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Superfund Record of Decision:

Valley Wood Preserving, CA

50272-101

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16. Abstract (Limit: 200 words)

The 14.4-acre Valley Wood Preserving (VWP) site is a former wood preserving facility in Turlock, Stanilaus County, California. Land use in the area is predominantly agricultural, and one residence is located onsite. There are subsurface irrigation drains at the site, which eventually discharge to the San Joaquin River about 12 miles west of the site. From 1973 to 1979, VWP used a solution of chromated-copper arsenate (CCA) to preserve lumber onsite. Wood preserving chemicals were mixed and stored onsite in three above-ground storage tanks. After treatment, the wood was allowed to drip dry on paved and unpaved areas. Chemical spills, leaking tanks, improper onsite disposal practices, and chemical drippings from the treated lumber are known sources of contamination. In 1979, State investigations identified metals including arsenic and chromium in an onsite storage pond, holding tanks, onsite and offsite soil, and the onsite underlying shallow aquifer. In 1989, EPA investigations identified low levels of chromium contamination in several domestic wells, and required VWP to install an interim ground water extraction and electrochemical treatment system to help contain the migration of contamination. EPA also required VWP to design a plan for the development of an alternative water supply for any

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Valley Wood Preserving, CA
First Remedial Action - Final
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b. Identifiers/Open-Ended Terms

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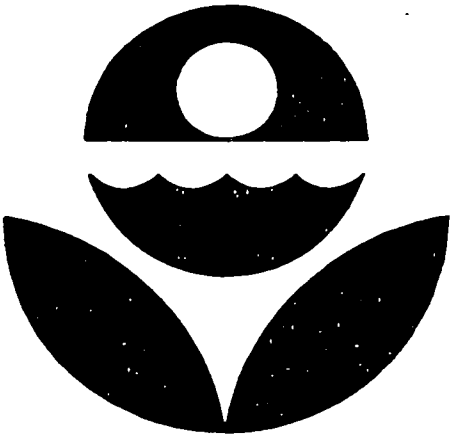
EPA/ROD/R09-91/062
Valley Wood Preserving, CA
First Remedial Action - Final

Abstract (Continued)

affected residences. VWP also installed three deep ground water wells to serve as domestic water supplies. This Record of Decision (ROD) provides a final remedy for contaminated soil and ground water. The primary contaminants of concern affecting the soil and ground water are metals including arsenic and chromium.

The selected remedial action for this site includes excavating approximately 15,000 cubic yards of contaminated surface and subsurface soil; treating the soil using cement-based fixation; backfilling excavated areas with treated soil that meets State criteria, maintaining stabilized soil mass onsite to prevent future exposure; placing treated soil that exceeds State criteria in lined cells onsite; collecting, handling, and disposing of leachate; pumping and treatment of contaminated ground water using electrochemical treatment to reduce hexavalent chromium to its trivalent form, followed by treating the residual using alumina adsorption to remove any residual arsenic; disposing of ground water onsite by infiltration and evaporation at one or more percolation ponds, or by underground injection through subsurface injection wells; disposing of sludge generated during the treatment process offsite; conducting soil, ground water, surface water, and air monitoring; and implementing institutional controls possibly including deed restrictions. The estimated present worth cost for this remedial action is $3,850,000, which includes an annual O&M cost of $224,000.

PERFORMANCE STANDARDS OR GOALS: Soil excavation clean-up standards are based on an excess cancer risk level of 10^{-6} for surface soil and levels protective of ground water from contaminated leachate for subsurface soil. Ground water clean-up standards are based on State levels and potential health risks. Chemical-specific soil goals include arsenic 2 mg/kg (risk-based) and hexavalent chromium 4 mg/kg (risk-based) for surface soil; and arsenic 5 ug/kg and hexavalent chromium 5 ug/kg for subsurface soil. State criteria require a liner below soil containing arsenic and chromium concentrations greater than 500 mg/kg and below soil exhibiting leachable arsenic and chromium at 5 ug/l. Ground water clean-up goals include arsenic 16 ug/l (health-based) and chromium 50 ug/l (State).



VALLEY WOOD PRESERVING SUPERFUND SITE

TURLOCK, CALIFORNIA

RECORD OF DECISION

United States Environmental Protection Agency
San Francisco, California

September 1991

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DECLARATION

DECLARATION

SITE NAME AND LOCATION

Valley Wood Preserving Site
Turlock, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the remedial actions selected for the Valley Wood Preserving Site in Turlock, California, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site.

The State of California concurs with the selected remedies.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDIES

The remedial actions have been selected to address contaminated soils and groundwater in a complete site cleanup strategy. These remedies address the documented principal public health and environmental threats from the site contamination. The major components of the selected remedies include the following:

- Extraction of the contaminated groundwater followed by electrochemical treatment, activated alumina adsorption, and disposal. The end use of the treated groundwater will combine one or both of the following methods: reinjection to groundwater and/or discharge to percolation ponds.

- Excavation of contaminated soils and chemical fixation followed by on-site disposal in treatment cells for treated soils designated as hazardous waste.

STATUTORY DETERMINATIONS

The selected remedies are protective of human health and the environment, address all principal threats from the site, comply with the federal and state requirements legally applicable or relevant and appropriate to the remedial action, and are cost effective. The remedies use permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable and satisfy the statutory preference for remedies that use treatment to reduce toxicity, mobility, or volume as their principal element. The groundwater remedy involves treatment estimated to take at least 5 years to reach remedial objectives. The soil remedy involves treatment estimated to take about 9 months to reach remedial objectives. Because these remedies may result in hazardous substances being left onsite above health-based levels, a review will be conducted within 5 years of commencement of remedial actions, and thereafter as necessary, to ensure that the remedies for groundwater and soils continue to adequately protect human health and the environment.

John Wise

Daniel W. McGovern for
Regional Administrator

9.27.91

Date

Section 1.0
SITE LOCATION AND DESCRIPTION

Section 1.0
SITE LOCATION AND DESCRIPTION

The Valley Wood Preserving (VWP) Superfund site, an inactive wood preserving facility, is located at 2237 South Golden State Boulevard in an unincorporated area of Stanislaus County, California, about 1.5 miles southeast of the City of Turlock's corporate boundary (Figure 1-1). The Merced County line is about one-half mile southeast of the site. The site is located within Section 25 of Township 5 South, Range 10 East, relative to the Mount Diablo base and meridian.

Prominent man-made landmarks in the vicinity of the site include the Southern Pacific Railroad that parallels South Golden State Boulevard to the east; the rest area on State Highway 99, about one-half mile to the south; Turlock Irrigation District (TID) Lateral No. 5 surface drain, about one-half mile to the south; and Johnson School, about one mile to the south in Merced County. The Turlock Airpark is located about one-and-one-quarter miles to the west.

The site, occupying an area of approximately 14.4 acres, is essentially level with parts of the site graded to control surface water runoff. The former wood treating and storage area is paved with asphalt. The remainder of the site is unpaved. The entire perimeter of the site is secured with a 6-foot-high chainlink fence.

The site is bounded by the southbound lanes of South Golden State Boulevard to the east, a vineyard to the north, a poultry farm to the south, and fallow agricultural/ residential lots to the west. Land use in the vicinity of the site is mostly agricultural. Most of the agricultural plots near the site are relatively large and at least partially in residential use.

A single-family residence is located in the northeast corner of the site. Associated structures include a garage/workshop and a storage shed. Water for domestic use is obtained from a well, designated VWP-2, located immediately northwest of the residence. Also, several corrugated metal buildings formerly occupied by an equipment rental company are located near the southeast corner of the site. They include two service/storage-type buildings and a covered work structure. Most of the wood preserving facilities and equipment have been dismantled and removed; however, an equipment shed, two large aboveground tanks, a pole shed, and an office structure remain. A 600,000-gallon tank constructed after closure of the wood treating facility is on-site as part of the interim groundwater cleanup program.

Subsurface features at the site include subsurface TID irrigation drains and subsurface piping. Four underground storage tanks were removed in 1990. The subsurface TID irrigation pipeline drain transects the eastern portion of the site parallel to South Golden State Boulevard. The invert of the pipe is 4.5 to 5.0 feet below grade. The TID eventually discharges to the San Joaquin River about 12 miles west of the site.

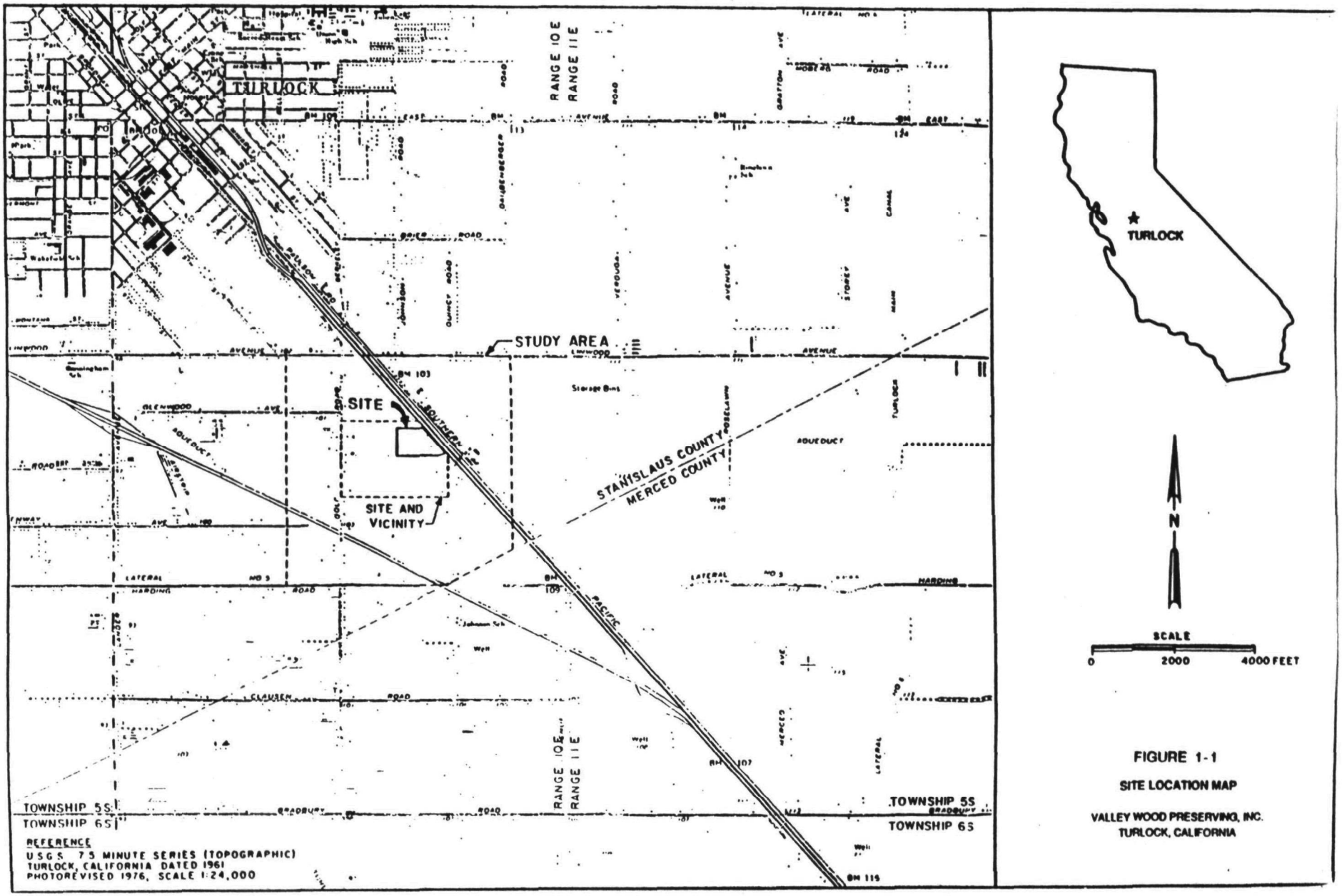

FIGURE 1-1

SITE LOCATION MAP

VALLEY WOOD PRESERVING, INC.
TURLOCK, CALIFORNIA

Three waterproducing wells, VWP-1, VWP-2, and VWP-3, are the other subsurface features at the site. According to site plans, only VWP-3 (inactive) of the three wells appears to have had a significant water distribution subsurface piping system on-site.

The mean annual precipitation in the site area is 11.7 inches, 80 percent of which falls as rain between November and March. Average monthly air temperature varies from 45.7°F in December and January to 76.9°F in July. Mean annual wind speed is approximately 7 miles per hour. The prevailing wind direction is north-northwest to northwest, except in December, January, and February when it is to the southeast.

Most of the direct precipitation and runoff from paved areas percolates rapidly into the ground. There is little, if any, overland flow and no significant streams or creeks exist in the vicinity of the site. There is an extensive network of subsurface drains and irrigation pipes originating from TID Lateral No. 5 surface drain located to the south.

In the vicinity of the site, 8 to 14 feet of vadose zone overlie an unconfined aquifer that extends to a depth of approximately 140 feet. The unconfined aquifer is separated from the confined aquifer by a low permeability clay layer (aquitard) called the "E-clay," which is present between 140 and 185 feet below grade. The water table is typically 4 to 8 feet below grade, but is several feet deeper at this time due to drought conditions. The groundwater flows to the southwest and has an average hydraulic gradient of approximately 0.002 under nonpumping conditions. The average transmissivity of the unconfined aquifer is 1,500 square feet per day. The hydraulic gradient between the unconfined and confined aquifers is vertically downward.

The "E-clay" is characterized by its dark greenish-gray to blue-gray color, which is probably due to the reduced state of the ferrous iron contained in the clay minerals. The most diagnostic feature of the "E-clay" is the presence of diatoms, which tend to be concentrated near the stratigraphic middle of the unit. The older alluvium overlies the "E-clay" and consists of intercalated beds of gravel, sand, silt, and clay with some "hardpan." Coloration of the older alluvium is variable and has been reported as brown, reddish-brown, gray, brownish-gray, white, blue, and black. It is generally distinguished from the underlying continental deposits by its coarser-grained texture. The older alluvium reportedly becomes less permeable with depth.

The unconfined aquifer zone has been extensively developed as a groundwater resource. There are 105 current or former water-producing wells within the study area, in addition to the 56 monitoring wells installed during investigations at the VWP site. Ninety-one of these wells (81 active and 10 inactive) are for domestic water supply, six are "drainage" wells, six are "industrial-use" wells, and two are without any known use. The extraction of small quantities of groundwater from the domestic wells in the study area does not have a significant effect on the regional groundwater flow regime. However, relatively large volumes of water are extracted from the unconfined aquifer on a continuous basis by TID to control groundwater levels.

Section 2.0
SITE HISTORY AND ENFORCEMENT ACTIVITIES

Section 2.0
SITE HISTORY AND ENFORCEMENT ACTIVITIES

Wood preserving operations at VWP were conducted from 1973 through 1979 and resulted in on-site and off-site soil and groundwater contamination. The contaminants of concern at VWP include hexavalent chromium and arsenic in the soils, from surface to approximately 12 feet in depth, and hexavalent chromium and arsenic in the groundwater. The groundwater contaminant plume extends approximately 2,000 feet off-site to the southwest and poses a substantial threat to neighboring domestic wells.

VWP preserved lumber using an aqueous solution containing 1 to 2 percent chromated-copper-arsenate (CCA). The wood preserving chemicals were stored and mixed on-site in three above-ground storage tanks. Lumber in loads of up to 20,000 pounds was placed onto a rail-mounted treatment train and pushed into one of four pressure treatment cylinders. After treatment, the train would exit the cylinder and the wood would be unloaded and allowed to drip dry on paved and unpaved areas. Chemical spills, leaking tanks, on-site disposal practices, and chemical drippings from treated lumber are the known sources of contamination associated with the VWP site. (Site features are shown on Figure 2-1.)

Harold and Joyce Logsdon were the owners of the VWP site from the beginning of operations at the site until 1980 when Valley Wood Preserving, Inc. acquired full ownership of VWP. Harold and Joyce Logsdon at all times have owned between 25 and 50 percent of the stock of Valley Wood Preserving (VWP), Inc. However, they are not the sole stockholders of the corporation; five other individuals have been identified as stockholders by the California Attorney General's Office.

2.1 INITIAL INVESTIGATIONS

In 1979, the California Central Valley Regional Water Quality Control Board (CVRWQCB) identified toxic wood treating chemicals (chromium, arsenic, copper) within an on-site storage pond, within holding tanks, and in on-site and off-site soils. In addition, groundwater contaminated with these same chemicals was detected within the shallow, unconfined aquifer at the site. In November 1979, the CVRWQCB issued a cleanup and abatement order to VWP, Inc. In 1980, the CVRWQCB obtained a preliminary injunction ordering VWP, Inc. to undertake groundwater pump- and-treat actions at the site. VWP, Inc. began soil and groundwater sampling in early 1980, but ceased remedial efforts in 1983 due to alleged financial difficulties.

In March 1987, the California Department of Health Services (DHS), now known as the California Department of Toxic Substances Control (DTSC), issued a remedial action order (RAO) to VWP, Inc. requiring it to conduct a remedial investigation and feasibility study (RI/FS) and to develop a remedial action plan (RAP). In response to the RAO, VWP, Inc. contracted with Geosystem Consultants, Inc. to conduct an RI/FS

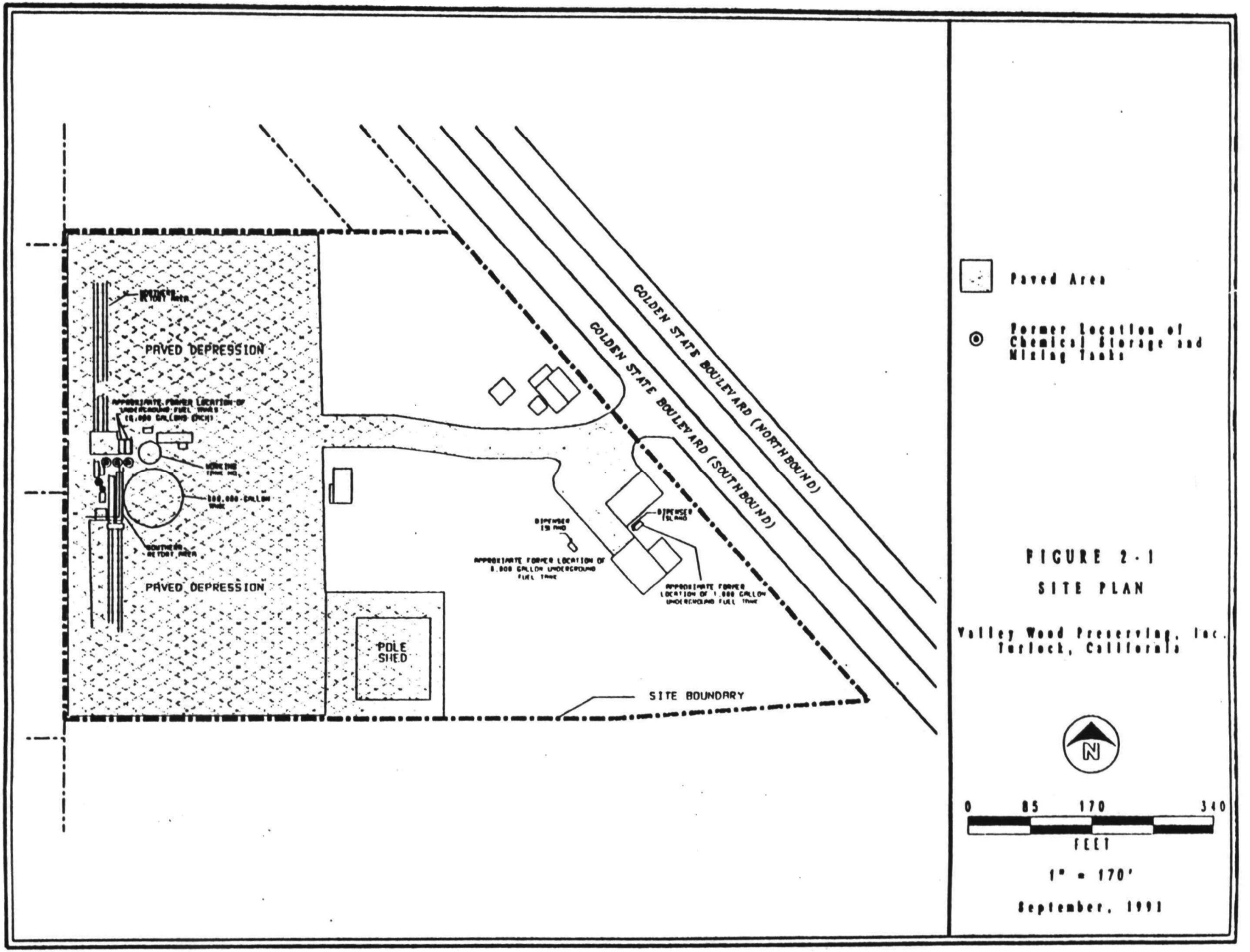

FIGURE 2-1

SITE PLAN

Valley Wood Preserving, Inc.
Turlock, California

at the site. In January 1989, VWP, Inc. submitted to DHS the initial draft RI report that has been revised several times to reflect additional site characterization. VWP was proposed for inclusion on the National Priorities List (NPL) in June 1988 and added to the NPL in March 1989. The United States Environmental Protection Agency (EPA) became the lead agency in September 1989.

