (VOCs) at concentrations that total more than 1 ppm;

(2) Containment by a cap (single layer asphaltic-concrete pavement without leachate collection or monitoring systems) using long-term maintenance to ensure elimination of the exposure pathway to building pads and soil contaminated with non-mobile chemicals (e.g., polychlorinated biphenyls (PCBs), pesticides, and metals);

(3) Removal and off-site disposal of contaminated septic system and sewer line following their excavation to reduce potential exposure to or migration of contaminated residues;

(4) Removal and off-site disposal of contaminated incinerator ash, stockpiled soil containing greater than 50 parts-per-million PCBs, nonessential wells acting as potential conduits, miscellaneous debris and the uncontaminated warehouse;

(5) Monitoring for VOCs in deeper aquifers and in soil gas near selected residences to provide advance warning in the unlikely event that significant migration of shallow groundwater contaminants begins;

(6) Reviews of the protectiveness of the selected remedy to occur at least once every five years in accordance with Section 121(c) of CERCLA; and

(7) Land use restrictions to prevent well construction (for water supply purposes) in source areas that remain contaminated and deed restrictions for those properties (LB&D, Recycled Fibers, Inc. [RFI] and the adjacent sidewalk area belonging to the City of San Jose) that contain contaminated soil exceeding cap action levels. Restrictions will prohibit residential development and will limit industrial development to activities that do not breach the integrity of the cap or do not mobilize the soil contaminants. Restrictions will also preclude excavation, other than temporary subsurface work beneath the cap and will require complete restoration of any disturbed fill or cap once any such temporary work is completed.

5.0 STATUTORY DETERMINATIONS

5.1 PROTECTIVENESS

The selected remedy is protective of human health and the environment. Protection is achieved at this industrial site, and in the aquifers extending beyond the former LB&D facility, in the following ways:

(1) The cap will protect humans from direct contact with building pads and contaminated soil present at or adjacent to the former LB&D facility. In addition to the LB&D and RFI properties, the cap will cover all adjacent soil (e.g., adjacent city sidewalk area) that exceeds the cap action levels for contaminants of concern (COCs). Risk will be reduced to zero because the cap breaks the exposure pathway. Soil adjacent to LB&D site boundaries would not be subject to the cap because it does not exceed cap action levels. The cap will also minimize contaminant leaching by surface water infiltration.

(2) Extraction of VOC-contaminated soil vapors followed by capture of the VOCs on granular activated carbon will protect the shallow groundwater from further degradation by these highly mobile contaminants. Health risks from the VOCs would be eliminated because they will be destroyed during regeneration of the granular activated carbon.

(3) Removal and off-site disposal of non-essential wells located in the vicinity of the shallow groundwater contamination plume will reduce the potential for the wells to act as vertical migration conduits for shallow groundwater contaminants. In addition, excavation and off-site disposal of the contaminated septic system and sewer line will reduce potential exposure to or migration of contaminated residues.

(4) Removal and off-site disposal of contaminated incinerator ash from the LB&D facility operations, stockpiled soil containing greater than 50 ppm PCBs, and contaminated debris and residues will prevent future direct human contact with these contaminated materials.

(5) Additional protection from future potential human exposure to contaminated groundwater will be provided by a mechanism for early warning in the unlikely event that shallow groundwater contaminants migrate towards the deep, drinking water aquifer. Both the intermediate and deep aquifers will be monitored for VOCs on a semi-annual basis to alert the community if VOCs are detected. In a similar fashion, monitoring of the soil gas near residences situated above the shallow groundwater plume will provide advance warning in the unlikely event that VOCs begin a significant migration towards the confined spaces of dwellings.

(6) Land use restrictions will prevent well construction (for water supply purposes) in source areas that remain contaminated. Deed restrictions will be imposed for those properties (LB&D, RFI, and the adjacent sidewalk area belonging to the City of San Jose) that contain contaminated soil exceeding cap action levels. Deed restrictions will prohibit residential development and will limit industrial development to activities that do not breach the integrity of the cap or do not mobilize the soil contaminants. Restrictions will also preclude excavation, other than temporary subsurface work beneath the cap and will require complete restoration of any disturbed fill or cap once any such temporary work is completed.

5.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy complies with federal and state requirements that are legally applicable, or relevant and appropriate (ARARs) to the remedial action.

5.3 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedy will use SVE to treat all of the VOC contaminated soil, which is about 15 percent of the contaminated soil at the LB&D site. This in situ treatment will occur only on the LB&D property. Extracted VOCs will be captured on granular activated carbon and subsequently destroyed off-site during the carbon regeneration process. No other treatment processes are involved in the final remedy, mostly because of the lack of technologies that can effectively treat the heterogeneous mix of LB&D soil COCs. Because principal threat soil is treated, the selected remedy satisfies the statutory preference for treatment as a principle element of the remedy.

5.4 USE OF PERMANENT SOLUTIONS, ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES

Permanent solutions, alternative treatment and alternative resource technologies were evaluated during the Feasibility Study (FS), but were not determined to be practicable or cost effective for most of the contaminated soil at the LB&D site, largely because of the heterogeneous mixture of COCs. By its use of SVE for principal threat soil, the selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on-site above health-based levels and the cap will require long-term routine maintenance, a review will be conducted within five years after commencement of the remedial action and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

5.5 COST EFFECTIVENESS

The remedy is cost effective because adequate protection is achieved for the estimated cost of performance. The analysis contained in the FS and this ROD demonstrates that additional remedial action and the cost associated with that action would not achieve a significantly greater reduction in risk, but would result in a dramatically higher cost. The FS and this ROD also show that a lesser effort and a lower cost would result in a measurably higher risk at the LB&D site.

5.6 SUMMARY

The selected remedy is protective of human health and the environment, complies with ARARs, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because the remedy will result in hazardous substances remaining on-site above health-based levels, a five-year review, pursuant to Section 121(c) of CERCLA, 42 U.S.C. 9621(c), will be conducted at least once every five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

PART II: DECISION SUMMARY

This Decision Summary provides an overview of the problems posed by the LB&D Superfund site, the remedial alternatives, and the analysis of the remedial alternatives. This Decision Summary explains the rationale for the remedy selection and how the selected remedy satisfies the statutory requirements.

1.0 SITE NAME, LOCATION, AND DESCRIPTION

1.1 SITE NAME AND LOCATION

Lorentz Barrel & Drum Superfund Site
1515 South Tenth Street
Corner of South Tenth Street and East Alma Avenue
San Jose, California 95112

CAD # 029295706

The LB&D site is located at the above address in Santa Clara County, about 13 miles southeast of the southern tip of San Francisco Bay (Figure 1.1). The LB&D site is defined as all land previously used for LB&D facility operations and all areas where contamination from the LB&D facility operations has come to reside. The LB&D site includes a contaminated shallow groundwater plume area and properties containing contaminated soil, structures, debris, and residues. Figure 1.1 shows the locations of the various areas of the LB&D site that are defined and described below. For purposes of reference, the first appearance of a defined area in the text below is underlined. These defined terms will be used throughout the remainder of this document.

The original LB&D property consisted of 10.5 acres located at the southern corner of South Tenth Street and East Alma Avenue in the City of San Jose. A 3.78-acre portion of the original property was never significantly involved in the LB&D drum recycling operations and was transferred shortly after the LB&D operations began. This portion includes the 3.39-acre Norton/Phelps property and a 0.39-acre Western Pacific Railroad easement. This portion is located at the southeastern end of the original LB&D property and is not considered part of the LB&D site.

The remaining 6.72-acre portion of the original 10.5-acre LB&D property that is contaminated from operations of the former LB&D facility is part of the LB&D site. This portion includes the LB&D property, defined as the 5.25-acre, L-shaped parcel that contained the LB&D facility operations in 1987. The former LB&D facility included all the buildings, equipment, and land that LB&D used in operating the drum recycling business from 1947 onward. Before 1981, facility operations also occurred on neighboring property, currently owned by RFI, that once was part of the original 10.5-acre LB&D property. The 1.47-acre RFI property includes the 1.32-acre RFI parcel (388 East Alma Avenue) that is occupied by the RFI paper recycling business operations (formerly known as Arata Western) and the 0.15-acre Pacific Sandblast Services (PSS) parcel (400 East Alma Avenue) that is occupied by the PSS business operations. PSS once leased its parcel from LB&D and now leases its parcel from RFI.

In addition to the former LB&D facility property, the LB&D site also includes a limited amount of adjacent City of San Jose property. The adjacent city sidewalk area is defined as soil belonging to the City of San Jose located between the LB&D property fence lines parallel to East Alma Avenue and to South Tenth Street and their respective street pavements. While the former LB&D facility operation did not officially involve the adjacent city sidewalk area, it is likely that contaminated runoff from the LB&D property contaminated soil beneath the sidewalks.

Finally, the area above the shallow groundwater plume is also part of the LB&D site, although there is no known surface or shallow soil contamination in this area, except for those portions of the plume that lie under LB&D, RFI, and adjacent city sidewalk area properties.

1.2 TOPOGRAPHY

The topography of the LB&D property is nearly flat, with a slight slope from the southwest corner to the northeast corner. The highest elevation at the southwest corner is 106 feet above mean sea level (msl), and the lowest point at the northeast corner is 102 feet above msl. The regional topography slopes gradually to the north toward Coyote Creek. Elevations south of the LB&D site are between 105 and 110 feet above msl and gradually decrease in the northerly direction toward Coyote Creek to between 95 and 100 feet above msl.

1.3 ADJACENT LAND USE

The LB&D and RFI property, and the surrounding area to the south and west are zoned for commercial/industrial use per the City of San Jose Planning Department. The predominant zoning within a 1-mile radius of the LB&D property is commercial/industrial. The residential and recreational district to the north and east of the LB&D property includes Spartan Stadium (San Jose State University [SJSU] football stadium), San Jose Municipal Stadium (City of San Jose), and SJSU recreation fields. The City of San Jose intends to maintain and further develop the recreational uses of land to the north and east of the LB&D site.

The closest residence to the LB&D property is the SJSU student housing on South Tenth Street, located approximately 700 feet north. Single family residential houses are located 1,100 feet north of the LB&D property. Less than 3,000 people are estimated to live within a 1-mile radius of the LB&D property.

1.4 HISTORICAL LAND USE

The majority of the San Jose area developed from agricultural use to the current predominant residential/commercial/industrial use. Review of a 1939 aerial photograph indicates that, prior to development of the LB&D and RFI properties, the nearest developments to the LB&D property consisted of Spartan Stadium to the northwest, SJSU tennis courts to the north, residential housing to the north, and railroad tracks to south.

A 1954 aerial photograph shows the LB&D drum reconditioning facility, including two warehouses. Other facilities on the original LB&D property included an auto wrecker in the southwest corner, California Roofing and Lou Jones Construction to the south of the LB&D facility and PSS to the north. Drums were stored on most of the open areas at the former LB&D facility, including at least half of the property that is now owned by RFI.

Between 1954 and 1968, the warehouse to the west of the processing facility was reportedly destroyed by fire and other structures were added or modified. The 1971 aerial photograph indicates that the northwest portion of the LB&D property (part of the RFI property) was fenced from the remainder of the LB&D property. This property was used as a junkyard. The 1976 aerial photograph of the current RFI property shows that the area was filled with automobiles (presumably junked), while in a 1980 aerial photo, the majority of the automobiles were gone. The 1982 aerial photograph shows the main RFI facility constructed. The basic structures on the LB&D property remained largely unchanged after 1968. From the photo, it appears that roadway improvements and sidewalk additions on both East Alma Avenue and South Tenth Street, which occurred in the late 1970s or early 1980s, may have covered over portions of land impacted by the LB&D facility operations.

1.5 GEOLOGY

The LB&D site lies near the axis of the Santa Clara Valley (a deep, broad, northwest tending alluvial basin) situated between the Santa Cruz Mountains to the southwest and the Diablo Range to the northeast. The basin sediments are divided into the lower Plio-Pleistocene Santa Clara Formation, which is somewhat consolidated and has been slightly deformed, and the upper Quaternary alluvium, which is poorly consolidated. Both units consist of interbedded gravel, sand, silt, and clay and cannot be reliably differentiated in well logs.

1.6 HYDROGEOLOGY

Water that is considered part of the LB&D site is comprised of the shallow and deep aquifers. The LB&D site is located in the southeastern region of the San Jose water resources subarea. This groundwater basin subarea is an important groundwater source due to the extent, thickness, and permeability of the deep water-bearing units. Numerous water-bearing units (aquifers) underlie the LB&D site, separated by thick low-permeability marine clay layers (aquitards) formed during past incursions of San Francisco Bay.

There are four predominantly granular water-bearing or potentially water-bearing subsurface zones below the LB&D site. These zones have been designated with respect to increasing depth below ground surface (bgs) as Zone A, Zone B, Zone C, and Zone D as shown in Figure 1.2. The contaminated shallow groundwater currently located in Zone B comprises OU-2. If contaminated groundwater from Zone B also comes to exist in Zone A (e.g., a rise in the water table or resaturation), Zone A groundwater would be addressed under OU-2. The deep aquifer (Zones C and D) and potential conduits between the shallow and deeper aquifers comprise the groundwater portion of OU-1. Unsaturated portions of Zone A lying above the contaminated groundwater in Zone B contain low levels of VOCs. VOC-contaminated soil gas and soil in Zone A are considered part of OU-1.

Zone A extends from the existing grade to approximately 20 feet bgs and is comprised of sand and silty sand with occasional lenses of silt and clay. Soil borings completed through Zone A indicate that the soils are generally dry, although it may contain seasonal perched groundwater. Zone A is underlain by a 2- to 7-foot-thick clay/silty clay aquitard with occasional local sandy to clayey silt discontinuities near or under the LB&D site that connect Zone A to the underlying Zone B.

Zone B contains VOCs as groundwater contamination (Figure 1.3) and is predominantly comprised of sands and silty sands with occasional lenses of sandy gravel, silt, and silty clay. These soils are encountered at depths starting at approximately 25 feet bgs. Zone B is a semi-confined aquifer and is currently the uppermost water-bearing unit under the LB&D site. Groundwater levels in Zone B range from approximately 18 to 30 feet bgs and the flow direction is northerly. Conduits may exist which could transfer VOC contaminants from the shallow aquifer to deeper aquifers.

Underlying Zone B is an approximately 35-foot-thick aquitard, encountered at depths from approximately 35 feet bgs to approximately 70 feet bgs. This unit is comprised primarily of very stiff clay/silty clay with occasional, discontinuous lenses of silt separating the shallow aquifer contamination from contaminating Zone C.

Zone C (starting from approximately 70 feet bgs) is predominantly comprised of sand and gravel and has a groundwater flow direction to the northwest.

According to Santa Clara Valley Water District (SCVWD), the granular, water-bearing soils in Zones B and C comprise the regional upper aquifer. The SCVWD indicates that groundwater usage in the regional upper aquifer is limited to local domestic or agricultural purposes. However, the SCVWD also indicates that

some of the deep production wells in the groundwater basin may be extracting water from both the upper and lower zones because of the placement of multiple perforations. This is the case for the SJSU Spartan Stadium well and for the Kelley Park well; both are gravel-packed across the Zone C and Zone D aquifers.

An approximate 100-foot-thick aquitard, consisting of silts and clays, separates Zone C from Zone D. Zone D (encountered from 230 to 1,000 feetbgs) is comprised of thick beds of sand and gravel interbedded with thick beds of silty and sandy clay. Zone D comprises the regional lower aquifer, or deep aquifer, from which Santa Clara Valley extracts an estimated 107,000 acrefeet of groundwater a year for irrigation and domestic uses. The San Jose Water Company (SJWC) maintains and operates the 12^{th} Street well field, located on 12th Street, approximately 0.75 miles north and downgradient of the LB&D property. The well field consists of nine production wells which extract groundwater from the Zone D aquifer for use as a municipal drinking water supply for approximately 33,000 households in the area. Water levels in wells at the 12th Street well field range from approximately 75 feet bgs to 150 feet bgs under pumping conditions. The expected gradient for Zone D is toward the north. At locations within the vicinity of the LB&D site, the gradient is influenced by the SJWC 12^{th} Street well field.

1.7 WATER USE

The LB&D site is located in the southeastern corner of the San Jose subarea as defined by the California Department of Water Resources. This subarea is one of the most important natural sources of groundwater in the south San Francisco Bay area (South Bay). The deep aquifer (250 to 400 feet bgs) is a major source of potable groundwater, from which it is estimated that Santa Clara Valley extracts 107,000 acre-feet per year. Three public water supply well fields (owned by SJWC), located at the 12th Street, Cottage Grove, and Needles Stations, are within 1 mile of the LB&D site. An SJSU well is located at the Spartan Stadium.

Groundwater in the area is used for drinking and irrigation. The nearby water wells all draw water from screened intervals located at depths greater than 150 feet bgs. The principal groundwater extraction wells for drinking water purposes are located in the Zone D aquifer and are operated by the SJWC. The SJSU Spartan Stadium well is used for both potable and irrigation purposes. The Kelley Park well provides water for the fish pond and is not used as a potable water supply. There are no extraction wells located in the Zone B aquifer other than those used for treatment of the contaminated groundwater.

Coyote Creek is located less than 0.5 miles northeast of the LB&D property. Historically, the primary uses of water from this creek have been agricultural and to some extent recreational. Its current principal value is the contribution to the ecology of the South Bay. No other surface waters are located within 2 miles of the LB&D site.

