UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX

RECORD OF DECISION

for

Del Amo Waste Pits Operable Unit

Del Amo Facility Proposed Superfund Site

Los Angeles, CA

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I. DECLARATION

1.1 Site Name and Location

Proposed Del Amo Superfund Site
Los Angeles, CA

1.2 Statement of Basis and Purpose

This decision document presents the selected remedial action for the Del Amo Waste Pits Operable Unit (Waste Pits OU) of the Proposed Del Amo Superfund Site (Del Amo Site), in Los Angeles, California, chosen 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) and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record.

The State of California concurs with the selected remedy.

1.3 Assessment of the Site

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.4 Description of the Selected Remedy

The remedy selected in this ROD for the Del Amo Waste Pits Operable Unit is the first of three planned RODs for the Del Amo Site. This ROD addresses the waste, soil and subsurface gas contaminated by hazardous substances within the 4-acre Waste Pits Area of the Del Amo Site (see Figure 1). This ROD selects a final remedy for the Waste Pits Area addressing potential human exposures to waste pit contaminants at or near the ground surface. This ROD also selects an interim groundwater remedy for the Waste Pits Area by selecting measures to prevent continued migration of hazardous substances from the waste pits or surrounding soil to the groundwater. The Waste Pits Area is one of many sources of groundwater contamination at the overall Del Amo Site.

The remedy selected in this ROD addresses the principal threat remaining at the Waste Pits Area by selecting actions that will prevent future releases of hazardous substances from the remaining waste materials present in the waste pits, either upward to the surface, downward into the groundwater, or laterally out from the pits, that would create unacceptable risks to public health or welfare or the environment. The ROD also selects measures intended to prevent additional contamination of groundwater beneath the Waste Pits Area by selecting response actions to clean-up hazardous substance contamination that had been previously released from the waste pits and is currently present in the vadose zone soils.

The major components of the selected remedy for this action include:

- Placement of a **RCRA-equivalent cap** over the Waste Pits Area as described in this ROD and associated soil gas monitoring;

- Installation of **surface water controls** to prevent ponding of water on the cap and to prevent runoff onto adjacent properties;

- Installation and operation of a **soil vapor extraction system (SVE)** beneath the Waste Pits Area to achieve the interim soil remediation standards established in this ROD;

- Installation of **security fencing** around the treatment units associated with the cap and SVE systems;

- Implementation of **deed restrictions** prohibiting future residential use of the Waste Pit Area and prohibiting any future use of the Waste Pits Area that could threaten the integrity of the RCRA equivalent cap;

- **Long-term operation and maintenance** of all of the above and related components of the remedy selected in this ROD.

1.5 Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Components of the selected final remedy satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-Site above health-based levels, a review will be conducted at least once every five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of public health or welfare or the environment.

1.6 Signature

Keith A. Takata   9-5-97

Keith A. Takata, Director   DATE
Superfund Division
U.S. Environmental Protection Agency, Region IX

II. DECISION SUMMARY

2.1 Name, Location, Description

The proposed Del Amo Superfund Site (Del Amo Site) is located in the city of Los Angeles, California. (See Location Map - Figure 1). It is located in a section of the city known as the Harbor Gateway, a narrow appendage of the city approximately a half mile wide that extends from the main body of the city south to the coast near Long Beach, CA. The Site sits approximately 6 miles south of the main body of the city and 10 miles north of the Pacific Coast. To date, EPA's investigation of the Site has focused on the 280 acres formerly occupied by a synthetic rubber manufacturing operation and on the associated groundwater contamination. The subject of this ROD is the Waste Pits Area, a 4-acre portion of the Site that sits at the southern boundary of the area formerly occupied by the synthetic rubber manufacturing operation. The Waste Pits Area consists of two parcels: Lot 36 and Lot 37, as identified on the Los Angeles County Assessor's Map Number 7351-034 Northwest.

The proposed Del Amo Site sits adjacent to the junction of Interstate Highways 405 (the San Diego Freeway) and 110 (the Harbor Freeway). The City of Los Angeles appendage, within which sits the Site, and the adjacent unincorporated areas, are sandwiched between the cities of Torrance to the west and Carson to the east. The area that was once occupied by the synthetic rubber manufacturing operation is bounded by 190th St. on the north, Del Amo Blvd. on the south, roughly Normandie Ave. on the west, and Interstate 110 on the east.

The Waste Pits Area encompasses approximately 4 acres and sits adjacent to the southern Site boundary of the area once occupied by synthetic rubber manufacturing operation. The Waste Pits Area is bounded by industrial and commercial development on the north and Del Amo Boulevard with adjacent residences on the south. Electrical power transmission easements run along the Waste Pits Area's northern and southern boundaries, and two major underground petroleum and chemical pipeline corridors run along it's southern boundary. The adjacent area south of the Waste Pits Area is a residential community, within the jurisdiction of unincorporated Los Angeles County.

Today, the area formerly occupied by the synthetic rubber manufacturing operation is mostly being used for light industrial and commercial purposes, including food processing, light manufacturing, and warehousing. There are a few vacant parcels that have not been redeveloped, including the Waste Pits Area. The adjacent lands to the north are also used for light industrial and commercial purposes, as are the lands on the west (which include several aircraft manufacturing facilities and active chemical plants). The land adjacent to the Site on the east is a freeway, and the adjacent lands on the south are residential. Del Amo Boulevard separates the Waste Pits Area from residents' backyards. The fronts of these residences are on 204th St.

To the west, the Montrose Chemical Corporation of California manufactured the pesticide DDT from 1947 until 1982 at 20201 Normandie Avenue. The Montrose plant property and areas impacted by releases from that property, the Montrose Chemical Corporation Superfund Site, were added to the Superfund National Priorities List in 1989.

The land upon which the Del Amo Site sits is a relatively flat alluvial plain. Underlying the Site are alluvial deposits of sands, silts, and clays that extend down hundreds of feet. These deposits contain four distinct and separate aquifers, the third and fourth (deepest) of which are used for municipal drinking water. There are no surface water resources at the Site.

To date, no man-made structures from the original synthetic rubber manufacturing operations have been discovered with the exception of the waste pits and ponds in the Waste Pits Area. The Waste Pits Area contains the most concentrated sources of waste materials generated by the synthetic rubber operations, as well as other related hazardous substance contamination. The Waste Pits Area, a series of six former waste disposal pits and four former evaporation ponds, had been covered or filled with soil at various points in the past.

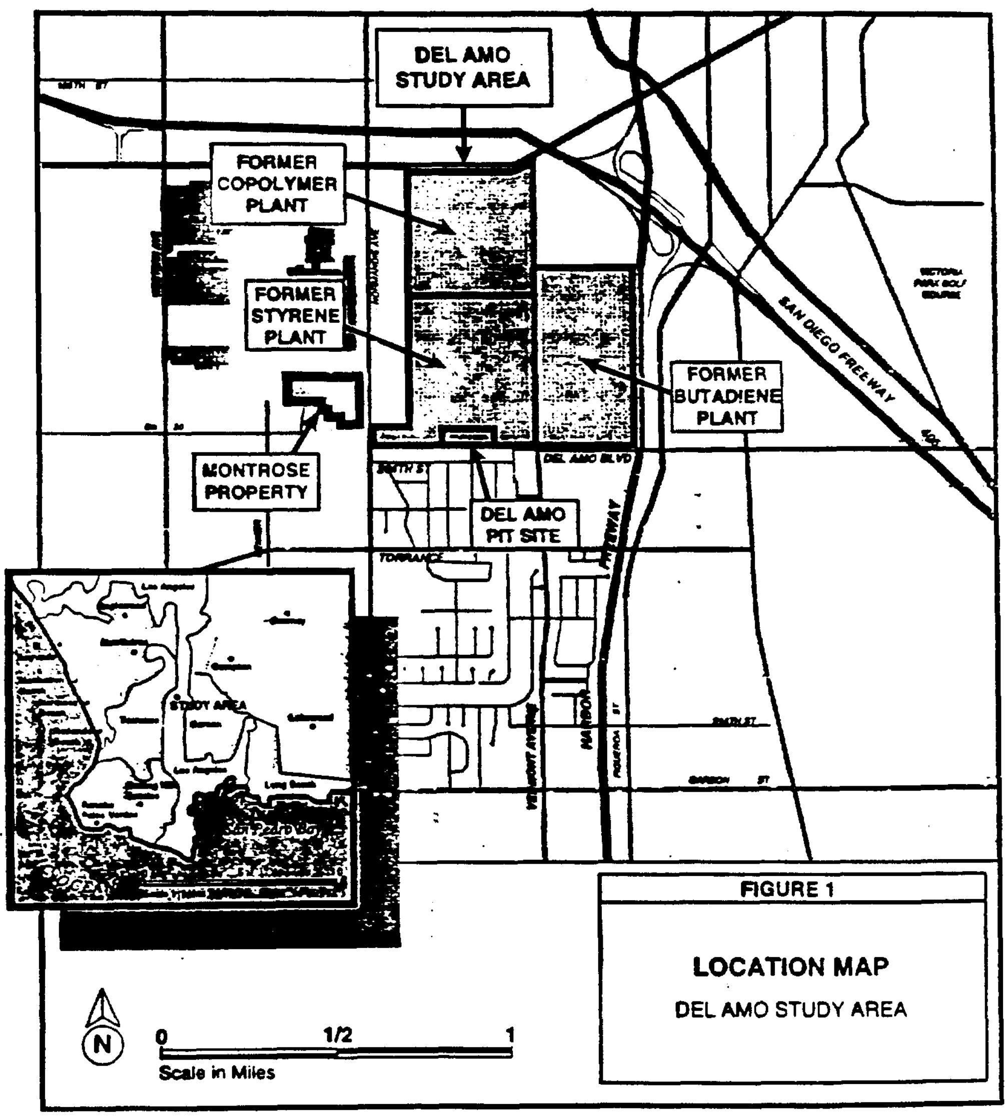


FIGURE 1

LOCATION MAP

DEL AMO STUDY AREA

2.2 Site History and Enforcement Actions

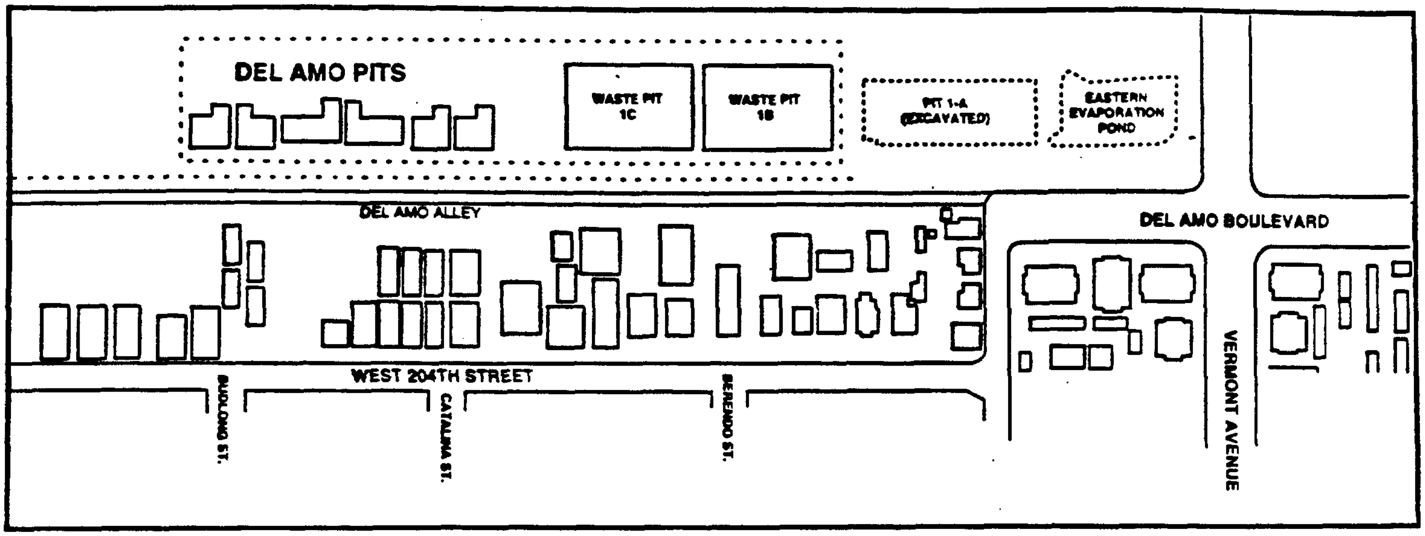
From 1943 until 1972, a synthetic rubber manufacturing operation, consisting of three separate plants, covered 280 acres at the Site. Built to produce synthetic rubber during World War II, the 280-acre operation, from 1942 until 1955, consisted of a styrene plant operated by Dow Chemical Co., a butadiene plant operated by Shell Oil Co., and a synthetic rubber (copolymer) plant operated by U.S. Rubber Co., Goodyear Tire & Rubber Co., and others. During this period, the United States owned all three plants, which were operated by the above-noted companies under agreements with the United States. In 1955, the United States sold all three plants to Shell Oil Company and Shell continued to operate these plants until 1971.

Synthetic rubber was produced by manufacturing styrene and butadiene separately, piping them to the rubber plant, and then chemically synthesizing the two into synthetic rubber. (See Figure 1 - Location Map). Raw materials and finished products were stored primarily in aboveground tanks. Some feedstock chemicals, particularly benzene, were delivered via underground pipeline from off-site sources. The styrene plant consisted of approximately 106 acres. The primary feedstocks for styrene manufacture were propane and crude benzene. Other chemicals used or produced in the process include toluene, ethylbenzene, styrene, caustic, hydrochloric acid, and sulfuric acid. The butadiene plant consisted of approximately 90 acres. Butadiene is a gas at standard temperature and pressure. Butadiene feedstock including a mixture of butane, butylene, and butadiene, were received primarily by pipeline. The copolymer plant occupied approximately 82 acres. Synthetic rubber was produced in a series of reactions by combining styrene and butadiene with lesser amounts of other chemicals including soap solutions and acid solutions.