2.2 REMOVAL ACTIONS

While the RI was being revised, EPA became concerned about the threats to water quality in the neighboring residential wells. In August 1989, EPA advised VWP, Inc. to conduct monthly domestic well sampling. In addition, EPA began preparing a removal consent order to require VWP, Inc. to implement an interim pump-and-treat operation to contain the off-site migration of the groundwater plume. From September through November 1989, EPA conducted site and neighborhood visits with residents in the area. In October 1989, several domestic wells showed detectable concentrations of hexavalent chromium. In November 1989, EPA's Environmental Services Branch sampled seven domestic wells, and the data revealed that several of the wells contained elevated concentrations of hexavalent chromium; these levels were, however, below the California Maximum Contaminant Level (MCL) for chromium.

The removal consent order was signed on December 8, 1989. The order calls for VWP, Inc. to conduct two aquifer tests to determine the aquifer's hydrologic characteristics and to aid in the design and implementation of an extraction system for the interim pumping. Following completion of the aquifer tests, VWP, Inc. is required to implement an interim pump-and-treat system. In addition, the removal consent order calls for VWP, Inc. to design a plan for the development of an alternative water supply for affected residents. An alternate water supply must be made available to affected residents if any contaminant in existing supply wells reaches 60 percent of its MCL. To date, VWP, Inc. has generally complied with the removal consent order. The extraction and electrochemical treatment system has been operating since June 1990.

In January 1990, VWP, Inc. began to install three deep groundwater wells to serve as domestic water supplies. These wells have been completed and determined to be clean and residential water is now supplied by these wells. VWP, Inc. will eventually seal the old, shallow domestic wells; they are currently used as monitoring wells.

2.3 REMEDIAL INVESTIGATION/FEASIBILITY STUDY

On May 4, 1990, Harold Logsdon signed a second EPA administrative consent order on behalf of Respondent VWP, Inc. The administrative consent order requires VWP, Inc. to conduct an RI/FS. The effective date of this order, which supersedes the 1987 DHS RAO, is May 1, 1990. As part of the RI/FS, EPA completed a baseline risk assessment in February 1991 to estimate potential health and environmental risks that could result if no action were taken at the site. The risk assessment indicated that exposure to groundwater contaminated by chemicals from VWP could result in significant health

risks. No significant ecological risks were identified. The risk assessment is described in more detail in Section 6.0.

In June 1991, the RI/FS was completed with the following conclusions:

- The contaminants of concern in both soil and groundwater are hexavalent chromium and arsenic.
- The groundwater plume continues to migrate toward domestic wells.
- Additional investigation of the vertical extent of the groundwater plume is required immediately to ensure successful design and implementation of the extraction well field.
- Remedial technologies capable of cleaning up the VWP site in accordance with EPA and state standards are available.

Section 3.0
HIGHLIGHTS OF COMMUNITY INVOLVEMENT

Section 3.0
HIGHLIGHTS OF COMMUNITY INVOLVEMENT

Community interest in the VWP site was high during the late 1970s when owners of property adjacent to the site became concerned about odors, potentially contaminated domestic wells, and general exposures to site chemicals. Interest has subsided somewhat since the onset of remedial activities, which continue to be frequently covered by local newspapers.

EPA has encouraged public participation during the RI/FS process and has met the requirements for public participation under CERCLA Section 113(K)(2)(B)(i-v). Public participation has occurred through the following activities:

November 1988	Release of the community relations plan (CRP) under the direction of DHS (now DTSC)
January 1989	DHS fact sheet regarding site investigations
October 1989	EPA community interviews, fact sheet regarding EPA involvement at VWP
December 1989	EPA progress letter
April 1990	EPA fact sheet on the removal pump-and-treat system
June 1990	EPA fact sheet on groundwater cleanup activities
January 1991	EPA fact sheet on remedial investigation activities
June 1991	Public notice and release of draft remedial investigation/ feasibility study and proposed plan for public comment
June 1991	EPA letter reminding community of proposed plan public meeting
June 1991	A formal public meeting in accordance with CERCLA Section 117(a)(2) was held on June 25 to discuss the RI/FS and the proposed plan. Approximately 25 community members attended and no public opposition to the plan was voiced. Two written comments were submitted at the meeting; the state and PRPs were the only other commentors during the public comment period.

The administrative record file has been established at EPA's Region 9 office in San Francisco and at the City of Turlock library. Responses to official public comment are presented in the Response Summary attached as Appendix A to this ROD.

Section 4.0
SCOPE AND ROLE OF RESPONSE ACTIONS

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SCOPE AND ROLE OF RESPONSE ACTIONS

The selected response actions address contamination in soil and groundwater caused by operations at the VWP site. The response actions will be performed to meet the final site treatment standards listed in Table 4-1. These levels are based on Applicable or Relevant and Appropriate Requirements (ARARs) and health protection criteria. Table 4-2 presents regulatory standards and guidelines for arsenic and hexavalent (chromium VI) chromium.

Table 4-1
Contaminant Concentrations and Cleanup Standards

Contaminant	Background Levels	Maximum Site Levels	Site Cleanup Standards
SURFACE SOILS	(ppm)	(ppm)	(ppm)
Hexavalent Chromium	<1	30	4[a]
Arsenic	<3	140	2[a]
SUBSURFACE SOILS	(ppm)	(ppm)	Leachate (ppb)
Hexavalent Chromium	<1	68	5 (DLM)[b]
Arsenic	<3	232	5 (DLM)[b]
GROUNDWATER	(ppb)	(ppb)	Treated Water Discharge Limits (ppb)
Hexavalent Chromium	<10	28,000	50 (State MCL)
Arsenic	<14	2,350	16 (HI[c] = 1)

[a]Standard represents a 1×10^{-6} excess risk concentration.
[b]DLM: Designated Level Methodology adopted by the Central Valley Regional Water Quality Control Board (CVRWQCB) for protection of groundwater
[c]HI$\leq$ 1: An HI $\leq$ 1 means that no adverse health effect would be present due to exposure to these concentrations.

Arsenic, copper, hexavalent chromium, and trivalent chromium are contaminants frequently detected in elevated concentrations at the site. EPA's Risk Assessment determined that health risks from trivalent chromium and copper at the site are not significant; therefore, arsenic and hexavalent chromium are the primary contaminants of concern. In significant concentrations, arsenic in all media and hexavalent chromium

Table 4-2
Regulatory Standards and Guidelines for VWP Site Chemicals

Parameter	Site Chemicals	
	Arsenic	Chromium
Maximum Contaminant Level (MCL) (ppb)[a]	50	100 (Total Chromium)
Maximum Contaminant Level Goal (MCLG) (ppb)	50	100 (Total Chromium)
California Maximum Contaminant Level (MCL) (ppb)	50	50 (Total Chromium)
One-Day Acute Health Advisory 10 Kg. Child (ppb)[b]	—	1,000 (Total Chromium)
Longer Term Health Advisory 10 Kg. Child (ppb)[b]	—	200 (Total Chromium)
Lifetime Health Advisory 70 Kg. Adult (ppb)[b]	—	100 (Total Chromium)
Total Threshold Limit Concentration (TTLC) (ppm)[c]	500	500 (Chromium VI)
Soluble Threshold Limit Concentration (STLC) (ppm)[c]	5	5 (Total Chromium)
Soluble Designated Level Methodology (DLM) Concentration (ppb)[d]	5	5 (Chromium VI)

[a] MCLs, MCLGs, and Health Advisories, and SMCLs were extracted from "Region 9 Environmental Protection Agency Drinking Water Standards and Health Advisory Table" by the U.S. EPA Region 9 (Drinking Water and Groundwater Protection Branch, January 1, 1991.)
[b] Standards were extracted from IRIS (Integrated Risk Information System) files for individual chemicals (U.S. EPA, 1990).
[c] Values were obtained from California Administrative Code, Title 22.
[d] Based on the Designated Level Methodology utilized by CVRWQCB in the June 1989 updated Staff Report "The Designated Level Methodology for Waste Classification and Cleanup Level Determination".

in inhaled particulates are known human carcinogens. They are present at the VWP site at concentrations exceeding health standards. The selected remedies presented herein address the documented potential threats from the site. Treatment of the contaminated soil and groundwater will significantly reduce the potential for future exposure to contaminated soil and groundwater.

4.1 SOIL CONTAMINATION

The surface soil (0 to 4 feet in depth) cleanup standards for the site are based on potential health risks from inhalation and direct contact, corresponding to 1×10^{-6} excess cancer risk. They are 4 ppm for hexavalent chromium and 2 ppm for arsenic. The surface soils above these concentrations will be removed and treated, thus reducing excess cancer risk to the 1×10^{-6} level.

The subsurface soil (deeper than 4 feet) cleanup standards for the site are based on protection of groundwater from contaminated leachate from these soils. The cleanup standards are 5 ppb for chromium and 5 ppb for arsenic as measured in the leachate from subsurface soils. These levels are based on the Designated Level Methodology for characterizing wastes in soils adopted by the CVRWQCB in June 1989. Subsurface soils (below 4 feet to the top of the water table) with leachate exceeding these levels will be removed and treated.

4.2 GROUNDWATER CONTAMINATION

The cleanup standard for hexavalent chromium in groundwater for the site is 50 ppb, which corresponds to the California MCL for total chromium in drinking water. The corresponding EPA MCL for total chromium is 100 ppb. The 50 ppb cleanup standard for chromium will reduce the corresponding Hazard Index to less than one.

The cleanup standard for arsenic in groundwater for the site is 16 ppb, which is based on potential health risk. Since there are two contaminants, arsenic and hexavalent chromium, that affect the same location in the human body, the arsenic cleanup standard is set at 16 ppb so that the sum of the Hazard Index for all the contaminants does not exceed one.

4.3 PRINCIPAL THREAT

Contaminated groundwater at the site represents the primary risk at the site, and the remedy will seek to return groundwater to its beneficial uses within a reasonable period of time. Soil contamination at the site represents a continuing source of groundwater contamination and represents the principal threat at the site. This principal threat will be addressed by the remedy.

Section 5.0
SUMMARY OF SITE CHARACTERISTICS

Section 5.0
SUMMARY OF SITE CHARACTERISTICS

The contaminants present at and adjacent to the VWP site appear to be related exclusively to the chromate-copper-arsenate solution used in the wood preserving process and include trivalent chromium, hexavalent chromium, copper, and arsenic. Hexavalent chromium and arsenic are known human carcinogens and are considered to be primary contaminants of concern and principal health threats. Trivalent chromium and copper are less toxic than the primary site contaminants, are identified as contaminants of less concern, and are considered low-level threats for which no action is required.

5.1 GROUNDWATER

The predominant metal detected in the unconfined aquifer is hexavalent chromium. Hexavalent chromium is present in groundwater from the western site boundary to approximately 2,000 feet downgradient to the southwest (Figure 5-1). The concentrations of total chromium and hexavalent chromium in the wells sampled are generally equal, indicating there is very little trivalent chromium in the groundwater. Under nonpumping conditions the hexavalent chromium plume appears to be migrating at a rate of approximately 0.21 feet per day; however, the center of the plume has not migrated significantly since 1986. The movement of this plume has decreased since the interim pumping and treating system began operating in June 1990.

Currently, the 50-ppb hexavalent chromium isoconcentration has migrated to within about 200 feet of several domestic wells along Golf Road. As of April 1991, hexavalent chromium had not significantly affected any of these water-producing wells, which supply the residences along Golf Road. However, shallow domestic wells, Segars-3, Segars-5, and Dixon-1, have been replaced by deeper water supply wells as a precaution against future contamination and public exposure.

The concentrations of hexavalent chromium in on-site wells have decreased with time. Currently, the highest concentrations (up to 28,000 ppb) of hexavalent chromium have been detected in Wells GW-5, GW-15B, and GW-26. All of these wells are off-site to the southwest of the former mixing tank area. Hexavalent chromium concentrations in groundwater do not vary significantly with depth in the unconfined aquifer down to 60 feet, although the highest concentrations in some well clusters are at the deepest intervals (50 to 60 ft).

Trivalent chromium and copper are not present at concentrations of concern in groundwater, based on assessment of site risks, as explained in Section 6.0.

Arsenic has been detected in on-site groundwater along the western site boundary (Figure 5-1) up to a maximum concentration of 2,350 ppb. There is no significant

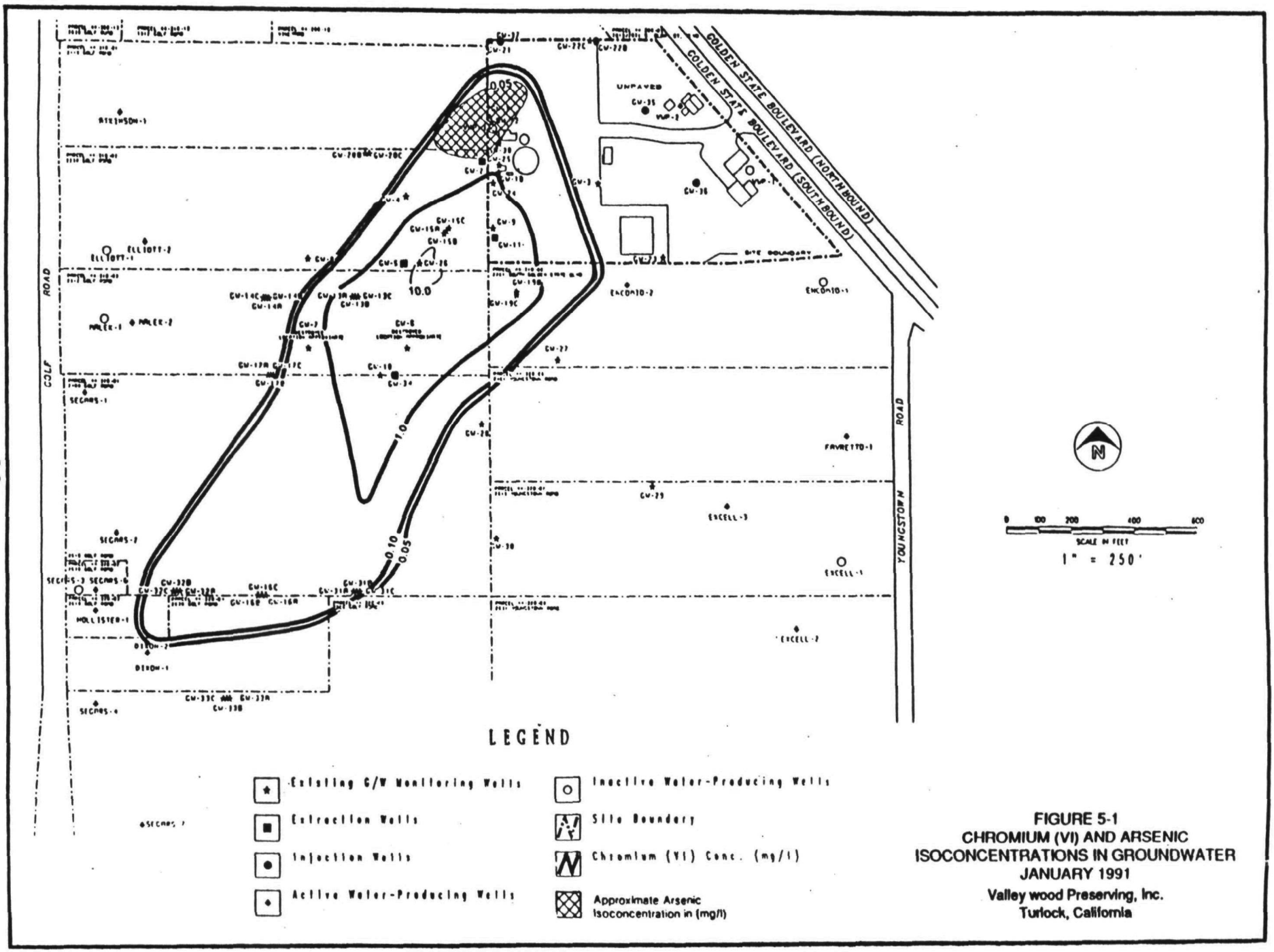

FIGURE 5-1
CHROMIUM (VI) AND ARSENIC
ISOCONCENTRATIONS IN GROUNDWATER
JANUARY 1991
Valley wood Preserving, Inc.
Turlock, California

off-site migration of arsenic from the site, as the arsenic plume extends only about 200 feet west of the VWP property. The arsenic concentrations in groundwater in areas beyond the arsenic plume shown on Figure 5-1 are, in general, less than 20 ppb (near background levels). Also, arsenic concentrations in samples collected from on-site and off-site domestic wells are within the background arsenic concentration range.

Investigations have not been performed in the study area to characterize the groundwater in the unconfined aquifer below 60 feet and in the strata below it. Since the hydraulic gradient between the two aquifers (unconfined and confined) is vertically downward, there is concern over the potential for the vertical migration of hexavalent chromium from the unconfined aquifer to the underlying zones. Additional investigations are underway to assess the water quality of the deeper areas of the unconfined aquifer and of the E-clay layer. The groundwater extraction and treatment system will be expanded to address the lower water-bearing zones if contamination is detected above cleanup levels.

5.2 SOIL

The principal contaminants detected in the surface soil (0 to 4 feet) are hexavalent chromium and arsenic. The approximate areal extent of the surface soil affected by these contaminants is shown on Figure 5-2. Hexavalent chromium is distributed far less widely than total chromium and is generally present at substantially lower concentrations. Thus, most of the chromium detected in soil is in the trivalent form.

The maximum hexavalent chromium contamination detected in the surface soil is 30 ppm at a depth of 0.5 feet in Boring B-7, located near the eastern edge of the northern paved depression. Background concentrations of hexavalent chromium are less than 1 ppm. The on-site shallow soils significantly affected by hexavalent chromium are limited to the area west of the tanks and to the paved depression areas. Soils in off-site areas have not been significantly contaminated with hexavalent chromium.

Arsenic concentrations above the background levels of 0.5 - 3 ppm were detected in surface soil (0 to 4 feet) samples primarily in on-site areas, with the exception of Borings P-1 through P-7 located around the perimeter of the paved wood treatment and storage area and B-55 located just north of the site boundary. The areal distribution of arsenic in surface soil samples is shown on Figure 5-2. As shown on this figure, surface soils contaminated with arsenic are localized primarily around the former mixing tanks and northeast of the site. The maximum arsenic concentration detected in surface soils is 140 ppm at a depth of 0.7 feet in Boring P-2, located in the northern part of the on-site area at the edge of the paved wood-treatment and storage area.

The distribution of hexavalent chromium in subsurface soils (4 feet to water table) was very similar to that in surface soils (Figure 5-3). Sampling results indicate little vertical variation in hexavalent chromium concentrations in soil. The maximum detected concentration of hexavalent chromium in subsurface soil was 68 ppm at a depth of 6.5 feet in Boring S-8, located west of the former mixing tanks.

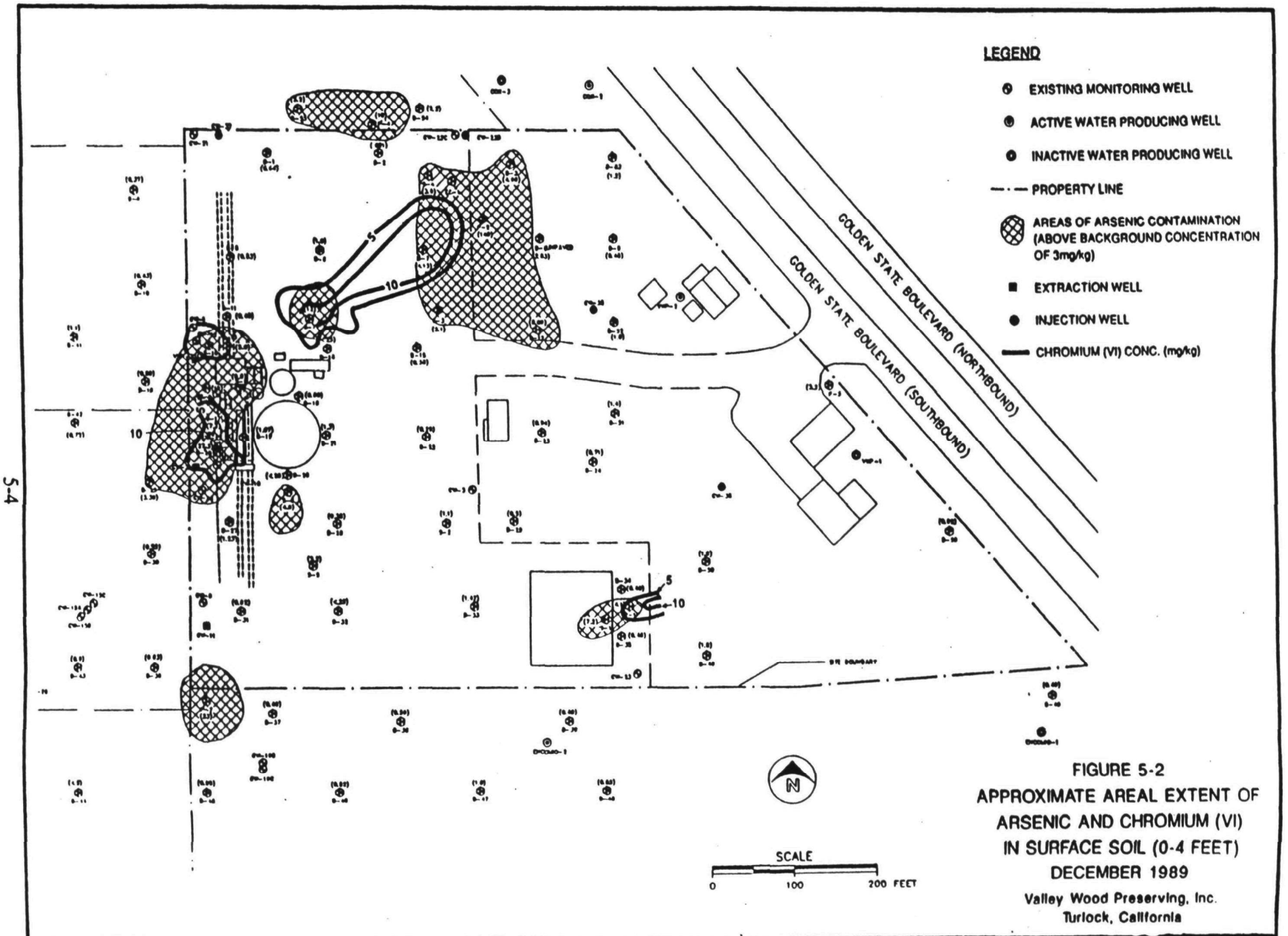

FIGURE 5-2
APPROXIMATE AREAL EXTENT OF ARSENIC AND CHROMIUM (VI) IN SURFACE SOIL (0-4 FEET)
DECEMBER 1989
Valley Wood Preserving, Inc.
Turlock, California