1.8 STRUCTURES

Approximately 2.75 acres of the LB&D property have been paved with a tar and gravel mixture (chipped seal) to cover an area once used for drum storage. The paved area overlies soils which are discolored and potentially contaminated. A small portion of this 2.75 acres is covered by an asphaltic concrete cover installed by LB&D. The other 2.5 acres of the LB&D property are unpaved but are covered by five buildings which housed the drum reconditioning facilities, several sumps, an open storage bin located adjacent to the processing facility, various piles of wood, rusted metal debris, numerous empty drums and numerous non-hazardous drums. All of these structures and materials, with the exception of an intact warehouse and drums of ash, are scheduled to be removed in 1993 and 1994 by a group of potentially responsible parties (PRPs) under an Administrative Order on Consent (AOC) as more fully described below. Figure 1.4 shows the locations of existing and former facilities. Some of the facility structures, numerous barrels and limited amounts of soil were removed from the LB&D site during 1987 emergency response actions conducted by the California Department of Health Services' (DHS's) toxic substances control division, (now known as DTSC, a part of Cal-EPA).

The RFI property includes both the RFI and PSS parcels, as shown in Figure 1.4. The RFI parcel is completely covered by a concrete slab, and the PSS parcel is entirely covered by asphalt.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 HISTORY OF SITE ACTIVITIES

The Lorentz family started recycling drums at the former LB&D facility in 1947. During the early years, portions of the original LB&D property (10.5 acres) were also rented or leased to other companies. Several facilities were in operation on the LB&D property around 1954, including an auto wrecker, a junkyard, a roofing company, a construction company, and sandblasting services.

Drums for recycling were received from both private and public sources throughout California and Nevada. Private sources included over 2000 different companies and individuals, representing chemical, food, health care, electronics, paint, ink, and paper industries. Public sources included military bases, research laboratories, and county agencies. Many drums arrived at the LB&D facility containing residual aqueous wastes, organic solvents, acids, oxidizers, and oils.

The LB&D facility operations consisted in part of emptying all residues, cleaning, resealing, repainting, and reselling the drums. Residues were removed from the drums by various methods, including caustic and acid washes, incineration, blasting with steel shot, and steam cleaning. Drums were then resurfaced, resealed, and repainted using various substances, including phenolic epoxy resins and rust inhibitors.

From the 1950s until some time between 1976 and 1978, a drainage ditch from the processing facility was utilized to drain wastes. The drainage ditch discharged to a large sump (approximately 30 by 80 feet) located in the northern corner of the LB&D property bounded by the corner of East Alma Avenue and South 10th Street. Aerial photographs of the LB&D site from that time period reveal the presence of liquids in the sump, drainage ditch, and various ponded areas. The sump discharged to the storm drain system. Between 1968 and 1971, the discharge was diverted to the sanitary sewer.

Previous investigations have indicated that discharge to the sanitary sewer ceased in 1983 or 1984. After 1984, liquid wastes were reportedly reduced in volume by evaporation, drummed, and disposed as hazardous waste along with incinerator ash, residual liquids, and sludge. Surface runoff was reportedly collected and recycled in the hot caustic wash cycle of the drum recycling process. As a result of the LB&D facility operations, a large variety of chemical residues from drums delivered to the LB&D site, as well as chemicals used by the LB&D facility in its drum reconditioning processes, have contaminated soil, structures, and shallow groundwater at and beneath the LB&D site. Contaminated groundwater has also migrated about 2,000 feet north of the LB&D property.

The LB&D facility ceased operations in 1987. In late 1987 and early 1988, DTSC and the U.S. Environmental Protection Agency (EPA) conducted emergency response actions at the LB&D site that included removal of 3,000 cubic yards of highly contaminated soils at the former main sump area and over 26,000 drums, some of which contained residues. At the conclusion of the removal action, the majority of the LB&D property was paved over.

In 1992, pursuant to a Consent Decree (CD) with EPA, a group of eleven PRPs, known as the Lorentz Shallow Groundwater Task Force (LSGTF), completed construction of and began operating a shallow groundwater extraction and treatment system. This system addresses the VOC contamination of groundwater beneath the LB&D site, as well as the plume that extends approximately 2000 feet north from the former main sump.

Recently, a separate group of seven PRP companies, known as the Structures Removal Group, has begun a removal of buildings, sumps, drums, and miscellaneous debris pursuant to an AOC with EPA. They are expected to complete the removal in 1994.

2.2 HISTORY OF SITE INVESTIGATIONS

Since 1981, there have been several environmental sampling studies at the LB&D site aimed at investigating the nature and extent of contamination. Over a period of 6 years DTSC and LB&D have collected soil and groundwater samples from on-site and off-site monitoring wells. Numerous metals, organics, and PCBs were found above Total Threshold Limit Concentrations (TTLC). Sampling results from these efforts are summarized in Section 5.0 of this Decision Summary.

In 1988, EPA began field activities for the Remedial Investigation (RI). The RI included sampling and analysis of surface and subsurface soil, facility structures, groundwater, sediments, and surface water; a geophysical survey; topographic surveying and mapping; pump tests; borehole geophysics; geotechnical sampling; air sampling; and biota sampling. Additionally, a limited well survey was performed, and potential conduits were investigated.

Beginning in 1991, EPA commenced field activities for six RI addenda. For RI Addendum No. 1, EPA installed eight Zone B, one Zone C, and one Zone D monitoring wells to better define the groundwater contaminant plume boundaries and to provide deep aquifer monitoring. RI Addendum No. 2 included sampling of 30 soil borings on the RFI property to assess the impact of the LB&D operations on the RFI property. RI Addendum No. 3 updated the Baseline Health Risk Assessment (BHRA) contained in the RI by evaluating soil risks under a residential use scenario. It also modeled and evaluated potential risk from the vapor-phase migration of groundwater contaminants up to the surface and into confined spaces of buildings located above the plume.

In RI Addendum No. 4, EPA assessed the location and status of potential conduits and whether additional conduits existed along the leading edge of the plume. In RI Addendum No. 5, EPA investigated the stockpiled soil excavated from the treatment facility foundation to assess the soil contamination present. The sampling results of the stockpiled soil were compared with previous investigation results to evaluate heterogeneity of LB&D soil. For RI Addendum No. 6, EPA installed one Zone C monitoring well to serve as a warning well for the SJSU Spartan Stadium well and to better define the characteristics of the Zone C aquifer immediately downgradient from the original source area.

In addition, various sampling and analysis activities have been performed by the Structures Removal Group as part of the removal of structures, debris, equipment, and drums. Specific sampling activities have been performed on drum contents, sump liquids, and building materials.

2.2.1 Soil

2.2.1.1 Soil With Health-Risk-Based COCs

There are two basic categories of soil COCs that remain at the LB&D site. Some contaminants have been identified as health-risk-based COCs because they contribute a significant level of cancer or non-cancer risk for direct exposure as determined in the RI risk assessment. All of the contaminated soil at the LB&D site contains health-risk-based COCs. However, most of this soil poses a low level threat because the COCs have low mobility in the environment, and are present near health-based levels.

In a few small areas near former sumps, the soil also contains VOCs at concentrations that threaten to contaminate groundwater. VOCs are not included as health-risk-based COCs because of their limited occurrence in contaminated soils and the absence of a direct human exposure threat from their presence in soil. Instead they are considered a separate category of COCs because they represent a principal threat to the groundwater environment.

LB&D Property. The 5.25 acre LB&D property was originally investigated by LB&D in 1982, by DTSC and EPA in the mid and late 1980s, and most recently by the Structures Removal Group as part of the waste profiling necessary for off-site disposal. A discussion of the sampling performed on the LB&D property on the surface, subsurface and stockpiled soil is presented below.

Surface soil. Limited investigations of the surface soil have been conducted by LB&D and DTSC in addition to EPA's RI soil sampling. Data collected by LB&D and DTSC are of limited use because the data were not validated. EPA conducted the RI starting in 1988 and issued the RI Report in 1990. The focus of the RI was on the LB&D property. However, off-site surface samples were taken to assess background chemical concentrations.

Subsurface soil. Investigation of the subsurface soil was conducted as part of the RI. RI Addendum No. 5 reported the results of three additional soil borings sampled to assess heterogeneity of the LB&D site's soil contaminants.

Stockpiled soil. During the geotechnical investigation conducted for the LSGTF shallow groundwater treatment facility, pesticide and PCB contamination was encountered. During excavation activities, the LSGTF removed and stockpiled approximately 1,000 cubic yards of potentially contaminated soil at the LB&D property. A portion of this stockpiled soil (10 cubic yards) was excavated for installation of a utility line to service the treatment facility. The stockpiled soil was subsequently investigated (RI Addendum No. 5) to assess contaminant levels and heterogeneity in the LB&D site soil contaminants.

Neighboring Properties. The neighboring properties consist of the RFI property and the adjacent City of San Jose sidewalk area bordering the LB&Dproperty. The RFI property was investigated as part of RI Addendum No. 2. The sidewalk area was not directly investigated, but EPA believes that there is contamination based on RI results from soil samples taken adjacent to the sidewalk and on a 1954 aerial photograph. Runoff from the former LB&D facility flowed over the sidewalk area nearest the corner of E. Alma Avenue and South Tenth Street.

2.2.1.2 Principal Threat Soil

The principal threat soil poses a potential groundwater threat and is defined as soil containing VOCs at a combined total concentration greater than 1 part per million (ppm). The principal threat soil has been identified through the soil borings conducted alongside the sumps and from samples taken of the sump contents.

2.2.1.3 Vicinity/Background Soil

EPA performed the vicinity/background sampling as part of the Limited Sample Plan/Public Health Evaluation (LSP/PHE) and the RI. The LSP/PHE investigated off-site garden soil for pesticide and PCB contamination. The RI evaluated off-site locations to assess background concentrations of contaminants for comparison to the LB&D site contamination.

2.2.1.4 Coyote Creek Sediments

The sediments in Coyote Creek were investigated to assess if discharges from the LB&D site to the storm drain impacted Coyote Creek. Investigations were conducted during both the LSP/PHE and RI to assess temporal trends.

2.2.2 Water

Water concerns at the LB&D site involve groundwater (Zones A - D) and the surface water of Coyote Creek (0.5 miles to the east).

Groundwater (Zones A-D). The Zone B shallow groundwater contains the contaminant plume. Zone A is currently dry. The deeper Zones C and D aquifers are used for irrigation and drinking water purposes. The Zone A through C aquifers were addressed as part of the original RI. Additional wells in Zones B, C, and D were installed as part of RI Addendum No. 1. The Zone D well (MW-44) provides an early warning mechanism in case contamination is transferred via conduits to the deeper aquifers. As part of the RI Addendum No. 6 investigation of the Zone C aquifer, EPA installed an early warning well (MW-45) upgradient of the SJSU Spartan Stadium well. The installation of MW-45 assisted in determining the regional groundwater gradient in the Zone C aquifer.

Coyote Creek. Surface water samples were collected near the Coyote Creek outfall of the storm drain once used by the former LB&D facility. Sampling was conducted for the LSP/PHE and RI.

2.2.3 Air

Soil Gas. EPA conducted modeling of the soil gas emissions due to the VOCs in the shallow groundwater contaminant plume as part of RI Addendum No. 3. The potential health risk effects were evaluated for residences above the groundwater contaminant plume.

Surface Air and Dust. EPA evaluated the surface air and dust exposure routes during the RI. The objective was to assess if soil contamination at the LB&D site was impacting breathing zones adjacent to the LB&D site. Upwind and background samples were also collected.

2.2.4 Conduits

Identification of conduits at the LB&D site includes both vertical and horizontal conduits.

Vertical Conduits. Because of the importance of attempting to locate all potential conduits that threaten to convey shallow groundwater contaminants to the drinking water aquifer, three different conduit investigations were conducted. An initial conduit survey was performed by DTSC. As part of the RI and RI Addendum No. 4, EPA performed further document investigations and door-to-door searches for potential conduits.

Horizontal Conduits. EPA conducted a limited investigation of potential horizontal conduits on the LB&D site during the RI. EPA performed a geophysical survey and subsequent test pit investigation as part of the RI. A redwood tank, which is thought to be part of the former LB&D facility septic system was encountered during the test pit investigation. In addition, sewer and water lines are suspected to exist at the LB&D property and further investigation is required to establish their existence and locations.

2.2.5 Structures/Debris

Buildings/Equipment. Wipe sampling of the buildings and equipment was conducted as part of the RI. The Structures Removal Group conducted additional sampling to better profile the buildings and equipment for off-site disposal.

Pavements/Pads. Sampling of the various concrete pads was conducted as part of the RI. The various bermed and paved areas have not been sampled because of their limited volume.

Surface Drains. The surface drains have not been sampled because of the limited volume.

However, analytical data obtained from the sump residues, which were discharged to the surface drains, indicate potential contamination of the surface drains.

Sumps. Sampling and analysis of the sump structures have not been conducted. However, the sump contents were sampled by EPA during the RI and, more recently, by the Structures Removal Group.

Septic Tank. EPA conducted an analysis of the septic tank as part of the test pit investigation (Test Pit No. 4) during the RI. Sampling was performed on the soil surrounding the septic tank.

Debris Pile and Other Debris. Although the various debris piles at the LB&D property have not been sampled, EPA conducted sampling of the adjacent buildings and equipment during the RI. Based on the adjacent sampling and field observation, EPA expects that the debris contains minimal contamination. The debris piles will be removed by the Structures Removal Group.

Remaining Drums. Various drums remain that will be removed by the Structures Removal Group. The drums are mostly empty, although some contain acids and caustics used as part of the LB&D drum cleaning operation. Because the majority of the drums do not contain materials and are limited in number, they have not been sampled.

2.2.6 Residues

Contents of Structures and Conduits. EPA has not conducted sampling of the structures and conduits. However, for those structures connecting the sumps, EPA expects that the structure and conduit residues will be similar to the residues discovered in the RI analysis of sump residues.

Sump Residues. EPA conducted an analysis of the sump residues during the RI. Subsequent sampling was conducted by the Structures Removal Group as part of the profiling necessary for off-site disposal.

Incinerator Ash. EPA conducted sampling and analysis of the incinerator ash as part of the RI. Subsequent sampling was conducted by the Structures Removal Group as part of the profiling necessary for off-site disposal of drum contents.

2.3 HISTORY OF ENFORCEMENT ACTIONS

Since 1968, federal, State, and local authorities have taken many regulatory and enforcement actions at the LB&D site. A complete chronological list of enforcement events is provided in Appendix 1-A of the RI. In summary, the major enforcement actions have included:

1968 - City of San Jose industrial waste inspector ordered Lorentz to switch sump discharge from Coyote Creek storm drain to the sanitary sewer.

1980 - California Occupational Safety and Health Administration (Cal-OSHA) informed DHS of potential problems with hazardous materials at the Lorentz facility. LB&D site is entered into EPA's CERCLIS database.

1982 - DTSC inspected the facility and issued a Notice of Violation to Lorentz for soil and groundwater contamination.

1983 - The Regional Water Quality Control Board (RWQCB) began investigating potential threats to the groundwater from sumps and other LB&D facility activities and issued Clean Up & Abatement Order No. 83007. U.S. Dept. of Fish & Game cited Lorentz for violations involving heavy metals and petroleum products in surface runoff leaving the LB&D facility and entering the storm drain to Coyote Creek.

1984 - San Jose/Santa Clara Water Pollution Control District cited Lorentz for violations and issued a cease and desist order for discharge into sanitary sewer. EPA completed a Preliminary Assessment and Site Investigation and proposed the LB&D site for the National Priorities List (NPL).

1985 - DTSC cited LB&D with 14 violations of the California Administrative Code and Federal Regulations concerning the handling and storage of hazardous wastes. The Santa Clara County District Attorney obtained a Temporary Restraining Order to close down operations at LB&D. Operations resumed after 3 months.

1986 - The Santa Clara County District Attorney filed a criminal complaint against LB&D and Ernest Lorentz which alleged the defendants had committed one felony and 13 misdemeanor violations of the California Hazardous Waste Control Act. The RWQCB issued Corrective Action Order #86-001 requiring LB&D to determine the lateral off-site extent of groundwater pollution.

1987 - The LB&D facility ceased operation. EPA assumed the lead agency responsibility for the LB&D site remediation.

1988 - EPA and DTSC completed removal of 3,000 cubic yards of highly contaminated soils and over 26,000 drums. EPA paved most of the LB&D property.

1988 - EPA issued the OU-2 ROD for expedited cleanup of the shallow groundwater.

1989 - EPA sent Special Notice to 43 PRPs to start negotiations on the OU-2 ROD. The LB&D site went from proposed to final on the NPL.

1990 - EPA and 11 PRPs (the LSGTF) signed a CD requiring the PRPs to design, construct, and operate a shallow groundwater extraction and treatment system as specified in the OU-2 ROD.

1992 - EPA and a group of 7 different PRPs (the Structures Removal Group) signed an AOC that requires the PRPs to remove from the LB&D property and dispose of the remaining barrels, asbestos, site debris, structures (except the concrete pads and the warehouse), and sumps.

1993 - EPA proposed a final remedy addressing all remaining contamination at the LB&D site.

3.0 COMMUNITY RELATIONS

The RI/FS report and Proposed Plan for the LB&D site were released to the public in May 1993. These two documents were made available to the public in both the Administrative Record and the information repositories maintained at the SJSU Library, San Jose Main Library and EPA Region 9 Superfund Records Center. The notice of the availability of these two documents was published in the San Jose Mercury News on May 19, 1993. A public comment period was held from May 17, 1993 through June 17, 1993. In addition, a public meeting was held on May 27, 1993. At this meeting, representatives from EPA answered questions about the LB&D site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD. This decision document presents the selected remedial action for the LB&D site in San Jose, California, chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the NCP. The decision for the LB&D site is based on the Administrative Record.