Within each plant, wastes from the production processes were directed into separator units. Settled sludge from the separator units was disposed of either off-site or in a waste disposal area located on-Site. Waste disposal impoundments were located on two parcels (the Waste Pits Area) covering a total of approximately 4 acres at the southern boundary of the styrene plant, including four evaporation ponds (referred to as pits 1-A through 1-C and the eastern evaporation pond) and six waste pits (referred to as pits 2-A through 2-F). The 1-series evaporation ponds received aqueous waste, and the 2-series pits received semi-viscous to viscous wastes. All of the pits and ponds were unlined. (See Figure 2 - Waste Pits Area). The 2-series pits received an aluminum chloride complex, containing a large amount of hydrocarbons. The 2-series pits also received heavy impurities and tars, including sulfur tars from the styrene purification process. The four 1-series evaporation ponds received a variety of materials, including acid sludge (a by-product of the treatment of benzene and sulfuric acid), kaolin clay (used to dehydrate alcohol and produce ethylene) and lime slurry (a by-product of a zeolite softening system). The evaporation ponds also received the heavy hydrocarbons that had settled at the bottom of the water skimmers in the styrene plant.

Upon closure of the three plants by Shell Oil Company in 1972, the unlined pits and ponds that were still open were covered with soil and surrounded by a double row of chain link

FIGURE 2
WASTE PIT AREA



fence. In 1972, Shell sold the facility and the property to a development company and the three plants were dismantled. Most of the 280-acre area once occupied by the synthetic rubber manufacturing operation has since been redeveloped as an industrial park.

In 1983, the California Department of Toxic Substances Control (DTSC) began investigating waste disposal areas within the Waste Pits Area. In 1984, contamination was discovered in the waste pits area and underlying soils. From 1985 until 1991, Dow Chemical Company, Shell Oil Company and G.P. Holdings conducted RI/FS activities for Lot 36 under a Memorandum of Agreement and subsequently under an Administrative Order with the California Department of Toxic Substance Control (DTSC). In 1991, DTSC issued a Notice of Non-Compliance and terminated the Administrative Order.

In July 1991, EPA proposed the Del Amo Site be added to EPA's National Priorities List (NPL). Shortly after that, DTSC turned over regulatory responsibility for the Site to EPA. In June 1996, EPA re-proposed the Site with updated technical information.

On May 7, 1992, EPA, DTSC, and two potentially responsible parties, the Shell Oil Company and the Dow Chemical Company, entered into a Administrative Order on Consent (U.S. EPA Docket No. 92-13) agreeing to perform an remedial investigation and feasibility study for the Site. In addition, Dow and Shell agreed to perform an accelerated RI/FS for the Waste Pits Area. The purpose of these activities was to determine the nature and extent of contamination at the Site and to determine feasible remediation options for the Site.

On July 15, 1994, EPA issued a Unilateral Administrative Order to the Shell Oil Company following the discovery of small areas or seeps of exposed waste at Pits 2-B and 2-A. The Order requires Shell to conduct regular inspection and maintenance of the Waste Pit Area and in particular, to detect and cover or remove exposed waste material.

The focused RI/FS for the Waste Pits Area is contained in two documents - the Waste Excavation Feasibility Study (WEFS) and the Focused Feasibility Study (FFS). Information and analysis meeting Superfund requirements for a remedial investigation and baseline risk assessment are contained in the FFSC Chapter 2 and Chapter 3, respectively, and related appendices. On November 30, 1994, EPA issued a Notice of Tentative Disapproval to the PRPs for the Waste Excavation Feasibility Study and the Focused Feasibility Study (FFS) for the Waste Pits Area. These documents were unacceptable due to their "overall poor quality, inaccurate or inappropriate assumptions, and inaccurate and unfounded conclusions." EPA required the PRPs to make significant revisions to the reports. In July 1995, EPA issued a Notice of Disapproval of the Waste Excavation FS on the grounds that it significantly failed to adequately address EPA comments. EPA then prepared a Waste Excavation Feasibility Study, which the PRPs incorporated into a revised FFS. EPA finally approved the revised Focused Feasibility Study Report for the Waste Pits Area in December, 1996.

2.3 Highlights of Community Participation

This ROD (including the Response Summary) presents the selected remedial action for the proposed Del Amo Site Waste Pit Operable Unit. The remedial action is chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, in accordance with the National Contingency Plan. The decision for the Waste Pit Operable Unit is based on the Administrative Record established for this action.

On December 16, 1996, EPA issued the Proposed Plan for the Del Amo Waste Pit Operable Unit, and sought public comments on the Proposed Plan. On that date, a copy of the Administrative Record for the Proposed Plan, which included the Focused Feasibility Study and the Waste Excavation Feasibility Study, was placed in the local repositories near the Del Amo Site - the Torrance Public Library and the Carson Public Library. EPA established a 60-day period for the public to provide comments on the plan. During the comment period, EPA held a public meeting at the Torrance Cultural Arts Center, in Torrance, CA, to discuss the Proposed Plan with the public and receive public comments. The public comment period ended on February 13, 1997. The Proposed Plan and the subsequent invitation to the public meeting were both mailed to the entire Site mailing list, which includes approximately 1800 residents and other concerned citizens. In addition, the issuance of the Proposed Plan and the location and date of the Proposed Plan Public Meeting were advertised in the local newspaper, the Torrance Daily Breeze. In response to the comments EPA received from the public, EPA prepared a Response Summary, which is part of this ROD.

EPA has conducted frequent public meetings since March 1994, approximately every two to three months, to present and discuss information and issues concerning both the proposed Del Amo Site and the adjacent Montrose Chemical Corporation NPL Superfund Site. Since assuming the lead for the Del Amo Site from the State of California in 1991, EPA has issued 22 Fact Sheets explaining the results of the RI sampling, the neighborhood sampling, the Site history, the Superfund process, and other matters. In addition, EPA held a community workshop to describe potential remedial alternatives in February 1996, upon initial development of draft remedial alternatives in the Focused Feasibility Study for the Waste Pits Area.

EPA made particular efforts to inform and communicate with the community regarding sampling conducted by EPA in residential areas adjacent to the southern boundary of the Waste Pits Area. In October 1993 and February 1994, EPA conducted soil sampling in residential lots adjacent to the Waste Pits Area and other residential lots adjacent to the southern boundary of the property formerly occupied by the Styrene Plant. The results of this sampling found contaminants associated with the Del Amo Site but at levels that did not pose an unacceptable risk to human health. EPA provided these sampling results, by letter, to owners and occupants of the properties sampled by EPA. EPA also discussed these results in a community meeting held on March 22, 1995 at Halldale School Auditorium near the site.

In the summer of 1994, EPA conducted air monitoring at the Waste Pits Area and indoor/outdoor air monitoring at residential lots adjacent to the Waste Pits Area. These sampling results and the results of other sampling including soil, indoor dust and drinking water sampling, were presented in public meetings, held on May 24, 1995, and subsequent dates, at Residence Inn, Torrance . These results also did not find contaminants associated with the Waste Pits Area or the Del Amo Site at unacceptable levels. These sampling results were provided, via correspondence from EPA, to occupants and owners of the parcels sampled.

2.4 Scope and Role of OU or Response Action

This ROD is for the Waste Pits Area at the proposed Del Amo Site, the first of three planned remedial decisions for the Site. An "operable unit" is a portion of a Site for which EPA selects a remedial action separately from the other operable units or the overall Site. Operable units can be defined by distinct physical areas of a Site, contaminated medium (e.g. groundwater vs. soils), or contaminants (e.g. metals vs. solvents). For the proposed Del Amo Site, EPA has broken RI/FS activities into three components: the Waste Pits Area, groundwater, and the remainder of the proposed Del Amo Site (primarily soil contamination). EPA's management approach to groundwater and other Del Amo Site RI/FS investigations may be changed at EPA's discretion.

Because the Waste Pits Area was the largest and most concentrated known source of hazardous substance contamination at the proposed Del Amo Site, and because of its close proximity to residences, EPA decided it was appropriate to accelerate the schedule for the Waste Pits Operable Unit RI/FS.

This Record of Decision for the Waste Pits Operable Unit is a final remedial decision for the Waste Pits area, addressing the potential for human exposure to hazardous substances on or near the ground surface of the two lots (Lot 36 and Lot 37) that make up the Waste Pits Area. However, this ROD is an interim remedial decision for groundwater by addressing the potential for migration of hazardous substances at the Waste Pits area from the waste material, soil or to groundwater. This ROD is an interim remedial decision for groundwater because the actions selected in this ROD pertain only to the Waste Pits area as a groundwater contaminant source. There are other areas that are sources of groundwater contamination at the Del Amo Site in addition to the Waste Pits Area. Generally, EPA selects interim actions which are anticipated to be consistent with a final remedy. The groundwater operable unit ROD will select final remedial actions, if any, for the Site-wide groundwater contamination. In so doing, the groundwater operable unit ROD may include adjustments to groundwater-related decisions made in this ROD. This ROD does not make any remedial decision concerning the groundwater beneath the Waste Pits Area or any other area of the proposed Del Amo Site.

A decision concerning remedial actions, if any, to address groundwater contamination will likely be the next remedial decision made by EPA for the proposed Del Amo Site. Groundwater contamination at the Site (including known human carcinogens) appears to exhibit the potential to spread and to reach aquifers being used for drinking water unless response activities are taken. Any principal threats associated with the groundwater will be identified in the studies, remedial plans and selections for the groundwater operable unit. The third and final EPA ROD will address the remainder of the proposed Del Amo Site other than the waste pits and groundwater, principally soil contamination. Any principal threats associated with soils in the rest of the Del Amo facility will be identified in the studies, remedial plans and selections for the operable unit covering the remainder of the Del Amo Site.

2.5 Summary of Site Characteristics

The Waste Pits Area consists of four former evaporation ponds and six former disposal pits on two lots (Lots 36 and 37 of the Los Angeles County Assessors Map Number 7351-034 Northwest). See Figure 2. The former evaporation ponds have been designated as "Pits 1A, 1B, 1C," and the "Eastern Evaporation Pond." The former disposal pits have been designated as "Pits 2A, 2B, 2C, 2D, 2E, and 2F." All of the series 2 Pits and Pits 1B and 1C are located on Lot 36, which is owned by a subsidiary of Shell Oil Company, Triton Diagnostics. Currently, Lot 36 of the Waste Pits Area is a vacant lot, surrounded by a double row of chain-link fencing and covered by soil fill and weeds. An earthen mound approximately 15 feet high is present over the western portion of the area. Pursuant to a unilateral administrative order, Shell Oil Company conducts regular inspections of Lot 36 as well as regular fence maintenance and weed mowing. Pit 1-A and the Eastern Evaporation Pond are located on Lot 37 which is owned by Western Waste Industries. Lot 37 is also currently a vacant lot covered by soil fill and vegetation and surrounded by a double row chain-link fence.

The waste material in the pits contains two main types of hazardous substances that are of concern: semi-volatile organic compounds (SVOCs) and volatile organic compounds (VOCs) (see Table 1). Soil beneath and adjacent to the waste material is also contaminated with SVOCs and VOCs. Benzene, a VOC and known human carcinogen, is the most frequently found hazardous substance and is present in the highest concentration of all VOCs found in the waste, the soil, and the groundwater of the Waste Pits Area. The SVOCs found most often and in the highest concentration in both the waste and soil of all Polycyclic aromatic hydrocarbons (PAHs) is naphthalene. Naphthalene is not classified as a human carcinogen, but it can cause a number of adverse health effects in humans resulting from acute or chronic exposure, including cataracts, dermatitis, and anemia. Concentrations of metals detected in the waste pits were below PRGs (preliminary remediation goals) except for arsenic. Arsenic was detected at a concentration of 25 mg/kg, which exceeds arsenic's PRG of 2.4 mg/kg. This is consistent with background levels of arsenic in California soils, which typically have such elevated concentrations. Hydrogen sulfide (H_2S) was also found, with the maximum emission rate being from the 2-series pits, 2-C, 2-D and 2-F, at 11,060 mg/m^2/min, upon disturbance.

The waste material in pits 1B and 1C (former evaporation ponds) is covered with 2-4 feet of soil fill, and the waste extends down an average of 9 feet. The waste material in the 2-series pits (former disposal pits 2A - 2F) is covered with 3-15 feet of soil fill, and the waste extends down 21 to 32 feet. The estimated volume of the waste material itself is 15,600 yd^3, and the estimated volume of very heavily contaminated soil adjacent to the waste material is 17,100 yd^3. Beneath several of the pits, contaminated soil extends down to the water table, a depth of approximately 60 feet. The lateral extent of the contaminated soil is roughly confined within the inner fence that surrounds the pits. The estimated volume of these farther reaches of contaminated soil surrounding the pits is 300,000 yd^3.

The groundwater beneath the pits is heavily laden with hazardous substances from both the waste pits as well as other upgradient sources. The predominant contaminants present in the groundwater beneath and immediately downgradient of the pits are: benzene, ranging from 12,000 ppb to 470,000 ppb and averaging 171,000 ppb in the monitoring wells as of the late 1996 sampling round, ethylbenzene ranging from less than 100 ppb to 15,000 ppb and averaging 4,200 ppb, and phenol, ranging from 29 ppb to 440 ppb and averaging 180 ppb in the same monitoring round. The data shows a sharp rise in groundwater contaminant concentrations in the immediate vicinity of the Waste Pits Area, as compared to the monitoring wells further upgradient. This is indicative of the Waste Pits Area being a source of groundwater contamination. If the Waste Pits were not a source, the groundwater contaminant concentrations from upgradient sources would decline as the water moved downgradient. Thus, the data clearly indicates that contaminants from the waste pits are migrating to and causing significant contamination of the underlying groundwater. The data also shows there is contamination in the soil underlying the waste pits. Contamination has migrated through the waste pits and into the vadose zone.

TABLE 1 - Chemicals of Concern at Waste Pits Area (parts per million, ppm)

Chemical	1-Series Pits	2-Series Pits	Soil Below	Soil Adjacent
Total Semi-volatile Organic Compounds	1,000 ppm - 38,000 ppm	22 ppm - 30,200 ppm	1 ppm - 10,199 ppm	ND* - 1,393 ppm
Total Volatile Organic Compounds	126 ppm - 4,600 ppm	2,300 ppm - 117,000 ppm	ND* - 42,640 ppm	ND* - 10,400 ppm

*Not Detected

Pit 1-A was excavated in the mid-1980's and soil contamination data was collected beneath the excavation floor before the excavation was backfilled with clean soil. The excavation was 6 feet deep at the eastern end, 25 feet deep at the western end, and covered the areal extent of Pit 1-A. Contaminant concentrations in the soil beneath the floor of the excavation ranged from nondetect to 16,000 ppm for naphthalene and from nondetect to 13,000 ppm for phenanthrene. It is believed that, similar to other pits, contamination in the soil beneath Pit 1-A extends to the water table.