SFO31594.RP

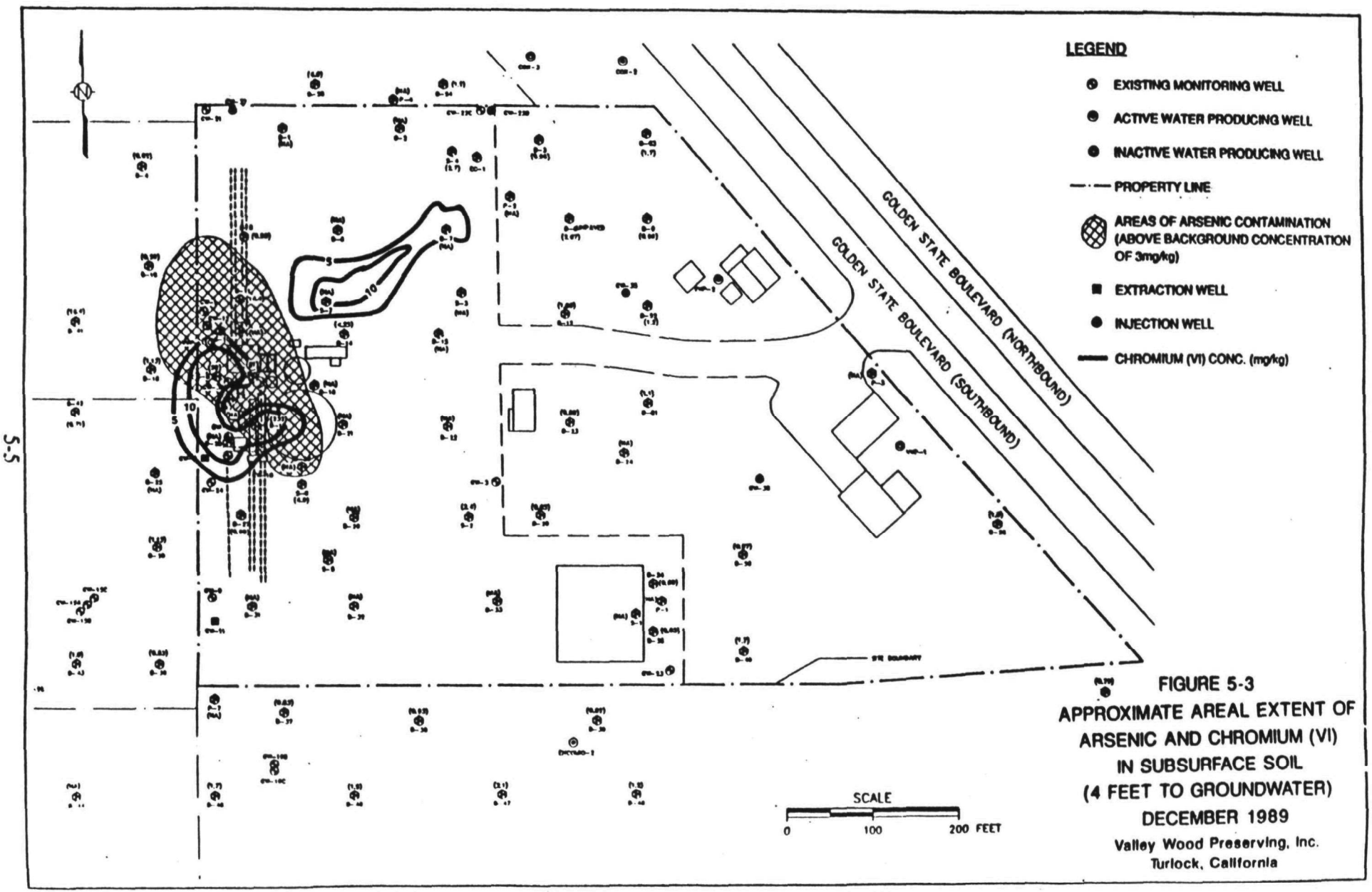

FIGURE 5-3
APPROXIMATE AREAL EXTENT OF ARSENIC AND CHROMIUM (VI) IN SUBSURFACE SOIL (4 FEET TO GROUNDWATER) DECEMBER 1989
Valley Wood Preserving, Inc.
Turlock, California

SFO31594.RP

Elevated arsenic concentrations in subsurface soils occur only in the vicinity of the wood preserving areas near the western on-site boundary, as shown on Figure 5-3. The maximum arsenic concentration detected was 232 ppm at a depth of 6.5 feet in Boring B-19 located in this area.

Copper was detected above background concentrations of 7 ppm in subsurface soils in the same area reported for hexavalent chromium and in soils around the perimeter of the paved area on-site. The maximum copper concentration detected was 845 ppm at a depth of 6.5 feet in Boring B-19, located between the former locations of the two southern retorts.

5.3 CONCLUSION

Chromium and arsenic concentrations exceeding federal and state drinking water standards occur in the contaminated area of the unconfined aquifer down to at least 60 feet below the surface and extend to approximately 2,000 feet downgradient of the VWP boundary. The groundwater cleanup standard for chromium corresponds to the California MCL of 50 ppb. The cleanup standard of 16 ppb for arsenic corresponds to a Hazard Index of 1. These are concentrations at which no adverse health effects are expected to occur through any exposure pathway. EPA expects that approximately 360,000 gallons of contaminated groundwater will require treatment each day for at least 5 years.

The most seriously contaminated soils are under the paved area on the VWP property. The area with the highest levels of soil contamination consists of nearly one-eighth acre, located on the west side of the 600,000-gallon tank currently being used in the interim groundwater cleanup program. Another area under the northeast corner of the pavement is also significantly contaminated with hexavalent chromium and arsenic. EPA's remedy for soil cleanup will involve excavation and treatment of approximately 15,000 cubic yards of soil contaminated with arsenic and hexavalent chromium. The remedy will reduce these soil contaminant concentrations to those corresponding to potential excess health risk of 1×10^{-6}.

The principal site-related chemicals, the media affected, background concentration levels, and maximum concentration levels detected are presented in Table 4-1. Data used by EPA to develop the feasibility study, to select remedial alternatives, and to develop conclusions and cleanup standards presented in this Record of Decision (ROD) were validated by EPA and considered of acceptable quality for the purposes of the RI/FS.

Section 6.0
SUMMARY OF SITE RISKS

Section 6.0
SUMMARY OF SITE RISKS

EPA prepared an endangerment assessment to document the potential risks associated with the actual or threatened releases of hazardous substances from the VWP site. This section summarizes the information found in the following two documents:

(1) U.S. Environmental Protection Agency, February 4, 1991. Risk Assessment, Valley Wood Preserving Site, Turlock, California. EPA WA C09030 (prepared by PRC Environmental Management, Inc.).

(2) U.S. Environmental Protection Agency, November 21, 1990. Preliminary Ecological Risk Assessment, Valley Wood Preserving Site, Turlock, California. EPA WA C09030 (prepared by Versar, Inc.).

6.1 HEALTH RISKS

VWP used a solution of chromate-copper-arsenate (CCA) in day-to-day operations. These were also the compounds detected most frequently and at the greatest concentrations in on-site and/or off-site soils and groundwater. Of these, hexavalent chromium in groundwater was the only contaminant linked to the site that was identified as a contaminant of concern under current land use conditions. Contaminants of concern under future land use conditions include hexavalent chromium and arsenic. Copper was not chosen as a chemical of concern primarily because of its low mobility and low human toxicity. Arsenic and hexavalent chromium were selected because of their relatively high human toxicity, the significant concentrations detected, and detection frequency in soil and groundwater.

Hexavalent chromium was identified in the toxicity assessment as a probable human carcinogen only via inhalation, whereas arsenic is considered carcinogenic by all routes of exposure. Arsenic and hexavalent chromium are capable of causing acute and chronic noncarcinogenic health effects in humans at sufficient exposure levels.

The VWP site is bordered by residences and agricultural lands, and from land use development patterns, it was assumed in the risk assessment that both actual and potential uses for the site are residential. It was also assumed that under current conditions it is unlikely that exposure to heavily contaminated surface soils on-site will occur, since most contaminated soil is overlain by asphaltic pavement. However, future residential and/or industrial development will likely occur, which may require soil excavation to a depth of 10 feet; therefore, exposure to contaminated soils may occur. Potential pathways of contaminant migration from the site to the surrounding area include air (windblown dust) and groundwater.

A number of exposure scenarios identifying exposures associated with current potential and future potential land use conditions were developed. Under current potential land use conditions, the exposures with the highest probability of occurring are residential exposures associated with (1) ingestion of groundwater, (2) dermal contact with groundwater, (3) ingestion of on-site soils, (4) dermal contact with on-site soils, and (5) inhalation of suspended particulates on- and off-site.

To assess carcinogenic risks, the following slope factors (mg/kg-day) were used:

Arsenic (inhalation):	1.5×10^{1}	(Source: IRIS)
Arsenic (oral):	1.8×10^{1}	(Source: IRIS)
Chromium VI (inhalation):	4.1×10^{1}	(Source: IRIS)

To assess noncarcinogenic effects, the following reference dose values (RfD; mg/kg-day) were used:

Arsenic (oral; dermal):	1.0×10^{-2}	(Source: HEAST)
Chromium VI:	5×10^{-3}	(Source: IRIS)
Chromium VI (oral):	2×10^{-2}	(Source: IRIS)
Chromium VI (dermal):	1×10^{-4}	(Source: IRIS)

Assumptions used for soil exposure assessment included an exposure frequency of 365 days per year, ingestion rate of 100 mg per day (adult) and 200 mg per day (child), an exposure duration (noncarcinogenic effects) of 30 years (adult) and 6 years (child), and a lifetime exposure (for carcinogenic effects) of 70 years. Assumptions used to assess groundwater exposure included ingestion of 2 liters of water per day (adult) and 1 liter of water per day (child) for the same exposure duration and frequency used for soil exposure assessment.

Based on the risk assessment, it was concluded that under actual current land use conditions, adverse health effects are unlikely. However, as levels of hexavalent chromium have increased over time in the shallow wells downgradient from the site and are expected to increase for an unknown time in the absence of remedial action, ingestion of well water downgradient from the site is expected to pose a significant hazard in the near future. Based on this scenario, Table 6-1 presents potential health risks under baseline (current land use, no remedial alternative) conditions. Using simulated data, based on solute transport analytical modeling, generated for the Dixon-1 well, Hazard Indices (HI) of 4 and 8 were estimated for children and adults, respectively. These values exceed the benchmark value of 1 and therefore warrant public health concern. It should be noted that under current land use conditions, arsenic will not move to domestic wells.

Potential risks to residents under future land use conditions were estimated both for an average exposure scenario and a reasonable maximum exposure (RME) scenario. Under a RME scenario, a resident is assumed to build a home on-site above a soil hot spot and to draw water from the arsenic-contaminated wells. For the off-site resident,

Table 6-1
Summary of Results of the Health Risks by Exposure Pathways
Current Land Use--Potential Risks at the VWP Site and Vicinity

Residential Population	Exposure Pathway	Chemical	Average Exposure		Reasonable Maximum Exposure	
			Cancer Risk	Hazard Quotient	Cancer Risk	Hazard Quotient
Adult	Ingestion of Groundwater from Dixon Well	chromium (VI)	NC	7.2×10^{0}	NC	7.2×10^{0}
	Dermal Contact with Contaminants in Groundwater at Dixon Well	chromium (VI)	NC	3.3×10^{-1}	NC	5.5×10^{-1}
TOTAL RISKS ACROSS PATHWAYS			NC	8×10^{0}	NC	8×10^{0}
Child	Ingestion of Groundwater at Dixon Well	chromium (VI)	NC	3.9×10^{0}	NC	3.9×10^{0}
	Dermal Contact with Contaminants in Groundwater at Dixon Well	chromium (VI)	NC	1.6×10^{-1}	NC	2.7×10^{-1}
TOTAL RISKS ACROSS PATHWAYS			NC	4×10^{0}	NC	4×10^{0}

Note:
NC = Noncarcinogenic

was assumed that a home is built south (downwind) of the soil hot spot and is exposed to both contaminated water and dust released from the site.

Table 6-2 presents a summation of risks across pathways for on-site residents under future land use conditions. The cancer risk associated with this exposure point, combining exposures via ingestion, dermal contact, and inhalation, is a 1 in 100 excess risk in adults and a 6 in 1,000 excess risk for children, based on an RME estimate. The most significant potential cancer risks for on-site residents under this condition result from exposure to high arsenic concentrations in the groundwater. Ingestion of and dermal contact with groundwater at the arsenic-contaminated wells result in an average excess cancer risk of 9 in 10,000 and an RME cancer risk of 1 in 100 for adults. For children, ingestion of groundwater results in an average excess cancer risk of 1 in 1,000 and an RME cancer risk of 5 in 1,000. Hazard Indices for average and RME estimates of noncarcinogenic toxicity also far exceed the benchmark of 1 (30 and 40 for total RME risk across pathways for adults and children, respectively).

Table 6-3 presents a summation of risks across pathways for off-site residents under future land use conditions. According to these estimates, carcinogenic health effects exceed the benchmark values (1×10^{-6}) for the RME scenarios but not the average scenarios. Hazard Indices, as estimates of noncarcinogenic toxicity, exceed the benchmark value of 1 for both RME and average scenarios (50 and 2 for total RME risk across pathways for adults and children, respectively). The pathway of greatest concern for noncarcinogenic hazard is ingestion of groundwater, whereas the pathway of greatest concern for carcinogenic risks is inhalation of respirable particulates. Hexavalent chromium is designated a Class A carcinogen via inhalation. Its contribution to the cancer risk via the inhalation pathway is somewhat less than the risk associated with arsenic. For adults and children, the combined cancer risk for an average exposure is less than the one in a million target risk level. However, the combined excess cancer risk for a reasonable maximum exposure is three in one million for children and eight in one million for adults.

6.2 ENVIRONMENTAL RISKS

A preliminary ecological risk assessment was performed to determine (1) if any wetlands exist on or near the VWP site, and (2) if a complete ecological risk assessment is required.

This study concluded that aquatic communities are unlikely to be affected by contaminants originating from the VWP site. It was determined that there are no wetlands or watercourses either on or in the immediate vicinity of the site. Contaminated groundwater underlying the site and adjacent areas does not discharge to a nearby surface watercourse. Also, there are no known aquatic endangered or threatened species affected by contaminants originating from the site. The California Department of Fish and Game's natural diversity data base did not indicate the occurrence of known endangered or threatened aquatic species in the site vicinity.

Table 6-2
Summary of Results of the Health Risks for Multiple Pathways
Future Land Use--Potential Risks at the VWP Site and Vicinity

ON-SITE RESIDENTS

Population	Exposure Pathway	Average Exposure		Reasonable Maximum Exposure	
		Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Adult Living onsite at the Hot Spot	1. Groundwater Ingestion	9×10^{-4}	$1 \times 10^{+1}$	1×10^{-2}	$3 \times 10^{+1}$
	2. Dermal Contact with Groundwater During Household Use	9×10^{-7}	4×10^{-1}	2×10^{-5}	1×10^{0}
	3. Ingestion of On-site Soil	2×10^{-5}	7×10^{-2}	3×10^{-4}	3×10^{-1}
	4. Dermal Contact with On-site Soil	3×10^{-7}	2×10^{-2}	2×10^{-4}	6×10^{-1}
	5. Inhalation of Dusts	3×10^{-7}	NA	1×10^{-5}	NA
TOTAL RISKS ACROSS PATHWAYS		9×10^{-4}	$1 \times 10^{+1}$	1×10^{-2}	$3 \times 10^{+1}$
Child Living on-site at the Hot Spot	1. Groundwater Ingestion	1×10^{-3}	$1 \times 10^{+1}$	5×10^{-3}	$4 \times 10^{+1}$
	2. Dermal Contact with Groundwater During Household Use	1×10^{-6}	2×10^{-1}	7×10^{-6}	6×10^{-1}
	3. Ingestion of On-site Soil	9×10^{-5}	6×10^{-1}	5×10^{-4}	3×10^{0}
	4. Dermal Contact with On-site Soil	7×10^{-6}	5×10^{-2}	9×10^{-5}	8×10^{-1}
	5. Inhalation of Dusts	9×10^{-7}	NA	8×10^{-6}	NA
TOTAL RISKS ACROSS PATHWAYS		1×10^{-3}	$1 \times 10^{+1}$	6×10^{-3}	$4 \times 10^{+1}$

Note:
NA = Not Available

Table 6-3
Summary of Results of the Health Risks for Multiple Pathways
Future Land Use--Potential Risks at the VWP Site and Vicinity

OFF-SITE RESIDENTS

Population	Exposure Pathway	Average Exposure		Reasonable Maximum Exposure	
		Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Adult (Living 200 meters offsite)	1. Groundwater Ingestion	Not Above Background	$1 \times 10^{+1}$	--	$5 \times 10^{+1}$
	2. Dermal Contact with Groundwater During Household Use	--	6×10^{-1}	--	4×10^{0}
	3. Inhalation of Fugitive Dusts	3×10^{-7}	NA	3×10^{-6}	NA
	TOTAL RISKS ACROSS PATHWAYS	3×10^{-7}	$1 \times 10^{+1}$	3×10^{-6}	$5 \times 10^{+1}$
Child (Living 200 meters offsite)	1. Groundwater Ingestion	--	8×10^{0}	--	2×10^{0}
	2. Dermal Contact with Groundwater During Household Use	--	3×10^{-1}		
	3. Inhalation of Fugitive Dusts	9×10^{-7}	NA	8×10^{-6}	NA
	TOTAL RISKS ACROSS PATHWAYS	9×10^{-7}	8×10^{0}	8×10^{-6}	2×10^{0}

Note:
NA = Not Available

The study concluded that there are no environmentally sensitive areas affected by site contaminants. Also, it is unlikely that mammals or birds, including known endangered or threatened species, would be affected by site contaminants. The California Department of Fish and Game's natural diversity data base did not indicate the occurrence of known endangered or threatened floral or faunal species in the site vicinity.

Based on the results of the preliminary ecological risk assessment, a detailed ecological risk assessment was not performed.

6.3 CONCLUSION

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response actions selected in the ROD, may present an imminent and substantial endangerment to public health. The current potential risk level (noncarcinogenic) from off-site groundwater ingestion pertains to a noncarcinogenic risk (HI) of 4 and 8 for children and adults, respectively. Future potential cancer risks for on-site residents are estimated to be as high as 1×10^{-2} for adults and 6×10^{-3} for children and the HI is estimated to be as high as 30 for adults and 40 for children. Future potential cancer risk for off-site residents is estimated to be as high as 3×10^{-6} for adults and 8×10^{-6} for children. The HI is estimated to be as high as 50 for adults and 2 for children. EPA's acceptable excess cancer risk range is 1×10^{-4} to 1×10^{-6}, while that for noncarcinogenic risk pertains to the HI not exceeding 1.

Aquatic life is unlikely to be affected by site contaminants. No environmentally sensitive areas, or mammals or birds are expected to be adversely affected by the contaminants.

Section 7.0
DESCRIPTION OF ALTERNATIVES

Section 7.0
DESCRIPTION OF ALTERNATIVES

The following discussion presents a brief description of soil and groundwater remedial alternatives that have survived the preliminary screening and have been carried through a detailed analysis in the VWP site Feasibility Study (FS) report. Table 7-1 lists the alternatives subject to detailed evaluation in the FS. The soil and groundwater cleanup standards have been described in Section 4.0 of this document.

Table 7-1
List of Alternatives Considered in VWP Site Feasibility Study

Soil
1. No Action
2. Capping
3. In-Situ Flushing, Excavation, Fixation, and On-Site Disposal
4. Excavation, Fixation, and On-Site Disposal
Groundwater
A. No Action
B. In-Situ Chemical Treatment and Hydraulic Control
C1. Groundwater Extraction, Electrochemical Treatment, and Activated Alumina Adsorption
C2. Groundwater Extraction, Chemical Reduction/Precipitation, and Activated Alumina Adsorption

The present worth costs for the remedial alternatives are based on capital and O&M costs, 5 percent discount rate, and the period of performance defined for each alternative. All costs are in January 1991 dollars. To avoid duplication of costs, annual O&M costs pertaining to 30 years of groundwater monitoring, are not included in the costs for soil remedial alternatives, as they are included in the groundwater remedial alternatives costs.

7.1 SOIL REMEDIAL ALTERNATIVES

Alternative 1--No Action

Under this alternative, no remedial activity would occur. At least 15,000 cubic yards of contaminated soils would be left in place and contaminated groundwater would continue to move off-site. Access to the site would continue to be restricted by the existing 6-foot-high perimeter fence. Warning signs would be posted at 100-foot intervals along the fence and at the entrance gate, which would be securely locked. Continued

groundwater monitoring would be required. No risk reduction would result. The alternative would not comply with ARARs or water quality standards. The cost of this alternative, primarily for groundwater monitoring, is discussed under Section 7.2 (Groundwater Remedial Alternatives), Alternative A - No Action, to avoid duplication of costs.