A more detailed description of the history of community relations activities at the LB&D site, the background on community involvement and concerns, and specific comments and responses on EPA's proposed plan for the final remedy are included in the Responsiveness Summary (Part III) of this ROD.

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION

4.1 SCOPE OF THE RESPONSE ACTION

The main objective of the response action selected as the final remedy for the LB&D site is to protect human health and the environment from all remaining releases or threats of releases of hazardous substances that have not already been addressed by previous or current cleanup actions at the LB&D site. The materials of concern include groundwater in deeper aquifers, vadose zone soil gas near residences situated above the shallow groundwater contaminant plume, vertical and horizontal conduits (e.g., old agricultural wells and sewer lines), structures and debris (e.g., septic tank), residues (e.g., LB&D incinerator ash), soil contaminated with health-risk based COCs, and, the only principal threat remaining unaddressed at the LB&D site, soil contaminated with VOCs that threaten groundwater.

The response action objectives are:

(1) Treat or remove principal threat soil that threatens to contaminate groundwater;

(2) Reduce potential exposure to other, non-mobile soil contaminants;

(3) Reduce potential exposure to contaminated structures, conduits, debris and residues;

(4) Reduce potential groundwater migration and surface water infiltration by removing non-essential wells that could act as potential conduits; and

(5) Provide advance warning to drinking water suppliers and residents in the event that shallow groundwater contaminants begin significant migration to deeper aquifers or towards confined spaces of dwellings.

To address the response action objectives, three alternatives were evaluated during the FS. Alternative 1 is the no action alternative and was evaluated as a basis for comparison with the two action alternatives. Alternative 2, involving a hybrid closure cap and soil vapor extraction, was presented as EPA's preferred alternative in the Proposed Plan. Alternative 3 involves excavation and off-site disposal of contaminated soil and other contaminated material. Each of these alternatives is described in more detail in Sections 8 and 9 of this ROD. Section 10 further describes Alternative 2 as the selected response action.

4.2 ROLE OF THE RESPONSE ACTION

The selected response action is the final remedy in a series of cleanup activities that have been or are currently being conducted at the LB&D site. In 1988 EPA and DTSC performed a joint removal of contaminated soil and drums. EPA then divided the LB&D site into two operable units. OU-1 addresses the overall LB&D site and source control while OU-2 specifically addresses the contamination in the shallow groundwater. A limited removal of sumps, structures, and debris is currently being performed by seven companies pursuant to an AOC with EPA. Because a remedy was selected for OU-2 before a remedy was selected for OU-1, the OU-1 remedy selected in this ROD is considered and referred to as the final remedy.

4.2.1 Relationship with OU-2: Shallow Groundwater Cleanup

The 1988 ROD for the OU-2 shallow groundwater response action included the following objectives: 1) control plume migration by preventing existing contamination in the shallow aquifers (i.e., Zones A and B) from migrating deeper and farther from the LB&D site, 2) attempt to retard north and northeasterly migration and discharge of contaminated shallow groundwater to Coyote Creek, and 3) remove contaminated water from the shallow aquifer to greatly reduce the possibility of contamination of potable water supplies. To meet these objectives, the 1988 ROD requires design, construction, and operation of a groundwater extraction and treatment system based in part on further information gathered during the OU-1 RI. No other separate types or zones of shallow groundwater contamination were identified during the RI.

The 1990 CD requires the LSGTF to implement the 1988 ROD. They are currently operating a shallow groundwater extraction and treatment system and monitoring the Zone B aquifer. If necessary, they will monitor the Zone A aquifer and Coyote Creek.

The groundwater extraction and treatment system design includes a contingency plan in the unlikely event that the currently operating extraction and treatment system fails to reduce contaminant levels at the leading edges of the shallow groundwater plume.

The 1988 ROD and 1990 CD for the OU-2 shallow groundwater remedy do not address all aspects of potential migration of shallow groundwater contaminants to deeper aquifers. While the ongoing shallow groundwater remedial action is directed at controlling lateral migration of the plume and eventually reducing contamination to acceptable levels, the pumping will, to some extent, also reduce potential downward migration of contaminated shallow groundwater. Since the OU-2

ROD does not directly address potential migration of shallow groundwater contaminants to deeper aquifers through conduits, the OU-1 selected remedy will address potential conduits. Remediation of deeper groundwater contamination, if any were found during the RI, has always been considered to be part of OU-1. Monitoring of deeper aquifers will be performed as part of the final remedy to verify that potential conduits are not a problem and to provide advance warning in the event that contaminants migrate to the deeper aquifers.

Although soil gas was not addressed by the OU-2 ROD, the decrease in shallow groundwater VOC concentrations resulting from implementation of the OU-2 remedial action is expected to have the complementary effect of reducing VOC concentrations in the vadose zone soil gas (Zone A). This in turn will reduce the likelihood of significant migration of VOC contaminants through soil gas towards dwellings situated above the contaminant plume. Monitoring of soil gas near residences will be performed as part of the final remedy to verify models that predicted that, even under a worst case scenario, the risk from VOCs in confined spaces would still be within the EPA acceptable risk range. Such monitoring would also provide advance warning in the event that VOCs begin significant upward migration. Unsaturated portions of Zone A containing VOC concentrations that threaten groundwater will also be addressed by the final remedy.

4.2.2 Relationship with Soil, Drums, and Structures Removals

In early 1988, EPA and DTSC removed most of the drums (over 26,000) and the most heavily contaminated sump and associated soils (3,000 cubic yards). Some full or partially full drums, empty drums, small sumps, and a variety of debris were left behind to be addressed by the OU-1 RI/FS and final remedy.

During the course of the RI/FS and the OU-2 Remedial Design/Remedial Action (RD/RA), the condition of these remaining structures and materials deteriorated and began to present further threats of releases of hazardous substances at the LB&D site. In addition, trespassers added to the threats of releases of hazardous substances by dismantling some of the facility structures and exposing asbestos covered piping. Accordingly, in 1992, EPA signed an AOC with seven PRPs (Structures Removal Group) requiring the PRPs to remove the exposed asbestos material and to contain the leaking drums. In addition, the AOC requires the Structures Removal Group to prepare an engineering evaluation/cost analysis (EE/CA) and, based on the EE/CA, to remove all remaining sumps, and most of the remaining structures, debris, and drums from the LB&D property.

Upon completion of the removal, the Structures Removal Group is required to secure the Lorentz property by boarding up the remaining warehouse, covering remaining drums of incinerator ash with a plastic covering, and paving over any exposed surface soils. In addition, they will mark the extent of sump excavations to delineate the boundary between original Lorentz soils and clean backfill. This removal action will facilitate implementation of the final remedy.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 SOURCES OF CONTAMINATION

The LB&D facility received barrels and drums for recycling from numerous businesses. The barrels and drums often contained chemical residues (e.g., solvents, PCBs, and spent cleaning fluids) from the businesses when the LB&D facility received them. These residues sent to the LB&D facility were discharged by LB&D to various sumps, drains, or the ground. The processing of the barrels and drums also led to the generation of residues such as incinerator ash. Thus, the LB&D site soil and groundwater were gradually contaminated over time by residues contained in the used barrels and drums, incineration products of those residues, and other chemicals used to handle, store, or recondition the barrels and drums.

Soil COCs chosen for evaluation at the LB&D site are listed in Table 5.1. Contaminants not chosen as COCs because of low toxicity, frequency of detection, and/or concentration are listed in Table 5.2. The materials comprising OU-1 are shown in Table 5.3.

5.2 DESCRIPTION OF CONTAMINATION

5.2.1 SOIL

The description of the soil characteristics for the LB&D site has been divided into the soil exceeding the health-risk-based cleanup standards for the COCs (Table 2-5 in the FS), the soil considered a principal threat to the groundwater, and the vicinity/background soil. The estimated volume of contaminated soil is 50,000 in place cubic yards.

5.2.1.1 Soil With Health-Risk-Based COCs

LB&D Property. Soil contamination at the LB&D site was identified during the RI through investigation of the surface,

subsurface, and stockpiled soil as described below. A summary of the various investigations conducted at the LB&D property prior to the RI is provided in the 1988 ROD.

Surface soil. A total of 54 surface soil samples (including five duplicates) were collected at the LB&D property from 0 to 2 feet bgs during the RI. No significant concentrations of VOCs were detected. Butylbenzylphthalate was the most commonly detected base/neutral and acid extractables (BNA) compound, ranging in concentration from 79 to 7,400 parts per billion (ppb). Di(ethylhexyl) phthalate was also found at concentrations up to 25,000 ppb. Other BNA compounds detected in LB&D property surface soils were phenol and benzoic acid. Locations of concentration maxima for these compounds coincided and occurred in the area of the existing sumps near the processing facility.

Pesticides and PCBs were detected frequently in the surface soils of the LB&D site. The occurrence of pesticides in LB&D site surface soils generally parallels the distribution of PCBs, although at lower concentrations. The pesticide dichlorodiphenyldichloroethylene (DDE) was most prevalent, with concentrations ranging from 29 to 29,000 ppb. The pesticides dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyltrichloroethane (DDT) were also present in comparable concentrations. PCBs were predominant in terms of magnitude and spatial extent with concentrations ranging from 230 to 380,000 ppb. The highest concentrations of PCBs were detected along the northern boundary of the LB&D property near the location of the former main sump, and around the processing facility.

Lead and chromium were the primary metals detected at concentrations above background levels. The highest values of lead, up to 9,210 ppm occurred in the vicinity of the processing facility, with additional elevated concentrations occurring near the southern boundary of the LB&D property. Concentrations of chromium up to 4,400 ppm occurred near the processing facility.

Thirteen surface soil samples, including two collocated field duplicate samples, were collected for dioxin/furan analysis by a modification of EPA Method 8280, which quantifies the isomers of greatest concern. All samples contained dioxin/furan detections. The 2, 3, 7, 8-Dioxin tetrachlorodibenzop-dioxin (TCDD) isomer, considered to be the most toxic of the polychlorinated dibenzodioxin/polychlorinated dibenzofurans (polychlorinated dibenzodioxin [PCDD]/polychlorinated dibenzofuran [PCDF]), was detected in four surface soil samples east of the processing facility. These locations also had more detections of other PCDD/PCDFs than did other locations. Concentrations of isomers were low enough that, when converted to TCDD equivalents, values were near or below 0.5 ppb.

Subsurface soil. The discussion of VOCs in the subsurface soil is provided in Section 5.2.1.2. The spatial distribution of BNAs generally occurred with maximum concentrations limited to the deeper subsurface soils in the vicinity of the former sump area.

Principal BNA subsurface contaminants include phenol, detected at concentrations up to 12,000 ppb, di(ethylhexyl) phthalate (3,000 ppb), phenanthrene (6,480 ppb), and pentachlorophenol (PCP; 12,000 ppb).

PCBs were predominant (primarily Aroclor 1260, detected at concentrations up to 63,000 ppb), with the pesticides DDD, DDE, and DDT detected at concentrations up to 4,800 ppb. Maxima for these compounds were detected in the northeast corner of the LB&D property and west of the processing facility. Pesticides and PCBs were generally limited to depths less than 10 feet bgs.

Of the metals analyzed, only arsenic (at a maximum concentration of 35.8 ppm) and lead (at a maximum concentration of 391 ppm) occurred at concentrations above background in subsurface soils. Dioxin/furans (equivalents) were detected in two of six samples at a maximum concentration of 0.182 ppb.

Stockpiled soil. The BNAs bis(2-ethylhexyl)phthalate, di-nbutylphthalate, and butylbenzylphthalate occurred with a frequency of 95, 76, and 71 percent, respectively, with the highest concentration being butylbenzylphthalate at 98,000 ppb. Pesticides and PCBs were detected at concentrations above instrument detection limits (IDLs) in all 21 samples analyzed from the stockpiled soil with the highest concentration being 54,000 ppb for PCBs. Concentrations of the inorganic analytes arsenic, cadmium, copper, mercury, nickel, and zinc are consistent with background values identified in the RI Report. Lead was detected at a maximum concentration of 977 ppm and chromium was detected at a maximum concentration of 201 ppm.

The stockpiled soil generally contains higher average concentrations of BNAs, pesticides and PCBs than encountered in prior investigations conducted on LB&D and adjacent properties. The results of the extensively sampled stockpiled soil indicate that the former drum storage areas, assessed as relatively uncontaminated in the 1990 RI Report, are likely contaminated.

Neighboring Properties. Investigation of the RFI property did not detect total VOCs above 1 ppm. The BNA bis(2-ethylexyl) phthalate was the most significant BNA detected in terms of concentration (34,000 ppb). Results of the inorganic analyses indicate that soil concentrations are consistent with background levels established in the RI Report. PCBs (up to 1,700 ppb) exceeded the 10[-6] risk levels in two samples and the 10[-5] risk levels in one sample. The maximum pesticide concentration was 3,800 ppb of DDT. Sampling conducted on the LB&D property adjacent to the City sidewalk area along Alma Avenue suggests that pesticide and PCB contamination extend under the sidewalk area.

5.2.1.2 Principal Threat Soil

Soil with greater than 1 ppm of total VOCs is termed principal threat soil. The principal threat soil is located in the former sump area, as evidenced by high concentrations of VOCs in adjacent soil borings and the sump residues. The primary VOCs detected are trichloroethene (TCE) and tetrachloroethene (PCE) at maximum concentrations of 940 ppb and 1,300 ppb, respectively. The estimated volume of principal threat soil is 7,200 cubic yards (in place). VOC contamination was generally limited to the deeper soil (10 to 20 feet bgs).

5.2.1.3 Vicinity/Background Soils

Soil samples were collected from off-site locations (within 0.25 miles) to assess background contaminant concentrations. PCBs were detected in one background sample (at 230 ppb) during the RI and three perimeter samples (up to 1,200 ppb) during the LSP/PHE. Of the BNAs, polycyclic aromatic hydrocarbons (PAHs; up to 3,156 ppb) and phthalates (up to 4,600 ppb) were detected in both investigations although with limited frequency. Lead and arsenic were encountered at concentrations up to 366 ppm and 14.9 ppm, respectively.

Surface soil from residential gardens overlying the shallow groundwater plume contained a variety of pesticides (up to 880 ppb of DDE) but no PCBs. DDE and DDT were detected (up to 20 and 37 ppb, respectively) in the surface soil from the Community Garden east of the LB&D site. Contamination detected in the residential gardens is not attributable to the LB&D site because the contaminant concentrations increased with increasing distance from the LB&D site. Similar levels of pesticides can be found in other areas that were once agricultural.

5.2.1.4 Coyote Creek Sediments

Analyses for pesticides, PCBs, and VOCs were conducted in the Coyote Creek sediments at one upstream and three downstream locations during the LSP/PHE, and at one upstream and six downstream locations during the RI. VOCs were detected at or below the Contract Required Quantitation Limits (CRQL) for both investigations. Significant concentrations of PCBs (up to 7,300 ppb) and pesticides (DDD up to 3,300 ppb) were detected at two of the farthest downstream locations (approximately 1 kilometer from the LB&D site stormwater outfall). Concentrations of the BNAs pyrene (2,500 ppb) and pentachlorophenol (up to 1,700 ppb) were also detected.

Concentrations of metals in the downstream samples were compared to the upstream sample taken 100 yards up from the LB&D site stormwater outfall. Eighty-three percent of the metals on the RI Target Compound List were detected at levels higher than those of the upstream sample.

Contaminants were detected at various concentrations in all downstream samples, as well as in the background sample, and their distribution is random. The LB&D site does not appear to be a source for the sediment contamination because of the lack of intermediate contamination between the storm-drain outfall and farthest downstream sample.

5.2.2 Water

Water relevant to the LB&D site is comprised of the shallow and deep aquifers (Zones A through D) and Coyote Creek. A summary of the early groundwater investigations is provided in the 1988 ROD.

Groundwater (Zones A-D).

Zone A. Wells installed in 1988 in the shallowest potential water bearing zone beneath the LB&D site during the RI have been dry since their installation. It is likely that most groundwater contaminants migrated from sumps directly through Zone A to Zone B, the first consistently water-bearing zone.

Zone B. Common VOCs detected in the shallow groundwater (Zone B) and their approximate highest concentrations are TCE (900 ppb), 1,1-DCE (800 ppb), 1,1-DCA (52 ppb), vinyl chloride (170 ppb), and benzene (78 ppb). Pesticides, PCBs, and metals have not been confirmed in the shallow aquifer. Quarterly groundwater monitoring is currently being conducted by the LSGTF with oversight by the RWQCB and EPA. The shallow groundwater monitoring results obtained to date show no significant movement of the plume since the 1988 ROD (see Figure 1.1). The installation of the monitoring wells at the leading edge of the plume has better defined the plume's limit.

Zone C. The intermediate groundwater aquifer (Zone C) is not contaminated based on the findings of two years of quarterly groundwater monitoring. TCE was once detected at 13 ppb in a Zone C well located on the LB&D property near the former processing facility. This detection was not confirmed during any of the next five quarterly sampling events for this or any other Zone C well.

Zone D. The deepest groundwater aquifer (Zone D) is used as a supply of drinking water and is uncontaminated. Nearby wells at SJSU's Spartan Stadium and the SJWC's 12th Street Well Field have been tested regularly for the presence of VOCs. No VOCs have ever been detected in these wells. EPA installed a deep well between the SJWC's well field and the leading edge of the shallow groundwater plume. This well serves as a warning well in the event that shallow groundwater contaminants migrate to the deepest aquifer. No VOCs have been detected in this well either.