Based on the analytical results from soil borings reported in the FFS, EPA has concluded that the Eastern Evaporation Pond does not contain soil contamination at unacceptable levels. Therefore given available information, EPA in this record of decision is determining that no remedial action at the Eastern Evaporation Pond is warranted at this time.

The exposure pathways of concern for the Waste Pits Area are groundwater exposure and surface exposure. The possibility of volatile contaminants migrating to nearby homes and causing exposure to residents was investigated, but EPA found it not to be an exposure pathway of concern. The groundwater beneath the Waste Pits is heavily laden with contaminants from the pits, as shown by the high contaminant levels found in the groundwater investigations. To investigate potential surface exposures, air emission tests were conducted above the waste and adjacent contaminated soil. Results indicated that all the pits contain waste that is capable of emitting significant levels of VOCs into the air if disturbed (i.e. excavated). The 2-series pits are capable of emitting significant levels of hydrogen sulfide (H_2S) gas if the waste comes into contact with air. Emissions of benzene and H_2S gas into the atmosphere are of greatest concern due to adverse health effects that could result from exposure.

Emissions were measured during a "downhole flux monitoring" investigation, the results of which are summarized in a report entitled "Data Summary Report, Measurement of Emissions Rates and Specifications of Vapor Phase Contaminants from Disturbed Waste," prepared by Dames & Moore, dated April 30,1996. This investigation found VOC emissions including benzene, toluene, ethylbenzene and styrene. Benzene was found at a maximum concentration of 24,000 mg/kg at 35 ft bgs (below ground surface) and ethylbenzene at a maximum concentration of 18,000 mg/kg, also at 35 ft bgs. VOC concentrations were less in 1-B and 1-C then in the 2-Series pits. SVOCs detected in the pits included anthracene, chrysene, fluorene and naphthalene. Hydrocarbon emissions were higher in the 2-Series pits (10^4 -10^5 $\mu g/m^2/min$) than the 1-B and 1-C pits (10^5 -10^6 $\mu g/m^2/min$). Hydrogen sulfide (H_2S) was found, with the maximum emission rate being from the 2-series pits, 2-C, 2-D and 2-F, at 11,060 $mg/m^2/min$. Non-methane hydrocarbons were found at a maximum concentration of 50,000 ppmv (parts per million volume).

Soil gas and air monitoring were also conducted in the vicinity of the pits and fenceline, the results of which are summarized in "Final Report, Ambient Air, Surface Flux, and Soil Gas Characterization" prepared by CH2M Hill, dated January 26, 1996. The ambient air monitoring detected benzene in the range of 0.57 - 3.2 ppbv, which is within background concentration ranges. Soil gas testing found benzene (maximum concentration 35 ppbv), toluene (51 ppbv), 1,2 xylene (43 ppbv), and styrene (3.1 ppbv). These concentrations do not result in indoor concentrations above PRGs in adjacent residential properties. Surface Flux testing revealed a maximum benzene concentration of 180 ppbv, a maximum styrene concentration of 9.3 ppbv, and a maximum hydrogen sulfide concentration of 9 ppbv. This value is within the range of background ambient air concentrations.

The backyard soil samples from residences on 204th street are summarized in a memorandum from Tom Dunkelman, then Project Manager for the EPA, dated December 3, 1993. The results showed that arsenic, total chromium and benzo pyrene were all below PRG's. DDT was the only contaminant that was found in concentrations above the PRGs, which is attributed to the Montrose Site.

Residential indoor and outdoor air monitoring was summarized in the report entitled "Final Report, Residential Indoor Air Characterization Study, West 204th Street Temporary

Relocation Zone" prepared by CH2M Hill, dated March 16, 1996. Benzene was found above its PRG of 7.0 ppbv at two residences. In the first residence, 1051 204th St, the concentration was 11.6 ppbv; upon additional testing, however, benzene was found to be below its PRG. The original value was thought to be from a gas line leak. At the second residence, 1063 204th St., benzene was found at a concentration of 8.7 ppbv. Household cleaning products were removed and additional testing was performed where benzene was found to be below its PRG. The backyard air sampling found the ambient air to be within background concentrations.

2.6 Summary of Site Risks

To determine the potential health risks resulting from contamination at hazardous waste Sites, EPA conducts risk assessments. An EPA risk assessment estimates the *potential* adverse effects on human health from *potential* exposure to Site chemicals using Site data and a theoretical model. To do this, the risk assessment must first assume how the area and its surroundings are to be used, determine who might be affected by the Site, and ascertain the pathway by which they may be affected. The risk assessment must then utilize Site data to determine which chemicals people may be exposed to and at what concentrations, and then select assumptions for the frequency and duration of the exposure. Finally, health information about each chemical is combined with all the other data and assumptions mentioned, to calculate the risk. Conservative assumptions as well as limitations to both our knowledge and the risk calculations must be recognized when drawing conclusions and utilizing these calculations to make remedial decisions.

As stated in Chapter 3 of the FFS, the waste pits baseline risk assessment (risk assessment) assumed that the future use of the Waste Pits Area would remain consistent with current uses, and that the current conditions of the Waste Pits Area would remain in the future. These assumptions include the Waste Pits Area being surrounded by a double row of chain-link fence, soil fill covering the waste, and the area being routinely inspected and maintained. The risk assessment also assumed that the people most affected by any hazardous substance releases from the Waste Pits Area would be residents located at the fence line on the south side of the pits, office workers located at the northern fence line, and a maintenance worker on the waste pits Site itself. Finally, it assumed that the existing controls described above would prevent direct contact with waste and contaminated soil, and therefore, the only pathway by which people could be exposed to the chemicals at or near the ground surface would be from inhaling chemical vapors.

The risk assessment did not quantitatively evaluate potential future exposures that might occur if conditions at the Waste Pits Area were to change (e.g., if the soil fill cover over the waste were allowed to erode,). If those conditions should change, exposures and resultant risks to humans at or in the vicinity of the Waste Pits Area would likely be substantially higher and at unacceptable levels.

The risk assessment also did not quantitatively evaluate risks associated with contaminated groundwater. Because this ROD selects an interim, not final action for groundwater, potential risks associated with groundwater will be assessed separately and presented at the time EPA issues its proposed remedial plan for groundwater at the Del Amo Site. While groundwater risks are not included in the risk assessment that is presented in the FFS, it should be noted that it is unlikely that any persons would be exposed to vapors from the pits and the groundwater contaminated by the pits at the same time. EPA believes that these two types of risk can be considered independently.

The risk assessment evaluated current and future risks in order to provide a basis for cleanup decisions contained in this ROD. The risk assessment did not evaluate past exposures to hazardous substances that may have been released from the Waste Pits Area in the past nor does the risk assessment evaluate the possible health effects that could arise from those exposures, if they existed.

The risk assessment was performed utilizing Site data from soil gas and "flux chamber" sampling of the waste material and adjacent soil at the Waste Pits Area. All contaminants detected in these sampling events were then evaluated by the risk assessment (see Table 2 for the contaminant list). To define the contaminant concentrations to which residents, office workers, and maintenance workers would be exposed under various scenarios, the flux chamber data were used as input to an air dispersion model. The model calculated the hypothetical contaminant concentrations at the fence lines surrounding the pits, where it was assumed the office workers and residents would be located.

The reasonable maximum exposures were calculated using conservative assumptions. These included: (1) assuming that the emissions emanate from both the waste and the surrounding soil; (2) assuming that *all* of the area of waste pits emit at the maximum emission rate ever measured at any point on the pits; (3) assuming that the soil adjacent to the pits emits at the same rate as the pits; and (4) assuming that the exposed populations are working or living directly at the fence line. An air dispersion model was used to assist in making these evaluations. It was assumed that the maintenance workers would be present at the Waste Pits Area. The risk assessment assumed that the neighboring residents live at the fence line 24 hours/day, 350 days/year, for 30 years, and that the office workers are working at the fence line 10 hours/day, 5 days/week, for 25 years. The assessment compared Site maintenance workers' potential exposure to the OSHA Permissible Exposure Limits (PELs) for the workplace because they would be expected to work at the Waste Pits Area only periodically.

EPA uses two different indicators that describe a chemical's potential health effects: the "carcinogenic effects" and the "non-carcinogenic effects." To calculate carcinogenic effects, the risk assessment began with "cancer potency factors" (CPFs). The cancer potency factors for the chemicals of concern for the waste pits are shown in Table 2. Cancer potency factors 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 $(mg/kg\text{-}day)^{-1}$, 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 under-estimation 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.

Excess lifetime cancer risks were then determined by multiplying the chemical intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1x10^{-6}$ indicated that, as a plausible upper bound, an individual has an extra one in one million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a Site.

Non-carcinogenic effects are calculated using factors called "Reference doses" (RfDs). The Reference doses for the chemicals of concern for the waste pits are shown in Table 2. Reference doses have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of maximum quantities to which someone, including sensitive individuals, can be exposed for a long period of time without appreciable risk of harmful effects. 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 RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

TABLE 2

TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemicals of Potential Concern	Cancer Classification	Oral Ingestion		Inhalation	
		Slope Factor (kg-d/mg)	Reference Dose (mg/kg-d)	Slope Factor (kg-d/mg)	Reference Dose (mg/kg-d)
Benzene	A	0.029	0.0017	0.029	0.0017
sec-Butylbenzene	nd		0.01		0.01
1,2-Dichlorobenzene	D		0.09		0.057
1,4-Dichlorobenzene	C	0.024	0.23	0.024	0.23
Ethylbenzene	D		0.10		0.29
Hydrogen sulfide	nd		0.003		0.00029
Isopropylbenzene	nd		0.04		0.0026
Isopropyltoluene	nd		0.20		0.11
Methylene chloride	B2	0.0075	0.06	0.0016	0.86
Napthalene	D		0.04		0.04
Phenanthrene	nd		0.04		0.04
n-Propylbenzene	nd		0.04		0.0026
Styrene	nd		0.20		0.29
Tetrachloroethene	nd	0.052	0.01	0.002	0.01
Toluene	D		0.20		0.11
1,2,4-Trimethylbenzene	nd		0.05		0.05
1,3,5-Trimethylbenzene	nd		0.05		0.05
Xylene (mixed)	D		2.00		0.20

Cancer Classification: A = human carcinogen; B1 = probable human carcinogen, limited human data; B2 = probable human carcinogen (sufficient evidence in animals, inadequate or no evidence in humans); C = possible human carcinogen; D = not classifiable as to human carcinogenicity; nd = no data.

Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the Hazard Quotient ("HQ," the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably by exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. A Hazard Index of 1 or greater indicates the potential for adverse health effects from exposure to the chemicals at the given concentrations and exposure durations.

For surface emission exposures, the risk assessment results show that the maximum cumulative risk to the residents is 2×10^{-6} (2 in one million lifetime chance of death by cancer), the maximum cumulative risk to the office worker is 3×10^{-7} (3 in ten million lifetime chance of death by cancer), and the maintenance worker's exposure is always below the OSHA Permissible Exposure Limit. When evaluating non-cancer effects, the risk assessment found that the Hazard Index for all the contaminants in all the exposure scenarios is less than 1, indicating that persons would not be exposed to waste pits contaminants above levels of concern.

Based on the assumptions described above, the results of the waste pits risk assessment indicate that contaminants do not currently pose an unacceptable threat to human health for persons living or working at the ground surface at or near the pits, provided that the physical conditions and emissions rates from the pits stay as they are today. (see Table 3). However, while surface risks under current conditions are acceptable, there remains nonetheless a significant possibility that a release of hazardous substances could occur that would result in an unacceptable risk. Specifically, if the waste pits were disturbed, significant emissions of volatile contaminants, particularly hydrogen sulfide, could be released, which could pose a significant and unacceptable risk to the public. There is substantial uncertainty regarding the reliability of the risk assessment assumption that the existing conditions (i.e. fencing) is adequate to prevent human intrusions into the Site and potential human incursions into the waste itself. Any future development activities which include trenching or excavations for structures, pipeline or utilities would result in disturbance of the soil and waste materials resulting in the release of hazardous substance. Such human incursions could result from digging since the 1-series pits are only covered with 2-4 feet of soil. Finally, natural incursions could take place that would expose waste material to the surface, such as acute erosion from large storm events (the 1-series pits are only covered with 2-4 feet of soil). Emissions testing of disturbed waste, conducted in 1974 and 1992, indicate that upon disturbance, the waste material can emit volatile contaminants at concentrations as high as 11,060 mg/m^2/min hydrogen sulfide, 68,000 mg/m^2/min benzene and 1000 mg/m^2/min styrene. Acute exposure to these contaminants can cause irritation, dizziness, suffocation, and even death.

EPA's policy on utilizing baseline risk assessments in making risk management and remediation decisions is set out in OSWER Directive 9355.0-30, dated April 22, 1991. This policy states, in part, that the criterion of a baseline risk from Site conditions sufficient to warrant remedial action can be met where Maximum Contaminant Levels (MCLs) are exceeded in groundwater at the Site. The groundwater beneath the waste pits Site contains contaminant concentrations in excess of MCLs as a direct result of uncontrolled migration of waste pits contamination into the groundwater. The FFS states, in Chapter 4, that "When material was first deposited in the waste pits . . . it is likely that there was some amount of free liquid (e.g. aqueous phase contamination) which migrated downward through the soil until it reached groundwater." Consistent with EPA policy, this exceedance of MCLs in groundwater beneath the pits supports the need for remedial action. In this ROD, the major remedial actions selected by EPA will result in protection of groundwater. The RCRA-equivalent cap will prevent surface water infiltration into the Waste Pits Area which could otherwise act to carry hazardous substances, present in the waste material or vadose zone, down into the groundwater. The SVE system will act to protect groundwater by removing hazardous substances that are present in the vadose zone at the Waste Pits Area or that may be released into the vadose zone in the future from the waste materials. All groundwater under the pits is classified as a potential future drinking water source by the State of California.

Given these uncertainties and potential risks, EPA has determined that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

An assessment of ecological risks was performed when the State of California was the lead agency for the Site. That assessment concluded that no plant species listed as rare and endangered or sensitive were observed at the Site or in the immediate Site vicinity. EPA is adopting these conclusions and relying on them for the purposes of this ROD.

TABLE 3

MAXIMUM RISKS

Exposed Population	Cumulative Cancer Risk	Cumulative Non-Cancer Hazard Index	Percentage of Workplace PEL * Exposed to
Residents	2x10e-6	0.4 (children)	
Office Workers	3x10e-7	0.04 (adults)	
Maintenance Workers			0.09% (Benzene)

2.7 Description of Alternatives

The alternatives considered by EPA as possible cleanup options for contaminated waste and soil at the Waste Pits Area are described below.