Alternative 2--Capping

This alternative involves capping soils containing above-background concentrations of hexavalent chromium and/or arsenic. The design objective of the cap would be to minimize the infiltration of water through the metal-contaminated soil and prevent exposure of this soil to the atmosphere and to potential receptors. The cap would also be designed to promote runoff and drainage away from the impacted areas. To the extent possible, the existing asphalt- and concrete-paved areas would be repaired and sealed. The unpaved areas underlain by elevated concentrations of hexavalent chromium and arsenic would be graded and paved using an appropriate low permeability paving material. Long-term maintenance would be required to preserve the integrity of the paving. It is estimated that an area of approximately 17,000 square feet (ft^2) would require paving and approximately 41,000 ft^2 would require repair and sealing. The currently unpaved area affected by above-background concentrations of metals is located, for the most part, east of the northern depression. As at least 15,000 cubic yards of contaminated soil would be left in place untreated, long-term cap maintenance, institutional controls, and site (groundwater) monitoring would be required for this alternative to remain protective. This alternative will not meet the groundwater ARARs. Capping is not a fully permanent alternative and it would not reduce toxicity, mobility, or volume through treatment. The capital, annual operation and maintenance (O&M), and present worth costs for this alternative are $78,000, $138,000, and $216,000, respectively, based on 30 years.

Alternative 3--In-Situ Flushing, Excavation, Fixation, and On-site Disposal

Alternative 3 combines the in-situ flushing of soils containing elevated concentrations of hexavalent chromium with the excavation and chemical fixation of arsenic-containing soil. The in-situ soil flushing would be performed in conjunction with groundwater extraction and treatment. The existing asphalt and concrete pavement would be removed in the retort/wood preserving area and in the vicinity of the northern paved depression. Flushing basins would be constructed in each of these two areas. Water would be ponded in the flushing basins to infiltrate through the soil. An effective groundwater extraction system would be installed downgradient of the flushing basins to capture the elutriate. The extracted groundwater would be treated to meet groundwater cleanup standards before reapplication to the flushing basins. Subsequent to achieving the target cleanup goal for hexavalent chromium-contaminated soils, the flushing basins would continue in operation solely as a means of discharging treated groundwater.

Because of arsenic's low leachability, soil flushing is not expected to have a significant mitigating effect on arsenic-contaminated soil. However, the most soluble fractions of arsenic compounds would leach during the initial stages of soil flushing and the concentration of arsenic would decrease thereafter. Cleanup of arsenic-contaminated soil would be performed by excavation and on-site, aboveground chemical fixation. The treated soil could be used as backfill at the site. (Chemical fixation is discussed as a separate remedial alternative under Alternative 4 below.)

The in-situ flushing would involve approximately 8,000 cubic yards of soils containing elevated concentrations of hexavalent chromium. The excavation, fixation, and on-site disposal would involve approximately 9,000 cubic yards of primarily surface soils contaminated with arsenic. The time to achieve cleanup would be approximately 5 years. Treatability studies using site soils would be performed before remedial design. This alternative, if implemented, would meet ARARs and reduce the potential excess cancer risk to 1 x 10^{-6} level. Institutional controls would be put in place to ensure that future land use practices are compatible with the fixed-soil mass. The risk posed by the site would be reassessed at 5-year intervals after cleanup to confirm that this remedy continues to protect public health and the environment. The capital, annual O&M, and present worth costs are $1,232,000, $21,000, and $1,323,000; respectively, based on 5 years of operation to achieve cleanup. Annual O&M costs pertaining to groundwater monitoring are not included in this alternative, as they are already included in the costs for groundwater remedial alternatives.

Alternative 4--Excavation, Fixation, and On-site Disposal

This alternative involves the excavation and chemical fixation of surface soil (0 to 4 feet) containing hexavalent chromium, and arsenic exceeding the 1 x 10^{-6} excess cancer risk. In addition, subsurface soils (from 4 feet below surface to groundwater) above levels considered to be protective of groundwater would be excavated and chemically fixed. The total volume of such soil is estimated at approximately 15,000 cubic yards. The time to achieve cleanup from the beginning of the remedial action would be approximately 9 months.

Excavation would be performed using conventional earthmoving equipment. The excavated soil would be blended with commercially available chemical stabilizing agents (such as Portland Cement) in mixing equipment similar to a concrete batching plant. The fixed-soil matrix would be used to backfill the excavation. The purpose of the treatment is to stabilize the contaminants and prevent mobilization. The stabilized soil mass would eliminate fugitive dust emissions, prevent surface water erosion of contaminated soil, and reduce leachability of contaminants. Treatability studies using site soils will be performed during remedial design. Measures such as covers of clean soil and vegetation or a clay cap would be taken to protect the surface of the fixed-soil mass from physical decomposition. Institutional controls would be put in place to ensure that future land-use practices are compatible with the fixed-soil mass. This alternative, if implemented, would meet ARARs and reduce the potential excess cancer risk to 1 x 10^{-6} level. The risk posed by the site would be reassessed at 5-year intervals to confirm

that this remedy continues to protect public health and the environment. The capital, O&M, and present worth costs for this alternative are $1,853,000, $0, and $1,853,000, respectively, based on less than one year of operation to achieve cleanup. Annual O&M costs primarily for groundwater monitoring are included in the groundwater remedial alternatives costs.

7.2 GROUNDWATER REMEDIAL ALTERNATIVES

Alternative A--No Action

This remedial alternative features a no-action response to groundwater containing hexavalent chromium and arsenic. Under this alternative, the existing interim groundwater cleanup program would be terminated, resulting in uncontrolled migration of the hexavalent chromium and arsenic in the aquifer. The migrating chemicals, particularly hexavalent chromium, could ultimately reach the active domestic water supply wells located hydraulically downgradient of the site. The risks associated with exposure to the chemicals in groundwater would remain unchanged, although decreases in the concentrations of hexavalent chromium and arsenic would be expected at some future time due to natural attenuation and dispersion. Groundwater monitoring would be required during implementation of the no-action response. This alternative would not comply with ARARs. The capital, O&M, and present worth costs for this alternative are $39,000, $77,000, and $1,223,000, respectively, primarily based on 30 years of groundwater monitoring.

Alternative B--In-Situ Treatment and Hydraulic Control

This alternative would involve the in-situ treatment of hexavalent chromium and arsenic-contaminated groundwater using ferrous ions generated by an on-site, aboveground ferrous ion generator. The ferrous ions would be introduced to the aquifer, in solution, via injection wells, infiltration galleries, and/or infiltration ponds. Injection wells would be used in off-site areas, and infiltration ponds would be used on-site. The existing extraction wells, as well as additional extraction wells near the downgradient edge of the plume, would enhance the migration of ferrous ions through the aquifer while hydraulically containing the plume.

Contaminated groundwater would be extracted from the aquifer via an expanded extraction system consisting of approximately six extraction wells at a rate of about 250 gallons per minute (GPM). The contaminated groundwater would be transferred back to the site for electrochemical treatment using the existing ferrous ion generator. Depending on the arsenic content of the treatment system influent, it may be necessary to polish the effluent using activated alumina adsorption. The treated water would be transferred to the 600,000-gallon holding tank where precipitation and settling would occur. The treatment process would generate sludge containing elevated metal concentrations and requiring special handling and disposal at an off-site waste disposal facility in accordance with state and federal regulations. Treated water would be drawn from the holding tank and pumped to a mixing tank where ferrous ions from a second

ferrous ion generator would be added. The ferrous ion-containing solution would be pumped from the mixing tank and delivered to the on-site infiltration ponds and the off-site injection wells. Dissolved hexavalent chromium and arsenic would be immobilized in situ and adsorbed onto the soil matrix. Groundwater treated in situ would be extracted downstream for additional, above-ground treatment using ferrous ions, then recycled through the system.

A bench-scale test was performed at the site to determine the impact of ferrous ions on the in-situ conversion of hexavalent chromium to trivalent chromium. The results of this test demonstrated that in-situ groundwater treatment is feasible and should be further evaluated on a pilot-scale level. Bench-scale tests indicate that this alternative may achieve target cleanup goals established for groundwater. A passage of at least three pore volumes of solution, corresponding to at least three years of pump and treat, is estimated to be required to achieve target cleanup concentrations. Pilot-scale testing will be required to confirm or refine these conclusions and estimates.

Based on bench-scale testing, this alternative will be able to meet ARARs. However, pilot-scale testing will address uncertainties in the ability of this alternative to comply with the groundwater ARARs and cleanup standards within the entire aquifer.

The capital, annual O&M, and present worth costs for this alternative are $254,000, $245,000 ($168,000 for remediation and $77,000 for groundwater monitoring), and $1,895,000, respectively. This is based on 3 years of operation to achieve cleanup, and 30 years of O&M including groundwater monitoring.

Alternative C1--Groundwater Extraction, Electrochemical Treatment, and Activated Alumina Adsorption

This alternative involves the extraction of hexavalent chromium-and-arsenic-containing groundwater, followed by above-ground electrochemical treatment (similar to that currently being used in the interim cleanup program) to remove dissolved hexavalent chromium, followed by activated alumina adsorption to remove residual dissolved arsenic. The groundwater extraction system would consist of the existing interim pump-and-treat system supplemented by additional extraction wells near the leading edge of the plume. A minimum of six extraction wells pumping at a combined rate of about 250 gpm would be needed. It is expected that the removal of at least 5 pore volumes would be required to achieve the target cleanup levels for groundwater (50 ppb for hexavalent chromium and 16 ppb for arsenic), corresponding to a cleanup time of at least 5 years. The time estimate for aquifer cleanup is based on the assumption that desorption of hexavalent chromium is uniform throughout the target zone. This assumption will be verified by evaluating the water quality data during full-scale cleanup operations.

Extracted groundwater would be transferred to the 600,000-gallon holding tank. Ferrous ions from the ferrous ion generator would be injected continuously into the water transfer piping where mixing would occur. The reduction of hexavalent

chromium to its trivalent form would occur in the piping and in the holding tank. The reduced chromium would precipitate out in the holding tank. The electrochemical process should be capable of reducing arsenic concentrations. If required, treated effluent would be transferred to the alumina-adsorption column for secondary treatment to remove residual arsenic. Once treated, the effluent would be discharged to one or more percolation ponds for infiltration and evaporation. Subsurface injection wells could be used as a complementary option for discontinuous or intermittent discharge. The treatment process would generate sludge containing elevated metal concentrations and requiring special handling and disposal at an off-site waste disposal facility in accordance with state and federal regulations.

This alternative will meet all ARARs for the action. Institutional controls to prevent access to the contaminated aquifer would be necessary while the action is being implemented. The area of attainment of cleanup standards is the entire aquifer.

The capital, annual O&M, and present worth costs for this alternative are $177,000, $224,000 ($147,000 for remediation and $77,000 for groundwater monitoring), and $1,997,000, respectively, based on 5 years of operation to achieve cleanup and 30 years of O&M including groundwater monitoring.

Alternative C2--Groundwater Extraction, Chemical Reduction/Precipitation, and Activated Alumina Adsorption

This alternative would involve all of the process steps included in Alternative C1 except that electrochemical treatment would be replaced with chemical reduction/precipitation. During the chemical reduction/precipitation process, a reducing agent would be added to the extracted groundwater to transform hexavalent chromium into its nontoxic trivalent form. The reduction process would take place under highly acidic conditions. The effluent from the reducing process would be transferred to the 600,000-gallon holding tank and given sufficient time for precipitation of trivalent chromium. The effluent would be transferred to the alumina-adsorption column to remove residual arsenic. All other aspects, including cleanup goals, time frame for completion, and effluent and residuals management, would remain the same as those under Alternative C1.

This alternative will meet all ARARs for the action. Institutional controls to prevent access to the contaminated aquifer would be necessary while the action is being implemented. The area of attainment of cleanup standards is the entire aquifer.

The capital, annual O&M, and present worth costs for this alternative are $369,000, $396,000 ($319,000 for remediation and $77,000 for groundwater monitoring), and $2,934,000, respectively. This is based on 5 years of operation to achieve cleanup and 30 years of O&M including groundwater monitoring.

Section 8.0
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 8.0
SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

An evaluation and comparison of the alternatives are presented in this section. The comparison is based on the nine key criteria required under the National Contingency Plan and CERCLA Section 121 for use in evaluation of remedial alternatives by EPA. The nine criteria are as follows:

- Overall protection of human health and the environment
- Compliance with ARARs (see Table 8-1 for ARARs and TBCs evaluated)
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

8.1 ALTERNATIVE COMPARISON FOR SOILS

Table 8-2 presents a comparison of remedial alternatives for soils treatment.

8.2 ALTERNATIVE COMPARISON FOR GROUNDWATER

Table 8-3 presents a comparison of remedial alternatives for groundwater treatment. Note that, except for cost, the evaluations of Alternatives C1 and C2 are identical.

8.3 REMEDY SELECTION RATIONALE

A comparison of alternatives by the nine selection criteria and rationale for site-remedy selection are discussed in this section. The criteria used in selecting each remedy are summarized in Table 8-4.

Table 8-1 Summary of ARARs and TBCs		
Title	**Description**	**Comment**
SAFE DRINKING WATER ACT		
National Primary Drinking Water Standards 40 CFR Part 141.11(b)	Maximum Contaminant Levels (MCLs) establish maximum permissible levels of contaminants in drinking water from a public water system.	ARARs (applicable); Chromium 100 ppb Arsenic 50 ppb
Underground Injection Control Regulations 40 CFR Part 144 to 147	Provides for protection of underground sources of drinking water.	ARARs (relevant and appropriate); A permit is not required for onsite CERCLA response actions, but substantive requirements apply to the disposal of treated groundwater by injection wells.
CLEAN WATER ACT		
Water Quality Criteria U.S. EPA, "Quality Criteria for Water, 1986" (May 1986) plus updates (various dates)	Ambient Water Quality Criteria (AWQC) for surface water based on toxicity to aquatic organisms and public health.	TBCs; This is applicable only to one disposal alternative: discharge to Turlock Irrigation District Channel.
National Pollutant Discharge Elimination System (NPDES) 40 CFR Part 122	Establishes permit requirements for discharge of pollutants from any point source into waters of the United States.	ARARs (applicable); This is applicable only to one disposal alternative: discharge to Turlock Irrigation District Channel.
CALIFORNIA SAFE DRINKING WATER ACT		
Maximum Contaminant Levels (MCLs) 22 CCR, Div. 4, Chapter 15, Sec. 64401 *et seq.*	MCLs are acceptable concentration limits from a "free flowing cold water outlet of the ultimate user."	ARARs (applicable); The state MCL for arsenic is 50 ppb. The state MCL of 50 ppb of chromium was used to identify groundwater cleanup standard at the VWP site.

Continued

Table 8-1 Summary of ARARs and TBCs		
Title	**Description**	**Comment**
PORTER COLOGNE WATER QUALITY ACT		
Water Code, Div. 7, Sec. 13000 *et seq.* 23 CCR, Division 3, Chapter 15 Discharges of Waste to Land	Governs discharges of waste to land, where water quality could be adversely impacted.	ARARs (relevant and appropriate); Contains siting, containment, monitoring, and closure standards. The Designated Level Methodology of the Central Valley RWQCB was used to set subsurface soil cleanup standards for this site. (Chromium = 5 ppb, and arsenic = 5 ppb, both measured in leachate)
Water Quality Control Plans Water Code, Div. 7, Sec. 13000 *et seq.*	Promulgated water quality standards, based on beneficial uses for surface water and groundwater, and on water quality objectives, narrative and numerical, which protect specific beneficial uses.	ARARs (relevant and appropriate); Water Quality Objectives are used to set limits for NPDES discharges and for discharges to land. Applies to all disposal alternatives for groundwater treated at the site.
SOLID WASTE DISPOSAL ACT (RCRA)		
Identification and Listing of Hazardous Waste 40 CFR Part 261	Defines those solid wastes which are subject to regulation as hazardous wastes.	ARARs (applicable); Applies to sludge from treatment process of the selected remedy.
Releases from Solid Waste Management Units 40 CFR, Part 264, Subpart F	Establishes maximum contaminant concentrations that can be released from hazardous waste units.	ARAR (relevant and appropriate); The maximum contaminant concentrations that can be released from hazardous waste units are identical to the MCLs. Applies to the selected remedy for treatment of contaminated soil at the site.
Standards Applicable to Generators of Hazardous Waste 40 CFR Part 262	Establishes standards for generators of hazardous waste.	ARAR (applicable); Applies to the hazardous wastes (sludge) generated by the groundwater treatment process.
Standards Applicable to Transporters of Hazardous Waste 40 CFR Part 263	Establishes standards that apply to persons transporting hazardous waste within the U.S. if the transportation requires a manifest.	ARAR (applicable); Applies to the off-site transport of sludge generated by the groundwater treatment process.
		Continued

Table 8-1
Summary of ARARs and TBCs

Title	Description	Comment
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities 40 CFR Part 264	Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.	ARAR (relevant and appropriate); Applies to the selected remedy for onsite treatment and disposal of hazardous waste.
Standards applicable to land disposal of hazardous waste. 40 CFR Part 268	Disposal of contaminated soil or debris from CERCLA response action or RCRA corrective actions is subject to land disposal prohibiting and/or treatment standards.	ARAR (applicable); Applies to onsite and off-site disposal of hazardous waste generated during the remedial actions; specifically the groundwater treatment process sludges and the treated soils.
HAZARDOUS MATERIALS TRANSPORTATION ACT		
49 U.S.C. Sec. 1801-1813	Regulates transportation of hazardous materials.	ARAR (applicable); Applies to off-site transport of sludge generated by groundwater treatment process.
CALIFORNIA HAZARDOUS WASTE CONTROL LAWS		
Health & Safety Code, Div. 20, Chapter 6.5, Sec. 25100 *et seq.* 22 CCR, Div. 4, Chapter 30, Drv. 66001 *et seq.*	Regulations governing hazardous waste control; management and control of hazardous waste facilities; transportation; laboratories; classification of extremely hazardous, hazardous, and nonhazardous waste. Generator requirements: hauler registration; hazardous waste facility permits; enforcement and inspections.	ARARs (applicable); Applies to management of hazardous wastes from the groundwater treatment process and the on-site treatment of contaminated soil.
STANDARDS FOR SOLID WASTE HANDLING AND DISPOSAL 14 CCR, Div. 7, Chapter 3, Sec. 17020 *et seq.*	Sets the minimum requirements and performance standards for solid waste handling and disposal activities.	ARARs (applicable); Applies to the placement of treated soil on-site.
CRITERIA FOR IDENTIFICATION OF HAZARDOUS AND EXTREMELY HAZARDOUS WASTES-THRESHOLD LIMIT CONCENTRATIONS		
22 CCR, Div. 4, Chapter 30, Art. 11, Sec 6693 *et seq.*	Promulgated criteria to determine if a material is hazardous waste. Includes Soluble Threshold Limit Concentration (STLCs) and Total Threshold Limit Concentrations (TTLCs).	ARARs (applicable); Used to define wastes that are generated as hazardous. Hexavalent Chromium-TTLC = 500 ppm, STLC = 5 ppm; Arsenic-TTLC = 500 ppm, STLC = 5 ppm; Copper-TTLC 2,500 ppm, STLC = 25 ppm.

Continued

Table 8-1 Summary of ARARs and TBCs		
Title	**Description**	**Comment**
CLEAN AIR ACT		
42 U.S.C. Sec. 7401-7642	Regulates air quality, incinerator emissions, excavation.	ARAR (relevant and appropriate); The substantive requirements will be met for Air Pollution Control District rules for excavation in the selected remedy for soil treatment.
CALIFORNIA CLEAN AIR ACT		
Health & Safety Code, Div. 26 Sec. 39000 *et seq.*	Regulates both nonvehicular and vehicular sources of air contaminants in California. Defines relationship of the California Air Resources Board (CARB) and local or regional air pollution control districts (APCD). Establishes ambient air quality standards. Establishes permit procedures.	ARARs (relevant and appropriate); The Stanislaus County APCD will set allowable discharge limits for discharges associated with the selected remedies, particularly emissions of particulate matter during soil excavation.
FEDERAL OCCUPATIONAL SAFETY AND HEALTH ACT		
29 U.S.C. Sec. 651-678	Regulates worker health and safety.	ARARs (applicable); Requirements of the Act apply to all remedial alternatives.
CALIFORNIA OCCUPATIONAL HEALTH AND SAFETY ACT		
Labor Code, Div. 5, Sec. 6300 *et seq.*	Regulations to assure safe and healthy working conditions by authorizing the enforcement of standards and procedures.	ARARs (applicable); Worker safety at the site is regulated by Cal-OSHA and federal OSHA for all remedial alternatives.

Table 8-2
Comparative Analysis of Soil Alternatives

Alternative 1	Alternative 2	Alternative 3	Alternative 4
1. Overall Protection of Human Health and the Environment			
No action would not address remedial action objectives. Continued releases of contaminants would occur in exceedence of health and environmental standards. It would not be protective of public health or the environment.	Capping would reduce direct contact and surface water runoff risk. Some reduction in groundwater mobility would be achieved, but the action would not be totally protective of groundwater.	Site conditions may limit the feasibility of this alternative as in-situ flushing may not be fully effective. Overall protection of human health and environment is uncertain as the action may not be totally protective of groundwater.	Fixation of contaminated soils would be protective through reduction of mobility. Direct contact and inhalation risk would be reduced, and groundwater would be protected.
2. Compliance with ARARs			
The No Action Alternative would not comply with federal or state health and environmental protection standards.	A cap could be constructed to address ARAR standards. A cap could meet surface water protection ARARs. A cap would not allow compliance with groundwater ARARs (MCLs).	This alternative will comply with all ARARs unless site conditions limit the feasibility of in-situ flushing to achieve groundwater cleanup standards.	This alternative will comply with ARARs.
3. Long-Term Effectiveness and Permanence			
No action would offer no long-term effectiveness. Site risks would remain indefinitely.	Contaminated soils would be left onsite. Less long-term effectiveness because this alternative does not destroy/remove contaminants.	In-Situ flushing may not be fully effective for groundwater protection. Treatability studies are required to demonstrate effectiveness. Long-term effectiveness is uncertain.	This alternative will be effective because fixated soils will either meet leaching criteria or be placed in lined cells. Institutional controls must be maintained.