Coyote Creek. Water samples from six locations in Coyote Creek contained no detectable concentrations of PCBs. All VOCs detected (acetone, chloroform, and bromodichloromethane) were at or below the CRQLs. No BNAs were detected above the CRQLs. Three pesticides (endosulfan I, 2.0 ppb; 4,4'-DDE, 0.34 ppb; and 4,4'-DDD, 0.39 ppb) were detected at one sample location. The observed random distributions of these contaminants in the creek water suggest that the former LB&D facility was not the only source of contamination to this section of Coyote Creek.

5.2.3 Air

Soil Gas. A potential exposure route for VOCs present in the groundwater to residences overlying the shallow groundwater contaminant plume is through the vadose zone. Soil gas monitoring for VOCs was not conducted during the RI. However, the VOC flux from groundwater to surface air and potential indoor air exposure risks have been calculated. Current VOC concentrations in the shallow groundwater used to estimate VOC concentrations in soil gas and confined spaces of dwellings do not indicate potential exposure risks outside ofEPA's acceptable risk range (10[-4] to 10[-6]).

Surface Air and Dust. Analytical parameters for air sampling targeted pesticides and PCBs in both particulate and vapor phases. The only contaminant detected was alpha-BHC, which was also found in the background sample. At this time, the LB&D site is not a significant source of offsite air or dust contamination.

5.2.4 Conduits

Vertical Conduits. Vertical conduits consists primarily of former agricultural wells and non-essential monitoring wells. The former agricultural wells were typically screened in deeper aquifers and have the potential to transfer shallow groundwater contamination to deeper aquifers. The non-essential monitoring wells are only in the shallow aquifer zones and have the potential to transfer surface water into the shallow aquifer zones. The well materials are only expected to be contaminated at surfaces that came into direct contact with the shallow groundwater contaminant plume.

Horizontal Conduits. Horizontal conduits consist of sewer, water, and surface drain pipes. The contents of these various conduits and their potential contamination will be addressed below in Subsection 5.2.6 Residues.

5.2.5 Structures/Debris

Buildings/Equipment. Analysis of building surface wipe samples indicates that significant portions of the processing facility structure have pesticide and PCB contamination. The Structures Removal Group will dispose of the former LB&D facility buildings and equipment in 1994 with the exception of the large, uncontaminated warehouse structure located in the southeast portion of the LB&D property. The volume of the wooden superstructure of the warehouse is 1,450 cubic yards.

Pavements/Pads. The various pavements, including the asphaltic chip-seal and bermed areas as well as the concrete pads, cover the majority of the LB&D and RFI properties. Three core samples taken from the concrete pads on the LB&D property contained BNAs in all samples at concentrations less than 10 ppm. Pesticides and PCBs were detected at all three locations, with the highest concentrations being 20,000 ppb for PCBs, 19,800 ppb for total chlordane, and 5,100 ppb for DDE.

Surface Drains. The concrete surface drains are expected to have contamination similar to the contaminated pavements and pads with the primary contaminants being pesticides and PCBs. Residues contained in the surface drains are expected to be similar to those contained in the sumps to which the drains were connected.

Sumps. Although the sumps will be removed in 1994, the soil surrounding the sumps will not be removed by the Structures Removal Group. A description of the sump contents is provided in Subsection 5.2.6 to provide further information on the likely soil contamination adjacent to the sumps.

Septic Tank. A redwood tank previously used as part of the septic system for the LB&D facility was encountered during the initial magnetometer survey and subsequent test pit investigation. Assorted debris, including cans, automobile parts, rags, and bottles, was found in the test pit. VOCs (toluene, ethylbenzene, and total xylenes) were detected at levels up to 330 ppb; BNAs to 13,000 ppb (benzoic acid); and PCBs to 31,000 ppb. Significant metals contamination was detected in samples collected from around the redwood tank (lead up to 4,220 ppm and chromium up to 7,210 ppm).

Debris Pile and Other Debris. The LB&D site contains various debris piles consisting primarily of scrap metal such as vehicles, drum lids, building fixtures, etc. The Structures Removal Group will dispose of most of this debris in 1994. Only materials supporting and covering the stockpiled soil will remain as debris.

Remaining Drums. The majority of the drums remaining on the LB&D site are empty and will be removed by the Structures Removal Group in 1993 and 1994. Some drums that contain former LB&D facility incinerator ash will remain. Characterization of the ash residue is presented in the next section.

5.2.6 Residues

The residues part of OU-1 includes the contents of various structures and conduits, sumps, and the drummed incinerator ash as described below.

Contents of Structures and Conduits. EPA expects that various onsite structures and conduits such as the sewer line and surface drains contain potentially hazardous residues. The primary contaminants are expected to be PCBs and lead based on analysis of sump residues as described below.

Sump Residues. Although the sump residues and structures are to be disposed of by the Structures Removal Group, the types of contaminants present and their concentrations will have affected the surrounding soil, and thus, they are relevant to this ROD. Most of the COCs were detected at elevated levels in the sump residues. VOCs such as TCE and PCE were present at concentrations of 83,000 ppb and 19,000 ppb, respectively. PCBs and lead are present at concentrations up to 70,000 ppb and 20,900 ppb, respectively. EPA expects that the surrounding sump soil contains similar contaminants, but at potentially lower concentrations.

Incinerator Ash. Approximately 15 cubic yards of incinerator ash are contained in drums at the LB&D site. The incinerator ash contains elevated levels of metals, including lead and chromium at 13,300 ppm and 1,930 ppm, respectively. Comparison with the soil data does not indicate significantly elevated concentrations of other contaminants. TCDDs/tetrachlorodibenzofurans (TCDFs) were detected in all ash samples up to hundreds of ppb levels. Five furan congeners and three dioxin congeners were detected in one or more samples. 2,3,7,8-TCDD, which is the most toxic dioxin isomer, was not detected in the ash samples. However, 2,3,7,8-TCDF, the most toxic of the PCDFs, was detected in the sample from inside the hopper at 0.088 ppb.

6.0 SUMMARY OF SITE RISKS

6.1 CONTAMINANT IDENTIFICATION

The media of concern for the LB&D site are soil, groundwater, structures, and air. Subcategories within these media are referred to as "materials" and include: principal threat soil, risk-based COCs soil, residues (ash and the contents of various conduits), concrete building pads and pavements, and conduits (horizontal and vertical). The main contaminants identified for each media include:

- Soil: Principal Threat - VOCs Risk-Based COCs - PCBs, metals, pesticides (Table 6.1)
- Groundwater: Shallow Groundwater - VOCs
- Structures/Debris: Surfaces - primarily pesticides and PCBs
- Air: Vapor emissions from shallow groundwater - VOCs Dust from risk-based COC soil - COCs (Table 6.1)

The LB&D risk assessment (including RI Addendum No. 3) evaluated the health risks associated with the risk-based COC soil, groundwater, and air. The health risks associated with the other materials were not evaluated because of either limited contamination and/or volume. The risk assessment used the arithmetic mean and maximum contaminant concentrations to model exposure risks.

6.2 EXPOSURE ASSESSMENT

6.2.1 Exposure Pathways and Receptors

A baseline risk assessment typically evaluates a site in the absence of any remedial action. However, at the LB&D site,

various interim remedial measures have been implemented since 1984 to limit potential human exposure to contaminants and to reduce LB&D site hazards. These measures included removal of waste drums, excavation and disposal of contaminated soil and replacement with clean soil, and sealing of 2.75 acres with a chip and asphaltic-seal mix. The LB&D risk assessment considered LB&D site conditions that existed following these interim remediation activities and is referred to as the Current Conditions Scenario (CCS). In addition, a second risk scenario, termed the Future Use Scenario (FUS) evaluates risks associated with hypothetical future industrial land use at the LB&D site. In comparison, the CCS evaluates only soil and Coyote Creek sediment exposure pathways for a child receptor (a 6 year old trespasser is most conservative case), whereas the FUS includes a groundwater exposure pathway and additional receptor populations

(SJSU student, adult gardener, on-site worker, and average adult resident) as well as a child. The combined Current Conditions and Future Use Scenarios evaluated 12 different exposure cases.

The exposure pathways evaluated under the CCS for a child receptor were on-site soil ingestion and dermal absorption, and Coyote Creek sediment ingestion and dermal absorption. The SJSU student, adult gardener, on-site worker, and average adult receptors were only evaluated under the FUS exposure pathways.

The soil exposure pathways evaluated under the FUS for the child, SJSU student, adult gardener, on-site worker and average adult receptors were contaminated soil inhalation, ingestion, and dermal contact. In addition the following exposure pathways were evaluated for the SJSU student, adult gardener, and average adult receptors: off-site dermal adsorption of soil contaminants, off-site inhalation of wind-borne contaminants, and off-site soil ingestion.

Soil gas emissions from the VOC shallow groundwater contaminant plume were evaluated as a potential inhalation health risk because the groundwater contaminant plume extends beneath residential areas. The health risk associated with VOC emissions was evaluated by estimating the magnitude of emissions reaching the living spaces and then performing risk calculations. Exposure risks were estimated using seven cases based on varying input parameters including groundwater chemical concentrations, soil porosity, housing air exchange rates, and housing configurations.

6.2.2 Exposure Assumptions

The CCS assumes that only the on-site trespassing child receptor would receive any significant exposure (inhalation, ingestion, or dermal) to soil contamination. Due to the extensive soil crusting and an asphaltic covering (70% of the LB&D property), off-site receptors would not be exposed to particulate emissions. The FUS makes the conservative assumption that the entire LB&D site would be exposed to limited erosion of soil particles to off-site receptor locations.

The CCS modeling and exposure data used for a child receptor assumed a 6 to 10 year old child, weighing 22 kilograms (kg), exposed for 2/4 years (best estimate/plausible maximum), 24/48 days per year, and 0.5 hours per day. The soil ingestion rate is 200 milligrams (mg)/day, the sediment ingestion rate is 25/100 mg/day, and the assumed gastrointestinal absorption is 50%/100%. The FUS makes similar exposure assumptions for a child. The adult on-site worker, which is the most conservative exposure scenario, assumed a 70 kg adult, exposed 20/40 years for 240 days per year, and 8 hours a day. The assumed soil ingestion rate is 100 mg per day with a gastrointestinal absorption of 50%/100%.

6.3 TOXICITY ASSESSMENT

The primary source for all toxicity information, such as verified chronic reference doses (RfDs) and cancer potency factors (CPFs) was the EPA risk assessment database Integrated Risk Information System (IRIS). The risk assessment generally used those toxicity values presented in the Health Effects Assessment Summary Tables (HEAST; EPA 1989). If an RfD was not available from IRIS, Acceptable Daily Intakes (ADI) were developed or obtained from other sources, such as the National Academy of Sciences or the World Health Organization.

CPFs have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)[-1], are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

RfDs have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

6.4 RISK CHARACTERIZATION

The LB&D risk assessment and RI Addendum No. 3 evaluated the health risks associated with the primary exposure sources: the contaminated soil at the LB&D property and the shallow groundwater plume. Although a specific risk assessment was not performed for each of the various materials comprising OU1, an evaluation is presented below of the general risks associated with the various materials.

6.4.1 Soil

6.4.1.1 Soil With Health-Risk-Based COCs

LB&D Property. Soil at the LB&D property is comprised of shallow, deep, and stockpiled soil as discussed below.

shallow soil. The operation of the LB&D facility required large areas for the storage of open and leaking drums that contained residues of hazardous substances. Thus, the most significant contamination occurs in the shallow soil (the upper 4 feet bgs). The shallow soil also exhibits heterogeneity in soil contaminants and concentrations. Under the CCS, the greatest exposure to a trespassing child occurred through shallow soil ingestion (1.8 x 10[-6]/2.1 x 10[-4]). For the FUS, greatest risk for exposure to the shallow soil was to the on-site worker through direct contact (with a carcinogenic risk of 1.4 x 10[-4]/9.1 x 10[-3] and a hazard index (HI) of 6.9/270). The contaminant contributing the most to the CCS and FUS excess risks was PCBs.

deep soil. The deeper soil (greater than 4 feet bgs) contains contamination in various isolated areas. Because of the limited access by potential receptors, the deeper soil was not evaluated for potential risks.

stockpiled soil. The stockpiled soil was excavated from the upper 3 feet of the LB&D site to allow construction of the LSGTF Treatment Facility. Initial geotechnical borings and subsequent analytical testing of the excavation bottom detected elevated concentrations of health-risk-based COCs, primarily PCBs. Subsequent visual characterization, sampling, and analyses of the stockpiled soil indicated similar contaminants as detected around the former processing facility but, typically, at lower concentrations. The stockpiled soil investigation provided evidence that there is significant heterogeneity in the presence and concentration of contamination at the LB&D site. The stockpiled soil presents a potential risk to trespassing individuals over the long term should the LB&D site not be maintained. Currently, the stockpiled soil is covered and the LB&D site fenced, thus the stockpiled soil is not considered to have immediate public health risk.

Neighboring Properties. Testing of the RFI property encountered contaminant concentrations within the EPA risk range and less than concentrations 6.4.2 typically encountered on the LB&D property. Based on soil sampling conducted along the perimeter of the LB&D site, there is a likelihood that the sidewalk areas adjacent to the LB&D property have soil contamination exceeding the risk-based cleanup standards developed in the FS. Because both the RFI property and the adjacent sidewalk area are covered with either concrete or asphaltic-concrete there is minimal current risk since the soil is not exposed. There could, however, be health risks if the soil were to be exposed in the future.

6.4.1.2 Principal Threat Soil

The principal threat (VOC contaminated) soil, if allowed to remain in place, could impact the groundwater. Thus, the risk associated with the principal threat soil is primarily through the groundwater exposure pathway. Based on this exposure scenario, there are no risks associated with the CCSs. The FUS groundwater exposure risks for the child and average adult are 1.5 x 10[-3]/5.0 x 10[-2] and 6.9 x 10[-3] 10[-3]/6.3 x 10[-1], respectively. The FUS HI estimates for the child and average adult are 93/580 and 61/320, respectively.

Health risks were not evaluated for the VOCs present in the Principal Threat soil. It is unlikely that the VOCs in principal threat soil would significantly increase the level of risk posed by the other COCs in principal threat soil under the soil exposure pathways described in Section 6.4.1.1. However, it is possible that the VOCs would pose a risk to indoor air spaces of potential future dwellings constructed directly above the principal threat soil.

6.4.1.3 Vicinity/Background Soil

Shallow samples (a total of 14) were collected from off-site locations to serve as background data. PCBs were detected at levels in excess of the 10[-6] risk level in one sample. DDE, the most frequently occurring pesticide, exceeded the 10[-6] risk level in 7 samples. The presence and concentration of BNAs was not considered significant. The only significant metal detected offsite was lead, at a concentration of 642 ppm, which exceeds the cleanup standard of 500 ppm.

6.4.1.4 Coyote Creek Sediments

Exposure through ingestion and dermal contact with sediments from Coyote Creek was considered a pathway for the CCS only. Under the CCS, dermal contact with the sediments resulted in risks of 2.0 x 10[-7]/1.7 x 10[-5], attributed primarily to PCBs. The total sediment exposure His (attributed primarily to PCBs) were 0.1 for the best estimate HI and 3.5 for the plausible maximum HI. As part of the initial Public Health Evaluation conducted at the LB&D site, the adjacent Community Garden produce was sampled. Risk characterization of the produce did not indicate that consumption of the produce was a significant exposure pathway.

6.4.2 Water

Groundwater (Zones A through D). Because contamination is currently only detected in the shallow aquifer (Zones A/B) and not in the deeper aquifers (Zones C and D), the groundwater pathway was not evaluated for the CCS since there is no current exposure through ingestion. The risk assessment did assess shallow groundwater contamination risks under an FUS because of the high VOC concentrations in the shallow groundwater and the potential for future exposures. The risk assessment is applicable to the deeper aquifers in the event that contamination is found in Zones C and D. Groundwater risks were evaluated through groundwater ingestion, inhalation and dermal exposures routes. The most significant exposure occurs through groundwater ingestion.

carcinogenic. The greatest exposure risk for groundwater ingestion was for adults using the best estimate/plausible maximum (1.2 x 10[-3]/2.9 x 10[-2]). The total groundwater exposure risks (including inhalation) for children and the average adult were 1.5 x 10[-3]/5.0 x 10[-2], and 6.9 x 10[-3]/6.3 x 10[-1], respectively.

noncarcinogenic. In terms of the HI, the greatest exposure risk for groundwater ingestion was for children (91/560) and is attributed to antimony. The total groundwater exposure risks (including inhalation) for children and the average adult were 93/580, and 61/320, respectively.

Coyote Creek. The FUS exposure route evaluated only the consumption of fish. Evaluation of the risks of consumption of fish from Coyote Creek was also performed during the initial Public Health Evaluation.

carcinogenic. The FUS evaluated the risks of fish consumption for children and the average adult, and the levels were 1.2 x 10[-4]/2.3 x 10[-4], and 7.3 x 10[-4]/2.5 x 10[-3], respectively.

noncarcinogenic. A single HI of 52/32 was calculated for the child and adult receptors, respectively, for the fish consumption exposure pathway.

6.4.3 Air

Evaluation of air risks consists of soil gas (vapor emissions) and surface air and dust from the LB&D site.