ALTERNATIVE 1: NO ACTION

Under this alternative, no action would be taken at the Waste Pits Area. No remediation or monitoring of contaminated media would occur, and no access or deed restrictions would be implemented. This alternative satisfies the NCP requirement for inclusion of a no-action or no-further action alternative among the options considered. Alternative 1 would neither reduce any site-related surface risk (described in Section 2.6 - "Summary of Site Risks") nor do anything to prevent contamination from the pits from continuing to threaten groundwater. There would be no cost for Alternative 1. This Alternative would not comply with the major Applicable or Relevant and Appropriate Requirements (ARARs) regarding closure of hazardous waste disposal facilities.

ALTERNATIVE 2: INSTITUTIONAL CONTROLS

This alternative includes maintenance of the soil and vegetation cover currently present on the site, installation of surface water controls to prevent ponding of water and runoff onto adjacent properties, placement of deed restrictions prohibiting future residential use or any other use that could impact the integrity of the soil cover, and upgrading and maintaining the existing perimeter fence. This alternative also includes groundwater monitoring to evaluate potential changes in groundwater conditions over time.

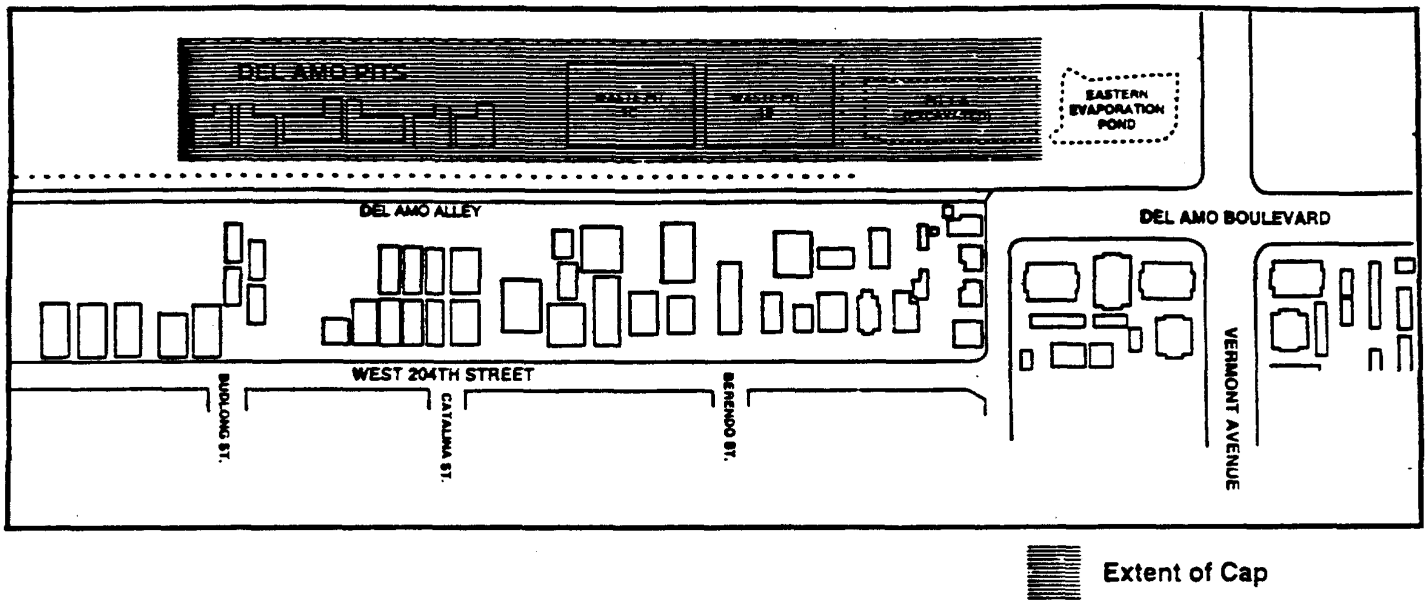
Alternative 2 would not reduce any site-related surface risk (described in Section 2.6 - "Summary of Site Risks"). In particular, this alternative would do little to mitigate adverse exposures of the public to waste pit contaminants in the event that the current cap is eroded, disturbed, or displaced. In addition, this alternative would do nothing to prevent pits contamination from continuing to migrate into the groundwater.

The cost of Alternative 2 would be approximately $790,000 (total present worth), but it would not meet the major relevant and appropriate ARARs regarding closure of hazardous waste disposal facilities. To prevent inappropriate future land use or development, this alternative would require institutional controls that prohibit future residential use of the Waste Pits Area and prohibiting future use which could impact the integrity of the cap.

ALTERNATIVE 3: RCRA-EQUIVALENT CAP

Under this alternative, a RCRA-equivalent cap would be constructed over the waste and contaminated soil. There are approximately 15,600 yd^3 of waste in the pits and approximately 317,100 yd^3 of contaminated soil surrounding the pits that would be covered by the cap. Based on existing information, the cap would cover slightly less than 4 acres (See Figure 3). The RCRA-equivalent cap would consist of multiple layers, typically including a vegetated cover, a marker bed, a drainage layer, a low permeability layer (including a high density plastic liner), a gas collection layer, and a grading layer.

FIGURE 3
EXTENT OF CAP (APPROXIMATE)



The major ARARs that would be met during implementation of this action include closure requirements for hazardous waste disposal facilities. Monitoring associated with the cap would include soil vapor monitoring at varying depths around the pits area, which would help determine whether any vapors are migrating or spreading laterally out from under the cap. Final design of the cap and monitoring system would be determined during the remedial design phase of the project. Long-term maintenance of and repairs to the cap would also be conducted.

To prevent inappropriate future land use or development, this alternative would also require deed restrictions, prohibiting future residential use of the Waste Pits Area and prohibiting future use which could impact the integrity of the cap.

Alternative 3 would eliminate any surface risk associated with the waste pits area. It would also reduce the amount of contamination migrating from the waste pits and adjacent soil into the groundwater. It would accomplish this by preventing infiltration of water from the ground surface; however, some amount of contamination would continue to migrate into the groundwater via vapor migration and via advection in draining soil water.

The cost of Alternative Three would be approximately $2,833,000 in capital costs, $1,410,000 in operation and maintenance costs, and a total of $4,243,000 (all costs are shown in terms of present worth).

Alternative 3 would require an estimated 6 to 12 months to design and construct.

ALTERNATIVE 4 RCRA-EQUIVALENT CAP AND SOIL VAPOR EXTRACTION OF CONTAMINATED SOIL

This alternative consists of the those actions discussed in Alternative 3, and adds a soil vapor extraction (SVE) component. Soil vapor extraction would physically remove volatile contaminants from soil by moving them into the soil vapor and then removing the vapor for treatment. Under Alternative 4, the SVE system would be designed to limit the amount of contaminants that move from the waste pits or the soils beneath the pits into the groundwater.

The SVE system would be applied to the soils under and adjacent to the pits, including both coarse and fine-grained soil layers. The SVE system would not be applied to the waste material itself, because it is too dense and would not provide sufficient air permeability to allow for vapor extraction. The extracted air stream would be treated to remove the contamination prior to being vented into the atmosphere. The actual width and depth of the soil vapor extraction zone would vary across the area to some degree, based on a highly detailed review of soil characteristics and contaminant distribution to be made during remedial design and system installation. In general, the SVE coverage would extend vertically from just below each pit to just above the capillary fringe above the groundwater table. The SVE coverage would extend horizontally such that SVE is active wherever soil and soil vapor concentrations exceed interim soil remediation standards. It is estimated that the volume of soil within which the SVE system would be applied is approximately 317,100 yd^3.

Interim soil remediation standards would be established to protect groundwater from significant additional contamination emanating from the waste pits. The focus of the SVE action, cleaning the soil to the interim soil remediation standard, would be to ensure that: (1) contaminants already in the soils under the pits do not continue to significantly contribute to groundwater contamination or counter future groundwater remedial efforts, and (2) contaminants still in the waste in the pits, which may leach out of the pits in the future, cannot pass through the soils and significantly contribute to groundwater contamination or counter future groundwater remedial efforts.

Major ARARs would be met during operation of the SVE system including emission standards for the vapor treatment system.

This alternative also includes appropriate soil and soil gas monitoring to evaluate remediation progress.

The cost of Alternative Four would be approximately \$6,290,000 in capital costs, \$2,690,000 in operation and maintenance costs, and a total of \$8,980,000 (all costs are shown in terms of present worth).

Alternative 4 would require an estimated 8 to 12 months to design and construct. It is estimated that the SVE system would have to operate for five years before meeting the interim soil performance standards. Upon reaching those goals, the SVE system would need to be operated whenever more contaminants migrating from the pits and adjacent soil surpass the remediation goals set in either this ROD or as revised by the future groundwater ROD.

ALTERNATIVE 5 COMPLETE EXCAVATION OF 1-SERIES AND 2-SERIES PITS BENEATH AN ENCLOSURE, AND SOIL VAPOR EXTRACTION OF CONTAMINATED SOIL

This alternative includes complete excavation and offsite disposal of waste within the 1 series pits and the 2 series pits, and excavation of contaminated soil 5 feet beneath and around the boundary of these pits. The total excavation volume for Alternative 5 is estimated to be about 42,900 cubic yards. Upon removal of the waste, the risk posed by potential surface emissions from the waste would be eliminated.

Expected high concentrations of VOC and hydrogen sulfide air emissions from disturbed waste material would require that the excavation be performed under a temporary enclosure equipped with a ventilation and emission control system. The ventilation system would reduce the concentration of airborne contaminants inside the enclosure, although workers inside the enclosure would still be required to wear protective clothing and self-contained breathing apparatus (SCBA) tanks. Exhaust hoods would be used to capture emissions from the face of the excavation and from the roll-off bins where excavated waste and soil would be stored prior to offsite transport. Contaminated air exhausted from within the enclosure would be treated on-site in a series of air treatment units prior to being released to the atmosphere. Upon excavation, the waste and soil would be transported to an offsite incinerator for treatment.

The major ARARs that would be met during implementation of the excavation phase include emission standards for the air containment and treatment system, disposal restrictions for the excavated waste, and excavation requirements.

The excavated area would be backfilled and a low-permeability cap would be installed after backfilling is complete. The cap would be designed with surface water controls to prevent ponding of water on its surface and to prevent runoff onto adjacent properties. Since contaminated soil beneath the waste would be left in place, a soil vapor extraction system as described in Alternative 4 would be required. To prevent inappropriate future land use or development, the alternative would also require deed restrictions. This alternative also includes groundwater monitoring to evaluate potential changes in groundwater conditions over time associated with the remediation.

Alternative 5 would require an estimated 2 years for excavation and backfilling.

Equipment design, procurement and construction, system start-up and shakedown, dismantling the enclosure and other equipment after excavation is complete would add an additional 2 years to the project, bringing the total project duration to an estimated 4 years.

The cost of Alternative 5 would be approximately $95,820,000 in capital costs, $1,490,000 in operation and maintenance costs, and a total of $97,310,000 (all costs are shown in terms of present worth).

2.8 Summary of Comparative Analysis of Alternatives

This section compares the remedial alternatives described in Section 2.7. The comparative analysis provides the basis for determining which alternative presents the best balance of EPA's nine Superfund evaluation criteria provided in 40 Code of Federal Regulations Section 300.430 (f) (criteria listed below). The first two cleanup evaluation criteria are considered *threshold criteria* that the selected remedial action must meet. The five *primary balancing criteria* are balanced to achieve the best overall solution. The two *modifying criteria*, state and community acceptance, are also considered in the remedy selection.

Threshold Criteria

1. Overall Protection of Human Health and the Environment addresses whether an alternative provides adequate protection from unacceptable risks posed by the site.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) addresses whether an alternative attains specific federal and state environmental requirements and state facility siting requirements, or provides grounds for a waiver.

Primary Balancing Criteria

3. Long-Term Effectiveness and Permanence refers to the degree to which an alternative provides reliable protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, and Volume (TMV) through Treatment refers to the degree to which an alternative uses treatment to reduce the health hazards of contaminants, the movement of contaminants, or the quantity of contaminants at the site.

5. Cost evaluates the estimated capital, operation and maintenance, and indirect costs of each alternative in comparison to other equally protective alternatives.

6. Short-Term Effectiveness addresses the degree to which human health and the environment will be adversely impacted during construction and implementation of an alternative.

7. Implementability refers to the technical and administrative feasibility of an alternative. This includes technical difficulties and uncertainties and the availability of materials and services. It also includes coordination of federal, state, and local government efforts.

Modifying Criteria

8. State Acceptance indicates whether the state agrees with, opposes, or has concerns about the preferred alternative.

9. Community Acceptance includes determining which components of the alternatives people in the community support, have reservations about, or oppose.

The strengths and weaknesses of the alternatives were weighed to identify the alternative providing the best balance with respect to the nine evaluation criteria.

Overall Protection of Human Health and the Environment

The NCP requires that all alternatives be assessed to determine whether they can adequately protect human health and the environment, in both the short term and long term, from unacceptable risks. These risks can be mitigated by eliminating, reducing, or controlling exposure to hazardous substances, pollutants, or contaminants. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. Reduction of toxicity, mobility, and volume is another important criterion for this overall evaluation.

Alternative 1: No Action. Of all the alternatives, Alternative 1 is the least protective of human health and the environment. Alternative 1 would not comply with ARARs for closure of hazardous waste disposal facilities (e.g. surface capping of areas that leave hazardous waste in place). Under Alternative 1, unchecked erosion of the surface soil cover would occur and eventually expose contamination that in some places is only two feet below the ground surface. Such erosion could allow direct contact with contaminants, allow water runoff and wind to transport contaminants to nearby yards, and allow vapors to escape into the air. This alternative would do nothing to prevent human access to the area and potential human incursion into the uppermost layers of waste. In addition, this alternative does nothing to prevent the downward migration of contaminants to groundwater currently in the waste and soils, and would not prevent contamination of groundwater caused by a rising water table contacting contaminated soil.

Each of the other alternatives incorporates, at a minimum, institutional controls to attempt to prevent human access to the contaminated area and possible human incursion into the uppermost waste layers. Several other alternatives incorporate source control measures to prevent further migration of contamination into the underlying aquifer. Because Alternative 1 has no provisions to prevent either potential human incursions into the contamination, continued contaminant migration into the underlying aquifer, or contamination of groundwater caused by a rising water table contacting contaminated soil, it is not protective of human health and the environment.