Continued

Table 8-2
Comparative Analysis of Soil Alternatives

Alternative 1	Alternative 2	Alternative 3	Alternative 4
4. Reduction of Toxicity, Mobility, or Volume through Treatment			
Would not reduce toxicity, mobility, or volume of metals contaminated soil. Alternative does not include treatment.	Capping would reduce surface water runoff potential and air dispersion. Some reduction in groundwater mobility possible. No reduction in toxicity or volume would be achieved. Alternative does not include treatment.	Would directly reduce the volume of hexavalent chromium in soil. Toxicity of hexavalent chromium reduced by transformation to trivalent form. Leachability, mobility, and exposure potential for arsenic may be reduced. Volume of soil would increase due to addition of fixing agents.	Fixation would eliminate leachability and mobility of hexavalent chromium and arsenic in soil. No reduction in toxicity, but exposure potential would be reduced. Volume of soil would increase due to addition of fixing agents.
5. Short-Term Effectiveness			
Not applicable. The alternative does not involve an action.	Capping would pose least risk to workers and community during implementation. Minimal amounts of contaminants would be handled.	Could be performed to be protective of workers and community. Greater potential for worker and community exposure due to increased material handling.	Excavation and fixation could be performed to be protective of workers and community. Greater potential for worker and community exposure due to increased material handling.
6. Implementability			
Not applicable. The alternative does not involve an action.	Readily implementable. Equipment and services readily available.	Mostly implementable. Soil flushing not expected to encounter any insurmountable physical or technical difficulties, though vertical plume capture is uncertain. Soil excavation and fixation available through several companies.	Implementable. Soil excavation and fixation available through several companies.

Continued

Table 8-2
Comparative Analysis of Soil Alternatives

Alternative 1	Alternative 2	Alternative 3	Alternative 4
7. Cost*			
Capital: Primarily Annual O&M: groundwater Present Worth: monitoring costs, presented in Table 8-3, Alternative A.	Capital: $78,000 Annual O&M: $138,000 Present Worth: $216,000	Capital: $1,232,000 Annual O&M: $21,000 Present Worth: $1,323,000	Capital: $1,853,000 Annual O&M: $0 Present Worth: $1,853,000
8. State Acceptance			
Not acceptable	Not acceptable as final action. The state prefers treatment.	Not acceptable until effectiveness of in situ flushing is proven.	Acceptable.
9. Community Acceptance			
Not acceptable.	Not acceptable.	Not acceptable until effectiveness of in situ flushing is proven.	Acceptable.

*All costs are presented in January 1991 dollars. Discount rate of 5 percent was used in present worth calculations. Period of performance (number of years of operation) used in present worth calculations is stated separately for each alternative in Section 7.0. Annual O&M costs for 30 years of groundwater monitoring are included in the groundwater remedial alternatives costs.

Table 8-3
Comparative Analysis of Groundwater Alternatives

Alternative A	Alternative B	Alternative C1 and C2
1. Overall Protection of Human Health and Environment		
Not protective of public health or the environment. No action would allow continued migration of contaminants downgradient. Groundwater concentrations exceeding health standards would exist indefinitely.	Protection of public health and the environment is uncertain as effectiveness of in situ chemical treatment is uncertain at this time. This action may not be totally protective of public health as insufficient data exist to demonstrate the effectiveness of this technology. Treatability studies are required.	Protective of public health and the environment. Extraction would contain the plume. Potential excess risk associated with arsenic and hexavalent chromium-containing groundwater reduced to acceptable levels through either type of treatment.
2. Compliance with ARARs		
Would not comply with ARARs.	Pilot-scale testing needed to demonstrate the ability of this alternative to achieve full compliance with ARARs for groundwater.	This alternative will comply with ARARs.
3. Long-Term Effectiveness and Permanence		
Would not be effective in the long term. Potential excess risk associated with ingestion and dermal contact with hexavalent chromium and arsenic containing groundwater would remain.	Long-term effectiveness is uncertain as this technology is still in experimental phases and insufficient data exist to demonstrate its effectiveness.	Potential excess risk reduced over period of time (minimum of 5 years) to acceptable levels. Effective and permanent in the long term. Extraction and treatment of groundwater would prevent the migration of dissolved constituents to potential offsite receptors and indirectly contain hexavalent chromium and arsenic leached from soil.
4. Reduction of Toxicity, Mobility, or Volume through Treatment		
No reduction in either toxicity of mobility of contaminants. Volume of hexavalent chromium and/or arsenic containing groundwater would increase due to dispersion. Alternative does not include treatment.	Hexavalent chromium and arsenic concentrations in groundwater would decrease. Toxicity and volume of water would decrease correspondingly. Mobility limited by hydraulic control.	Hexavalent chromium and arsenic concentrations in groundwater would decrease. Toxicity and volume of water would decrease correspondingly. Mobility limited by hydraulic control.

Continued

Table 8-3
Comparative Analysis of Groundwater Alternatives

Alternative A	Alternative B	Alternative C1 and C2
5. Short-Term Effectiveness		
Not applicable. No action is taken.	The extraction and treatment process could be constructed and operated to be protective of human health and the environment. Hydraulic containment could prevent exposure to community during implementation. Overall effectiveness of in situ chemical treatment is unknown.	The extraction and treatment process could be constructed and operated to be protective of human health and the environment.
6. Implementability		
Not applicable. No remedy implemented.	Implementation technically and administratively feasible. Pilot test will be required to demonstrate applicability to site-specific conditions and effectiveness of remedy. Solid wastes containing chromium and arsenic must be handled in accordance with state and federal regulations.	Implementation technically and administratively feasible. Proposed remedial technologies are proven and readily available. Solid wastes containing chromium and arsenic must be handled in accordance with state and federal regulations.
7. Cost*		
Capital: $39,000 Annual O&M: $77,000 Present Worth: $1,223,000	Capital: $254,000 Annual O&M: $245,000 Present Worth: $1,895,000	Alternative C1 Capital: $177,000 Annual O&M: $224,000 Present Worth: $1,997,000 Alternative C2 Capital: $369,000 Annual O&M: $396,000 Present Worth: $2,934,000

Continued

Table 8-3
Comparative Analysis of Groundwater Alternatives

Alternative A	Alternative B	Alternative C1 and C2
8. State Acceptance		
Not acceptable.	Not acceptable until effectiveness of technology is proven for this site.	Alternatives C1 and C2 are acceptable.
9. Community Acceptance		
Not acceptable.	Not acceptable until effectiveness of technology is proven for this site.	Alternatives C1 and C2 are acceptable.

*All costs are presented in January 1991 dollars. Discount rate of 5 percent was used in present worth calculations. Period of performance (number of years of operation and maintenance including groundwater monitoring) used in present worth calculations is stated separately for each alternative in Section 7.0.

Table 8-4
REMEDY SELECTION SUMMARY

Alternative	Selection Assessment
Soil	
Alternative 1: No Action	Not protective Does not comply with ARARs No TMV reduction; no treatment Not acceptable to state or community
Alternative 2: Capping	Not protective of groundwater Does not comply with groundwater ARARs No long-term effectiveness Some reduction in mobility; no reduction in toxicity and volume; no treatment Least cost Not acceptable to state or community
Alternative 3: In-Situ Flushing, Excavation, Fixation, and On-Site Disposal	May not be totally protective of groundwater May not achieve full compliance with groundwater ARARs Long-term effectiveness uncertain Reduction in toxicity and mobility; increase in volume Lower cost than Excavation, Fixation, and On-site Disposal Not acceptable to state or community unless its effectiveness is proven
Alternative 4: Excavation, Fixation, and On-Site Disposal	Protective Complies with ARARs Provides long-term effectiveness with institutional controls Reduces mobility; increase in soil volume Highest cost Acceptable to state and community
Groundwater	
Alternative A: No Action	Not protective Does not comply with ARARs No TMV reduction; no treatment Not effective Not acceptable to state or community
Alternative B: In-Situ Chemical Treatment and Hydraulic Control	May not be fully protective (pilot testing needed to prove full protectiveness) May not fully comply with groundwater ARARs (pilot testing needed to eliminate uncertainty) Long-term effectiveness uncertain Reduction in TMV Pilot test required before full-scale implementation Least cost among treatment alternatives Not acceptable to state or community unless site-specific technology effectiveness is proven

Continued

Table 8-4 REMEDY SELECTION SUMMARY	
Alternative	**Selection Assessment**
Alternative C1: Groundwater Extraction, Electrochemical Treatment, and Activated Alumina Adsorption	Protective Complies with ARARs Effective and permanent in long term Significant TMV reduction Medium cost Acceptable to state and the community
Alternative C2: Groundwater Extraction, Chemical Reduction/ Precipitation, and Activated Alumina Adsorption	Protective Complies with ARARs Effective and permanent in long term Significant TMV reduction Highest cost Acceptable to state and community

8.3.1 SOIL

Alternatives Assessed

1. No Action (No Action)
2. Capping (Capping)
3. In-Situ Flushing, Excavation, Fixation, and On-Site Disposal (Flushing)
4. Excavation, Fixation, and On-Site Disposal (Fixation)

Criteria Assessment

Overall Protection of Human Health and the Environment. No Action would not be protective of human health or the environment; continued releases of site contaminants into the environment would occur. Capping would prevent direct contact and inhalation and reduce surface water runoff risk; but it would only be partially protective of groundwater and would leave groundwater and soil contamination on-site. Flushing may not be totally protective of groundwater, as site conditions may limit the feasibility of this alternative. Fixation would be protective of human health and the environment.

Compliance with ARARs. No Action would not comply with federal and state ARARs. Capping of soils would not address groundwater protection ARARs. Flushing may not achieve full compliance with groundwater ARARs. Fixation would achieve full compliance with the ARARs.

Long-Term Effectiveness and Permanence. No Action would not offer any long-term effectiveness. Capping could remain effective for preventing surface exposure as long as the cap were maintained. Capping would not provide long-term protection of groundwater. Long-term effectiveness for Flushing is uncertain, as it may not be fully effective for groundwater protection. Long-term effectiveness for Fixation would be dependent on the long-term maintenance and monitoring of the fixed-soil mass and liner system used to control leachate. If implemented properly and institutional controls are maintained, Fixation is expected to provide long-term effectiveness.

Reduction of Toxicity, Mobility, or Volume (TMV) through Treatment. No Action would not achieve a TMV reduction. Capping would reduce surface mobility but very little groundwater mobility. Flushing would reduce toxicity and mobility but would increase volume of treated soil. Fixation would reduce mobility through treatment and containment. No reduction in toxicity would occur and volume of soil would increase due to the addition of fixing agents.

Short-term Effectiveness. All alternatives could be implemented to be protective of workers and the community during remedial action. Capping would pose the least risk during implementation, as minimal amounts of contaminants would be handled.

Implementability. All alternatives are implementable, and equipment and services are readily available.

Cost. No Action would cost $1.223 million, primarily for groundwater monitoring; Capping would cost $216,000; Flushing would cost $1.323 million; and Fixation would cost $1.853 million (present worth costs).

State Acceptance. No Action and Capping would not be acceptable to the state. Flushing would not be acceptable until its effectiveness is proven for the site. Fixation would be the most acceptable alternative.

Community Acceptance. No Action and Capping would not be acceptable to the community. Flushing would not be acceptable until its effectiveness is proven for the site. Fixation would be the most acceptable alternative.

Remedy Selection Rationale

EPA has selected Excavation, Fixation, and On-Site Disposal as the remedy for soils. This alternative best protects human health and the environment and is the only alternative that complies with all ARARs. Even through it is more costly than Flushing, Fixation is more effective and is more acceptable to the state and the community because soil flushing is completely unproven at this site and site conditions may limit its feasibility.

8.3.2 GROUNDWATER

Alternatives Assessed

A. No Action (No Action)

B. In-Situ Chemical Treatment, and Hydraulic Control (In-Situ Treatment)

C1. Groundwater Extraction, Electrochemical Treatment, and Activated Alumina Adsorption (Electrochemical Treatment)

C2. Groundwater Extraction, Chemical Reduction/Precipitation, and Activated Alumina Adsorption (Chemical Reduction)

Criteria Assessment

Overall Protection of Human Health and the Environment. No Action would not be protective of human health or the environment. In-Situ Treatment may not be totally protective of human health, as insufficient data exist to demonstrate the effectiveness of this technology. Both Electrochemical Treatment and Chemical Reduction would be protective of human health and the environment and would contain the plume.

Compliance with ARARs. No Action would not comply with ARARs. In-Situ Treatment may not fully comply with groundwater ARARs. Both Electrochemical Treatment and Chemical Reduction could be implemented to comply with ARARs.

Long-Term Effectiveness and Performance. No Action would not be effective in the long term. Long-term effectiveness for In-Situ Treatment is uncertain, as this technology is still in experimental phases. Both Electrochemical Treatment and Chemical Reduction would provide long-term effectiveness and performance through extraction, removal, destruction of contaminants, and long-term containment of residuals.

Reduction of Toxicity, Mobility, or Volume through Treatment. No Action would not result in a reduction in TMV through treatment. Reduction in TMV would occur by any of the other three alternatives: In-Situ Treatment, Electrochemical Treatment, or Chemical Reduction.

Short-Term Effectiveness. All action alternatives could be implemented to be protective of workers and the community during implementation.

Implementability. All action alternatives are implementable. However, for In-Situ Treatment, a pilot test to demonstrate applicability to site-specific conditions and effectiveness of remedy will be required before full-scale implementation.

Cost. No Action would cost $1.223 million, primarily for groundwater monitoring. In-Situ Treatment would be the least expensive of all treatment alternatives ($1.895 million). Electrochemical Treatment would cost $1.997 million. Chemical Reduction would be the most costly alternative, $2.934 million (all costs reported as present worth).

State Acceptance. No Action would not be acceptable to the state. In-Situ Treatment would not be acceptable until effectiveness of technology is proven for this site. Both Electrochemical Treatment and Chemical Reduction would be acceptable to the state.

Community Acceptance. No Action would not be acceptable to the community. In-Situ Treatment would not be acceptable until effectiveness of technology is proven for this site. Both Electrochemical Treatment and Chemical Reduction would be acceptable to the community.

Remedy Selection Rationale

EPA has selected Electrochemical Treatment as the remedy for groundwater because it is more protective and effective than No Action or In-Situ Treatment and as protective and effective as Chemical Reduction. However, Electrochemical Treatment is less costly than Chemical Reduction.

Section 9.0
SELECTED REMEDIES

Section 9.0
SELECTED REMEDIES

The following text presents the selected remedies for contaminated soil and groundwater. Both remedies will be performed to address either 1 x 10^{-6} or greater cancer risk level, greater than a Hazard Index of 1 for noncarcinogenic risks or background (nondetect) levels where achievable.

9.1 REMEDY FOR CONTAMINATED SOILS

Remedy Description

For contaminated soils, EPA plans to excavate the soil, fix it with a cement-based compound, and maintain the mixture on-site to prevent future exposure or movement. For this remedy to be implemented, surface soil (0 to 4 feet) containing hexavalent chromium and arsenic at 4 ppm and 2 ppm, respectively, must be excavated and fixed. Subsurface soil (4 feet to groundwater) with leachate concentrations above 5 ppb for chromium and arsenic, respectively, would also be excavated and fixed. Fixed soil exceeding CCR Title 22 TTLC/STLC and Title 23, Chapter 15 criteria would be placed in lined cells. Fixed soil meeting TTLC/STLC and Title 23 criteria would be placed back onto the site.

Excavation will be performed using conventional earthmoving equipment. The excavated soil will be blended with commercially available chemical stabilizing agents (such as Portland Cement) in mixing equipment similar to a concrete batching plant. The agents and the mix ratio will be based on treatability studies performed using site soils. The fixed-soil matrix will be used to backfill the excavation. A liner below the fixed soil would be required for soils containing arsenic greater than 500 ppm, chromium greater than 500 ppm, and copper greater than 2,500 ppm (California Title 22 TTLC criteria). A liner would also be required if leachable arsenic and chromium exceed 5 ppm and copper 25 ppm (California Title 22 STLC criteria). Collection, handling, and disposal of leachate and long-term monitoring are required to comply with State and Federal regulations. Deed restrictions are required for all areas where treated waste has been deposited.

It is estimated that approximately 15,000 cubic yards of contaminated soil will be fixed with this remedy. Remedial objectives are estimated to be achieved in approximately 9 months, if remedial actions are done continuously. Capital and present-worth costs have been estimated at $1,853,000 (January 1991 dollars; see pages 7-1 and 7-4). Annual operation and maintenance costs, primarily for groundwater monitoring for the entire on-site and off-site areas not directly related with fixation, are included in the remedy for contaminated groundwater (Section 9.2).

Remedy Selection Rationale

The selected remedy satisfies the two threshold criteria (overall protection of human health and the environment and compliance with ARARs), provides the best balance of the five balancing criteria (long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost). This alternative uses permanent solutions and an alternative technology or resource recovery to the maximum extent practicable. This alternative, compared with the other remedial alternatives, provides the most overall protection, most fully complies wth ARARs, and has the best long-term effectiveness. It also permanently reduces the mobility of the contaminant. Even though this alternative is associated with the highest cost, it is cost-effective, as it provides the highest level of effectiveness for a reasonable cost. The selected remedy also has the strongest state and community acceptance.

The objectives of the remedy for contaminated soils are to prevent surface-water runoff of contaminated surface soils, to prevent air emissions of contaminated dusts, and to prevent contaminants from leaching into the groundwater, which is a drinking water aquifer at this site. Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, EPA and the State of California believe that the selected remedy will achieve these goals through proper implementation and monitoring of the action. The selected soil remedy will be coupled with groundwater extraction and treatment. The removal and treatment of contaminated soils may significantly reduce the time required for extraction and treatment of groundwater contaminated with inorganic compounds. The point of compliance will be all site soils from the surface to the water table that contain contamination above the cleanup standards.

Periodic groundwater, surface water runoff, and air quality monitoring and sampling of leachate will be required to determine the effectiveness of this remedy and to verify achievement of cleanup levels. Long-term operation and maintenance (O&M) activities for the treated soil mass, institutional and engineering controls, and their cost estimates will also be required for a period of 30 years. Such requirements and a specific monitoring program will be defined more precisely during the Remedial Design/Remedial Action (RD/RA) phase.

Overall protection of human health and the environment was the most important criterion in selecting the soil remedy. The selected remedy was the only alternative which satisfied this threshold criterion.

ARARs

The selected remedy will comply with ARARs. Health-based ARARs pertaining to soil contaminated with inorganic compounds are not available for the site. The soil contamination will therefore be reduced to the health-based standards discussed in

Section 4.0 that eliminate threats to public health and the environment through surface water, groundwater, and air.

Surface soil (0 to 4 feet) will be excavated to 1 x 10^{-6} excess cancer risk level (4 ppm for hexavalent chromium and 2 ppm for arsenic). Subsurface soil (from 4 feet below surface to groundwater) will be excavated to levels that will meet California Regional Water Quality Control Board Designated Level Methodology leachability limits (5 ppb for chromium and arsenic). The soils will be treated to reduce leachability to levels that remain protective of the groundwater resource.

Treated soils will be placed as necessary in treatment cells designed to meet Federal and State land disposal requirements. The treatment technology used will reduce leachability of contaminants to below the RCRA land disposal requirements. Once treated, the soil will no longer be a hazardous waste as long as leachability of the fixed soil meets the treatment standards.

9.2 REMEDY FOR CONTAMINATED GROUNDWATER

Remedy Description

For contaminated groundwater, EPA has selected the remedy involving extraction, electrochemical treatment, activated alumina adsorption, and discharge. Groundwater will be treated to achieve EPA cleanup standards before reuse or discharge from the site. EPA plans to use an electrochemical treatment process, similar to that currently used at the site for groundwater treatment to remove dissolved hexavalent chromium followed by activated alumina adsorption to remove residual dissolved arsenic.

Extracted groundwater would be transferred to a holding tank. Ferrous ions from the ferrous ion generator would be injected continuously into the water transfer piping where mixing would occur. The reduction of hexavalent chromium to its trivalent form would occur in the piping and in the holding tank. The reduced chromium would precipitate out in the holding tank. The effluent from the electrochemical treatment process would then be transferred to an alumina-adsorption column for secondary treatment to remove residual arsenic.

Groundwater treated to health-based standards will be disposed of through one or both of the following means: (1) infiltration and evaporation at one or more percolation ponds, and (2) underground injection through subsurface injection wells. The treatment process will generate sludge containing elevated metal concentrations that will be disposed of at an off-site waste disposal facility in accordance with state and federal regulations. Disposal details will be defined further during the RD phase, and EPA will work closely with all appropriate state and local agencies on this issue before disposal is carried out during RA.

This groundwater alternative will reduce contaminants to the cleanup standards listed in Table 4-1. Chromium in groundwater will be cleaned up to 50 ppb, which is the

California MCL, and arsenic in groundwater will be cleaned up to 16 ppb, corresponding to a Hazard Index of less than 1. Both of these concentration levels correspond to those that will reduce the Hazard Index to less than 1. Point of compliance for the remedy will be the entire aquifer below the site and downgradient, as defined by the arsenic and chromium plumes. Continued definition of the plume extent and compliance with the groundwater standards will be demonstrated through a network of monitoring wells. The remedy will treat all contaminants to their treatment standards.