Soil Gas. Soil gas emissions which could potentially emanate from the shallow groundwater contaminant plume were evaluated. VOCs could potentially migrate from the shallow groundwater through the vadose zone and enter into overlying residences. The risk evaluation concluded that neither the current TCE and vinyl chloride chemical concentrations beneath residential housing nor the highest concentrations of TCE and vinyl chloride likely to be encountered beneath residential areas once the groundwater extraction/treatment system is operating, indicate risks outside the EPA's acceptable risk range. In addition, evaluation of the potential exposure risks posed by VOC emissions for residences with walk-in basements does not indicate potential exposure risks exceeding the EPA acceptable risk range.

Surface Air and Dust. Under the CCS, inhalation was not considered a pathway because of the limited exposure. Thus, only future exposure scenarios evaluated surface air and dust.

carcinogenic risks. The FUS soil inhalation risk was greatest for the on-site worker (1.8 x 10[-4]/1.3 x 10[-2]; best estimate/upper bound exposure). The inhalation pathway for vapors generated during the domestic use of shallow groundwater was greatest for the average adult (5.0 x 10[-3]/5.2 x[-1]) and exceeded EPA's acceptable risk range.

noncarcinogenic risks. In terms of the HI, the on-site worker had the greatest risk (0.016/1.4) posed by inhalation of soil contaminants. The average adult risks posed by inhalation of VOCs through domestic water use were 2.4/11. The contaminant contributing most significantly to this risk is 1,1dichloroethene.

6.4.4 Conduits

There are two types of conduits at the LB&D site, vertical conduits and horizontal conduits.

Vertical Conduits. Vertical conduits include all types of wells that could potentially transfer contaminants from the shallow aquifer to deeper aquifers. The vertical conduits pose a potential drinking water risk.

Horizontal Conduits. The horizontal conduits include utility lines (e.g. sewer lines) underlying the LB&D site which could contain contaminated residues. The horizontal conduits are buried and, because of their limited exposure, they pose minimal health risks. The conduit residues are addressed in Section 6.4.6.

6.4.5 Structures/Debris

The structures/debris consists of the warehouse, pavements/ pads, surface drains, septic tank, and other debris. They have minimal contamination associated with them, however, they could be potential conduits (i.e. surface drains and septic tank). The risk due to direct contact was not evaluated because of the limited contamination.

Buildings/Equipment. The warehouse that will remain upon completion of the ongoing structures removal action, is not contaminated and poses no health risks.

Pavements/Pads. The chip and asphaltic-seal covering is uncontaminated. Portions of the concrete building pads may contain limited contamination.

Surface Drains. The concrete surface drains have the potential to act as horizontal conduits, but will pose minimal risk provided the drain residues are removed. Septic Tank. The septic tank has the potential to act as a conduit but poses minimal risk provided the residues are removed.

Debris Pile and Other Debris. Most debris at the LB&D site has not been tested, but is not expected to pose a significant risk. The most contaminated structures, the processing facility and its building pad, were tested and found to contain only low levels of pesticides and PCBs on their surfaces.

6.4.6 Residues

The residues are comprised of the ash, spent granulated activated carbon ([GAC] from the SVE system), the contents of the various conduits and structures, and decontamination liquids and material (from RD/RA). If not attended to, the residues are expected to have a similar risk as the risk-based COC soil. However, this risk can be substantially reduced provided the residues are contained in drums (thus limiting access), their volume is kept to a minimum, and they are disposed at a secure facility.

Contents of Structures and Conduits. The contents of the various structures and conduits at the LB&D site likely contain significant concentrations of contaminants and are considered a potential human health risk and groundwater threat.

Incinerator Ash. Based on the elevated concentrations of metals detected in the incinerator ash, the incinerator ash poses a significant human health risk.

6.4.7 Uncertainties

Uncertainties specific to the LB&D site risk assessment are grouped into 1) monitoring data gaps, 2) model parameters, and 3) exposure or fate models. Monitoring data gaps include the limited availability of fish from Coyote Creek and limited ambient air data. Model input parameters for which high uncertainty exists are numerous. These include contaminant-specific dermal absorption efficiencies, gastrointestinal absorption efficiencies of soil contaminants relative to contaminants in food, daily soil ingestion rate, soil (and sediment) loading per unit of skin surface area, contaminant-specific uptake efficiencies for plants, home-grown produce consumption estimates, actual fish consumption rates, and estimated off-site soil concentrations. In the absence of comprehensive ambient air sampling, two air quality models were used to estimate annual average emissions of contaminants from the LB&D site. These models have not been field verified. Estimation of the VOC emissions in residential areas had uncertainties in soil moisture content, volatilization of contaminants and building air exchange rates.

6.5 PRESENCE OF SENSITIVE HUMAN POPULATIONS

Although the LB&D site is currently unoccupied, there are sensitive human populations in close proximity to the LB&D site. The LB&D site is located in an industrial area and is zoned industrial. The SJSU stadium, fields, and student housing are located to the north; a parking area and community gardens (to be relocated in the future) are located to the east; and, to the south and west are industrial-related businesses. Residences and Kelley Park are located within 0.25 miles of the LB&D site. Residences are located over portions of the shallow groundwater VOC plume perimeter.

6.6 PRESENCE OF SENSITIVE ECOLOGICAL SYSTEMS

Due to the urban location of the LB&D site, ecological risk is presently limited. The ecological effects associated with the LB&D site contamination are presently associated primarily with two effects: 1) if the LB&D site were converted to an unpaved park or open space, potential ingestion of soil contaminants by birds and; 2) contamination of Coyote Creek with soil contaminants released from the LB&D site through storm runoff. Quantitative evaluation of the effects of bird ingestion of soils is very difficult due to a lack of information regarding expected soil consumption rates for urban bird species. Therefore, a quantitative analysis of this possibility was considered beyond the scope of the risk assessment and was not performed.

LB&D site contaminants that could potentially be released into Coyote Creek through the East Alma storm sewer may become bioconcentrated in fish, insects, or other aquatic organisms which serve as important food supplies to wildlife in the area. Analysis of Coyote Creek water samples for VOCs, BNAs, pesticides, PCBs, and metals showed no significant contamination. However, a sediment sample taken downstream of the LB&D site did show high PCB contamination. Although high sediment PCB concentrations correlate with the high concentrations of PCBs observed in the LB&D shallow soils, the location of this sample is quite removed from the LB&D drainage area's storm sewer outfall and little contamination was found in the samples between the outfall and the Keyes Street/Story Road overpass. Downstream transport of these contaminants seems unlikely considering the lack of any gradational trends from upstream. In addition, the storm drain serves the industrial area adjacent to the LB&D site. Other point sources in the area (e.g., the Story Road landfill) also could have contributed to elevated levels of pollution found in Coyote Creek. At present, it appears that Coyote Creek ecology is more affected by urban land use and runoff than by LB&D runoff.

6.7 CONCLUSION

Because a variety of the COCs detected at the LB&D site pose a significant health risk as carcinogens and/or as noncarcinogens, and that complete exposure pathways exist, EPA has determined that remedial action is appropriate for the LB&D site.

Actual or threatened releases of hazardous substances from the LB&D site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health, welfare, or environment.

7.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d) of CERCLA requires, for hazardous substances left on site at the conclusion of remedial actions, that the action requires a level or standard of control which at least attains applicable or relevant and appropriate federal or state environmental or public health requirements (ARARs), except in certain limited circumstances. To ensure protection of human health and the environment, remedial alternatives must attain or exceed ARARs, or qualify for a waiver. Section 121(d)(4) provides a list of the six potential waivers.

ARARs may include the following:

- Any standard, requirement, criterion or limitation under federal environmental law;

- Any promulgated standard, requirement, criterion or limitation under a state environmental or facility-siting law that is more stringent than the associated federal standard, requirement, criterion or limitation.

A requirement may be either "applicable" or "relevant and appropriate," but not both. Applicable requirements include requirements that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements include those requirements that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situation sufficiently similar to those encountered at the CERCLA site that their use is appropriate to the site.

Substantive requirements are requirements that apply directly to actions or conditions in the environment. Examples include quantitative health or risk-based standards for contaminants. Administrative requirements are those mechanisms that assist in the implementation of the substantive requirements (e.g. reporting, record keeping, permit issuance etc.). While offsite activities must fulfill both substantive and administrative requirements, in general, on-site CERCLA actions must comply only with substantive requirements.

ARARs are identified from information about specific chemicals at a site, specific features of a site location and actions that are considered as remedies. If an ARAR does not address a particular situation or does not sufficiently protect human health or the environment, nonpromulgated standards, criteria, guidance and advisories may be considered to guide selection of a protective remedy. These to-be-considered criteria (TBCs) may be adopted as enforceable cleanup standards in a ROD.

7.1 TYPES OF ARARs

ARARs fall into three broad categories, based on the manner in which they are applied at a site. These categories are as follows:

- Chemical-Specific - These ARARs govern the extent of site cleanup. Such ARARs may be actual concentration-based cleanup standards or they may provide the basis for calculating such concentrations. In general, chemical-specific ARARs and TBCs are considered during the risk assessment process. Chemical-specific ARARs may be superseded by the risk-based levels for a site if they are not sufficiently protective of human health and the environment. Examples of chemical-specific ARARs include groundwater maximum contaminant levels (MCLs) and air emission standards.

- Location-Specific - These ARARs are restrictions placed on the concentration of a hazardous substance or of activities planned because of natural or man-made site features or environmentally sensitive areas. Examples of restricted locations include 100 year floodplains or historic properties or landmarks.

- Action-Specific - These ARARs affect the implementation and/or operation of remedial actions. These technology or activity-based requirements determine how a remedial action must be performed. Examples of action-specific ARARs include RCRA generator requirements and land-disposal restrictions.

7.2 SITE SPECIFIC ARARs

Table 7.1 lists and explains ARARs for the selected alternative. Because no potential chemical-specific or location-specific ARARs have been identified, the table consists of only action-specific ARARs. The FS contains a detailed description of the potential ARARs and TBCs for Alternatives 1 (No Action) and 3 (Excavation and Off-Site Disposal).

Action-specific ARARs differ from alternative to alternative. For example, California Hazardous Waste Control Law (state authorized RCRA equivalent law) closure requirements are relevant and appropriate for Alternatives 1 and 2 which leave contaminated soil in-place, but not for Alternative 3 which involves excavation of contaminated soil. Other action-specific ARARs may effect the action alternatives (2 and 3) but not Alternative 1. For example, RCRA generator standards and RCRA land disposal restrictions, as specified in 22 CCR, Division 4.5, Chapters 12 and 18, are ARARs for Alternatives 2 and 3 insofar as they involve generation and disposal of hazardous waste. Similarly, TSCA disposal requirements (40 CFR 761.60) apply to the disposal of PCB contaminated soil contemplated under Alternatives 2 and 3. The ARARs for theselected alternative, Alternative 2, are described in detail below. There are no chemical-specific or location-specific ARARs for this alternative. Action-specific ARARs for this alternative include:

- 22 CCR, Div. 4.5, S66264.310 (Landfill Closure Requirements) - HWCL/RCRA landfill closure is an action-specific ARAR for this alternative because contaminated soil will be left inplace without excavation or treatment. LB&D was not a RCRA regulated facility, therefore RCRA closure is not applicable but is relevant and appropriate. Because the LB&D site is most closely analogous to a landfill type unit, the relevant and appropriate analysis focuses on the landfill closure requirements of 22 CCR, Div. 4.5, S66264.310 and the "alternate-landfill" or "hybrid" closure described in the proposed revisions to the NCP, 53 FR 51446, and in EPA's ARARs guidance (Volume I, p. 2-20).

- The guidance describes the following conditions as appropriate for implementation of hybrid closure: residual waste material at a site poses a direct contact threat but does not pose a threat to groundwater; and, residual leachate contamination does not exceed health-based levels. The hybrid closure to address this scenario consists of a permeable cover to address the direct contact threat and limited long-term management, including site and cover maintenance, groundwater monitoring and institutional controls, including land use restrictions. Conditions at the LB&D site are such that hybrid closure is appropriate. Implementation of Alternative 2 would satisfy this closure ARAR.[1] <Footnote>1 TSCA PCB disposal regulations (40 CFR 761.60) do not impact the hybrid closure as described in alternative 2. These regulations apply to post-1978 disposal of non-liquid PCBs at concentrations greater than 50 ppm. If these regulations were an ARAR, then the long-term management controls required for TSCA chemical waste landfills would need to be addressed for some of the soils that will be left on site under alternative 2. Because it is not known when disposal of PCBs occurred or what levels were disposed of, these regulations are not applicable. Further, in accordance with EPA's guidance on remediating PCB contamination at Superfund Sites, the regulations are not relevant and appropriate. As stated in the guidance, at sites where RCRA closure is also an ARAR, TSCA will not be considered relevant and appropriate because RCRA closure requirements will address the situation. ("Guidance on Remedial Actions for Superfund Sites with PCB Contamination" (OSWER Dir. No. 9355.4-01), p.47.) However, as stated in the text, these regulations are applicable to the off-site disposal of PCB contaminated soil that is a separate element of alternative 2.</footnote>

- 22 CCR, Div. 4.5, Chapter 12 (HWCL/RCRA generator standards) - hazardous wastes generated during the RD/RA, including contaminated SVE treatment residuals and any other potential hazardous wastes, shall be managed in accordance with the RCRA generator regulations (e.g. manifesting, labeling etc.).

- 22 CCR, Div. 4.5, Chapter 18 (HWCL/RCRA LDRs) - any hazardous wastes to be disposed of off-site under this alternative shall be tested and handled in accordance with LDR standards. For off-site disposal of contaminated soil to which RCRA land disposal restrictions would apply, a treatability variance, as provided for in 22 CCR, Div. 4.5, S66268.44 and 40 CFR S268.44, will need to be obtained.

- 40 CFR S761.60 (TSCA PCB Disposal Requirements) - in accordance with these regulations, off-site disposal of the small amount of stockpiled soil contaminated by PCBs at a concentration greater than 50 ppm shall be in a TSCA-approved chemical waste landfill, a TSCA-approved incinerator, or by a TSCA-approved alternative disposal method.

- BAAQMD Regulation 8 - Rule 47 - emissions from the soil vapor extraction system must be controlled in accordance with this rule. Section 302 of Rule 47 specifies that any soil vapor extraction operations with VOC emissions greater that 15 pounds per day must employ a control device which reduces the total VOC emissions to the atmosphere by at least 90% by weight.

- BAAQMD Regulation 8 - Rule 15 - this rule specifies the types of asphalt that may be used for capping and the percent of petroleum solvent the asphalt may contain.

- California Water Code S13801 and Bulletin 74-90 (Well Abandonment Standards) - removal of potential vertical conduits for groundwater contamination by closure of wells must be performed in accordance with the standards set in Bulletin 74-90.

8.0 DESCRIPTION OF ALTERNATIVES

8.1 REMEDIAL ACTION OBJECTIVES

The overall remedial action objective for the final remedy is to protect human health and the environment from all remaining contaminated materials that are not currently addressed by the OU-2 CD or the AOC for removal of structures, sumps, drums, and debris.

Specific remedial action objectives for the final remedy include:

- Reducing the principal threat of soil contaminants potentially migrating into and contaminating shallow groundwater;

- Reducing potential exposure to soil contaminants;

- Reducing potential exposure to soil contaminants;

- Reducing potential exposure to contaminated structures, debris, and residues;

- Reducing potential migration of contaminated shallow groundwater to deeper aquifers and potential surface water infiltration; and

- Providing advance warning to drinking water suppliers and residents in the event that VOCs begin significant migration through conduits or the event that VOCs begin significant migration through conduits or confined air spaces of dwellings).

Another Remedial Action Objective for soil gas and groundwater migration is to eliminate the source of VOCs in the shallow groundwater. The 1988 ROD for OU-2 already addresses this objective by requiring that all contaminated shallow groundwater be extracted and treated to reduce contaminant levels. Groundwater extraction and treatment will continually reduce VOC contaminant concentrations to levels that will greatly reduce their potential to reach harmful concentrations in dwellings or deeper groundwater aquifers. Because this remedial action objective for soil gas and groundwater migration was fully addressed by the OU-2 ROD, it is not included in this final site ROD.

8.2 SOIL CLEANUP STANDARDS

Soil with Health-Risk-Based COCs. EPA developed capping action levels (Table 8.1) for soil contaminated with the health-risk-based COCs. Soil with COCs present at concentrations exceeding these action levels is subject to the cap described in Section 8.4.2. The cap action levels presented in Table 8.1 are identical to the cleanup standards that were presented in Table 2-5 of the FS and were also used to evaluate Alternative 3, excavation and offsite disposal.

Because there currently are no chemical-specific ARARs for soil, the cap action levels were developed based on the risk assessment; and, in the case of lead, on a guidance document. Criteria used in deriving these action levels included maintaining a cumulative hazard index less than 1.0, maintaining an individual cancer risk no greater than 1 x 10[-5], and maintaining a cumulative cancer risk no greater than 10[-4] for direct contact with exposed soil at the LB&D site under a future industrial use scenario for an on-site worker.

Principal Threat Soil. Any soil that contains contaminants that threaten to migrate to and contaminate shallow groundwater is

considered principal threat soil. Based on RI data, the principal threat soil is limited to soil contaminated with VOCs adjacent to former sumps. EPA has adopted the RWQCB recommended cleanup level of 1 ppm total VOCs for principal threat soil. EPA assumes, based on engineering experience, that the health-risk-based COCs do not pose a threat to groundwater at the concentrations found during the RI.