Alternative 2: Institutional Controls. Alternative 2 also would not comply with ARARs for closure of hazardous waste disposal facilities. However, unlike Alternative 1, Alternative 2 would include site maintenance of the existing soil cover and site fencing. Such maintenance would repair surface erosional problems before contamination can be exposed. In addition, this alternative provides some degree of prevention against human trespassing and potential human incursion into the contamination by maintaining the existing perimeter chain-link fence. However, a perimeter chain-link fence is not a reliable long-term deterrent against trespassing, particularly given the proximity to residential properties. Finally, this alternative does nothing to prevent the downward migration to groundwater of contaminants currently existing in the waste and soils, and would not prevent contamination of groundwater caused by a rising water table contacting contaminated soil.

Several other alternatives contain more permanent measures to prevent human incursion into the contamination than does this alternative. Also, several other alternatives incorporate source control measures to prevent further migration of contamination into the underlying aquifer. Alternative 2 does not have lasting, reliable measures to prevent potential human incursion and contact with the contamination, it has no provisions to prevent continued contaminant migration into the underlying aquifer, and it has no provisions to prevent contamination of groundwater caused by a rising water table coming into contact with contaminated soil. Therefore, it is not protective of human health and the environment.

Alternative 3: RCRA-Equivalent Cap. Alternative 3 complies with ARARs for closure of hazardous waste disposal facilities by providing an appropriate surface cap over areas where hazardous waste is left in place. Construction of a RCRA-equivalent cap would result in a permanent cover over the Waste Pit Area that would eliminate the direct contact, ingestion and vapor inhalation exposure pathways that could result from uncontrolled erosion or human incursion into the contamination. The cap also provides a significant physical barrier against human incursions into the waste. In addition, the cap would provide some degree of groundwater protection by preventing a large amount of rainwater from infiltrating through the waste and contaminated soil. However, Alternative 3 would not eliminate the downward migration to groundwater of contaminants currently existing in the waste and soil, and it would not prevent contamination of groundwater caused by a rising water table contacting contaminated soil.

Alternatives 3 and 4 provide the second highest level of access prevention, second only to Alternative 5, which completely removes the waste material. Whereas it could still be theoretically possible that a human could intrude upon the cap and dig through it to expose contamination, the undertaking would be so significant as to render the possibility extremely unlikely. Regarding source control, Alternative 3 does not go as far as either Alternatives 4 or 5. Alternative 3 does nothing to eliminate the other possible mechanism, vapor migration, whereby the contamination could continue to impact the groundwater. Alternative 4 and 5 both accomplish that goal through active remediation. The State Water Resources Control Board considers groundwater beneath the pits a potential future drinking water source. For these reasons, Alternative 3 is not fully protective of human health and the environment.

Alternative 4: RCRA-Equivalent Cap and Soil Vapor Extraction. Alternative 4 complies with ARARs for closure of hazardous waste disposal facilities by providing an appropriate surface cap over areas where hazardous waste is left in place. This cap would achieve the same objectives as the cap described in Alternative 3. In addition to the degree of groundwater protection provided by the cap, Alternative 4 also would utilize Soil Vapor Extraction to provide an even greater degree of protection for the groundwater by removing migrating volatile chemicals from the soil above the water table. This would protect the groundwater aquifer from the downward migration of contaminants that currently exist in the waste and soil, and it will also prevent significant contamination of groundwater caused by a rising water table coming into contact with contaminated soil.

Alternative 4, as was true for Alternative 3, would provide the second highest level of access prevention, second only to Alternative 5, which completely removes the waste material. The source control provided by Alternative 4 goes farther than Alternative 3 by removing volatile contaminants from the soil above the water table via Soil Vapor Extraction. However, Alternative 4 does not go as far as Alternative 5, which completely removes the contaminant source material. Because the State Water Resources Control Board considers groundwater beneath the pits a potential future source of drinking water, protection of the groundwater becomes an important factor in comparing the alternatives. Consequently, Alternative 4 is considered to be fully protective of human health and the environment.

Alternative 5: Complete Excavation of 1-Series and 2-Series Pits Beneath an Enclosure and Soil Vapor Extraction of Contaminated Soil. Alternative 5 complies with ARARs for closure of hazardous waste disposal facilities by excavating and removing the remaining hazardous waste mass and providing an appropriate cap for areas with soil contamination. By removing the waste mass, this alternative eliminates possible human exposures from direct contact, ingestion and vapor inhalation pathways at the surface. In addition, the waste would no longer be a source of groundwater contamination. The remaining soil contamination would be remediated with a Soil Vapor Extraction system. The SVE system would protect the groundwater from the downward migration of the contaminants remaining in the soil, and it would prevent significant contamination of groundwater caused by a rising water table contacting the contaminated soil. Alternative 5 would provide the greatest and most permanent protection of human health and the environment in the long term because the contaminated waste mass would be completely and permanently removed from the site. This eliminates the need to perpetually maintain containment mechanisms, which are necessary in the alternatives that leave waste in place.

Alternative 5 provides the highest level of prevention of direct human contact because it completely removes the waste mass. This removal also provides the highest level of source control against further contamination to the underlying groundwater. The soil contamination remaining after the removal would be removed with the same SVE system as described in Alternative 4. For these reasons, Alternative 5 is considered to be fully protective of human health and the environment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternatives 1 and 2 do not comply with ARARs. Alternatives 1 and 2 do not meet federal and state laws and regulations identified in Attachment A regarding the safe closure and post-closure of hazardous waste facilities. Because Alternatives 1 and 2 do not comply with the threshold criterion of Compliance with ARARs, they are not selected as a remedy for the waste pits.

Alternatives 3, 4 and 5 comply with all ARARs.

Long-Term Effectiveness and Permanence

Long-term effectiveness is evaluated through two criteria: the magnitude of the residual risk remaining after the remedy is implemented, and the adequacy and reliability of engineering and institutional controls.

The magnitude of the residual risks is typically gaged by the risks remaining from untreated waste after the conclusion of remedial activities. The risk of further groundwater contamination posed by the waste material left in place after remediation is completed would be the same for Alternatives 1, 2, and 3, is significantly less for Alternative 4, and is least of all for Alternative 5. Each of the first 3 alternatives (No Action, Institutional Controls, and Cap alternatives) would leave all the waste material in place. These alternatives do not treat or remove any amount of existing contamination, allowing contaminants to continue to migrate into the underlying groundwater aquifer. Alternative 4 (Cap and SVE) would remove a significant amount of VOC contamination from the vadose soils below the pits in order to significantly reduce the continued migration of contaminants from the waste pits and surrounding soil into the groundwater aquifer. Details regarding the exact degree of remediation that the SVE system would accomplish are provided in Section 2.9, The Selected Remedy. By strategically removing contamination in this way, Alternative 4 would, in the long run, prevent additional contamination of groundwater beneath the Waste Pits Area. For this reason, Alternative 4 is superior to Alternatives 1, 2, and 3 with regards to residual risk from contamination left in place. Alternative 5 (Excavation, Incineration, SVE, and Cap) would remove the waste material via excavation and utilize soil vapor extraction to remove the residual contamination remaining in the unexcavated soil. This alternative removes the most contamination and leaves the least residual risk of all the alternatives.

The "adequacy and reliability of controls" criteria pertains to the adequacy and suitability of controls that are used to manage residuals or untreated wastes that would remain at the site. The adequacy of these controls for each alternative varies significantly. The potential risks associated with the remaining waste include both surface exposure risks and risks associated with further contaminant impacts to groundwater. Alternative 1 (No Action) provides no engineering or institutional controls to manage either surface or groundwater risks from remaining contamination. Alternative 2 (Institutional Controls) provides minor institutional controls to prevent surface exposures, consisting of security fencing to prevent human access, and maintenance of the surface soil cover to repair erosional damage. Neither of these first two alternatives provide any controls against further contaminant impact to the groundwater. Alternative 3 (Cap) provides significant and highly effective engineering controls against surface exposures to remaining contamination by constructing a RCRA-equivalent cap over the remaining waste and contaminated soil. The cap also provides a moderate level of control to lessen the continued contaminant migration to groundwater. The cap provides this control by eliminating the possibility for precipitation that falls directly on the cap to infiltrate through the waste and contaminated soil and transport contaminants to the groundwater. There would still be the possibility, however, for precipitation falling near the cap to spread under the cap as it infiltrates, thus transporting some contaminants to the groundwater. These effects, however, would be less than without the cap. In addition, there remains the possibility that the water table, which has been steadily rising, will continue to do so and thus contact contaminated vadose soils, adding to the contamination already in the water. Alternative 4 (Cap and SVE) provides the same significant and highly effective engineering controls against surface exposures as does Alternative 3. Alternative 4 provides, however, a much more significant level of control against continued contaminant migration to groundwater. The SVE system beneath the waste would capture a significant amount of the contaminants between the waste and the water table, thus minimizing further contaminant migration and minimizing the additional contamination that could be added to the groundwater as the water table rises. Alternative 5 (Excavation, Incineration, SVE, and Cap)after removing the waste material and leaving only residual contamination in the soil, will have minimized the need for engineering or institutional controls for surface exposures. The engineering controls to minimize groundwater impacts from residual soil contamination are the same as Alternative 4, consisting of an SVE system and a cap.

Reduction of Toxicity, Mobility, and Volume (TMV) through Treatment

This evaluation criterion addresses the statutory preference for selecting remedial actions that permanently and significantly reduce toxicity, mobility, or volume through treatment. This criterion is evaluated according to treatment processes used and materials treated; the amount of hazardous materials destroyed or treated; expected reductions in the toxicity, mobility, and volume; irreversibility of the treatment; and the type and quantity of treatment residuals.

Alternative 1 (No Action) and Alternative 2 (Institutional Controls) do not meet the statutory preference for treatment by reducing the toxicity, mobility and volume of waste or contaminated soil through treatment in any way. Alternative 3 (Cap) does not treat any waste. All three of these alternatives leave approximately 15,600 cubic yards of waste and 317,100 cubic yards of contaminated vadose zone soil in place. Alternative 3, however, covers this waste and soil with a RCRA - equivalent cap. The intrinsic toxicity, and volume of waste is unaffected by this alternative. However, Alternative 3 would reduce the mobility of the contaminants by preventing volatile gas emissions and limiting the amount of rainfall that will infiltrate the waste and contaminated soil and transport contaminants to the groundwater. Alternative 3, however, does not satisfy the statutory preference for treatment as defined in Section 121(b)(1) of the Superfund law 42 U.S.C. § 9621(b)(1).

Alternative 4 (Cap and SVE) provides for some reduction of toxicity, mobility, and volume through treatment. This alternative contains an SVE component that will remove volatile contaminants from the soil beneath the pits so that groundwater would not be significantly affected by contaminants from the waste pits in the future. This will reduce the toxicity and volume of the contaminants in the soils under the pits. The volume and toxicity of the waste material in the pits, however, would be unaffected. The mobility of contaminants will be reduced more than in Alternative 3 (Cap only) because the SVE would capture the volatile contaminants before they reach the groundwater and become further mobilized. The vapors will be treated by means of one of several treatment technologies such as thermal oxidation. SVE is an irreversible treatment in that the contaminants, once removed, will stay removed. However, under Alternative 4, the main mass of waste material would remain making it necessary for the SVE system to continue removing any new contamination that enters the underlying vadose soil from the waste pits. SVE would be applied to approximately 317,100 yd^3 of soil. Alternative 4 leaves approximately 15,600 cubic yards of waste in the pits beneath the cap.

Alternative 5 (Excavation, Incineration, SVE and Cap) provides the highest level of reduction in toxicity, mobility, and volume (TMV) by excavation and off-site incineration of waste and soil vapor extraction of contaminated soil beneath the waste. The total excavation volume for Alternative 5 is estimated to be about 42,000 cubic yards. This volume consists of approximately 10,200 cubic yards of surface fill, 15,600 cubic yards of waste material, 5,200 cubic yards of contaminated soil adjacent to the pits, and 11,900 cubic yards of soil below the pits. This action would drastically reduce the toxicity, mobility and volume of contaminants at the site, and when the waste is destroyed at an off-site incinerator, its intrinsic toxicity and volume will be permanently destroyed. There would be approximately 289,800 yd^3 of contaminated soil remaining after the excavation to which SVE would be applied. SVE would permanently remove the volatile contaminants from these soils, thus reducing the toxicity and volume of the contaminants in the soil.

Cost

A summary of the estimated costs for Alternative 3, 4, and 5 is presented below. Cost estimates for Alternatives 1 and 2 are not provided because these alternatives were found to not be protective of human health and the environment. The cost estimates presented include capital costs, operation and maintenance costs, and net present worth. An overview of the cost analysis as well as detailed cost break-down for each alternative, are presented in the Focused Feasibility Report.

As shown in Table 4, the operation and maintenance costs are relatively consistent for the three alternatives, ranging from $1.4 million to $2.69 million. The capital costs, however, vary drastically, ranging from $2.83 million to $95.82 million. The largest jump in capital costs between alternatives, by far, is between Alternative 4 and 5 jumping from $6.29 million to $95.82 million. The cost of the excavation and incineration aspect of Alternative 5 accounts for this drastic capital cost difference. The cost of Alternative 5 is more than ten times the cost of

Alternative 4, which is also protective of human health and the environment.

TABLE 4: Cost Estimates

Alternative	Capital ($)	Operation and Maintenance ($)	Total Present Worth ($)
1: No Action	NA	NA	NA
2: Institutional Controls	NA	NA	NA
3: RCRA-Equivalent Cap	2,833,000	1,410,000	4,243,000
4: RCRA-Equivalent Cap and Soil Vapor Extraction	6,290,000	2,690,000	8,980,000
5: Excavation, Incineration, Soil Vapor Extraction, Cap.	95,820,000	1,490,000	97,310,000

Short-Term Effectiveness

Several factors are addressed in evaluating short-term effectiveness of the remedial alternatives, including potential short-term risk to the community during implementation, threats to workers during remedial actions, and potential adverse environmental impacts from construction and implementation.

Risk to Community During Remedial Action Implementation. Alternatives 1 and 2 (No Action and Institutional Controls) have no adverse short-term effects. Because there are no remedial actions that would be taken for these alternatives, there would be no risk to the community, workers, or environment associated with remedial action implementation. Under Alternatives 3 (Cap) and 4 (Cap and SVE), the potential for short-term exposure to contaminants during implementation would be limited and readily controllable. In Alternative 3, a RCRA-equivalent cap would be constructed, requiring approximately 6 to 12 months of design and construction activities. In Alternative 4, an SVE system would be constructed in addition to the cap, requiring approximately 8 to 12 months combined to design and construct.