Groundwater extraction and treatment is estimated to be at a rate of approximately 250 gallons per minute, corresponding to about 360,000 gallons per day. It is uncertain how long it will take to achieve the remedial objectives; however, is estimated to take at least 5 years. Capital costs have been approximated at $177,000. Annual operation and maintenance costs are estimated at $224,000 ($147,000 for remediation and $77,000 for groundwater monitoring). The present worth of this remedy is estimated at $1,997,000, based on a discount rate of 5 percent and period of operation of 5 years and groundwater monitoring for 30 years. All costs reported are in January 1991 dollars.

At the time of development of this ROD, the existing groundwater treatment plant does not have the activated alumina-adsorption column, has not run in a continuous mode, has not been tested at design capacity, and the effectiveness of the facility in removal of metals has not been fully demonstrated. EPA will allow one year from initiation of Remedial Design to modify the facility and treatment scheme to achieve the standards presented in Table 4-1. Facility performance requirements will be specified in the Scope of Work.

Remedy Selection Rationale

The selected remedy provides the best balance of the two threshold criteria and the five balancing criteria. This alternative uses permanent solutions and alternative technologies to the maximum extent practicable. The in-situ chemical treatment alternative is not considered to be fully protective and complying with groundwater ARARs because of the uncertainty associated with its long-term effectiveness. The remaining two groundwater extraction and treatment alternatives are very similar in all evaluation criteria, except for cost. The selected remedy is more cost-effective than the alternative involving chemical reduction. The selected alternative provides the best long-term and short-term effectiveness; permanently and significantly reduces the toxicity, mobility, and volume of hazardous substances through treatment; and can be implemented at the site at substantially lower cost than the treatment alternative involving chemical reduction/precipitation. The selected remedy employs treatment as a principal element that significantly and permanently reduces toxicity, mobility, or volume of the hazardous substances. It is protective of public health and the environment, complies with federal and state ARARs, and is cost-effective.

The objective of this remedial alternative is to restore groundwater to its beneficial use, as a drinking water source for this site and vicinity. Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, EPA and the State of California believe that the standards required by the selected remedy will achieve this objective. The selected remedy will require contaminated soil removal and treatment to achieve this objective in a timely manner. The selected remedy is expected to take at least 5 years to accomplish. The system will be adjusted as warranted by the performance data collected during its operation.

Periodic groundwater monitoring will be required to determine the effectiveness of the remedy and to verify achievement of the cleanup standards. Long-term O&M activities, institutional and engineering controls, and their costs will be required. Such requirements and a specific monitoring program will be defined precisely as the Scope of Work is developed.

ARARs

This alternative will comply with federal and state applicable or relevant and appropriate requirements.

The groundwater remediation and treatment standards selected for the groundwater remedy are presented in Table 4-1. These standards were selected by the process described below. In accordance with Section 300.430(e) of the NCP, federal MCLGs, where promulgated, were initially selected as the treatment standards. In the event that the MCLG has been set at a level of zero, then the federal MCLs, where promulgated, or the 1×10^{-6} risk or Hazard Index of 1 was selected. In the event that a more stringent MCL has been promulgated by the State of California, then the state MCL was selected as the treatment standard. The selected remedy will achieve the treatment standard in the entire aquifer below the site and vicinity and in the effluent discharged from the treatment unit.

For hexavalent chromium, the treatment standard of 50 ppb represents the California MCL. It also represents the level at which the Hazard Index is reduced to less than 1. For arsenic, the treatment standard of 16 ppb represents the level at which the Hazard Index is reduced to less than 1. This level was selected instead of the MCL as it (16 ppb) is more protective. These contaminants were detected in groundwater at levels exceeding their treatment standards.

The treatment technology used in the selected remedy will treat contaminated groundwater to nonhazardous waste levels, and the groundwater will no longer be subject to regulation under Subtitle C of RCRA.

9.3 CONCLUSION

Both remedies identified in this ROD will reduce the residual risk for each contaminant in soil and groundwater at the site to less than 1×10^{-6} risk or a Hazard Index less than 1. The remedies, mentioned in the preceding sections, may need to be modified as a result of the remedial design and construction process. The changes may reflect alterations made during the remedial design phase and will be performed so that standards stated in Table 4-1 will be met and the remedies will remain protective and effective.

Section 10.0
STATUTORY DETERMINATIONS

Section 10.0
STATUTORY DETERMINATIONS

The selected remedies satisfy the two threshold criteria and provide the best balance of the five balancing criteria.

The selected remedies are protective of human health and the environment as required by Section 121 of CERCLA. Existing or potential risks from exposure to soils and groundwater will be eliminated, reduced, and controlled by treating contamination, stabilizing contamination, and containing contaminants. Remedial objectives will reduce excess cancer risks to 10^{-6} when possible (if background levels of chemicals do not exceed this risk level), which is within the 10^{-4} to 10^{-6} risk range. Risks from noncarcinogens will be reduced to Hazard Indices of less than one. All contaminants of concern will be addressed by the proposed remedies. During the implementation of the remedies, engineering controls such as dust control measures will be employed to ensure against unacceptable short-term risks or cross-media impacts.

The remedies selected will comply with ARARs. The remedies selected will meet Safe Drinking Water Act MCLs and the California DTSC Applied Action Levels for drinking water for contaminants of concern.

The remedies for contaminated soil will comply with Federal and State Land Disposal Restrictions. Concentrations of contaminants within leachate generated from the waste will be handled in compliance with with 40 CFR 268 and CCR Title 23, Division 3, Chapter 15. The treatment technology used will reduce leachability of contaminants to below the RCRA land disposal requirements. Once treated, the soil will no longer be a hazardous waste as long as leachability of the fixed soil meets the treatment standards.

The remedy for groundwater will comply with the state's well installation regulations, water treatment facility siting and operation regulations, and worker protection regulations.

The discharge of treated effluent will comply with ARARs and TCBs, as described more fully in Section 9.0.

During implementation of the remedies, the substantive requirements of the Stanislaus County Air Pollution Control District will be met.

The aforementioned protectiveness and compliance with environmental requirements will be achieved cost effectively. The alternatives chosen are the cost-effective approaches available to achieve the necessary degree of protectiveness.

The selected remedies use permanent solutions and alternative technologies to the maximum extent possible and satisfy the statutory preference for remedies that employ as a principal element treatment that reduces toxicity, mobility, or volume.

The cleanup standards defined in this ROD are subject to reevaluation with respect to effectiveness in protecting human health and the environment at the 5-year review period.

10.1 CONTAMINATED SOILS

The proposed remedy, Excavation, Fixation and On-Site Disposal, will be protective through containment of the metals in the fixed-soil mass. This alternative will involve treatment to reduce mobility. Toxicity and volume will not be reduced. Short-term effectiveness will be maintained through strict environmental controls. The alternative is implementable using standard equipment and materials.

The No Action alternative would not be protective because contaminants would continue to be released into groundwater, surface water runoff, and in airborne dust.

The Capping alternative would be only partially protective of groundwater. Mobility into groundwater would remain a concern.

The In-Situ Flushing alternative may be only partially protective of groundwater, as site conditions may limit the feasibility of this alternative.

10.2 CONTAMINATED GROUNDWATER

The groundwater remedy, Extraction followed by Electrochemical Treatment and Activated Alumina Adsorption, will be a permanent solution because the contaminants will be destroyed or removed from the groundwater. The groundwater remedy is expected to take at least 5 years to achieve treatment standards. Significant reduction in TMV will occur. The alternative is implementable using readily available equipment and materials.

The No Action alternative would not be protective because contaminants would continue to remain in the groundwater.

The In-Situ Chemical Treatment alternative may be only partially protective of human health and the environment, as insufficient data exist to demonstrate the effectiveness of this technology.

The Chemical Reduction/Precipitation alternative offers the same TMV and risk reduction benefits and effectiveness as the selected groundwater remedy. However, it is more expensive than the selected remedy, and therefore not as cost-effective.

Section 11.0
DOCUMENTATION OF SIGNIFICANT CHANGES

Section 11.0
DOCUMENTATION OF SIGNIFICANT CHANGES

Subsurface soil cleanup standards for hexavalent chromium and arsenic at the site have been revised since the issuance of the Proposed Plan. The revised cleanup standards for each of these two chemicals are 5 ppb in leachate for subsurface soils (4 feet to groundwater). These standards are based on recommendations by the California Central Valley Regional Water Quality Control Board (CRWQCB). According to their recommendations, their June 1989 updated staff report "The Designated Level Methodology for Waste Classification and Cleanup Level Determination" was used to calculate the Soluble Designated Levels, thus determining soil cleanup levels on the leachable concentrations, assuming an attenuation factor of 1, due to the presence of hexavalent chromium and arsenic in the groundwater and the limited attenuation of the existing on-site contaminated soils. Thus the revised cleanup standards of 5 ppb of hexavalent chromium and arsenic in leachate for subsurface soils are Soluble Designated Level Methodology concentrations, and are based on CRWQCB guidance on whether a waste poses a threat to beneficial uses of the groundwater.

Appendix A
RESPONSE SUMMARY

RESPONSE SUMMARY

The Proposed Plan for the Valley Wood Preserving (VWP) site was issued to the public on June 17, 1991. This Proposed Plan described EPA's preferred remedial alternatives for contaminated soils and groundwater at the site. During the public comment period, which extended from June 17 through July 17, 1991, EPA briefed concerned citizens and state and local officials on the Proposed Plan at a public meeting (June 25, 1991).

SUMMARY OF COMMENTS RECEIVED

During the public comment period, EPA received comments from two individuals within the local community, from the Central Valley Regional Water Quality Control Board, the California Department of Toxic Substances Control, and from the potentially responsible parties. Comments pertaining to elements of the Proposed Plan and EPA's responses to the comments are summarized below.

A. COMMENTS FROM COMMUNITY MEMBERS

Commentor: Resident of Community No. 1
Date: June 25, 1991

1. Comment:

The commentors raised questions about backfill and fence replacement during off-site excavations.

1. Response:

All soil excavated from off-site areas will be replaced with clean soil and if excavation requires fence removal, the fence will be replaced by Valley Wood Preserving.

2. Comment:

The commentors state that additional extraction wells on their property should be placed so as to protect their livestock.

2. Response:

EPA agrees. EPA will direct VWP, Inc. to conduct all remedial design/remedial action activities associated with the site in a manner that minimizes inconveniences to neighboring residences and is protective of private property, including livestock.

3. Comment:

The commentors state that they prefer reinjection and percolation ponds, rather that irrigation, as disposal options for treated groundwater.

3. Response:

Onsite reinjection and/or percolation ponds are the only disposal options for treated groundwater selected in the Proposed Plan. Turlock Irrigation District has expressed several concerns regarding potential discharge of the treated groundwater from VWP into its system; therefore, EPA would further explore this option only if reinjection/percolation were ineffective.

Commentor: Resident of Community No. 2
Date: June 25, 1991

1. Comment:

The commentor expressed concern about movement of contaminants from VWP in the air and groundwater, and potential adverse health effects.

1. Response:

According to data gathered during the Remedial Investigation/Feasibility Study (RI/FS), the prevailing wind direction at the VWP site during most of the year is to the north-northwest; from December through February, the prevailing wind direction is to the southeast. The commentor's given address, south of VWP, is upwind most of the year and the soils which could pose health threats through blowing dust have been paved since 1976. The groundwater plume is moving to the southwest and appears to be approximately 1,000 feet cross-gradient from the commentor's well; analyses of samples from this well have never detected VWP site contaminants. Therefore, based upon data obtained to date, no adverse health effects are expected to have occurred at this residence from VWP site contaminants through the air or groundwater pathways. The Proposed Plan recommends a site remedy that will prevent potential adverse health effects through these exposure pathways in the future.

B. COMMENTS FROM STATE AGENCIES

Commentor: Antonia K.J. Vorster, Central Valley Regional Water Quality Control Board (CVRWQCB)
Date: August 9, 1991

1. Comment:

The commentor states that Title 23 of the California Code of Regulations (CCR), Chapter 15, is an Applicable or Relevant and Appropriate Requirement (ARAR) for alternatives that leave contaminated soils onsite.

1. Response:

EPA concurs. CCR Title 23, Chapter 15 will be added to the FS and included in the Record of Decision (ROD).

2. Comment:

The CVRWQCB considers the Safe Drinking Water & Toxic Enforcement Act (Proposition 65) to be a site ARAR.

2. Response:

EPA has performed a thorough evaluation of Proposition 65 or the Safe Drinking Water and Toxic Enforcement Act of 1986 (the Act) and the regulations implementing it (CCR Title 22 Section 12000 et. seq.), and has determined that the Act is not an ARAR for this site for the following reasons. CCR Title 22, Section 12701, paragraph (a) clearly allows EPA to use discharge standards other than those presented in the regulation. This paragraph states, "Nothing in this article shall preclude a person from using evidence, standards, risk assessment methodologies, principles, assumptions or levels not described in this article to establish that a level of exposure to a listed chemical poses no significant risk." EPA has performed a risk assessment meeting the requirements of CCR Title 22, Section 12721, and has determined that EPA's standards pose "No Significant Risk" as intended under this regulation.

EPA's identification of an alternative standard is also supported by Proposition 65 Title 22 regulations. Section 12703, paragraph (b) states,

> For chemicals assessed in accordance with this section, the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime

> exposure at the level in question, except where sound considerations of public health support an alternative level, as for example, where a clean-up and resulting discharge ordered and supervised by an appropriate governmental agency or court of competent jurisdiction (emphasis added).

As the lead agency for the VWP site, EPA clearly can select health-based standards using other standards and considerations that are protective of human health and the environment.

EPA has discussed Proposition 65 issues with California Health and Welfare Agency personnel (the Health and Welfare Agency is the administering Agency for Proposition 65) and has been informed that Proposition 65 was not intended to establish clean-up levels or discharge limitations for hazardous waste site remedial actions. They cited CCR Title 22, Article 4 (Discharge), Section 12401 (Discharge of Water Containing a Listed Chemical at Time of Receipt) in making this statement. Section 12401 (b) states:

> Whenever a person otherwise responsible for the discharge or release, receives water containing a listed chemical from a source other than a source listed in subdivision (a), [subdivision (a) specifies a drinking water supply in compliance with all primary drinking water standards, which is not the case for this site], the person does not "discharge" or "release" within the meaning of the Act to the extent that the person can show that the listed chemical was contained in the water received, and "discharge or release" shall apply only to that amount of the listed chemical derived from sources other than water, provided that:
>
> (1) The water is returned to the same source of water supply, or
>
> (2) The water meets all primary drinking water standards for the listed chemical or, where there is no primary drinking water standard, the water shall not contain a significant amount of the chemical.

Therefore, treated water that is reinjected or directed to the percolation ponds, which both meets the standards presented in 12401 (b)(2) and will ultimately be returned to the same source of water supply as stated in 12401 (b)(1) does not constitute a discharge or release under Proposition 65.

In summary, it is EPA's goal to return the site aquifer to its greatest beneficial use and to reduce the residual risk at the site to health protective levels. All discharges from the site will be performed to standards identified in the Record of Decision that are protective of human health and the environment and will pose no significant risk. Because EPA goals and standards are consistent with Proposition 65, Proposition 65 is not an ARAR for this site.

Finally, the communication requirements of Proposition 65 duplicate or are not more stringent than Federal standards and are not an ARAR for this site.

3. Comment:

The commentor has provided a list of ARARs considered by the CVRWQCB to be pertinent to the VWP site.

3. Response:

EPA has included in the ROD the appropriate requirements from this list for the VWP site, and has directed VWP, Inc. to amend the FS in the same way. It should be noted that state standards or criteria that are less stringent than federal standards or criteria for the same contaminant are not considered ARARs. State Action Levels are "To Be Considered" (TBCs) criteria, if needed to protect public health; they are not enforceable standards and therefore, are not ARARs.

4. Comment:

Potential ARARs and TBCs for hexavalent chromium and arsenic in the FS should be revised to include the Designated Waste Methodology (and others already discussed above).

4. Response:

EPA agrees that the Designated Waste Methodology should be included in the FS and the ROD as a TBC in developing soil cleanup levels.

5. Comment:

The commentor recommends that the target zone for cleanup of soil contaminated with hexavalent chromium should be to the top of the groundwater table, rather than to 7 feet below surface, as stated in the FS.

5. Response:

EPA agrees. The ROD defines subsurface soils to be those from 4 feet to the top of the groundwater table, with leachate containing hexavalent chromium or arsenic above 5 parts per billion (ppb).

6. Comment:

The commentor disagrees with the soil cleanup levels defined in the FS. She recommends using the Soluble Designated Levels calculation to determine subsurface soil cleanup standards.

6. Response:

EPA agrees. The FS will be amended to include this calculation, which is incorporated within the Designated Waste Methodology, and EPA has used it in setting the ROD standards for subsurface soils: 5 ppb of hexavalent chromium and arsenic in the leachate from these soils.

7. Comment:

The commentor discusses inacceptability of soil remedial Alternatives 1 and 2, and potential acceptability of Alternatives 3 and 4.

7. Response:

EPA concurs. Comment noted.

8. Comment:

The commentor notes that Alternative B for groundwater is unacceptable to the CVRWQCB due to high Total Dissolved Solids in the groundwater.

8. Response:

Comment noted.

9. Comment:

The commentor states that the CVRWQCB advocates reuse/reclamation for treated groundwater, rather than discharge to a publicly owned treatment works (POTW).

9. Response:

The proposed Plan does not include discharge to a POTW as a disposal option.

10. Comment:

The CVRWQCB would like discharge to the Turlock Irrigation District (TID) network to be retained as a disposal option for treated groundwater.

10. Response:

Please see response #3 to Resident of Community No. 1.

Commentor: Anthony J. Landis, California Department of Toxic Substances Control (DTSC)
Date: July 19, 1991

1. Comment:

The commentor states that Proposition 65 is an ARAR for the VWP site.

1. Response:

EPA disagrees. Please see response #2 to A. Vorster.

2. Comment:

The commentor states that National Environmental Policy Act is an ARAR for this site.

2. Response:

The National Contingency Plan (NCP) presents the criteria that EPA uses in identification of ARARs. The NCP (40 CFR Section 300.400(g)(4)) states, "Only those state standards that are promulgated, are identified by the state in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate. For purposes of identification and notification of promulgated state standards, the term 'promulgated' means that the standards are of general applicability and are legally enforceable." The NCP further states that EPA may select an alternative that does not meet a state identified ARAR if "the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirements in similar circumstances at other remedial actions within the state" (40 CFR Section 300.430(f)(c)).

EPA has determined that the requirements of the National Environmental Policy Act (NEPA) are no more stringent than requirements for environmental review under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). Pursuant to the provisions of CERCLA, the NCP and other federal requirements, EPA's prescribed procedures for evaluation of environmental impacts, selecting a remedial action with feasible mitigation measures, and providing for public review, are designed to ensure that the proposed action provides for the short-term and long-term protection of the environment and public health and hence perform the same function as, and are substantially parallel to, the State's requirements under the California Environmental Quality Act (CEQA) (and under NEPA).

Since EPA has found that CERCLA, the NCP, and other federal requirements are no less stringent than the requirements of NEPA, EPA has determined that NEPA is not an ARAR for this site.

EPA will continue to cooperate with DTSC and other State and federal agencies during the design phase of the remedial action to clarify further environmental review and mitigation requirements and ensure that they are fulfilled.

3. Comment:

The commentor states that CCR Title 14, sec. 750 et seq., and Fish and Game Regulation on Pollution, sec. 5650 et seq., are applicable to the VWP site if percolation ponds are used for disposal of treated groundwater.

3. Response:

EPA agrees. These ARARs will be included in the FS and the ROD.

4. Comment:

General comments on the ARARs Table 7 in the FS are provided.

4. Response:

EPA has incorporated these suggestions in the FS and ROD where appropriate.

5. Comment:

The commentor disagrees with the subsurface soil cleanup standards defined in the Proposed Plan.

5. Response:

EPA concurs and has revised these standards. Please see response #6 to A. Vorster.

6. Comment:

The commentor notes that wastes and/or sludges of unknown composition remain onsite, as well as chromium sludge in the 20,000 gallon tank.

6. Response:

Comment noted. These sludges and/or wastes will be analyzed and either disposed of at a regulated facility off-site or, if possible, included in the soil remedy on-site.

7. Comment:

The commentor notes that the neighboring duck farm may be adversely affected by contaminated subsurface soils coming into contact with the groundwater table, should a percolation pond be built. He recommends monitoring the duck farm wells and maintaining a standard of 11 ppb for hexavalent chromium (EPA's National Ambient Water Quality Criteria) in these wells, to protect the ducks.

7. Response:

EPA has consulted with the California Department of Fish and Game and other wildlife experts regarding this issue and has not yet located any relevant literature or guidance pertaining to adverse health effects to waterfowl from ingestion of hexavalent chromium. We will continue to pursue this information. Until otherwise informed, EPA will maintain the 50 ppb State Maximum Contaminant Level (MCL) standard for hexavalent chromium in groundwater.

C. COMMENTS FROM THE POTENTIALLY RESPONSIBLE PARTIES

Commentor: Gene Pietila, Valley Wood Preserving, Inc.
Date: July 16, 1991

1. Comment:

The commentor questioned the calculations used to estimate cost of soil and groundwater alternatives.

1. Response:

The cost of soil and groundwater alternatives listed in Tables 24 and 25 of the RI/FS report was based on several sources of information. Capital and operation and maintenance costs were obtained from:

(1) Telephone contacts and correspondence with several vendors dealing with equipment and treatment process units;
(2) U.S. EPA Handbook: Remedial Action at Waste Disposal Sites; EPA/625/6-85/006, October 1985;
(3) U.S. EPA Costs of Remedial Action (CORA) Model, April 1990; and
(4) Prior experience by the consulting engineer (Geosystem) preparing the RI/FS report.