8.3 COMPLIANCE BOUNDARIES

Any contaminated soil at the LB&D site that exceeds cleanup standards is subject to the soil cleanup remedy that is selected in this ROD. For the purposes of estimating costs, especially for Alternative 3, EPA assumes that all surface soil down to a depth of four feet bgs exceeds cleanup standards (Table 2-5 in the FS) for PCBs, and possibly for other contaminants. EPA also assumes that soil beneath City of San Jose sidewalk area located adjacent to the LB&D property is contaminated. These assumptions are based on the detailed characterization of soil representative of the drum storage area and on lack of controls for runoff from the LB&D property during the former LB&D facility operations.

Contaminated soil at depths greater than ten feet bgs are not of concern for direct exposure health risks because of the low likelihood that any of this soil would ever be exposed at the surface. Therefore, the vertical compliance boundary for excavation under Alternative 3 is 10 feet bgs.

There is no exact vertical compliance boundary for principal threat soil. EPA assumes that VOCs migrated deeper than the COCs present in former sumps, and that they are present at depths greater than ten feet bgs. All principal threat soil down to the shallow groundwater table, approximately 20 feet bgs, will be addressed by the SVE treatment system that is selected in this ROD. Compliance monitoring for verifying cleanup of principal threat soil will include direct measurements of VOCs in soil samples.

Figure 8.1 shows a map of soil contamination at the LB&D, RFI, and adjacent city sidewalk area properties. The map indicates the various depth levels at which contamination exceeds cleanup standards for both soil with health risk-based COCs (applicable only to Alternative 3 analysis) and principal threat soils. Table 8.2 provides the estimated amounts of soil exceeding cleanup standards for both types of contaminated soils. Besides providing a total weight in tons for all contaminated soils, including principal threat soil and soil that exceeds the TSCA action level for PCBs, the table also indicates the individual weight of principal threat soil containing VOCs and the individual weight of soil that exceeds the TSCA action level for PCBs. The information relevant to Alternative 2 analysis is limited to the column for principal threat soil and the stockpiled soil in the column for soil contaminated with greater than 50 ppm PCBs. All of the information in this table is directly relevant to the analysis of Alternative 3.

Soil Gas Monitoring Compliance Boundaries. Monitoring of soil gas for VOCs will be limited to the residential areas that are near wells with groundwater concentrations of vinyl chloride or TCE that exceed maximum contaminant levels (MCLs). Such wells would be within the shallow groundwater plume boundaries, near the leading edges. Vadose zone sampling will be done right beside or just beneath (using diagonal probes) representative residences near the affected wells.

Groundwater Monitoring Compliance Boundaries. Monitoring of the groundwater in the Zones C and D aquifers will include all existing wells installed into these zones by EPA during the RI, the SJSU South Campus well and the Kelley Park well. Well samples will be analyzed as long as a significant threat of migration is posed by contaminants in the shallow (Zone B) aquifer. This threat will eventually be eliminated by the shallow groundwater extraction and treatment required by the 1988 OU-2 ROD, as implemented through the 1990 CD.

For five year reviews, it may be necessary to analyze SJWC wells and other nearby wells for soil COCs that are not routinely analyzed by SJWC or other well owners. Such analyses would be necessary in the event that soil COCs are detected in the Zone B aquifer during operation of the shallow groundwater extraction and treatment system. All wells in the vicinity of the LB&D site are already analyzed for VOCs on a routine basis.

Vertical Conduit Compliance Boundaries. The final remedy will address all non-essential vertical conduits that are within or near the shallow groundwater plume boundaries and have been identified as potential conduits of primary concern by EPA in RI Addendum No. 4. These conduits include abandoned agricultural wells (e.g., Well Nos. 1, 130, 192, 199) and the former SJSU South Campus well. Conduits to be addressed by the final remedy also include any monitoring wells installed by EPA during the RI that are no longer essential to the operation and oversight of the shallow groundwater extraction and treatment system.

Compliance Boundaries for Other Materials. All other materials involved in the final remedy are located at the LB&D property.

8.4 REMEDIAL ACTION ALTERNATIVES

Following a preliminary screening of soil cleanup technologies and process options, EPA developed seven cleanup alternatives in the FS to address the remedial action objectives for the LB&D site. These alternatives included no action, hybrid closure, excavation and off-site disposal, limited action, solidification/stabilization, soil washing, and off-site incineration. Only the first three alternatives survived the screening process through detailed analysis.

8.4.1 Alternative 1: No Action

The No Action alternative would only address groundwater in deeper aquifers. All other materials of concern for the final remedy would not be addressed. Thus, the remedial action objectives for the LB&D site would not be met. The No Action alternative was included as a basis for comparison as required by the NCP.

The No Action alternative does involve the semi-annual monitoring of six Zone C aquifer wells and one Zone D aquifer well until the shallow groundwater (Zone B) extraction system reduces VOC contaminant concentrations to levels that no longer pose a significant migration threat to the deeper aquifer zones. The status of the LB&D site would be reviewed every five years. Such a review would include analyses of groundwater samples for soil COCs if such contaminants were detected in the Zone B aquifer.

Under Alternative 1, 65,000 tons of contaminated soil would be left at the LB&D site and would pose a cancer risk of 1.3 X 10[-2] to future on-site workers. The HI for future on-site workers would be 270. About 9,700 tons of this soil would also pose a threat to shallow groundwater because of the presence of VOCs. In addition, a contaminated sewer line, septic system, drums of incinerator ash, and some contaminated pavements and drains would be left at the LB&D site and would pose health threats from direct exposure.

Alternative 1 has no capital costs. The present worth cost of $853,174 is based on 30 years of groundwater monitoring at an annual cost of $55,000.

8.4.2 Alternative 2: Hybrid Closure Cap

Alternative 2 involves removing almost all non-soil materials contaminated with LB&D COCs and covering all remaining contaminated materials (primarily soils) with a cap. Because contamination will be left at the LB&D site following implementation of Alternative 2, five-year reviews would be performed in accordance with Section 121(c) of CERCLA. In addition, Alternative 2 will require land use restrictions to prevent well construction (for water supply purposes) in source areas that remain contaminated and deed restrictions for those properties (LB&D, RFI, and the adjacent sidewalk area belonging to the City of San Jose) that contain contaminated soil exceeding cap action levels. Restrictions will prohibit residential development and will limit industrial development to activities that do not breach the integrity of the cap and do not mobilize the soil contaminants. Restrictions will also preclude excavation, other than temporary subsurface work beneath the cap and will require complete restoration of any disturbed fill or cap once any such temporary work is completed.

Groundwater. Additional protection from future potential exposure of humans to contaminated groundwater will be provided by a mechanism for early warning in the unlikely event that shallow groundwater contaminants migrate towards the deep aquifer that is used for drinking water. Both the intermediate and deep aquifers will be monitored for VOCs on a semi-annual basis to alert the community if VOCs are detected. Such monitoring would continue for 30 years or until concentrations of VOCs in the shallow groundwater no longer pose a threat to the deeper aquifers.

Vadose Zone Soil Gas. Ongoing shallow groundwater extraction and treatment is expected to reduce VOC source concentrations in the shallow groundwater contaminant plume to the extent that VOCs will not pose an indoor air threat to people inside dwellings over a sustained period of time (e.g., 30 years). While the risk assessment (RI Addendum No. 3, URS Consultants, Inc., 1992) indicates that probable carcinogenic VOC contaminant concentrations would not likely reach harmful levels in dwellings over a sustained period of time, some risk numbers were right at the 10[-4] borderline of EPA's acceptable risk range. More refined models of soil gas migration and risk assessment would likely indicate lower risk than the modeling effort used in the RI.

Soil gas measurements taken near residences located above the shallow groundwater contaminant plume will be used with more refined soil gas migration models to better predict the potential concentration of VOCs in confined spaces of dwellings. Such monitoring is expected to be limited in scope and only necessary as long as shallow groundwater VOC concentrations pose a significant migration threat. Such monitoring should provide ongoing assurances that vapor migration will not pose significant indoor air health risks.

Vertical Conduits. Alternative 2 requires that a geophysical survey be performed to locate abandoned wells that were identified during the RI as potential conduits of concern because of their proximity to the contaminated shallow groundwater. If these wells are located, the feasibility of removing them will be assessed and, if practical, performed. Shallow Zone A and Zone B monitoring wells no longer essential to operation and maintenance of the shallow groundwater extraction and treatment system will be removed and disposed at an appropriate landfill. Removal of these potential conduits will reduce the potential migration of shallow groundwater contaminants to deeper aquifers and will reduce the infiltration of surface water into the shallow aquifer.

Horizontal Conduits. A geophysical survey will be performed to locate an old sewer line, water line, and septic system. Once located, these structures will be excavated, removed, and disposed off-site at an appropriate landfill. The sewer line and septic system will probably need to be disposed of at a hazardous waste landfill because of the likely presence of contaminated residues.

Structures and Debris. The uncontaminated warehouse and decontaminated containment debris (e.g., used visqueen plastic and stockpile frame boards) and other LB&D site debris will be removed from the LB&D property and disposed at a Class III landfill. These actions will facilitate the installation of a cap over the contaminated soils.

Residues. Drums of contaminated incinerator ash and decontamination liquids and residues will be removed from the LB&D site and disposed at a Class I landfill. Eventually, spent granular activated carbon from the SVE system will be sent to a carbon regenerating facility.

Stockpiled Soil. Any stockpiled soil that contains PCBs at concentrations greater than 50 ppm will be removed from the LB&D site and disposed at a TSCA landfill. All other stockpiled soil (approximately 1100 tons) will be spread over the existing pavements and building pads. Clean fill will be used to grade the LB&D site and cover the contaminated stockpile soil before the cap is installed.

Principal Threat Soil. A SVE system will be tested before being installed in areas near former sumps that contain high soil concentrations of VOCs. The system will likely include a 600 cubic-feet-per-minute capacity using a 20 horsepower blower unit. A 500-pound GAC treatment unit would remove VOCs from the extracted soil vapors. Installation of the vapor extraction wells and modifications of well heads for existing groundwater monitoring wells will be completed prior to installation of the asphaltic-concrete cap. After completion of the cap paving, a small building to house the blower and GAC units will be erected on the cap.

The SVE system will treat 9,700 tons of soil in-situ to eliminate the threat of VOCs migrating to the shallow groundwater. This system is anticipated to operate for 2 to 3 years. The cleanup standard for VOCs will be 1 ppm total VOCs.

Soil with Health-Risk-Based COCs. A cap consisting of 180,000 square feet of a 3-inch-thick layer of compacted asphalt on a 6-inch-thick layer of compacted aggregate base (Caltrans Class II) will be installed on the LB&D property only. Existing LB&D site monitoring wells, retained for operation and maintenance of the shallow groundwater extraction and treatment system, will be protected during installation of the cap and left accessible. Surface drains will be installed as necessary. Long-term maintenance will be conducted to ensure the integrity of the cap. Minor Damage (e.g., utility line excavation) to the existing pavement on the RFI and adjacent city sidewalk area properties will require repair of the pavement at least equal to the integrity of the cap for the LB&D property. Extensive disturbance or exposure of the soil at these properties might require full implementation of a graded and drained cap as specified for and consistent with the LB&D property.

Alternative 2 will maintain a cap over the LB&D, RFI, and adjacent city sidewalk area properties and break the direct exposure pathway. Thus, the future potential cancer risk to an on-site worker of 1.3 X 10[-2] will be reduced to zero and the HI of 270 will also be reduced to zero. A total of 65,000 tons of contaminated soil will remain at the LB&D site beneath the cap.

Alternative 2 has a present worth cost ($1,970,000) that is about double that of Alternative 1 (Table 8.3). Annual Operation and Maintenance (O&M) costs ($63,000) include the same groundwater monitoring costs as Alternative 1 and, in addition, include a relatively minor increase for the annual O&M of the cap and SVE system. The present worth of O&M is $968,468. The total capital costs ($1,001,532) are dominated by the cap and SVE system costs.

8.4.3 Alternative 3: Excavation and Off-Site Disposal

Alternative 3 involves removing all non-soil materials contaminated with LB&D COCs and excavating and removing 65,000 tons of contaminated soil. All materials would be disposed at appropriate landfills. Because contamination above residential risk based standards would be left at the LB&D site following implementation of Alternative 3, five-year reviews would be performed in accordance with Section 121(c) of CERCLA. In addition, Alternative 3 would require land use restrictions to prevent well construction (for water supply purposes) in source areas that remain contaminated and deed restrictions for those properties (LB&D, RFI, and the adjacent sidewalk area belonging to the City of San Jose) that contain contaminated soil exceeding residential cleanup standards. Restrictions will prohibit residential development. Restrictions will also preclude excavation, other than temporary subsurface work beneath the existing caps at RFI and the adjacent city sidewalk area properties, unless the excavation conforms to the requirements of Alternative 3.

Groundwater, Soil Gas, Conduits, Structures/Debris, and Residues. For Alternative 3, all non-soil materials of concern would be addressed exactly the same as for Alternative 2, except that all existing building pads, pavements, and drains would also be removed and disposed off-site. For a detailed description of the remedy for each of these materials, see the description under Alternative 2 in Section 8.4.2.

Principal Threat Soil and Soil with Health-Risk-Based COCs. The only significant difference between Alternatives 2 and 3 is how they each would handle contaminated soil. Instead of leaving most of the soil in place, Alternative 3 would excavate all principal threat soil (9,700 tons) down to the water table (approximately 20 feet bgs) and excavate all other contaminated soil (55,300 tons) down to a maximum of 10 feet bgs. All excavated soil would be disposed off-site at appropriate landfills. Soil left behind at the LB&D site would present a cancer risk no greater than 6 X 10[-5] and a HI of 0.98 for a future on-site worker. This represents a risk reduction of 4600 times for cancer and 270 times for non-cancer risks.

Alternative 3 involves removal of all structures/debris, conduits, and all building slabs prior to performance of the soil excavation described above. About 8,900 tons of miscellaneous structures would be demolished and disposed at a Class III landfill. Soils contaminated with PCBs at concentrations greater than 50 ppm would be transported to and disposed at a TSCA-approved facility. Principal threat soil and stockpiled soil would be disposed at a Class I landfill. Any of the soil that exceeds land disposal restriction standards may require treatment at the landfill before actual disposal.

As a result of the extensive excavation, this alternative would be accomplished in phases of excavation and backfilling. All excavation would be backfilled using imported clean fill material, compacted, and surface graded. Excavation, clean soil placement, and compaction would be performed by conventional equipment, including bulldozers, backhoes, and compaction equipment. Dust may be generated during excavation and materials handling activities. Therefore, dust suppression procedures would be needed.

Perimeter air monitoring would be required during remedial activities to determine if measures were needed to protect the community from adverse air emissions. An emergency response plan is necessary to account for the possibility of a contaminated soil spill during off-site transport.

Soil excavation activities at the RFI and adjacent city sidewalk area properties would not be conducted unless there was extensive disturbance or exposure to the soil. A short-term disturbance or exposure of a small area (e.g., water or utility line trench) would require re-covering with pavement material equal to or greater than the existing pavement. Costs calculations for this alternative include the costs of removal of surface and subsurface features on the RFI property.

Alternative 3 has a present worth cost ($14,609,447) that is almost an order of magnitude higher than the present worth costs of Alternatives 1 and 2 (Table 8.3). The total capital costs ($13,756,273) are dominated by the approximate $6.5 million for off-site disposal costs. Annual O&M costs ($55,000) for groundwater monitoring are identical to those of Alternatives 1 and 2 and have a present worth of $853,174. The costs for addressing the various other non-soil materials such as the vertical conduits ($45,300) and soil gas monitoring and evaluation ($60,000) are the same as under Alternative 2.

9.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

9.1 CRITERIA

The alternatives were evaluated to determine which alternative provides the best balance of tradeoffs with respect to the following nine evaluation criteria. These criteria, which are listed below, are derived from requirements contained in the NCP and CERCLA Sections 121(b) and 121(c).

The first two criteria are known as the "Threshold Criteria" because they must be attained by an alternative selected as the remedy. They are:

1. Overall protection of human health and the environment; and

2. Compliance with ARARs.

The next five of the nine criteria are known as the "Primary Balancing Criteria" because they can provide the major areas of tradeoffs during the remedy section process. They are:

3. Long-term effectiveness and permanence;

4. Reduction of toxicity, mobility, or volume through treatment;

5. Short-term effectiveness;

6. Implementability; and

7. Cost.

The final two of the nine criteria are known as the "Modifying Criteria" because they are addressed during the public comment period and may influence the preferred remedy as described in the Proposed Plan. They are:

8. State acceptance/support agency acceptance; and

9. Community acceptance.

9.2 ANALYSIS OF ALTERNATIVES

The major objective of this section is to evaluate the relative performance of the alternatives with respect to the nine criteria so that the advantages and disadvantages associated with each cleanup option are clearly understood. Under each criterion, the alternative that performs best in that category is discussed first. The other alternatives are discussed in sequence from most to least advantageous.

9.2.1 Overall Protection of Human Health and the Environment

Only Alternatives 2 and 3 provide adequate protection of human health and the environment. Both alternatives reduce the concentration of VOCs in principal threat soils to levels that will not further degrade the shallow groundwater. Alternatives 2 and 3 protect humans from exposure to contaminated structures, conduits, and residues by capping or removing these contaminated materials from the LB&D site and properly disposing them off-site. Alternative 3 is slightly more protective than Alternative 2 because potentially contaminated drains, building pads, and pavements are removed and disposed off-site, whereas Alternative 2 leaves these structures in place beneath an asphaltic-concrete cap. However, the off-site landfill used for disposal under Alternative 3 would, ultimately, also be capped.