The effects on the community during both of these remedial actions, construction of a cap and construction of an SVE system, are related to the actual construction activities. Such effects include impacts from the dust generated during construction, increased vehicular traffic, air quality impacts from motorized equipment, and noise. There is also the potential for releases of volatile contaminants resulting from either accidental or intentional disturbances of the waste. Such disturbances could occur during grading, well drilling or other construction activities.

Whereas the potential for such releases can be mitigated with proper safety measures, they are possibilities nonetheless. Should such releases occur, however, the impacts to the community would be minor.

Alternative 5 (Excavation, Incineration, SVE and Cap) is expected to be more complex and take a longer time to implement than the other alternatives, and its short-term effectiveness is much more uncertain than other alternatives. This alternative would involve excavation of hazardous waste beneath an enclosure, which is an uncommon task and presents potential safety and health risks. The ability to protect the community during the excavation would be dependent on the effectiveness of the enclosure, ventilation and emissions treatment system. A failure of the enclosure or emissions treatment system could expose the community to elevated levels of airborne contaminants. Because the excavation and subsequent backfilling would last an estimated two years, and because the excavation activities would produce high levels of volatile contaminants, the remedy has comparatively much higher short term risks.

Protection of Workers During Remedial Action. There would be a potential for adverse health effects to workers resulting from exposure to hazardous substances during the construction activities of either Alternative 3, 4, or 5. Alternatives 1 and 2 have no construction activities. The construction activities for Alternatives 3 (Cap) and 4(Cap and SVE) are essentially the same. Both alternatives would involve surface grading and cap installation, as well as well drilling and installation of surface treatment units. If the construction activities adhere to the site health and safety plans and all regulatory requirements, the potential for exposure and adverse health effects to workers would be minimized.

Alternative 5 (Excavation, Incineration, SVE and Cap) has a significantly greater potential for adverse impacts to workers during implementation. Workers would be required to operate in an environment where benzene concentrations could range as high as 69 to 207 ppm. This is many times higher than the Occupational Safety and Health Administration (OSHA) standard of 1 ppm for benzene. Hydrogen sulfide concentrations inside the enclosure could be as high as 50 ppm, five times higher than its OSHA standard of 10 ppm and many times higher than its odor threshold of 6 ppb. These exposures would be mitigated by wearing protective clothing and SCBA tanks. However, because the project would last approximately 2 years, there would be a potential for the protective measures to fail. In addition, operating in such an enclosure with such personal protection gear would introduce the additional hazards of heat exhaustion, reduced hearing and visibility, and slip, trip, and fall hazards. These hazards would be significant because of the length of time the work would require. Working at this level of protection for prolonged periods of time is not routine.

Environmental Impacts. The main potential environmental impact associated with remedy implementation would be releases of volatile contaminants into the air. During construction activities for Alternatives 3 and 4, there would be the potential for releases of volatile contaminants resulting from disturbance of the waste. Such releases were described in the "Risk to Community" subsection above. As described in that same section, Alternative 5 has a greater potential for harmful releases of volatile contaminants into the environment than do Alternatives 3 and 4. This is due to the fact that Alternative 5 involves extreme disturbance of the waste material containing high concentrations of volatile contaminants, in an enclosed space, for a substantial period of time.

Implementability

This evaluation criterion addressed the technical feasibility, the availability of services and materials, and the administrative feasibility of each alternative. The technical feasibility includes the ability to construct and operate the technology, the relative ease of undertaking the remedial action and the ability to monitor its effectiveness. The availability of services and materials addresses the availability of the necessary equipment, technology, services, and other resources to construct the remedial action. The administrative feasibility considers the activities needed to coordinate and obtain approvals from other agencies.

Technical Feasibility. The technical feasibility of Alternatives 3 and 4 is very good. Alternatives 1 and 2 do not involve any construction activities, so they will not be included in this discussion. Caps and SVE systems are common technologies today and have been successfully employed at many sites. Alternative 5 is implementable, however, the enclosed excavation aspects of Alterative 5 present a number of technical constraints that would need to be overcome. These constraints include limited operating room for the excavation equipment, the need for an effective high volume ventilation and air treatment system, the necessary use of at least level B personal protection gear for workers, the need for and use of an effective vapor suppressing foam, and the need for customized waste handling techniques. These constraints can be addressed during design and trial-runs, but nonetheless pose some additional problems that other alternatives do not have.

Availability of Services and Materials. All services and materials needed to construct a RCRA-equivalent cap and SVE system, as required in Alternatives 3 and 4, are readily available. Alternatives 1 and 2 do not include any construction activities, so they will not be discussed here. For the cap and SVE system construction, there are a number of qualified bidders who could offer competitive bids. For Alternative 5, there is good availability of materials and services for the excavation work; the materials and services for the enclosure, ventilation, and air treatment work are generally available as well. Although few contractors in the Southern California area have experience constructing such enclosures and treatment systems, the availability of such services in the United States at large is good. Hazardous waste transporters are readily available in Southern California for transporting the waste material off-site to an incinerator.

Administrative Feasibility. Except for Alternative 1 (No Action) all the alternatives would require some administrative effort, including the implementation of institutional controls and coordination with other agencies regarding permits (or meeting the substantive requirements thereof). For Alternative 2, interagency coordination to implement deed restrictions would be required. Alternatives 3 and 4 would also require coordination with State and local agencies in order to comply with substantive requirements for grading and air and water discharges. Compliance with the technical requirements of these permits is considered to be relatively simple, and therefore it is expected that complying with the permit requirements will administratively be relatively simple as well. Alternative 5 would involve a greater administrative effort due to the complex enclosure and ventilation system, the hazardous working conditions, the off-site transportation of hazardous waste, and the incineration of the hazardous waste. The proposed ventilation and treatment system has been utilized in the area before (and has met local air permit requirements) but not at the scale that would be needed for this project. However, it is expected that it will be technically feasible to meet the relevant and substantive South Coast Air Quality Management District requirements with the proposed technology. It is expected that off-site incineration of the waste will be administratively feasible as well; however, adequate time will be needed to prepare applications and obtain permits for this disposal method well in advance of the initiation of site work.

State Acceptance

The State of California has concurred with EPA's selected remedy.

Community Acceptance

EPA received 12 sets of written comments from individuals, organizations, and agencies regarding EPA's Proposed Plan, as well as 16 verbal comments during its public meeting. These comments, and EPA's responses to the comments, are presented in the Response Summary in Part IV of this ROD.

Many of the comments received from the public expressed support for EPA's proposed remedy; others did not. Some commentors recommended that EPA select Alternative 5. EPA has determined that the preferred alternative presented in the Proposed Plan, Alternative 4, is the most appropriate remedy, and EPA has provided responses to those commentors that preferred other alternatives in the attached Response Summary.

2.9 The Selected Remedy

After considering CERCLA's statutory requirements, the detailed comparison of the alternatives using the nine criteria, and the public comments, EPA, in consultation with the State of California, has determined that the most appropriate remedy for addressing the contaminated waste and soil at the Del Amo Site Waste Pit Operable Unit is Alternative 4: "RCRA-Equivalent Cap and Soil Vapor Extraction." This alternative will isolate the waste material by installing a RCRA-equivalent cap over the surface of Lots 36 and 37 (as shown in Figure 3) and conducting soil vapor extraction beneath the waste, and adjacent contaminated soil, and above the water table. The remedy also requires deed restrictions, security fencing, and long-term monitoring and maintenance. EPA also believes that Alternative 4 is the most appropriate alternative for addressing, on an interim basis, the waste pits' contribution to contaminated groundwater.

The selected remedy does not constitute a remedial decision for currently contaminated groundwater at the proposed Del Amo Site or a remedial decision for contaminated soil/vadose zone areas of the Del Amo Site beyond the Waste Pits Area.

In considering the nine criteria and selecting Alternative 4, EPA assumed that the properties along 204th Street immediately adjacent to the Waste Pits Area will be permanently removed from residential or related uses as a result of the private non-CERCLA buy-out agreement between community residents and several responsible parties under which residential property adjacent to the Waste Pits Area will be removed from residential use. Because of this assumption, EPA did not evaluate the purchase of any residential properties or permanent relocation of any residents. In the event that properties on 204th Street adjacent to the Waste Pits Area are not removed from residential uses, EPA reserves the right to revaluate the remedy selected in this ROD.

Based on the Comparative Summary (presented in Section 2.8), Alternative 4 was found to be the best remediation alternative for the Waste Pits Area. The criteria that weighed most heavily in this decision were the threshold criteria of Protection of Human Health and the Environment, compliance with ARARs, and the balancing criteria of Short-Term Effectiveness and Cost. Alternative 4 (Cap and SVE) was one of only two alternatives that met the threshold criteria of Protection of Human Health and the Environment, the other alternative being Alternative 5 (Excavation, SVE, and Cap). Alternative 3, RCRA-Equivalent Cap, was found not to be *fully* protective of human health and the environment because it did very little to prevent further migration of the contaminants into the underlying groundwater. The cap utilized in Alternative 3 would provide some protection against rainwater infiltration, which is one mechanism for contaminant transport, but the cap's effectiveness in this regard is limited and there would still remain the vapor diffusion mechanism for contaminant transport.

In comparing the two alternatives that met the threshold criteria of Protection of Human Health and the Environment, Alternatives 4 and 5, the balancing criteria weighed more heavily in favor of Alternative 4. Alternative 5 was superior to Alternative 4 when compared to the criteria of Reduction of Toxicity, Mobility, and Volume (TMV) through Treatment and Long-Term Effectiveness and Permanence. However, Alternative 4 was superior to Alternative 5 when compared to the criteria of Implementability, Short-Term Effectiveness, and Cost.

Overall, the positive aspects and limited negative aspects of Alternative 4 outweighed the positive aspects and substantial negative aspects of Alternative 5. Specifically, Alternative 4 would provide good Reduction of TMV through Treatment, good Long-Term Effectiveness and Permanence, and relatively minor negative Short-Term Effects. Alternative 5, however, would provide superior Reduction of TMV through Treatment and superior Long-Term Effectiveness and Permanence, but the Short-Term Effects could be substantial and harmful to both the community and the on-site workers, and the Cost would be approximately ten times greater than Alternative 4. For this reason, Alternative 4 was chosen as the selected Remedial Action.

In further support of the decision to select Alternative 4, the State of California and a substantial portion of the community supported this alternative. The Del Amo Action Committee concurred but suggested that additional research in Biodegradation be conducted by the EPA.

Regardless of the type of remedy selected in the groundwater ROD, EPA believes that controlling the continuing source of contamination, as provided by Alternative 4, is prudent and appropriate. If drinking water-based cleanup standards were to be waived by the groundwater ROD, the containment of groundwater beneath the pits would be required for an indefinite period, possibly for centuries. Given this, it is appropriate to take reasonable steps to prevent additional waste pits contaminants from reaching the groundwater. This would lend greater long-term effectiveness and certainty during the very long period for which the groundwater remedy would have to be effective. Moreover, state and federal policies and regulations pertaining to zones of indefinite groundwater containment generally require source control, such as the SVE system would afford the soils under the pits, as part of a containment approach. On the other hand, if the groundwater ROD selects drinking water standards as the cleanup goal for the groundwater beneath the pits, the SVE action would be vital for such goals to be achieved. Therefore, the basis for selecting Alternative 4 over Alternative 3 is present regardless of the conclusions of the final groundwater ROD. Consequently, the SVE component of the selected remedy appears at this time to be consistent with the final remedial actions for the Del Amo Site.

DESCRIPTION AND SPECIFICATION OF THE REMEDY

The remedy selected by this ROD is described below. The remedy as designed and implemented shall meet all requirements and specifications described herein. Further, the remedy as designed and implemented must meet all ARARs as identified in Attachment A.

The selected remedy for clean-up of the Waste Pits Area consists of the following components:

(1) A RCRA-equivalent cap,
(2) Soil vapor monitoring,
(3) Surface water controls,
(5) Soil vapor extraction,
(6) Security fencing,
(7) Deed restrictions, and
(8) Long-term operation and maintenance.

RCRA-Equivalent Cap and Associated Monitoring

The RCRA-equivalent cap (meeting all identified ARARs) shall be constructed over the waste and contaminated soil. Based on existing information, the cap will cover slightly less than 4 acres. The cap shall be applied over all waste pits (1A, 1B, 1C, 2A, 2B, 2C, 2D, 2E, 2F) and related area as depicted in Figure 3. The cap shall include, among other things, a surface water drainage layer, a low-permeability layer, and a gas collection layer.

The objectives of the cap are:

(1) to prevent direct human contact with contaminants;
(2) to prevent generation of uncontrolled runoff and wind blown dust;
(3) to prevent the emission of contaminants into the air;
(4) to prevent rainwater from washing through the waste pits and carrying contaminants into the groundwater; and
(5) to prevent rainwater from washing through the contaminated vadose zone soils below the pits and carrying them into the groundwater.

Consistent with identified ARARS: the physical barrier created by the cap shall prevent direct human contact with the contaminants, the surface water collection and diversion system associated with the cap shall prevent uncontrolled runoff, the impermeable barrier created by the cap shall prevent rainwater from infiltrating the soil and transporting contaminants into the groundwater, and the cap's vapor collection and treatment system shall prevent the emission of unacceptable levels of contaminants into the air.

All of the ARARs identified in Attachment A which pertain to the cap shall be attained. The major ARARs that would be met during implementation of this action, including those specified by Title 22 of the California Code of Regulations, describe closure requirements for hazardous waste disposal facilities. The closure requirements specify that the design of the cap shall be sufficient to prevent damage due to settling and earthquakes. Any treatment units associated with the cap must have security fencing. The cap also must be designed with surface water controls to prevent ponding of water on its surface and to prevent runoff onto adjacent properties. Required monitoring associated with the cap includes soil vapor monitoring. The soil vapor monitoring is to be conducted at varying depths around the pits area in order to help determine whether any vapors are migrating or spreading laterally out from under the cap. These monitoring points could be located within the Waste Pits Area (lots 36 and 37) or on adjacent properties.

Final design of the cap and monitoring system shall be determined during the remedial design phase of the project. Such design items include (but are not limited to) layers and materials to be used in the cap, surface land-use and landscaping, location and depth of soil gas monitoring points, soil gas treatment system technology, and final areal extent of the cap. These and all other design items shall all meet the parameters for the cap as set forth in this ROD, including ARARs that pertain to the cap.