Present worth costs were based on capital costs, annual operation and maintenance costs, a 5 percent discount rate, and the number of years of remediation for each specific remedial alternative. All costs are reported in January 1991 dollars. It should be noted that all costs reported in the RI/FS report are order of magnitude

costs, accurate within the +50 and -30 percent range. More accurate costs of the selected remedy would become available during remedial design. For more details, the commentor should contact his (VWP's) consultant (Geosystem) who prepared these cost estimates.

2. Comment:

The commentor references a report on ambient arsenic levels in air, prepared by the staff of the Air Resources Board and dated March 1990, from which he concludes that the "ability to clean up Valley Wood Preserving to below the 10^{-6} risk is impossible."

2. Response:

EPA is not proposing to clean up the VWP site to below the 10^{-6} risk level in any media. The cleanup standards pertain to soil and groundwater at the site and vicinity.

3. Comment:

Cleanup levels cannot be achieved in the soil at VWP by excavation and fixation.

3. Response:

The intent of the excavation and fixation remedy for soils is to remove the potential for direct contact with contaminated soils and to prevent contamination from leaching into groundwater. Excavation and fixation accomplishes these goals by removing the contaminated soils and binding them so that hazardous substances can no longer migrate to the groundwater resource. The cleanup standards define the extent of soils for excavation. EPA recognizes that contaminants above these standards will remain in the fixed mass, but they will be immobilized in that mass, and contained in treatment units if leachability tests indicate contaminant leaching potential.

4. Comment:

The commentor notes that the arsenic cleanup standard for soils, 2 ppm, is very stringent when compared to ambient arsenic levels in soils statewide.

4. Response:

This is a site-specific cleanup standard. Background arsenic levels in VWP soils ranged from 0.49 - 3.2 ppm. Given the high toxicity of arsenic in all media and the site background concentrations, the 2 ppm cleanup standard is appropriate.

5. Comment:

The commentor provided a copy of a risk assessment conducted in New Jersey on chromium contaminated soil, which contradicts EPA's Risk Assessment on VWP.

5. Response:

The risk assessment procedures used by the Industrial Health Foundation in conducting the New Jersey site risk assessment were inconsistent with EPA risk assessment procedures. In addition, risk assessments are site-specific in their conclusions.

Appendix B
ADMINISTRATIVE RECORD INDEX

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IX

VALLEY WOOD PRESERVING, INC.

SUPERFUND SITE

Turlock, California

ADMINISTRATIVE RECORD INDEX

Documents:
AR1 - AR108
Supplement No. 1: AR109 - AR117
Supplement No. 2: AR118 - AR139

VALLEY WOOD PRESERVING, INC. SUPERFUND SITE
TURLOCK, CALIFORNIA
ADMINISTRATIVE RECORD FILE INDEX

This Index describes documents contained in the Administrative Record File for Valley Wood Preserving, Inc. Superfund Site in Turlock, California. The documents are in ascending chronological order, undated documents filing at the beginning of the chronological listing. Each document has been assigned a unique number for purpose of identification. They follow in sequential order and are consistant with the arrangement in the microfilm of the Administrative Record itself.

The documents contained in the Administrative Record File have been considered by the U.S. Environmental Protection Agency in identifying the appropriate response action for the Valley Wood Preserving, Inc. Superfund Site.

FACT SHEET

Administrative Records in Local Repositories

The "administrative record" is the collection of documents which forms the basis for the selection of a response action at a Superfund site. Under section 113(k) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA), EPA is required to establish an administrative record for every Superfund response action and to make a copy of the administrative record available at or near the site.

The administrative record file must be reasonably available for public review during normal business hours. The record file should be treated as a non-circulating reference document. This will allow the public greater access to the volumes and also minimize the risk of loss or damage. Individuals may copy any documents contained in the record file, according to the procedures at the local repository. If duplicate or replacement copies are needed of the microfilm or hard copy documents, contact:

Superfund Records Center
U.S. EPA (H-6-1)
75 Hawthorne Street
San Francisco, CA 94105
Tel. No. (415) 744-2165

Documents may be added to the record file as the site work progresses. Periodically, EPA may send supplemental microfilm, documents and/or indexes to the local repository. These supplements should be placed with the initial record file.

The administrative record file will be maintained at the local repository until further notice. Questions regarding the maintenance of the record file should be directed to the Superfund Records Center.

The Agency welcomes comments at any time on documents contained in the administrative record file. Please send any such comments to:

Diane Grosser
Remedial Project Manager
U.S. EPA (H-7-2)
75 Hawthorne Street
San Francisco, CA 94105

The Agency may hold formal public comment periods at certain stages of response process. The public is urged to use these formal review periods to submit their comments.

Administrtive Record File Index
Acronyms/Abbreviations

AO	- Administrative Order
ARARs	- Applicable or Relevant and Appropriate Requirements
attch	- Attachment
attchs	- Attachments
CADOHS	- California Department of Health Services
cont	- Contract
CRWQCB-CV	- California Regional Water Quality Control Board - Central Valley
docs	- Documents
encl	- Enclosure(s)
EPA	- Environmental Protection Agency
EPA-9	- Environmental Protection Agency - Region IX
fr	- From
FS	- Feasibility Study
Geosystem	- Geosystem Consultants, Inc
ltr	- Letter
#	- Number
photo	- Photograph(s)
RI	- Remedial Investigation
RI/FS	- Remedial Investigation/Feasibility Study
rpt	- Report
TES	- Technical Enforcement Support
TL	- Transmittal Letter
VWP	- Valley Wood Preserving Inc
w/	- With
WA	- Work Assignment
w/o	- Without

VALLEY WOOD PRESERVING, INC.
Turlock, California
ADMINISTRATIVE RECORD INDEX

AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
AR 1	00/00/00	Robert Bornstein Environmental Protection Agency - Region 9	Kevin Garrahan Environmental Protection Agency, Washington DC	Ltr: Concerns about absorption of heavy metals by various crops & water table fluctuation, w/o encl site history, undated
AR 2	00/00/00	Anne Sergeant Environmental Protection Agency - Office of Research & Development	Robert Bornstein Environmental Protection Agency - Region 9	Memo: Review soil & groundwater data for site - on potential root uptake of metals, w/bibliography (undated)
AR 3	57/00/00	Rodney Arkley Univ of California		Soil survey of eastern Stanislaus area, California (Soil Survey Series 1957 #20)
AR 4	87/03/18	James Allen CA Dept of Health Services	Harold Logsdon, Joyce Logsdon Valley Wood Preserving, Inc	Ltr: Issue remedial action order (w/encl - CADOHS docket #HSA 86/87-023), w/o mail receipt #P-475-808-747
AR 5	87/05/00	Carolyn d'Almeida Environmental Protection Agency - Region 9		HRS package w/list of references attchs (Reference docs - incomplete)
AR 6	88/06/20	Jerry Clifford Environmental Protection Agency - Region 9	Harold Logsdon Valley Wood Preserving, Inc	Ltr: Proposal to add VWP to National Priorities List (NPL) w/o encl
AR 7	88/10/15	Mohsen Nehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Progress rpt - 9/88 w/attchs
AR 8	88/11/08	Mohsen Nehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Update RI/FS of site w/attchs
AR 9	88/11/22	Tracie Billington CA Dept of Health Services	Albert Cronin, Jr., attorney City of Stockton	Ltr: Response to Geosystem's 11/8/88 ltr to addressee, urging VWP to comply w/revised time schedule, complete RI/FS & additional actions
AR 10	88/12/15	Mohsen Nehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Progress rpt - 11/88 - also address issues raised in CADOHS ltr of 11/22/88
AR 11	89/01/10	Mohsen Nehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Response to CADOHS 12/27/88 request re disposal of soil cuttings & groundwater in temporary storage

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
AR 12	89/02/01	James Tjosvold CA Dept of Health Services	Albert Cronin, Jr., attorney City of Stockton	Ltr: Response to Geosystem's 1/10/89 ltr re disposal of soil cuttings & groundwater
AR 13	89/03/07	Pete Collier CA Dept of Health Services	Tracie Billington CA Dept of Health Services	Memo: Response to request to evaluate portions of draft RI prepared by Geosystem
AR 14	89/03/10	Jay Lucas CA Dept of Health Services	Tracie Billington CA Dept of Health Services	Memo: Comments on geology & hydrogeology sections of RI draft rpt of 1/89 authored by Geosystem
AR 15	89/03/14	Tracie Billington CA Dept of Health Services	Albert Cronin, Jr., attorney City of Stockton	Ltr: Comments on draft remedial investigation (RI) rpt prepared by Geosystem
AR 16	89/04/06	Mohsen Nehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Response to regulatory agencies' comments on 1/20/89 draft RI rpt w/attch
AR 17	89/05/15	Val Siebal CA Dept of Health Services	Harold Logsdon, Joyce Logsdon Valley Wood Preserving, Inc	Ltr: Comments on Geosystem's 4/6/89 ltr, w/notice of proposed determination of noncompliance w/remedial action order# HSA 86/87-023
AR 18	89/05/31	Philip Miller, Mohsen Nehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Anticipated schedule for completion of RI/FS activities w/attchs - table 1 & recent correspondence
AR 19	89/05/31	Philip Miller, Mohsen Nehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Anticipated schedule for completion of RI/FS activities w/attch
AR 20	89/07/20	Robert Bornstein Environmental Protection Agency - Region 9	Emmanuel Mensah CA Dept of Health Services	Ltr: Handling of treated water on site, w/attch draft ltr to Russel DeLuca of Turlock Irrigation District for program implementation
AR 21	89/07/24	Robert Bornstein Environmental Protection Agency - Region 9	Emmanuel Mensah CA Dept of Health Services	Ltr: Support all comments & recommendations presented by CADOHS on 3/14/89, request the risk assessment to be rewritten
AR 22	89/09/12	Emmanuel Mensah CA Dept of Health	Donn Diebert CA Dept of Health	Memo: Comments on additional remedial investigations (RI) workplan submitted

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
		Services	Services	by Geosystem
AR 23	89/09/18	Robert Bornstein Environmental Protection Agency - Region 9	Jim Simpson Stanislaus County - Department of Environmental Resources	ROC: Sampling & monitoring of domestic wells along Golf Road w/3 copies
AR 24	89/09/19	Donn Diebert CA Dept of Health Services	Albert Cronin, Jr., attorney City of Stockton	Ltr: Comments on additional remedial investigations (RI) workplan
AR 25	89/09/21	Jeff Rosenbloom Environmental Protection Agency - Region 9	David Stuart Environmental Protection Agency - Region 9	Memo: Request sampling of domestic wells in the vicinity of site w/o encl
AR 26	89/10/03	Philip Miller Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Monthly sampling & analysis (monitoring) of groundwater w/attchs
AR 27	89/10/19	Philip Miller Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Monthly sampling & analysis (monitoring) of groundwater w/attchs
AR 28	89/11/00	Stewart Simpson Environmental Protection Agency - Region 9	Environmental Protection Agency - Region 9	VWP 11/89 groundwater sampling plan (w/Table 1.0 - draft) & 11/16/89 field summary rpt prepared 2/90, w/transmittal memo to Mary Masters, 2/28/90
AR 29	89/11/20	Robert Bornstein Environmental Protection Agency - Region 9	Albert Cronin, Jr., attorney City of Stockton	Ltr: Request sludge removal before storage tank inspection on site
AR 30	89/12/00	Geosystem Consultants, Inc	Valley Wood Preserving, Inc	Work plan - additional remedial investigations w/appendices A-C
AR 31	89/12/05	Mohsen Mehran Geosystem Consultants, Inc	Albert Cronin, Jr., attorney City of Stockton	Ltr: Progress rpt w/attchs
AR 32	89/12/11	Jeff Zelikson Environmental Protection Agency - Region 9	Harold Logsdon Valley Wood Preserving, Inc	Administrative consent order #90-01 in matter of VWP
AR 33	89/12/27	Robert Bornstein Environmental Protection Agency - Region 9	Emmanuel Mensah CA Dept of Health Services	Ltr: Comments on revised additional RI workplan (12/89) submitted by Geosystem

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
AR 34	90/01/23	Robert Bornstein Environmental Protection Agency - Region 9	Inter-agency committee members	Memo: Rpt on other site activities & request comments by 2/7/90 on draft interim groundwater remediation workplan of Geosystem
AR 35	90/02/08	Robert Bornstein Environmental Protection Agency - Region 9	Albert Cronin, Jr., attorney City of Stockton	Ltr: Approve Geosystem's interim groundwater remediation draft workplan of 1/12/90 w/comments
AR 36	90/02/21	Robert Bornstein Environmental Protection Agency - Region 9	Albert Cronin, Jr., attorney City of Stockton	Ltr: Notify VWP of stipulated penalties if it fails to begin pump test on 2/24/90
AR 37	90/03/05	Robert Bornstein Environmental Protection Agency - Region 9	Albert Cronin, attorney City of Stockton	Ltr: Re delay in sludge removal & extend date of required pump tests to 3/19/90 pursuant to EPA AO #90-01
AR 38	90/03/07	Robert Bornstein Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Ltr: Request for all pump test data & inform that regional hydrologist Herb Levine will help interpreting hydrological characteristics
AR 39	90/03/15	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 12/89 to 2/90 - w/attchs
AR 40	90/03/15	Mohsen Mehran Geosystem Consultants, Inc	Robert Bornstein Environmental Protection Agency - Region 9	Ltr: Response to request of 3/7/90 for pumping test data, ask for EPA references &/or computer programs for hydrologic analysis
AR 41	90/03/19	Robert Bornstein Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Ltr: Geosystem fails to inform regulatory agencies of 12/15/89 groundwater sampling data
AR 42	90/03/19	Robert Bornstein Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Ltr: Effectiveness of on-site electrochemical treatment cell, & other issues discussed at interagency meeting of 3/15/90
AR 43	90/03/30	Mohsen Mehran Geosystem Consultants, Inc	Robert Bornstein Environmental Protection Agency - Region 9	Ltr: Response to EPA ltr of 3/19/90, summarizes reasons for delay in reporting domestic well sampling
AR 44	90/05/01	Robert Bornstein Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Ltr: Request for additional details & flow diagrams of proposed extraction/injection system (4/12/90

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
				progress rpt)
AR 45	90/05/10	Jeff Zelikson Environmental Protection Agency - Region 9	Harold Logsdon Valley Wood Preserving, Inc	Administrative consent order in matter of VWP, USEPA docket #90-02, w/marginalia
AR 46	90/05/18	Robert Bornstein Environmental Protection Agency - Region 9	Intra-agency Committee Members	Memo: Request Geosystem to supply design specifications for pump & treatment system (AO 90-01) & EPA plan to conduct informal public meeting
AR 47	90/05/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 4/90, w/attchs & marginalia in table 1
AR 48	90/05/24	Philip Miller Geosystem Consultants, Inc	Robert Bornstein Environmental Protection Agency - Region 9	Ltr: Design for interim groundwater remediation, w/attchs
AR 49	90/05/31	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Regional well inventory, in response to section V-B-4 of USEPA administrative consent order #90-02, w/attchs & marginalia
AR 50	90/05/31	Kenneth Landau CA Regional Water Quality Control Board - Central Valley	Robert Bornstein Environmental Protection Agency - Region 9	Ltr: Questions & comments on 5/24/90 design & operation of interim groundwater remediation system, w/marginalia
AR 51	90/06/07	Robert Bornstein Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Ltr: Interagency committee requests actions re interim pump & treatment system pursuant to EPA AO 90-01 & 90-02 after 6/5/90 meeting
AR 52	90/06/20	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 5/90, w/attchs
AR 53	90/06/22	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Work plan - subsurface characterization in former underground tank area of site, w/attchs
AR 54	90/06/28	Robert Fourt Stanislaus County - Department of Environmental Resources	Robert Elledge Valley Wood Preserving, Inc	Ltr: Comments on Geosystem's 6/20/90 progress rpt re groundwater monitoring

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
AR 55	90/06/28	Robert Fourt Stanislaus County - Department of Environmental Resources	Valley Wood Preserving, Inc	Ltr: Comments on 6/20/90 workplan of Geosystem
AR 56	90/07/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 6/90, w/attchs
AR 57	90/07/30	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Revised work plan subsurface characterization in former underground tank area of site, w/attchs
AR 58	90/08/14	Robert Fourt Stanislaus County - Department of Environmental Resources	Robert Elledge Valley Wood Preserving, Inc	Ltr: Approve Geosystem's 7/30/90 workplan for installation of a groundwater monitoring well, w/outlined modifications
AR 59	90/08/20	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 7/90, w/attchs
AR 60	90/08/23	Kenneth Landau CA Regional Water Quality Control Board - Central Valley	Robert Bornstein Environmental Protection Agency - Region 9	Ltr: Comments on 7/90 draft feasibility study
AR 61	90/09/18	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Response to 9/13/90 inquiry of Robert Bornstein, EPA-9, re testing, operation & maintenance of interim groundwater remediation system on site
AR 62	90/09/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 8/90, w/attchs
AR 63	90/09/24	Mary Masters Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Ltr: Comments on draft feasibility study (FS) workplan of site, w/encl
AR 64	90/10/01	Kenneth Landau CA Regional Water Quality Control Board - Central Valley	Mary Masters Environmental Protection Agency - Region 9	Ltr: Comments on Geosystem's second draft 8/90 remedial investigation rpt
AR 65	90/10/08	Mohsen Mehran Geosystem Consultants,	Howard Saxion Versar, Inc	Ltr: Response to request re site, w/encl (Additional RI workplan 12/89 & second

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
		Inc		draft RI rpt 8/90)
AR 66	90/10/10	Robert Bornstein Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Ltr: Provisions re operation & maintenance of interim groundwater treatment system
AR 67	90/10/15	David Hogshead Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: 9/90 extraction injection operation data (8/31-10/1/90), w/attch
AR 68	90/10/22	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 9/90, w/attchs
AR 69	90/10/24	Mohsen Mehran Geosystem Consultants, Inc	Gene Boyer Planning Research Corp Environmental Management, Inc	TL: Data validation packages fr California Water Labs (CWL) & Mid-Pacific Environmental Laboratory, Inc (MPEL)
AR 70	90/10/26	Robert Bornstein, Mary Masters Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Ltr: Request for water quality data, treatment cell status, infiltration pond design & ltr of credit fr site
AR 71	90/10/29	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Biweekly rpt - groundwater extraction injection operation data (10/1-15/90) provided by VWP w/attch
AR 72	90/11/01	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Tank effluent water quality data (6/26-9/24/90), w/attchs
AR 73	90/11/09	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction/treatment operation data, biweekly rpt (10/16-31/90), w/attchs
AR 74	90/11/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 10/90, w/attchs
AR 75	90/11/21	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Response to EPA ltr of 10/26/90 re treated groundwater infiltration pond, w/attchs & marginalia
AR 76	90/11/21	Versar, Inc	Planning Research Corp Environmental Management, Inc	Preliminary ecological risk assessment, w/appendices A-C & 39 photo, w/o location map on page 3, WA# C09030, EPA

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ADMINISTRATIVE RECORD INDEX

AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
				cont# 68-W9-0009
AR 77	90/11/28	Jay Carter, Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Additional subsurface characterization study in former underground storage tanks of site, w/attchs
AR 78	90/12/05	Robert Bornstein, Mary Masters Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Ltr: Response to proposed plan of 11/21/90 re development & implementation of infiltration pond
AR 79	90/12/06	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Present results of capture zone analyses for treated groundwater infiltration in former ponding area, w/maps
AR 80	90/12/10	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction/injection operation & water quality data, biweekly rpt (11/16-30/90), w/attchs
AR 81	90/12/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction/injection operation & water quality data, biweekly rpt (12/1-15/90), w/attchs
AR 82	90/12/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 11/90, w/attchs
AR 83	90/12/21	Planning Research Corp Environmental Management, Inc	Environmental Protection Agency - Region 9	Validation rpt on select data, TES 12 at hazardous waste sites, zone IV, regions 8-10, EPA cont# 68-W9-0009, WA# 012-C0903007
AR 84	91/01/15	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction/injection operation & water quality data, biweekly rpt (12/16-31/90), w/attchs
AR 85	91/01/17	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 12/90, w/attchs
AR 86	91/01/22	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction/injection operation & water quality data, biweekly rpt (1/1-15/91), w/attchs
AR 87	91/01/24	Mohsen Mehran	David Doyle	Ltr: Work plan for abandonment of well

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
		Geosystem Consultants, Inc	Kimble, MacMichael & Upton	VWP-3
AR 88	91/02/00	Geosystem Consultants, Inc	Valley Wood Preserving, Inc	Feasibility study workplan, w/TL to David Doyle fr Mohsen Mehran, 2/22/91
AR 89	91/02/01	Mary Masters Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Memo: Request for response to 1/30/91 comments (encl) on proposed capture zone design by hydrologist David Burden to Herbert Levine (By Fax)
AR 90	91/02/04	Planning Research Corp Environmental Management, Inc	Environmental Protection Agency - Office of Waste Programs Enforcement	Risk assessment final rpt, TES 12 at hazardous sites, zone IV, regions 8-10, cont# 68-W9-0009, WA# C09030
AR 91	91/02/08	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction/injection operation & water quality data, biweekly rpt (1/16-31/91), w/attchs
AR 92	91/02/11	Mary Masters Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Ltr: Request comments fr EPA, CRWQCB-CV (1/17/91) & CADOHS (11/7/90) be included into RI/FS rpt, w/encl
AR 93	91/02/13	Mary Masters Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Memo: Request for inclusion of Stanislaus County well abandonment requirement into workplan, w/attch (Jim Simpson's 2/4/91 ltr & diagram) By fax
AR 94	91/02/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 1/91, w/attchs
AR 95	91/03/14	Marie McCrink CA Regional Water Quality Control Board - Central Valley	Mary Masters Environmental Protection Agency - Region 9	Ltr: Comments on VWP-3 well abandonment workplan
AR 96	91/03/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Work plan - additional on-site & off-site characterization, w/attchs
AR 97	91/03/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction/injection operation & water quality data, biweekly rpt (2/16-28/91), w/attchs
AR 98	91/03/22	Mohsen Mehran Geosystem Consultants,	David Doyle Kimble, MacMichael &	Ltr: Groundwater extraction/injection operation & water quality data, biweekly

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
		Inc	Upton	rpt (3/1-15/91), w/attchs
AR 99	91/03/22	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 2/91, w/attchs
AR 100	91/03/26	Donn Diebert CA Dept of Health Services	Mary Masters Environmental Protection Agency - Region 9	Ltr: Concern re well decomissioning, w/3/13/91 comments (attch) fr Richard McJunkin to Emmanuel Mensah on well abandonment workplan of 1/24/91
AR 101	91/04/15	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Biweekly rpt - groundwater remediation system operation data (3/16-31/91) provided by VWP w/attch (By fax)
AR 102	91/04/17	Mary Masters Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Comments on 3/91 draft rpt FS, w/ltr transmitting subject rpt, schedule meeting on 4/22 to discuss comments & inform final RI/FS rpt due by 5/20/91
AR 103	91/04/17	Planning Research Corp Environmental Management, Inc	Environmental Protection Agency - Office of Waste Programs Enforcement	Spring 1991 groundwater & treatment unit field sampling plan, TES 12 at hazardous waste sites, zone IV, regions 8-10, cont# 68-W9-0009, WA# C09030
AR 104	91/04/18	Mary Masters Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Ltr: Concur w/comments by CADOHS & CRWQCB-CV on 1/24/91 well VWP-3 abandonment workplan, request submission of revised abandonment workplan by 5/13/91
AR 105	91/04/19	Mary Masters Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Ltr: Disapprove of 3/19/91 additional on-site & off-site characterization workplan, outline work that should be included in revised workplan
AR 106	91/05/06	Mary Masters Environmental Protection Agency - Region 9	Mohsen Mehran Geosystem Consultants, Inc	Ltr: Outline comments which should be addressed in final FS for public comment due on 5/20/91, w/attch (example of ARARs table)
AR 107	91/05/13	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Biweekly rpt - groundwater remediation system operation data (4/16-30/91) provided by VWP w/attch
AR 108	91/05/14	Environmental Protection Agency		List of guidance documents

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Turlock, California
ADMINISTRATIVE RECORD INDEX

AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT

No. of Records: 108
\arfinal1.rpt

VALLEY WOOD PRESERVING, INC. SUPERFUND SITE
Turlock, California

Administrative Record File Index
Supplement Number 1

This Administrative Record File Index, Supplement Number 1, lists the documents contained in the Administrative Record File for the Valley Wood Preserving, Inc. Superfund Site, Turlock, California, since the compilation of the original on May 20, 1991. The Index presents the documents in ascending chronological order, reflecting the organization of the documents in the file itself.