In addition to groundwater monitoring, which is also included in Alternative 1, Alternatives 2 and 3 include monitoring of soil gas in residential areas located above the shallow groundwater plume. These monitoring programs would provide advance warning in the unlikely event that shallow groundwater VOC contaminants begin significant migration towards exposure points in drinking water aquifers or in confined spaces of dwellings. Alternatives 2 and 3 also provide protection to all groundwater aquifers, including the shallow aquifer currently under remediation, by removing potential conduits that might otherwise assist in potential groundwater migration or surface water infiltration.

Both Alternatives 2 and 3 will rely on deed restrictions and five year reviews to ensure that contamination beneath neighboring property currently owned by RFI and the City of San Jose, and soil beneath the OU-2 shallow groundwater treatment facility will eventually be addressed. In the meantime, current pavement and building structures prevent human exposure to any contaminated surface soils assuming that the underlying soil is not disturbed. In addition, five-year reviews and deed restrictions will prevent inappropriate uses (eg., residential development or storage of chemical-leaching agents) of the Lorentz, RFI, and City of San Jose sidewalk properties that comprise the contaminated soil portion of the LB&D site.

The major distinction between the protectiveness of Alternatives 2 and 3 lies in how each alternative reduces risk of human exposure to contaminated soils. Alternative 3 provides the highest degree of protectiveness for the LB&D site because all soil to a depth of 10 feet bgs posing a risk greater than 6 X 10[-5] and exceeding a HI of 1.0 will be excavated and disposed off-site. In most cases, the risk will be much lower because only several COCs at a given location would be present after cleanup at concentrations as high as their individual cleanup standards. Since very limited areas of the LB&D site at a depth greater than ten feet bgs might contain soils contaminated above the cleanup standards, it is considered extremely unlikely that such soil will ever become exposed at the surface under conditions that would pose significant risk to an on-site worker. In addition, deed restrictions and future land use plans of the City of San Jose further reduce the likelihood of significant risk from human exposure to the levels of contamination that will remain after cleanup by Alternative 3, particularly if the LB&D, RFI, and City of San Jose sidewalk properties remain covered by some form of paving or structure.

While Alternative 2 eliminates risk from soil contaminants by breaking the exposure pathway with a cap, it is less protective than Alternative 3 because almost all of the contaminated soil will remain on the LB&D property. A potential cap failure or leakage of chemical-leaching agents (e.g., acids) through the cap could increase the level of risk from major soil contaminants (e.g., lead and PCBs) because the contaminant levels exceed health-based cleanup standards (i.e., cap action levels) over most of the LB&D property, especially in the surface soils. Deed restrictions, five-year reviews, and City of San Jose future land use plans are expected to ensure cap integrity and, thus, adequate protection by Alternative 2. Alternative 3, on the other hand, would leave behind clean fill over most of the LB&D and RFI properties to a depth of four feet or more.

However, when considering the environment as a whole, both Alternatives 2 and 3 will ultimately result in contaminated LB&D soils remaining beneath caps because the off-site landfill used under Alternative 3 would eventually be capped. Thus, Alternatives 2 and 3 would provide essentially the same level of protectiveness for human health and the environment.

Alternative 1 is not protective of human health and the environment because contaminated materials are not treated, removed, contained, or even controlled. While there is a strong likelihood that present and future owners of the property would maintain a reasonably effective covering over surface soils, there is no assurance that one or more of the owners would not inadvertently or purposefully contribute to the migration or unsafe exposure of contaminants on- or off-site. Contaminated stockpile soil, drummed ash, and drain residues would most likely be disturbed once private activities resume at the LB&D property.

Alternative 1 does provide a small amount of protectiveness for the integrity of nearby drinking water wells. Groundwater monitoring of deeper aquifers will provide advance warning in the unlikely event that contaminated shallow groundwater began significant migration down into deeper aquifers. However, Alternative 1 does not reduce the likelihood of such vertical migration. Only Alternatives 2 and 3 remove potential vertical conduits, in addition to groundwater monitoring. Also Alternatives 2 and 3 provide monitoring and evaluation of the vadose zone soil gas as advance warning in the unlikely event shallow groundwater contaminants migrate into the confined spaces of dwellings.

In summary, Alternative 3 provides the highest degree of protectiveness and is closely followed by Alternative 2. Alternative 1 does not provide adequate protection of human health and the environment.

9.2.2 Compliance with ARARs

The evaluation of the ability of the alternatives to attain ARARs included a review and analysis of ARARs that was presented in the FS report for Alternatives 1, 2, and 3 and in Section 7.0 of this ROD for Alternative 2. Only Alternatives 2 and 3 can be performed to attain their respective ARARs. Alternative 1, the no-action alternative, would not attain its ARARs.

9.2.3 Long-term Effectiveness and Permanence

Alternative 3 provides the highest degree of long-term effectiveness and permanence because the vast majority of significantly contaminated soil and all other contaminated materials will be removed from the LB&D site. Ultimately, these soils and other contaminated materials may be treated and will be placed in a landfill that will have a liner and cap with integrity equal to or greater than the cap planned for Alternative 2. Alternative 3 will also require land use restrictions and five-year reviews to insure its long-term effectiveness since non-principal threat soil will remain beneath the RFI property, LSGTF treatment facility and adjacent City sidewalk area, and contaminated soil at the LB&D site would still exceed residential cleanup standards.

Alternative 2 provides a lower degree of long-term effectiveness and permanence because most of the contaminated soil will remain on-site covered by a cap. The integrity of the cap will rely on long-term O&M, deed restrictions, and five-year reviews. Such long-term controls are critical for Alternative 2 since failure to prevent or detect a problem with the cap may result in direct contact with the contaminated soil and further degradation of the groundwater if leaching agents are introduced.

Both Alternatives 2 and 3 will rely on deed restrictions and five-year reviews to ensure that contamination beneath neighboring property currently owned by RFI and the City of San Jose, and soil beneath the OU-2 shallow groundwater treatment facility will eventually be addressed. Delaying remedy implementation for these properties avoids costly disruptions to the current operations of RFI, PSS, and the OU-2 groundwater extraction and treatment system. In the meantime, current pavement and building structures prevent human exposure to any contaminated surface soils. Five-year reviews and deed restrictions are slightly less critical for Alternative 3 because soil contamination remaining on the LB&D, RFI, and adjacent City sidewalk area properties will be present at concentrations significantly lower than those remaining with Alternative 2.

In comparing the overall long-term effectiveness for addressing soil contamination, Alternative 2 is essentially as effective as Alternative 3. Although, for the LB&D site itself, Alternative 3 is significantly more effective and permanent because the contaminated soil would be removed from the site, both alternatives will result in LB&D soil contaminants remaining beneath a cap either at the LB&D site (Alternative 2) or at a distant offsite location (Alternative 3). Long-term operation and maintenance of the Alternative 2 cap along with deed restrictions and five-year reviews will be implemented to achieve a level of long-term effectiveness similar to the effectiveness of the off-site landfills used for Alternative 3.

Both Alternative 2 and 3 caps will prevent direct exposure to LB&D soil contaminants and will prevent contamination of groundwater. However, the off-site landfill (Alternative 3) would require a multi-layered cap, liners, and a leachate collection system because acids and other leaching agents would also be present or be produced in the landfill. The single layer Alternative 2 cap would be easier to maintain because it is simpler and does not need a leachate collection system. Even though rainwater infiltration might be better prevented by the off-site landfill cap, PCBs and metals will not be mobilized beneath the Alternative 2 cap because acids and other leaching agents will not be present or produced, and Alternative 2 will effectively prevent infiltration of leaching agents at the LB&D site. Only a rise in perched groundwater or infiltration of rainwater would ever bring water into contact with the soil contaminants at the LB&D site, and water is not an effective leaching agent for these remaining soil contaminants. Thus Alternatives 2 will provide a level of long-term protection of groundwater similar to the level for the more complex cap and operation and maintenance of an off-site landfill under Alternative 3.

Alternatives 2 and 3 are equally effective over the long-term at eliminating risk from human exposure to contaminated conduits, structures, and residues because these materials will ultimately remain beneath a cap at the LB&D site (pavements under Alternative 2) or at an off-site landfill (most of these materials under both alternatives).

Neither alternative provides a truly permanent remedy because, even under Alternative 3, contaminated materials will remain beneath a cap. However, Alternative 3 does permanently remove contaminated materials from the LB&D site.

As long as significant contamination remains in the shallow aquifer, Alternatives 2 and 3 will continue to provide a sufficient level of groundwater and soil-gas monitoring. Such monitoring can detect significant VOC migration from shallow groundwater into deeper aquifers or into soil gas beneath confined spaces of surface dwellings.

Alternative 1 provides almost no long term effectiveness because contaminated soil, residues, and structures are not treated, removed, or adequately contained or controlled. It is possible that some contaminants will degrade over a long period of time, but such natural attenuation cannot be relied on.

In summary, Alternative 3 provides more long-term effectiveness and permanence than Alternative 2, while Alternative 1 provides almost none. While excavation or removal and off-site disposal of the contaminated materials under Alternative 3 provide greater long-term effectiveness for the LB&D site itself, Alternatives 2 and 3 each involve leaving contaminated soil beneath caps that would provide essentially the same level of long-term effectiveness for the environment as a whole.

9.2.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the Alternatives offer significant reductions of toxicity, mobility, or volume through treatment. This is largely a result of the heterogeneity of the LB&D site and the lack of effective technologies that can treat the range of contaminants found at the LB&D site.

Alternative 2 will treat about 15% of the contaminated soil at the LB&D site using in situ SVE to remove VOCs from principal threat soils. While there will be volume reduction for soils containing VOC concentrations that threaten groundwater, most of the original volume will remain contaminated with COCs that are non-volatile. SVE will reduce the toxicity of this principal threat soil by removing most VOCs, although the toxicity of the remaining COCs is not affected. Mobility of extracted VOCs is reduced by adsorption onto GAC as part of air emissions control. Ultimately, the toxicity and mobility of removed VOCs will be eliminated when the VOCs are incinerated during GAC regeneration.

Only Alternative 2 treats the principal threat soil, thus satisfying the statutory preference for treatment as a principal element of the remedy. A cap will be used to break the exposure pathway to the vast majority of soil contaminants. Except for VOCs in a limited volume of LB&D soil, the cap and deed restrictions will ensure that all remaining soil contaminants will be essentially immobile in the soil matrix. While capping is not a treatment, it will slightly increase the immobility of COCs by limiting the possibility for leachates to reach the COCs. In addition, capping reduces mobility caused by contaminated surface soil becoming airborne or mobile by rainwater runoff. Alternative 2 does not reduce the toxicity or volume of soil contaminated with these COCs.

Alternatives 2 and 3 may reduce the mobility of contaminated shallow groundwater by the destruction of potential conduits, although the destruction process is not a true form of treatment. Containment of the shallow groundwater plume is also being addressed by the ongoing operation of the LSGTF groundwater extraction system required by the 1988 ROD for OU-2.

Alternative 3 provides no reduction of toxicity, mobility, or volume through on-site treatment. Excavated soil may be treated off-site to address land disposal restrictions at a disposal facility. If treatment is required prior to land disposal, it would most likely represent a small reduction in toxicity, mobility, or volume through treatment because only a small volume of contaminated soil is expected to exceed LDR standards.

Although excavation and off-site disposal alone do not represent treatment, Alternative 3 effectively eliminates on-site toxicity, mobility, and volume of soil contaminants. However, most of the toxicity, mobility and volume of LB&D site soil contaminants are simply transferred to another location, where exposure to landfill leachates may actually increase their mobility in the unlikely event of a landfill cap failure. Exposure to typical landfill leaching agents is much less probable in the unlikely event of on-site cap failure with Alternative 2.

Alternative 1 provides no treatment and no reduction of toxicity, mobility, or volume. Under this alternative, contamination is not treated or even removed. It is possible that, over a long period of time, some contaminants would be destroyed through natural attenuation, although this is not assured.

In summary, Alternative 2 provides a relatively low level of reduction of toxicity, mobility, and volume through treatment. Alternative 3 also provides a low level of reduction of toxicity, mobility and volume through treatment because treatment is, at best, a small element of the alternative. Alternative 1 provides no reduction through treatment.

9.2.5 Short-Term Effectiveness

Alternative 1 provides a high degree of short-term effectiveness because the only activity conducted at the LB&D site would be periodic groundwater monitoring of already-installed monitoring wells. None of the wells are currently contaminated, and they are anticipated to remain uncontaminated. Because no construction, soil handling, or excavations are involved, Alternative 1 does not pose any significant short-term risks to the on-site workers, members of the community, or the environment. However, it is likely that someone (e.g, an owner) would want to move the stockpiles of contaminated soil and drummed ash during resumption of private activities at the Lorentz property. Inexperienced or irresponsible disturbance of these two material types could lead to a short-term exposure to low levels of contamination. However, the City of San Jose and local health agencies are aware of this contamination and would be likely to insist that safe handling techniques be used.

Alternative 2 provides a moderate degree of short-term effectiveness. While the most heavily contaminated soil will remain undisturbed beneath existing surface pavements, some of the cap construction activities (e.g., site grading) will involve disturbing the moderately contaminated stockpiled soils. Also, excavation of the septic system and conduits will disturb contaminated soils. Standard dust suppression practices will limit exposure to on-site workers and members of the community. All removal, cap construction, and SVE system construction would likely be completed within a 6-month period.

Operation of the SVE portion of Alternative 2 on the LB&D property is anticipated to require about 2 years before VOC concentrations in principal threat soil are reduced to safe levels. During this time, escape of extracted VOCs to the atmosphere and subsequent exposure of on-site workers and members of the community will be virtually eliminated by using a GAC off-gas emissions control. Neither SVE nor relocation of contaminated-soil stockpiles will be involved in future implementation of Alternative 2 at the RFI property, adjacent city sidewalk property or at the site of the shallow groundwater treatment facility.

Alternatives 2 and 3 involve identical short-term risks during the removal and disposal of conduits, septic tank, residues, and the uncontaminated warehouse. Exposure risks for this removal are minor, considering the relatively small volume of these contaminated materials compared with the massive volumes of pavements and contaminated soil to be excavated under Alternative 3.

Alternative 3 provides the lowest level of short-term effectiveness because of the large volume of soil (over 60,000 cubic yards) that will be excavated and then transported through the immediate community. Dust suppression will be more difficult than in Alternative 2, not to mention that excavation will also involve the most heavily contaminated soils. VOC emissions from excavation of the principal threat soil will be difficult to control and will pose the greatest risk to on-site workers. Depending on actual air concentrations measured during excavation, workers may need face masks for protection. Because of the brief exposure time and the probable dilution as VOCs disperse into the community, members of the community would not be significantly affected.

Excavation and removal of the contaminated materials from the LB&D property by Alternative 3 is anticipated to require 10 to 12 months. Additional excavation and removal would be required for the neighboring properties if disruption or removal of the existing pavement occurs by the property owners or operators. Therefore, Alternative 3 would also produce future short-term risks, although from relatively low levels of contamination. Before implementation of the additional excavation, existing pavements and structures will protect on-site workers and members of the community from soil contamination at the RFI property and beneath the shallow groundwater treatment facility and sidewalks adjacent to the LB&D property.

In summary, relative performance in short-term effectiveness is most affected by the volume of soil handling involved in each alternative. Alternative 1 provides the highest degree of short-term effectiveness because no soils handling, construction, or removals are involved. Alternative 2 requires relatively little soil handling compared to the massive amounts required by Alternative 3. Therefore, Alternative 2 has a significantly higher degree of short-term effectiveness than Alternative 3.

9.2.6 Implementability

Alternative 1 would be the most easily implemented remedy because no cleanup actions are required. The five-year reviews and routine groundwater monitoring of deeper aquifers are relatively easy to implement, administratively as well as technically. These are standard practices at numerous other sites and are also required and easily implemented in Alternatives 2 and 3.

Alternative 2 would be relatively simple to implement. While construction of a cap would have significant materials handling requirements, the materials and expertise are available locally. Expansion of the cap to the RFI property and adjacent City sidewalk areas would be relatively easy once their structures were removed. Periodic maintenance of the cap will control its future reliability.

The SVE technology required by Alternative 2 is fairly reliable because of its mechanical simplicity. Also, limited downtime and very little operator involvement are anticipated. However, as with any in situ treatment system, samples throughout the principal threat soil area must be taken frequently to determine the progress and effectiveness of the technology. Since SVE with GAC emissions control is already being employed at other nearby cleanup sites, expertise and materials availability as well as meeting air emissions requirements are not expected to be problems.

Both Alternatives 2 and 3 involve locating and removing conduits. The only conduits that pose major problems are poorly-identified, former agricultural wells and the original SJSU Stadium well. Some wells may be inaccessible under residential structures and may present the administrative difficulty and gaining access permission from property owners. Even if the wells can be located, their condition and lack of well construction details may make removal especially difficult. All other conduits are fairly well described, located, and accessible.

Alternatives 2 and 3 also involve some limited soil gas measurements and the removal and disposal of various residues and structures. All these activities are expected to be easily implementable.

Alternative 3 will be most difficult to implement, primarily because of the large volume of contaminated soil that needs to be removed. Although standard excavation equipment will be employed, a significant level of field coordination will be required to determine that cleanup standards are met and safety precautions are followed effectively. Soil and air sampling as well as segregation of clean and dirty soils must be carefully integrated with progressive excavation and loading of various soil transporters. Execution of safety procedures and dust control are much more critical for Alternative 3 not only because of the large volume of contaminated soil being excavated, but also because of the high concentrations of contaminants in some of the soils.