Security fencing, to meet State ARARs, shall be installed around any treatment units associated with the cap that could potentially present a target for unauthorized access or tampering.

Long-term maintenance and repairs to the cap shall be conducted as part of this remedy for as long as the waste material remains at the Site. The maintenance and repairs shall be carried out on a schedule with a frequency such that the effectiveness of the cap and its compliance with the requirements of this ROD are maintained at all times. If the cap is at any point unable to be repaired without replacement, such as when it has reached the end of its natural life, then the cap shall be replaced so long as the waste remains in the pits.

A long-term operation and maintenance plan for the cap shall be established and approved by EPA before the cap is constructed. This plan shall provide, at a minimum:

1) Specification of all activities necessary to ensure complete maintenance and repairs of the cap over its lifetime and comply with ARARs relating to such maintenance and repair;

2) The schedule and frequency for maintaining the cap and for the execution of all activities identified;

3) Specification of all monitoring, analysis, sampling and other tests necessary to ensure the performance and integrity of the cap and identify cap components requiring repair or replacement;

4) Specification of the schedule and frequency for such monitoring, analysis, sampling, or other tests;

5) Specification of all regulatory agencies and persons within those agencies to which results and confirmation of maintenance and repairs shall be sent, and approvals which shall be necessary.

Once the operations and maintenance plan is approved by EPA, the requirements in it shall become part of the approved remedy for the site. The operations and maintenance plan shall not conflict with or negate any requirements or specifications of this ROD.

Soil Vapor Extraction and Associated Monitoring

The SVE system shall be designed to remove contaminants from the soil via the vapor phase in order to limit the amount of contaminants that migrate from the waste pits and surrounding soil into the groundwater, according to the specifications and requirements provided below.

The objectives of the SVE System are:

(1) to protect groundwater from contaminants that migrate out of the pits;
(2) to protect groundwater from contaminants that migrate out of the vadose soil below the pits; and
(3) to protect groundwater from contaminants in the soil below the pits in the event that the water table rises into the contaminated soil.

This remedy shall include design, installation, operation, and long-term maintenance of a soil vapor extraction (SVE) system to meet the above objectives and all requirements as specified below. The SVE system shall be applied to the unsaturated soils under the waste pits and above the groundwater, in the soil areas as defined below. The SVE system shall clean these soils to an interim soil standard as specified in this ROD. A monitoring system shall be established, for the soils and soil vapor under the pits, to monitor the remediation progress. The SVE system shall establish and maintain a zone of soil under the waste pits (see section entitled "Where SVE Shall Be Applied" for locational details) which does not exceed the interim soil standard.

Incremental Groundwater Contribution. The SVE portion of this remedy shall be designed to limit the *additional* contamination the waste pits and adjacent contaminated soil shall be allowed to contribute to groundwater now and in the future. The groundwater beneath the waste pits currently is highly contaminated from both the waste pits themselves and other upgradient sources. The *incremental groundwater contribution* is defined as the amount by which the soils under the pits would be able to *increase* the groundwater contaminant concentration if the groundwater were clean today. The SVE action, by maintaining a cleaned zone of soil, will place a limit on this incremental contribution.

The contaminant concentrations in groundwater, according to the groundwater sampling and analysis conducted in late 1996, currently range from 12,000 ppb to 470,000 ppb benzene, less than 100 ppb to 15,000 ppb ethylbenzene, and 29 ppb to 440 ppb phenol, among others. The exact wells to be used in calculating the existing groundwater concentrations of these contaminants and any other contaminants amenable to SVE treatment for determining the allowable incremental groundwater contribution, will be determined during design.

SVE Cleanup Standards. Because of potential physical constraints in the subsurface under the waste pits, this ROD establishes two methods for calculating the interim soil standard to which the soils under the waste pits shall be cleaned and maintained by the SVE system. Only one of these methods shall be used; this ROD establishes the rules for when either method shall be used. This is fully explained in the following discussion.

EPA recognizes that the groundwater under the pits is currently highly contaminated and EPA has determined that it would not be appropriate to set an incremental contribution limit that assumes the groundwater is clean today. Therefore, the SVE cleanup shall focus on ensuring that the incremental groundwater contribution resulting from migrating pits contaminants remains an insignificant fraction of the existing groundwater contamination. Rather than set an interim soil standard that is a fixed value, the standard shall be tied to a fixed percentage of the groundwater contaminant concentration. As the groundwater contaminant concentration varies, the incremental groundwater contribution would vary with it. For example, if the groundwater concentration becomes lower due to natural or human-induced effects, the soil standard that SVE must achieve shall become correspondingly lower, as calculated by the methods outlined below. If, in the groundwater ROD, EPA were to select the requirement that the groundwater under the pits were to be cleaned to drinking water standards, then the interim soil standard would automatically become stringent enough to attain that standard.

The performance standard for the SVE system shall be that the pits will not be able to cause an incremental groundwater contribution in excess of 0.5% of the existing groundwater concentration, at any point in time. When a final groundwater remediation standard is selected by the groundwater ROD, the incremental contribution shall be limited to 0.5% of the groundwater concentration at the time. The groundwater ROD will address any potential changes to this requirement if the groundwater contaminant concentrations ever approach federally mandated remediation levels.

Rationale for Two Methods of Calculating Interim Soil Standards for SVE. There may be areas in the soil beneath the waste pits that have such low air permeabilities due to fine-grained stratigraphic materials that it may be impractical or impossible to implement an effective SVE system in those areas. This does not apply to all materials under the waste pits, most of which will be amenable to SVE treatment. The focused feasibility study (FFS) and EPA's proposed plan for this remedy specified a method for calculating the interim soil standard for SVE; this method was based on the assumption that most all soils subject to SVE would be cleaned to the same soil concentration value such that the incremental groundwater contribution did not exceed 0.5% of the existing groundwater concentration. This calculation method shall be termed "Method A."

In the event that, during remedial design, it is found that SVE cannot be operated in significant portions of the soils beneath the pits, then Method A would not be appropriate. If only a subset of the soils are cleaned to the standard as calculated by Method A, then the incremental concentration would exceed 0.5% of existing groundwater concentrations. Should this situation exist, this ROD specifies that Method B shall be used to calculate the interim soil standard.

Method A: To Be Used When Most All Soils Can Be Cleaned To The Same Level. An overall attenuation factor of 10 shall be assumed as a ratio between soil and groundwater concentrations. EPA's proposed plan explained that while many physical parameters must be combined to derive the true value of the overall attenuation factor, EPA believes that 10 is a conservative but reasonable value within the range of possible values for this factor. Based on this belief, the following equation shall be used to determine the interim soil standard for SVE under Method A:

$$S = (GW_E * 0.005) * 10 = (GW_E * 0.05)$$

where

S	=	Interim Soil Standard for SVE
GW_E	=	Existing Groundwater Concentration (as defined by this ROD)
0.005	=	0.5% interim soil standard as described above
10	=	overall attenuation factor to be used

As an example, if the existing groundwater concentration is found to be 100,000 parts per billion (ppb), then the SVE system would be required to maintain all soils in the zone subject to SVE at 5000 ppb. This standard shall be applied independently to all chemicals in groundwater and in soils under the waste pits. The SVE system shall be operated such that the soils are maintained at or below this standard indefinitely. If the existing groundwater concentration changes, then the interim soil standard shall be adjusted based on the same calculation.

The "attenuation" refers to the decrease in concentration of contaminants as the contaminant passes through the soil away from a fixed source. Processes such as natural biodegradation and adsorption may occur in the intervening soil, causing concentrations to be less at the water table than directly under the pits. The degree of attenuation from all the processes and causes in the soil under the pits is not known. However, a reasonable range for this total attenuation can be assumed. It is conservative to assume that the real attenuation factor is in the low end of its reasonable possible range. This conservative assumption tends to underestimate the amount of attenuation and, therefore, overestimate the amount of contaminants arriving at groundwater over time. Conversely, assuming the real attenuation factor is in the high end of its reasonable possible range may underestimate the amount of contaminants arriving at the water table. The interim soil standard chosen by EPA was on the conservative end of the range.

Method B: To Be Used When All Soils Cannot Be Cleaned To The Same Level Because of Low Air Permeabilities in Certain Soil Areas. In the event that SVE cannot be applied to all areas of soil under the pits due to low air permeability of certain soils, then the equation in

Method A and the assumed attenuation factor of 10, shall not apply. Rather, the remedial design shall establish a vadose zone transport model, approved by EPA, that shall be configured to evaluate the contributions from all areas of soil under the pits. The model shall estimate the incremental concentration due to both (1) the soils to which SVE can be applied, as well as (2) the soils to which SVE cannot be applied. The interim soil standard for SVE shall be set such that when the soils to which SVE can be applied are cleaned to that value, the overall incremental contribution from the waste pits does not exceed 0.5% of the existing groundwater concentration. The SVE system shall be run such that soils are maintained at levels that will maintain this condition indefinitely. If the existing groundwater concentration changes, then the interim soil standard shall be adjusted based on the same model and calculation.

Where SVE Shall Be Applied. The depth of the SVE application shall be between the capillary fringe above the water table and just below the bottom of each waste pit. The areal extent of the SVE application shall extend all across the pits themselves and laterally beyond the boundaries of the pits in all directions to whatever distance is necessary such that all interim soil standards as specified in this ROD are met. This could extend beyond the boundaries of lots 36 and lot 37. The SVE system shall be applied so as to address soil contamination which has emanated or is emanating from the waste pits, and will not be designed to address contamination if it is emanating solely from other sources.

This ROD recognizes the following limitations to the application and operation of the SVE system. The SVE system shall not be applied to the waste itself. If the SVE system applies too strong a pneumatic influence near the bottom of the waste pits, it may have the undesirable effect of drawing contaminants directly downward out of the waste pits. Similarly, if a significant pneumatic influence from the SVE system is applied too close to the capillary fringe, it may have the undesirable effect of pulling-in volatile contaminants that exist in the capillary fringe as a result of off-gassing and capillary contaminants from the groundwater. The SVE system shall be designed to minimize these undesirable effects. It is *not* however, a requirement of this ROD that the pneumatic influence near the pits' bottom or near the capillary fringe be reduced to zero; this may not be possible. Rather, the influence near these areas shall be lessened as necessary to reduce or eliminate those undesirable effects.

SVE Monitoring. The remediation progress of the SVE system shall be monitored with appropriate soil and soil gas monitoring. This ROD recognizes that contaminants may exist, at any given location, in one or more of several phases, including sorbed to soil, soil vapor, dissolved in soil moisture, and residual phase. If only one phase is measured, the amount of contamination in other phases shall be calculated based on supportable partitioning relationships, and the contamination in all phases shall be included in estimating the impact to groundwater.

Other Requirements. The SVE system shall be designed with the appropriate safety features required to allow safe unattended operation. The soil vapor extraction and treatment system shall be inspected and monitored on a regular basis and repaired as needed. Appropriate security fencing, required by State ARARs, shall be installed around the SVE treatment units.

A long-term operation and maintenance plan shall be written for the SVE system. This plan shall be completed and approved by EPA prior to the operation of the system. The plan shall include, at a minimum, all of the following details:

1) Specification of all activities necessary to meet all ARARs and other requirements put forth by this ROD, and a schedule and frequency by which all such activities shall take place;

2) Specification of all activities necessary to operate and maintain the system in safe working order, and a schedule and plan of execution for all such activities;

3) Specification of all sampling, testing, and monitoring associated with operation and maintenance of the system and the scheduling and frequency for these actions;

4) Specification of all sampling, testing, and monitoring associated with verifying the performance of the SVE system and the scheduling and frequency for those actions.

The SVE system shall meet all ARARs specified in this ROD that pertain to the SVE system and its components. The major ARARs that would be met during implementation of the SVE system include emission standards for the vapor treatment system and monitoring requirements for response actions for hazardous waste facility closure. Such monitoring includes groundwater monitoring to evaluate potential changes in groundwater conditions over time associated with the remediation.

Deed Restrictions

To prevent inappropriate future land use or development, the remedy also requires deed restrictions, prohibiting future residential use of the Waste Pits Area and prohibiting any future use which could impact the integrity of the cap.

Cost and Time for Remedy

The cost of the selected remedy would be approximately $6,290,000 in capital costs, $2,690,000 in operation and maintenance costs, and a total of $8,980,000 (all costs are shown in terms of present worth).

The remedy would require an estimated 8 to 12 months to design and construct. It is estimated that the SVE system would have to operate for five years before meeting the interim soil performance standards. Upon reaching those goals, the SVE system would need to be operated whenever more contaminants migrating from the pits and adjacent soil surpass the remediation goals set in either this ROD or revised by the future groundwater ROD.

5-Year Review

As required by CERCLA Section 121c 42 U.S.C.§ 9621 (c), a review shall be conducted every 5 years as long as waste remains at the site at levels that prevent unrestricted use. This 5-Year Review shall determine whether the implemented remedy remains protective of human health and the environment. If the remedy is no longer protective, then a remedy should be selected that will be protective. As remediation technologies continue to be developed in the future, there may be technological advances (e.g. bioremediation) that can be utilized for safe, efficient elimination of the waste.

2.10 Statutory Determinations

Under its legal authorities, EPA's primary responsibility at Superfund Sites is to undertake remedial actions that achieve adequate protection of human health and the environment, see 42 U.S.C.§9604(a). In addition, section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy protects human health and the environment through capping the contaminated waste and soil and implementing soil vapor extraction in the vadose soil beneath the waste pits. This work will be done in accordance with ARARs identified by this ROD.

Capping the waste pits area will eliminate the threat of exposure to volatile contaminants from the waste pits. There is currently a significant possibility that a release of hazardous substances could occur due to disturbance of the waste. Such a release would result in an unacceptable risk to the public. This potential risk would be eliminated by a surface cap. Such a cap would reduce contaminant migration to the groundwater. Implementing SVE as an interim action will also reduce the continued migration of contaminants from the waste material into the groundwater to a negligible amount.

Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy of cap and SVE will comply with all applicable or relevant and appropriate chemical-specific, action-specific, and location-specific requirements (ARARS). The ARARs are presented in Attachment A.

Cost-Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, the net present worth value being $8,980,000. The estimated costs of the selected remedy are within an order of magnitude of (just over two times) the costs associated with on Alternative 3, capping only, and yet the selected remedy assures a much higher degree of certainty that the remedy will be protective of the groundwater due to the action of the SVE system. While the selected remedy effectively reduces the hazards posed by all of the contaminants at the site, its costs are less than 10% of the cost of alternative 5, excavation, incineration, SVE and cap.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final source control operable unit at the Del Amo Waste Pits. Vapor extraction and treatment technologies will be utilized both as part of the cap and the SVE system to extract and treat hazardous substances. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, cost, and considering both the statutory preference for treatment as principal element and State and community acceptance.

While the selected remedy does not offer as high a degree of long-term effectiveness and permanence as the excavation alternative, it will significantly reduce the inherent hazards posed by the contaminated soils through a cap that eliminates surface exposure and SVE system that significantly reduces the continued migration of contamination to the groundwater.

The selected remedy addresses the principal threats posed by the contaminated waste and soil, achieving significant reduction of their impacts to groundwater. The selected remedy is more effective than the other treatment option in the short-term, as there will be no danger of releases of site-related contaminants during remedy implementation. The implementability of the selected remedy is comparable to the non-treatment alternatives and significantly better than the excavation option. The selected remedy is also the least costly treatment option.

The selection of SVE treatment of the contaminated soil is consistent with program expectations that indicate that highly toxic and mobile contaminants are a priority for treatment and their treatment is often necessary to ensure the long-term effectiveness of a remedy.

Preference for Treatment

The Section 121(b) of CERCLA requires EPA to use some form of active treatment (or a combination of treatment and containment) to address principal threats, wherever this is practical. A principal threat is material that contains hazardous substances, acts as a reservoir for further migration of contamination, and presents a risk if exposure occurred. The waste material contained in the Del Amo pits and the soil beneath the pits are considered a principal threat to human health due to their high benzene content. Benzene is a highly toxic and highly mobile contaminant. The statutory preference for remedies that employ treatment as a principal element is satisfied.

2.11 Documentation of Significant Changes

There were significant changes to the Proposed Plan's preferred alternative made in this ROD. The first change is that an alternative method of calculating the interim soil standard was put forth in the ROD to address the case where significant portions of the soils under the waste pits are found, during remedial design, not to be amenable to SVE due to low air permeability. The alternative method (Method B, as presented above) still preserves the overall performance objective of limiting the incremental groundwater concentration due to soil contamination beneath the pits to 0.5% of the existing groundwater concentration. This change was made, in part, to address comments to the proposed plan by the responsible parties and will ensure protectiveness of the remedy under a wider range of situations.

The second change is that we changed terminology from "short-term performance standard" to "interim soil standard," and we changed "long-term performance standard" to "standards to be selected in the final groundwater ROD."

The third change is that groundwater monitoring will not be a required element of this ROD. In the Proposed Plan, groundwater monitoring was included in the remedy description for the purpose of monitoring potential changes in groundwater conditions over time due to the effects of the remediation. Upon further consideration, EPA has determined that the groundwater contaminant concentrations beneath the pits are currently too high and will remain so in the near future, and therefore it is not possible to discern the effects of the cap and SVE system on the groundwater concentrations. If such effects become discernable in the future, groundwater monitoring will be required to so monitor these effects. Groundwater monitoring in the waste pits area will be performed as part of the final groundwater ROD. Such monitoring will be specified in the groundwater ROD.

The final change is that this ROD does not provide for subsequent investigations to determine whether Pit 1A and adjacent areas should be covered by the RCRA-equivalent cap. The Proposed Plan stated that additional soil samples may be taken during design to determine the appropriateness of extending the selected clean-up plan to Pit 1A. However, the 1984 DHS report stated that contamination existed below the floor of the 1983-84 excavation. Although there was no quality assurance provided for these findings, this data is consistent with later data, taken beneath the other waste pits, that found contamination extending all the way to the water table. Because remaining contaminated soil still exists and such contamination could negatively impact the groundwater, EPA has decided, based on further review of available information, that Pit 1-A and adjacent soil as shown in Figure 3 should be covered with a RCRA-equivalent cap.

Attachment A

APPLICABLE/APPROPRIATE AND RELEVANT REQUIREMENTS

1. Applicable/Appropriate and Relevant Requirements

The following legal requirements are determined by this ROD to be applicable or appropriate and relevant requirements for the selected remedial action pursuant to Section 121(d)(2), 42 U.S.C. § 9621(d)(2). Applicable requirements are identified by (A) and appropriate and relevant requirements are identified by (R).

Only the substantive portions of the requirements identified below are ARARs as opposed to administrative requirements, including permitting requirements, which are not ARARs. See 42 U.S.C. § 9621(d)(2) and (e)(1); U.S. EPA, Compliance with Other Laws Manual-Interim Final at 1-11, 1-12 (EPA 540/G-89/006) (August 1988).

a. Hazardous Waste Management ARARs

(Implementing relevant portions of the California Hazardous Waste Control Act, Cal. Health and Safety Code Section 2500 et seq. and the Resource Conservation and Control Act, 42 U.S.C. § 6901 et seq. under EPA authorization pursuant to 42 U.S.C § 6926)

It is not yet known whether waste meeting the criteria for designation of hazardous waste will be generated by the components of the selected remedial action, the SVE system and the gas collection component of the RCRA-equivalent cap. Consequently, certain of the ARARs identified below are designated as both applicable and appropriate and relevant to these components of the selected remedial action. If for example, the SVE system, collects vapor/water with concentrations of contaminants meeting the hazardous waste toxicity criteria in the California regulations, then these hazardous waste management ARARs would be applicable ARARs for the SVE system because that system is collecting and treating hazardous waste.

If, on the other hand, the SVE system handles vapor/water that does not meet the regulations' criteria for hazardous waste designation, these ARARs would be relevant and appropriate ARARs for the SVE or gas collection system. The determination that such ARARs should be relevant is based on: 1) the fact that the waste which was disposed in the Waste Pit Area would be regulated RCRA hazardous waste if that waste were disposed of today and the treatment of that waste would be considered treatment of regulated hazardous waste, and 2) that contamination present in vapors generated by the SVE or gas collection system derives from waste which, except for the date of disposal, would otherwise have been defined as listed hazardous waste. See FFS Chapter 2 (Site Characterization-concentrations of hazardous substances in remaining waste and soils); 22 CCR § 66261.24 (toxicity criteria for benzene); 22 CCR § 66261.31 (hazardous waste from non-specific sources-F003, F005); and 22 CCR §

66261.33 (discarded, intermediate or off specification commercial chemical products-U019 benzene). See also, 40 C.F.R. § 261.3(c)(2) (derived-from rule) and 40 C.F.R. § 261.3(a)(2) (mixture rule). The determination that these ARARs are appropriate rests on two factors: 1) the proximity of the SVE vapor/water collection and treatment system and cap gas collection treatment system to adjacent residential properties (beyond the area being removed from residential use by the private non-CERCLA buyout on 204th Street immediately adjacent to the Waste Pit Area) and 2) the fact that one of the key contaminants, benzene is a known human carcinogen and is present at high concentrations. See FFS Chapter 2 and Figures 1.3.1-1 + 2.2.1-3.

The SVE system, excluding the thermal/catalytic oxidizer unit, is defined for purposes of applying the ARARs identified below as a miscellaneous unit. The thermal/catalytic oxidizer unit is defined for purposes of applying the ARARs identified below as an incinerator. The application of these definitions is based on the EPA's reading of how these terms are defined in the relevant regulations.

22 CCR Part 261 Criteria for Identifying Hazardous Waste (A)
22 CCR § 66262.11 Hazardous Waste Determination by Generators (A)
22 CCR § 66262.34 Accumulation Time (A)
22 CCR § 66264.14 (a), (b) Hazardous Waste Facility General Security Requirements (A)
22 CCR § 66264.15 General Facility Inspection Requirements (A) for the SVE system including the vapor/water treatment portions of the SVE system
22 CCR § 66264.17 Hazardous Waste Facility General Requirements for Ignitable, Reactive or Incompatible Wastes (A)
22 CCR § 66264.25 Hazardous Waste Facility Seismic and Precipitation Design Standards (A)
22 CCR § 66264.31 Preparedness & Prevention-Design and Operation of Facility (A)
22 CCR § 66264.32 Preparedness & Prevention-Required Equipment (A)
22 CCR § 66264.33 Preparedness & Prevention-Testing & Maintenance (A)
22 CCR § 66264.34 Preparedness & Prevention-Access to Communications or Alarm (A)
22 CCR § 66264.35 Preparedness & Prevention-Required Aisle Space (A)
22 CCR § 66264.37 Preparedness & Prevention-Arrangements with Local Authorities (A)
22 CCR § 66264.51 Contingency Plan-Purpose and Implementation (A)
22 CCR § 66264.52 Contingency Plan-Content (A)
22 CCR § 66264.53(a) Contingency Plan-Copies of Plan (A)
22 CCR § 66264.54 Contingency Plan-Amendment (A)
22 CCR § 66264.55 Contingency Plan-Emergency Coordinator (A)
22 CCR § 66264.56 Contingency Plan-Emergency Procedures (A)
22 CCR § 66264.111 Hazardous Waste Facility Closure Performance Standard (R) for the RCRA-equivalent cap (A) for the SVE system
22 CCR § 66264.114 Hazardous Waste Facility-Closure Disposal and Decontamination of Equipment, Structures and Soils (A) for SVE system
22 CCR § 66264.117 (a), (b)(1)(excluding reference to Article 6) and (d) Hazardous Waste Facility Postclosure Care and Use of Property (R) for the RCRA equivalent cap (A) for

SVE system

22 CCR § 66264.119 (a)(regarding notice to the local zoning authority), and (b)(1) Hazardous Waste Facility Post Closure Notices (R) for RCRA equivalent Cap and (A) for SVE system

22 CCR § 66264.171-66264.178 Use and Management of Containers (A) however, the time period for onsite storage of any hazardous waste is governed by 22 CCR 22262.34 Accumulation Time requirements.

22 CCR § 66264.228 (a)(2)(C), (b)(1), (b)(2), (b)(4), (b)(5), (b)(6), (e)(17), (e)(19), (h), (j), (k), (m), (o), (p), and (q); Hazardous Waste Facility Closure and Post Closure Care for Surface Impoundments (R)

22 CCR § 66264.310 (a), (b)(1), (b)(2), (b)(4), (b)(5), (b)(6), © and (d) Hazardous Waste Facility Closure and Post Closure for Landfills (R)

22 CCR § 66264.341 Hazardous Waste Incinerators Waste Analysis (A/R)

22 CCR § 66264.342 Hazardous Waste Incinerators POHCs (A/R)

22 CCR § 66264.343 Hazardous Waste Incinerators Performance Standards (A/R)

22 CCR § 66264.344(A/R) Hazardous Waste Incinerators Permits (A) (substantive requirement of subsection (a) only)

22 CCR § 66264.345 Hazardous Waste Incinerators Operation Requirements (A/R)

22 CCR § 66264.347 Hazardous Waste Incinerators Monitoring and Inspection Requirements (A/R)

22 CCR § 66264.351 Hazardous Waste Incinerator Closure (A/R)

22 CCR § 66264.1101 Containment Buildings-Design and Operating Standards (A)

22 CCR § 66268.1 Hazardous Waste Land Disposal Restrictions (A)

22 CCR § 66268.3 Hazardous Waste Dilution Prohibition as Substitute for Treatment (A/R)

22 CCR § 66268 Article 4 Hazardous Waste Treatment Standards (A) Article 10 Hazardous Waste - Non RCRA Wastes Land Disposal Restrictions (A)
Article 11 Hazardous Waste-Non RCRA Waste Treatment Standards (A)

b. Air Pollution Prevention Requirements

(Implementing relevant portions of Division 26 of the Cal. Health and Safety Code and the Clean Air Act, 42 U.S.C § §7401 et seq.)

South Coast Air Quality Management District (SCAQMD)

SCAQMD Regulation IV, Prohibitions

- Rule 401 Visible Emissions (A)
- Rule 402 Nuisance (A)
- Rule 403 Fugitive Dust (A)
- Rule 473 Disposal of Solid and Liquid Wastes (A)

SCAQMD Regulation X NESHAP For Benzene (substantive standards only)(A)

SCAQMD Regulation XI, Source Specific Standards

- Rule 1150.2 Control of Gaseous Emissions from Inactive Landfills (A)
- Rule 1166 VOC Emissions from Soil Decontamination (A)

SCAQMD Regulation XIII, New Source Review

Rule 1303 Attainment of State and Federal Ambient Air
Quality Standards (A)
Rule 1401 New Source Review of Carcinogenic Air Contaminants
(substantive standards only) (A)
SCAQMD Regulation XIV Toxics (substantive standards only)

2. Legal Requirement of Independent Legal Applicability to the Selected Remedial Action

The selected remedial action may trigger additional legal requirements. These requirements are not identified as ARARs in this ROD either because such requirements do not meet the definitional prerequisites to be identified as an ARAR for onsite activities or such requirements are triggered by offsite activities. See generally, 42 U.S.C § 9621(d). These requirements could be applicable to portions of the selected remedial of their own legal force, independent of the provisions of Section 121(d)(2) of CERCLA. The requirements identified below are presented for the informational purposes only. Any determination the legal applicability of such requirements ultimately rests with the governmental entity charged with implementing and enforcing compliance with such requirements.

CERCLA Section 121 (d)(3) requirements regarding offsite disposal of Superfund Waste

CERCLA Section 103 notification requirements and comparable provisions of California law

California Porter Cologne Act (implementing both state law and the federal NPDES program) concerning issuance of waste discharge requirements for point source discharges of water from the Waste Pit Area to offsite storm sewer conveyances

Los Angeles County Sanitation District Wastewater Ordinance, as amended, concerning discharges of water from the Waste Pit Area to the LACSD sanitary sewer system offsite

Provisions of Title 22 of the California Code of Regulations relating to offsite shipments of hazardous waste, including but not limited to manifest requirements, transportation requirements and offsite disposal/treatment requirements

Federal and State Occupational Health and Safety Act requirements

3. Guidance and Advisories To Be Considered

Certain non-promulgated advisories or guidance that are otherwise not legally binding may be identified in a ROD as guidance or advisories "to be considered" (TBC) particularly to aid the design and implementation of CERCLA remedial actions. For this Record of Decision, the advisories and guidance set out below are determined to be TBCs for the selected remedy:

Hydrologic Performance of Landfill Performance (HELP) Mode, Vol I and II, EPA/530-SW-84-

009 and EPA/530-SW-84-010

Landfill and Surface Impoundment Evaluation-EPA Technical Resource Document

Evaluating Cover Systems for Solid and Hazardous Waste-EPA Technical Resource Document

SCAQMD Best Available Control Technology (BACT) Guidelines Document

EPA Region IX Preliminary Remediation Goals (PRGs) 1996