Another difficulty in the implementation of Alternative 3 is the delay in excavating soil beneath the neighboring RFI property, the adjacent City sidewalk area, and beneath the shallow groundwater treatment facility. A high degree of ongoing coordination between various agencies and responsible parties will be necessary to ensure that excavation of contaminated soils will be carried out effectively and safely, once there was extensive disturbance of or exposure to the contaminated soil.

Meanwhile, deed restrictions and five-year reviews would inhibit any disruption of the current pavement that protects workers and the community from direct exposure.

In summary, Alternative 1 would be the easiest to implement because no cleanup actions are required. Alternative 2 would be moderately easy to implement because of the simplicity of the cap and SVE technologies and the limited disturbance of contaminated soils. Alternative 3 would be the most difficult to implement because of the degree of field sampling and coordination required to safely and effectively meet cleanup objectives. In addition, Alternative 3 would require a greater level of coordination with other agencies and parties to ensure future implementation on the neighboring properties.

9.2.7 Cost

Alternative 1 has the lowest present worth cost ($853,175) because it has no capital costs and only involves annual O&M costs ($55,500) for groundwater monitoring.

Alternative 2 has a present worth cost ($1,970,000) more than double that of Alternative 1. Annual O&M costs ($63,000) include the same groundwater monitoring costs as Alternative 1 and, in addition, include a relatively minor increase for the annual O&M of the cap. The present worth of O&Mis $968,468. The total capital cost ($1,001,532) is dominated by the cap, conduits and SVE system costs.

Alternatives 2 and 3 have the same costs for soil gas and groundwater monitoring and for the removal and disposal of the septic tank, warehouse, conduits, and residues. These non-soil capital costs (about $300,000) are relatively minor in comparison to the capital costs necessary for addressing soil contaminants.

Alternative 3 has a present worth cost ($14,609,447) that is an order of magnitude higher than the present worth costs of Alternatives 1 and 2. The total capital costs ($13,756,273) are dominated by the approximate $6.5 million off-site disposal costs. Annual O&M costs ($55,500) for groundwater monitoring are identical to those of Alternative 1 and have a present worth of $0.9 million.

When costs in common to Alternatives 2 and 3 (groundwater monitoring, soil gas monitoring, and removal and disposal of the septic tank, warehouse, conduits, and residues) are subtracted out from their respective present worth costs, the main distinction between these two alternatives becomes apparent. To attain ARARs and provide adequate protection from soil contaminants, Alternative 2 will cost about $0.9 million compared with $14 million for Alternative 3. While Alternative 3 is more protective over the long term, it is probably not even an order of magnitude more protective than Alternative 2, and thus, a 15 times greater cost for Alternative 3 is not justified.

In conclusion, Alternative 2 is more cost effective than Alternative 3 because the cap will provide adequate protection of human health and the environment for a cost almost fifteen times less than the soil excavation and offsite disposal of Alternative 3. Despite the lowest overall cost, Alternative 1 is the least cost effective because it is the only alternative that does not provide adequate protection or attain ARARs.

9.2.8 State/Support Agency Acceptance

The FS and Proposed Plan Fact Sheet were reviewed by the State of California's DTSC. In a letter dated June 23, 1993, DTSC concurred with EPA's proposed cleanup plan.

In addition, RWQCB, SCVWD, and DHS's Environmental Epidemiology and Toxicology Branch (EETB) reviewed the Proposed Plan Fact Sheet and attended the May 27, 1993 public meeting in San Jose. Each of these support agencies concurred with EPA's proposed cleanup plan.

The main concerns raised by State and support agencies focused on interim controls at the LB&D property and on groundwater and soil gas monitoring methods. However, EPA believes these minor technical concerns will be addressed by the selected remedy. A full response to comments received from state and support agencies can be found in the Responsiveness Summary (Part III) in this ROD.

9.2.9 Community Acceptance

The Proposed Plan was presented to the community of San Jose in a fact sheet and at a public meeting. During the 30 day comment period, 5 comment letters were received and one formal comment was made at the public meeting.

Commentors from the local community prefer Alternative 3. The major concerns of the community were long-term effectiveness, future land use, and cost. Commentors from the local community generally believe that Alternative 3 is the only alternative that will provide sufficient long-term effectiveness, especially because they would like to see the former LB&D facility properties restored to their fullest potential uses. Commentors from the local community are concerned that Alternative 2 would not allow profitable development of the former LB&D facility properties, which in turn might affect the prosperity of their neighborhood community and property values. Commentors from the local community generally believe that the increased cost of Alternative 3 is not that much on an absolute basis and that the PRPs should pay for Alternative 3.

None of the comments received provided EPA with the technical justification for selecting Alternative 3 or making any changes to Alternative 2. EPA remains convinced that Alternative 2 is essentially just as protective of human health and the environment as Alternative 3 over the long term. EPA knows of no indications that local prosperity or property values will be negatively affected by Alternative 2, and points out that successful businesses are currently operating on part of the LB&D site under the same limitations that will exist under Alternative 2. In addition, the City of San Jose and SJSU have joint plans to expand the recreational development of adjacent properties and have strong desires for the LB&D property to be used for public parking.

EPA disagrees that the absolute cost of Alternative 3 is relatively low and, therefore, should be spent by PRPs. EPA believes that the absolute cost is significant, especially when compared to the overall site cleanup costs. As required by law, EPA evaluated cost and effectiveness of the remedies as elements of the nine criteria used to evaluate the alternatives. EPA believes that spending $12.6 million more for a remedy (Alternative 3) that would only provide marginally better protection of a relatively low level threat (direct contact with PCBs and lead present at average concentrations near or below the cleanup standards typically used for industrial sites without a cap) is not justified.

All community concerns and comments received during the public comment period are addressed in the Responsiveness Summary (Part III) in this ROD.

10.0 THE SELECTED REMEDY

10.1 BASIS OF SELECTION

Only two of the alternatives, Alternatives 2 and 3, meet the threshold criteria by complying with their respective ARARs (See Section 7) and providing adequate protection of human health and the environment. Both alternatives provide a good level of overall protection, although they provide relatively low levels of reduction of toxicity, mobility, or volume through treatment. While Alternative 3 provides a greater level of long-term effectiveness and permanence because all significant soil contamination is removed from the LB&D and RFI property, Alternative 2 will provide a similar level of long-term effectiveness with long-term maintenance, deed restrictions, and five-year reviews ensuring cap integrity.

Alternative 2 provides greater short-term effectiveness and is easier to implement than Alternative 3, but the main advantage of Alternative 2 is its cost effectiveness. The Alternative 2 cap will provide good protection of human health and the environment at a significantly lesser cost (15 times less) than the soil excavation and off-site disposal in Alternative 3. For these reasons, EPA has selected Alternative 2, the hybrid closure cap with in situ SVE, as the final remedy for the LB&D site.

10.2 FEATURES OF THE REMEDY

All features of Alternative 2, the Selected Remedy, including remediation goals, cleanup standards, and compliance boundaries, are as described in detail in Section 8. Costs are summarized in Table 10.1. The selected remedy, which addresses soil, structures, debris, residues, vertical and horizontal conduits, groundwater, and vadose zone soil gas in residential areas, contains the following features:

Principal Threat Soil. Principal threat soil will be treated by SVE to remove VOCs present at concentrations that total more than 1 ppm. EPA assumes, based on engineering experience, that the COCs listed in Table 5.1 do not pose a threat to groundwater at the concentrations found during the RI.

Extraction of VOC-contaminated soil vapors followed by capture of the VOCs on granular activated carbon will protect the shallow groundwater from further degradation by these highly mobile contaminants. Health risks from the VOCs would be eliminated upon destruction of the VOCs during the regeneration of the granular activated carbon by incineration. The SVE system is estimated to cost $78,000 to construct and $84,000 to operate for 2 years.

Soil with Health-Risk-Based COCs. A cap (single layer asphaltic concrete pavement without leachate collection or monitoring systems) will be used to contain soil contaminated with non-mobile chemicals (e.g., PCBs, pesticides, and metals) that pose health risks. Long-term cap maintenance will ensure elimination of the exposure pathway to the contaminated soils and to the contaminated building pads that will be left in place beneath the cap. Capital costs for the cap are estimated to be $344,940 and the present worth of 30 years of cap maintenance is estimated to be $115,294. The present worth cost of performing cap maintenance in perpetuity is estimated to be $150,000.

Summary of Estimated Costs for the Selected Remedy The cap will protect humans from direct contact with building pads and contaminated soil present at or adjacent to the former LB&D facility. In addition to the LB&D and RFI properties, the cap will cover all adjacent soil (e.g., adjacent city sidewalk area) that exceeds the cap action levels for soil. Risk will be reduced to zero because the cap breaks the exposure pathway. The cap will also minimize contaminant leaching by surface water infiltration.

Any stockpiled soil that contains PCBs at concentrations greater than 50 ppm will be removed from the LB&D site and disposed at a TSCA landfill. All other stockpiled soil (approximately 1100 tons) will be spread over the existing pavements and building pads. Clean fill will be used to grade the LB&D property and cover the contaminated stockpiled soil before the cap is installed. It is estimated that 50 cubic yards of stockpiled soil will need to be removed and disposed at a cost of approximately $10,280.

Deed restrictions will be imposed for those properties (LB&D, RFI, and the adjacent sidewalk area belonging to the City of San

Jose) that contain contaminated soil exceeding cap action levels. Restrictions will prohibit residential development and will limit industrial development to activities that do not breach the integrity of the cap and do not mobilize the soil contaminants. Restrictions will also preclude excavation, other than temporary subsurface work beneath the cap, and will require complete restoration of any disturbed fill or cap once any such temporary work is completed.

In accordance with Section 121(c) of CERCLA, reviews of the protectiveness of the selected remedy, in particular the cap and its continued maintenance, will occur at least once every five years. The reviews will also consider the ongoing effectiveness of deed restrictions and other land use restrictions.

Structures and Debris. The warehouse and contaminated septic tank and miscellaneous debris (e.g., visqueen cover used on stockpiled soils) will be removed and disposed off-site. These actions will eliminate the potential for direct exposure to contaminated structures and debris located at the LB&D property and will also facilitate installation of the cap. The cost of addressing the structures and debris is estimated at $65,560.

Residues. Incinerator ash and decontamination liquids will be removed and disposed at an off-site landfill. Spent granular activated carbon will be decontaminated at a regeneration facility. The regeneration of the spent carbon will involve incineration, resulting in the destruction of the sorbed organic contaminants. Residues contained in the contaminated septic system and sewer line will be addressed by the removal of these potential conduits. These actions will prevent human exposure to contaminated residues located at the LB&D property. The cost of residue disposal is estimated to be $3,900.

Conduits. Accessible wells that could act as potential conduits in the vicinity of the shallow groundwater contamination plume will be located, assessed, and removed and disposed of at an off-site facility. However, there will always be some uncertainty whether all potential conduits have been located. It is possible that some of the old wells will not be able to be located or might not be accessible.

In the particular case of the currently-operating SJSU Spartan Stadium well, the pumping of this potential conduit may have a direct effect on the direction of flow in the intermediate aquifer and may increase the chances that contaminated shallow groundwater could migrate down to the intermediate aquifer. In the event that the intermediate aquifer becomes contaminated by shallow aquifer contaminants, EPA will reevaluate the need for restricting the use of this drinking water well to agricultural use or may require its removal.

The removal of potential conduits will reduce the potential for shallow groundwater contaminants to migrate to deeper aquifers. Removal of non-essential monitoring wells will also reduce the likelihood that the wells could act as potential conduits of surface water into the shallow aquifer zone. In addition, removal and disposal of the contaminated septic system and sewer line, following their excavation, will reduce potential exposure to or migration of contaminated residues contained in these potential horizontal conduits. The removal of potential conduits, including a geophysical survey, is estimated to cost $45,300.

Groundwater. Additional protection from future potential domestic exposure of humans to contaminated groundwater will be provided by a mechanism for early warning in the unlikely event that shallow groundwater contaminants begin significant migration towards the deep aquifer that is used for drinking water. Both the intermediate and deep aquifers will be monitored for VOCs on a semi-annual basis to alert the community if VOCs are ever detected. Also, land use restrictions will prevent well construction (for water supply purposes) in source areas that remain contaminated. The estimated present worth cost of 30 years of groundwater monitoring is $853,174.

Vadose Zone Soil Gas. Monitoring of the soil gas near residences situated above the shallow groundwater plume will provide advance warning in the unlikely event that shallow groundwater VOCs begin a significant migration towards the confined spaces of dwellings. Soil gas monitoring is estimated to cost $60,000.

11.0 STATUTORY DETERMINATIONS

11.1 PROTECTIVENESS

The selected remedy is protective of human health and the environment. Protection is achieved at this industrial site, and in the aquifers extending beyond the former LB&D facility, in the following ways:

(1) The cap will protect humans from direct contact with building pads and contaminated soil present at or adjacent to the former LB&D facility. In addition to the LB&D and RFI properties, the cap will cover all adjacent soil (e.g., adjacent city sidewalk area) that exceeds the cap action levels for soil. Risk will be reduced to zero because the cap breaks the exposure pathway. Soil beyond the LB&D site boundaries is not subject to the cap because it meets cap action levels. Such soil, if exposed under an industrial on-site worker scenario, would exhibit a maximum cancer risk of 6 X 10[-5] and a HI less than 1. The cap will also minimize contaminant leaching by surface water infiltration. (2) Extraction of VOC-contaminated soil vapors followed by capture of the VOCs on granular activated carbon will protect the shallow groundwater from further degradation by these highly mobile contaminants. Health risks from the VOCs would be eliminated because they will be destroyed during regeneration of the granular activated carbon.

(3) Removal and off-site disposal of non-essential wells located in the vicinity of the shallow groundwater contamination plume will reduce the potential for the wells to act as vertical migration conduits for shallow groundwater contaminants. In addition, excavation and off-site disposal of the contaminated septic system and sewer line will reduce potential exposure to or migration of contaminated residues.

(4) Removal and offsite disposal of contaminated incinerator ash from the LB&D facility operations, stockpiled soil containing greater than 50 ppm PCBs, and contaminated debris and residues will prevent future direct human contact with these contaminated materials.

(5) Additional protection from future potential human exposure to contaminated groundwater will be provided by a mechanism for early warning in the unlikely event that shallow groundwater contaminants migrate towards the deep, drinking water aquifer. Both the intermediate and deep aquifers will be monitored for VOCs on a semi-annual basis to alert the community if VOCs are detected. In a similar fashion, monitoring of the soil gas near residences situated above the shallow groundwater plume will provide advance warning in the unlikely event that VOCs begin a significant migration towards the confined spaces of dwellings.

(6) Land use restrictions will prevent well construction (for water supply purposes) in source areas that remain contaminated. Deed restrictions will be imposed for the properties (LB&D, RFI, and the adjacent sidewalk area belonging to the City of San Jose) that contain contaminated soil exceeding cap action levels. Deed restrictions will prohibit residential development and will limit industrial development to activities that do not breach the integrity of the cap or do not mobilize the soil contaminants. Restrictions will also preclude excavation, other than temporary subsurface work beneath the cap and will require complete restoration of any disturbed fill or cap once any such temporary work is completed.

11.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy complies with federal and state requirements that are legally applicable, or relevant and appropriate (ARARs) to the remedial action. See Section 7 for a detailed discussion of ARARs.

11.3 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedy will use SVE to treat approximately 15 percent of the contaminated soil at the LB&D site. This in situ treatment will occur only on the LB&D property. Mobility of the extracted VOCs is reduced by adsorption onto granular activated carbon as part of air emissions control. Ultimately, the toxicity and mobility of removed VOCs will be eliminated when the VOCs are incinerated and destroyed during GAC regeneration. No other treatment processes are involved in the final remedy, mostly because of the lack of technologies that can effectively treat the heterogeneous mix of LB&D soil COCs. Because principal threat soil is treated, the selected remedy satisfies the statutory preference for treatment as a principal element of the remedy.

While there will be volume reduction for soil containing VOC concentrations that threaten groundwater as principal threat, most of the original volume will remain contaminated with nonvolatile COCs (e.g., PCBs and metals). SVE will reduce the toxicity of this principal threat soil by removing most of the VOCs, although the toxicity of the remaining COCs is not affected.

11.4 USE OF PERMANENT SOLUTIONS, ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES

Permanent solutions, alternative treatment and alternative resource technologies were evaluated during the FS, but were not determined to be practicable or cost effective for most of the contaminated soil at the LB&D site, largely because of the heterogeneous mixture of COCs. By its use of SVE for principal threat soil, the selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining onsite above health-based levels and the cap will require long-term routine maintenance, reviews of the protectiveness of the remedy will be conducted every five years, in accordance with Section 121(c) of CERCLA.

11.5 COST EFFECTIVENESS

The remedy is cost effective because adequate protection is achieved for the estimated cost of performance. The analysis contained in the FS and this ROD demonstrates that additional remedial action and the cost associated with that action would not achieve a significantly greater reduction in risk, but would result in a dramatically higher cost. The FS and this ROD also show that a lesser effort and a lower cost would result in a measurably higher risk at the LB&D site.

11.6 SUMMARY

The selected remedy is protective of human health and the environment, complies with ARARs, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because the remedy will result in hazardous substances remaining on-site above health-based levels, a five-year review, pursuant to Section 121(c) of CERCLA, 42 U.S.C. 9621(c), will be conducted at least once every five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

12.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the LB&D site was released for public comment in May 1993. The Proposed Plan identified Alternative 2, the hybrid closure cap, as the preferred alternative. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, EPA determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.