Each document has been assigned a unique number for purposes of identification. These are indicated as "ARxx". Numbering of the documents in Supplement No. 1 begins where the original Administrative Record File Index left off; thus the first document is numbered "AR109".

Please note that the original Adminstrative Record File consists of documents #1 - 108 arranged chronologically from 1957 to 5/14/91. Supplement No. 1 consists of documents #AR109 - AR117 arranged chronologically from 4/19/91 to 6/10/91. Because of the overlap in dates, it is necessary to use both indices to locate documents for a particular date.

The documents contained in the Administrative Record File are used by the U.S. Environmental Protection Agency in identifying remedial activites appropriate for use at the Valley Wood Preserving, Inc., Turlock, California.

VALLEY WOOD PRESERVING, INC.
Turlock, California
ADMINISTRATIVE RECORD INDEX
Supplement No. 1

AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
AR 109	91/04/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 3/91, w/attchs
AR 110	91/04/29	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment reinjection system, operation & water quality data, biweekly rpt (4/1-15/91), w/attchs
AR 111	91/05/20	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 4/91, w/attchs
AR 112	91/05/24	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operation & water quality data, biweekly rpt (5/1-15/91), w/attchs
AR 113	91/06/00	Environmental Protection Agency - Region 9		Fact sheet: EPA announces proposed plan for long-term cleanup on site
AR 114	91/06/00	Geosystem Consultants, Inc	Valley Wood Preserving, Inc	Remedial investigation/feasibility study (RI/FS), v1 - text - final draft rpt
AR 115	91/06/00	Geosystem Consultants, Inc	Valley Wood Preserving, Inc	Remedial investigation/feasibility study (RI/FS), v2 - appendices
AR 116	91/06/07	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operation & water quality data, biweekly rpt (5/16-31/91), w/attchs
AR 117	91/06/10	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 5/91, w/attchs

No. of Records: 9
\arfinal1.rpt

VALLEY WOOD PRESERVING, INC.
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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
AR 118	00/00/00	Residents City of Turlock	Mary Masters Environmental Protection Agency - Region 9	Ltr: Public comment on Proposed Plan of site (Names & addresses of individuals redacted - Privacy Act)
AR 119	00/00/00	Resident City of Turlock	Mary Masters Environmental Protection Agency - Region 9	Ltr: Public comment on Proposed Plan of site (Names & addresses of individuals redacted - Privacy Act)
AR 120	91/06/13	Robert Fourt Stanislaus County - Dept of Environmental Resources	Robert Elledge Valley Wood Preserving, Inc	Ltr: Review 11/28/90 rpt by Geosystem Consultants, request VWP to submit workplan (due within 45 days) for onsite treatment of contaminated soils
AR 121	91/06/20	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operational & water quality data, biweekly rpt (6/1-15/91), w/attchs
AR 122	91/06/25	Ronald Peters Peters Shorthand Reporting Corp		Minutes of community meeting re Valley Wood Preserving Superfund Site proposed plan for long-term clean-up (Copy)
AR 123	91/07/01	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 6/91, w/attchs
AR 124	91/07/08	Mary Masters Environmental Protection Agency - Region 9	David Doyle Kimble, MacMichael & Upton	Ltr: Request revisions of RI/FS draft in ltr format as addendum by 7/17/91, w/attch memo (EPA corrections to 6/91 RI/FS rpt fr M Masters & G McCabe)
AR 125	91/07/09	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operational & water quality data, biweekly rpt (6/16-30/91), w/attchs
AR 126	91/07/16	Gene Pietila Valley Wood Preserving, Inc	Mary Masters Environmental Protection Agency - Region 9	Ltr: Public comment on Proposed Plan for site, w/attch
AR 127	91/07/16	Donn Diebert CA Dept of Health Services	Mary Masters Environmental Protection Agency - Region 9	Ltr: Outline comments on EPA Proposed Plan of 6/91, w/encl (7/16 memo of comments on proposed plan fr Toxic Substances Control Program, CADOHS)
AR 128	91/07/18	Lisa Hanusiak ICF Technology, Inc		Data validation rpt MYF826 Memo #2 w/attch & TL to Mary Masters/EPA-9 fr

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
				Victoria Taylor/ICF Technology Inc
AR 129	91/07/19	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operational & water quality data, biweekly rpt (7/1-15/91), w/attchs
AR 130	91/07/19	Anthony Landis CA Dept of Health Services	Mary Masters Environmental Protection Agency - Region 9	Ltr: Review comments on draft Feasibility Study (FS) dated 3/25/91, w/encl (7/19 memo on ARARs fr Toxic Substances Control Program, CADOHS)
AR 131	91/07/22	Lisa Manusiak ICF Technology, Inc		Data validation rpt MYF808 to MYF825, MYF827, MYF828 Memo #3, w/attch & TL to Mary Masters/EPA-9 fr Victoria Taylor/ICF Technology Inc
AR 132	91/08/09	Antonia Vorster CA Regional Water Quality Control Board - Central Valley	Mary Masters Environmental Protection Agency - Region 9	Ltr: Comments on Remedial Investigation/Feasibility Study (RI/FS) & addendum, w/encl (5/17 memo on ARARs, 8/7 memo w/comments on soil cleanup levels)
AR 133	91/08/15	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operational & water quality data, biweekly rpt (7/16-31/91), w/attchs
AR 134	91/08/20	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 7/91, w/attchs
AR 135	91/09/05	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operational & water quality data, biweekly rpt (8/1-15/91), w/attchs
AR 136	91/09/13	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Groundwater extraction treatment injection system, operational & water quality data, biweekly rpt (8/16-31/91), w/attchs
AR 137	91/09/13	Mohsen Mehran Geosystem Consultants, Inc	David Doyle Kimble, MacMichael & Upton	Ltr: Progress rpt - 8/91, wattchs
AR 138	91/09/16	Udai Singh	Daniel Shafer	Ltr: VWP remedial alternative cost

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AR #	DATE yy/mm/dd	AUTHOR	ADDRESSEE	SUBJECT
		CH2M Hill	Planning Research Corp Environmental Management, Inc	estimates for Record of Decision (ROD)
AR 139	91/09/27	Environmental Protection Agency - Region 9		Record of Decision (ROD)

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\arfinal1.rpt

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**									
0000	1	INDEX TO COMPENDIUM OF CERCLA RESPONSE SELECTION GUIDANCE DOCUMENTS	05/01/89	-OWPE -PRC-ENVIRONMENTAL MANAGEMENT, INC.	FINAL	8		1) DATA ELEMENT DEFINITIONS 2) ORGANIZATIONAL ABBREVIATIONS AND ACRONYMS IDENTIFIED IN INDEX	
** PRE-REMEDIAL									
0001	1	EXPANDED SITE INSPECTION TRANSITIONAL GUIDANCE FOR FY-88	10/01/87	-OERR	FINAL	74	2		OSWER #9345.1-02
0002	1	PRELIMINARY ASSESSMENT GUIDANCE FISCAL YEAR 1988	01/01/88	- OERR/HSCD	FINAL	83	2		OSWER #9345.0-01
** REMOVAL ACTION									
1001	1	COSTS OF REMEDIAL RESPONSE ACTIONS AT UNCONTROLLED HAZARDOUS WASTE SITES	01/01/81	- RISHEL, H.L. ET.AL./SCS ENGINEERS - ALBRECTH, O.W./MERL	FINAL	164	1		
1002	1	EMERGENCY RESPONSE PROCEDURES FOR CONTROL OF HAZARDOUS SUBSTANCE RELEASES	01/01/83	- MELVOLD, R.W./ROCKWELL INTERNATIONAL - MCCARTHY, L.T./MERL	FINAL	23	1		EPA-600/D-84-023

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1003	1	ENVIRONMENTAL REVIEW REQUIREMENTS FOR REMOVAL ACTIONS	04/13/87	- OERR/ERD	FINAL	6	2		OSWER #9318.0-05
1005	1	INFORMATION ON DRINKING WATER ACTION LEVELS	04/19/88	- FIELDS, JR., T.OSWER/ERD	FINAL	17	2	1) MEMO: RELEASES FROM LAWFULLY APPLIED PESTICIDES 2) MEMO DRIP CONTAMINATION 3) GUIDANCE FOR ETHYLENE DIBROMIDE IN DRINKING H20	
1006	1	SUPERFUND REMOVAL PROCEDURES, REVISION #3	02/01/88	- OSWER/OERR	FINAL	365	1		OSWER #9360.0-038
1007	1	THE ROLE OF EXPEDITED RESPONSE ACTIONS UNDER SARA	04/21/87	- LONGEST, H.L./OERR	FINAL	3	2		OSWER #9360.0-038
4002	26	INTERIM FINAL GUIDANCE ON REMOVAL ACTION LEVELS AT CONTAMINATED DRINKING WATER SITES [SECONDARY REFERENCE]	10/06/87	- OSWER/OERR	FINAL	9	2		OSWER #9360.1-01
** RI/FS - GENERAL									
2001	3	EPA GUIDE FOR MINIMIZING THE ADVERSE ENVIRONMENTAL EFFECTS OF	06/01/85	- ENVIRONMENTAL RESEARCH LABORATORY	FINAL	250	2		EPA/600/8-85/008

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Doc No	Vol	Title	Date	Authors	Status	Pages	Tier	Attachments	OSWER/EPA Number
		CLEANUP OF UNCONTROLLED HAZARDOUS-WASTE SITES							
2002	3	GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA	10/01/88	- OSWER/OERR	FINAL	390	1		OSWER #9355.3-01
2005	4	POLICY ON FLOOD PLAINS AND WETLAND ASSESSMENTS FOR CERCLA ACTIONS	08/01/85	- HEDEMAN, JR., W.N./OERR - LUCERO, C./OWPE	FINAL	9	2		OSWER #9280.0-02
2008	4	RI/FS IMPROVEMENTS	07/23/87	- LONGEST, H.L./OERR	FINAL	11	2	1) RI/FS IMPROVEMENTS	OSWER #9355.0-20
2009	4	RI/FS IMPROVEMENTS FOLLOW-UP	04/25/88	- LONGEST, H.L./OERR	FINAL	16	2	1) RI/FS IMPROVEMENTS FOLLOW-UP 2) REMEDIAL INFORMATION TRANSFER ACTIVITIES	OSWER #9355.3-05
2010	4	SUPERFUND FEDERAL-LEAD REMEDIAL PROJECT MANAGEMENT HANDBOOK	12/01/86	- OERR	DRAFT	179	1		OSWER #9355.1-1
2011	5	SUPERFUND REMEDIAL DESIGN AND REMEDIAL ACTION GUIDANCE	06/01/86	- OERR	FINAL	100	1		OSWER #9355.0-4A

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** RI/FS - RI DATA QUALITY/SITE & WASTE ASSESSMENT									
2100	5	A COMPENDIUM OF SUPERFUND FIELD OPERATIONS METHODS	12/01/87	- OERR - OWPE	FINAL	550	1		OSWER #9355.0-14
2101	5	6 DATA QUALITY OBJECTIVES FOR REMEDIAL RESPONSE ACTIVITIES: DEVELOPMENT PROCESS	03/01/87	- CDM FEDERAL PROGRAMS CORP. - OERR/OWPE	FINAL	150	1		OSWER #9355.0-7B
2102	6	DATA QUALITY OBJECTIVES FOR REMEDIAL RESPONSE ACTIVITIES: EXAMPLE SCENARIO: RI/FS ACTIVITIES AT A SITE W/CONTAMINATED SOILS AND GROUNDWATER	03/01/87	- CDM FEDERAL PROGRAMS CORP. - OERR/OWPE	FINAL	120	1		OSWER #9355.07B
2104	6	FIELD SCREENING FOR ORGANIC CONTAMINANTS IN SAMPLES FROM HAZARDOUS WASTE SITES	04/02/86	- ROFFMAN, H.K., ET. AL./NUS CORP. - CARTER. A/MICHIGAN DEPT. OF NATURAL RESOURCES -THOMAS, T./EPA	FINAL	11	2	1) MEMO: FIELD SCREENING FOR ORGANIC CONTAMINANTS	EPA-600/2-84-057
2105	6	FIELD SCREENING METHODS CATALOG: USER'S GUIDE	09/01/88	- OERR/HSED	FINAL	90	1		EPA/540/2-88/005
2106	6	FIELD STANDARD OPERATING	01/01/85	- OERR/HRSD	FINAL	29	2		OSWER #9285.2-01

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		PROCEDURES MANUAL #4-SITE ENTRY							
2107	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #6-WORK ZONES	04/01/85	- OERR/HRSD	FINAL	19	2		OSWER #9285.2-04
2108	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #8-AIR SURVEILLANCE	01/01/85	- OERR/HSCD	FINAL	24	2		OSWER #9285.2-03
2109	7	FIELD STANDARD OPERATING PROCEDURES MANUAL #9-SITE SAFETY PLAN	04/01/85	- OERR/HRSD	FINAL	26	2	1) SAMPLE SITE SAFETY PLAN AND OSHA SAFETY PLAN 2) EMERGENCY OPERATION CODES REAL TIME MONITOR 3) RESPONSE SAFETY CHECK-OFF SHEET	OSWER #9285.2-05
2112	8	GUIDELINES AND SPECIFICATIONS FOR PREPARING QUALITY ASSURANCE PROGRAM DOCUMENTATION	06/01/87	- ORD/QUALITY ASSURANCE MANAGEMENT STAFF	FINAL	31	2	1) MEMO: GUIDANCE ON PREPARING QAPPs DATED 6/10/87	
2113	8	LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING INORGANICS ANALYSES	07/01/88	- EPA DATA REVIEW WORK GROUP - BLEYLER, R.VIAR AND CO./SAMPLE MGMT. OFFICE - HSED	DRAFT	20	2		

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2115	8	PRACTICAL GUIDE FOR GROUND-WATER SAMPLING	09/01/85	- BARCELONIA, M.J., ET. AL./ILLINOIS ST. WATER SURVEY - SCALF, M.R./ORD/ERL	FINAL	175	1	EPA/600/2-85/104
2117	8	SOIL SAMPLING QUALITY ASSURANCE USER'S GUIDE	05/01/84	- BARTH D.S. & MASON, B. J./U. OF NEVADA, LAS VEGAS	FINAL			
2118	9+	TEST METHODS FOR EVALUATING SOLID WASTE, LABORATORY MANUAL PHYSICAL/CHEMICAL METHODS, THIRD EDITION (VOLUMES 1A, 1B, 1C, AND 11)	11/01/86	- OSWER	FINAL	3000	1	
2119	11	USER'S GUIDE TO THE CONTRACT LABORATORY PROGRAM	12/01/88	- OERR/CLP SAMPLE MANAGEMENT OFFICE	FINAL			
** RI/FS - LAND DISPOSAL FACILITY TECHNOLOGY								
2200	12	COVERS FOR UNCONTROLLED HAZARDOUS WASTE SITES	09/01/85	- MCANENY, C.C., ET. AL./U.S. COE/WES - HOUTHHOOFD, J.M./HWERL	FINAL	475	2	EPA/540/2-85/002
2201	13	DESIGN, CONSTRUCTION, AND	11/01/08	- COLDMAN, J.L., ET. AL.	FINAL	500	2	EPA/530/SW-86/007F

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		EVALUATION OF CLAY LINERS FOR WASTE MANAGEMENT FACILITIES		/NUS - ROULIER, M.H./RREL					
2204	13	LAND DISPOSAL RESTRICTIONS	08/11/87	- LONGEST, H.L./OERR - LUCERO, G./OWPE	FINAL	23	2	1) SUMMARY OF MAJOR LDR PROVISIONS AND CALIFORNIA LIST PROHIBITIONS 2) OTHER ATTACHS CITED ARE AVAILABLE IN FED. REG.	
2210	15	SUPPLEMENTARY GUIDANCE ON DETERMINING LINER/LEACHATE COLLECTION SYSTEM COMPATIBILITY	08/07/86	- WEDDLE, B.R./PERMITS AND STATE PROGRAMS DIV	FINAL	60	2	1) ANALYSIS AND FINGERPRINTING OF UNEXPOSED & EXPOSED POLYMERIC MEMBRANE LINERS MATRECON, INC. 2) SEC. 3019: EXPOSURE INFO. AND HEALTH ASSESSMENTS	OSWER #9480.00-13
2211	15	TECHNICAL GUIDANCE DOCUMENT: CONSTRUCTION QUALITY ASSURANCE FOR HAZARDOUS WASTE LAND DISPOSAL FACILITIES	10/01/86	- HERRMANN, J.G./HWERL/LAND POLLUTION CONTROL DIV - OSWER	FINAL	88	2		OSWER #9472.003
3000	25	APPLICABILITY OF THE HSWA MINIMUM TECHNICAL REQUIREMENTS RESPECTING LINERS AND LEACHATE COLLECTION	04/01/85	- SKINNER, J./OSW	FINAL	3	2		OSWER #9480.01(85)

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		SYSTEMS (SECONDARY REFERENCE)							
** RI/FS - OTHER TECHNOLOGIES									
2300	16	A COMPENDIUM OF TECHNOLOGIES USED IN THE TREATMENT OF HAZARDOUS WASTES	09/01/87	- ORD/CERI	FINAL	49	2		EPA/625/8-87/014
2308	18	HANDBOOK FOR STABILIZATION/SOLIDIFICATION OF HAZARDOUS WASTE	06/01/86	- CULLINANE JR., M.J. ET.AL. /U.S. COE/WES - HOUTHHOOFD, J.M./ORD/HWERL	FINAL	125	1		EPA/540/2-86-001
2309	19	HANDBOOK REMEDIAL ACTION AT WASTE DISPOSAL SITES (REVISED)	10/01/85	- ORD/HWERL - OSWER/OERR	FINAL	560	1		EPA/625/6-85/006
2311	20	MOBILE TREATMENT TECHNOLOGIES FOR SUPERFUND WASTES	09/01/86	- CAMP, DRESSER, AND MCKEE INC. - GALER, L.D./HRSD	FINAL	130	1		EPA/540/2-86-003F
2315	21	REVIEW OF IN-PLACE TREATMENT TECHNIQUES FOR CONTAMINATED SURFACE SOILS-VOL. 2: BACKGROUND INFORMATION FOR IN-SITU TREATMENT	11/01/84	- SIMS, R.C., ET.AL./JRB ASSOCIATES - BARKLEY, N./HERL	FINAL	350	1		EPA-540/2-84-003B

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2316	21	REVIEW OF IN-PLACE TREATMENT TECHNIQUES FOR CONTAMINATED SURFACE SOILS-VOL 1: TECHNICAL EVALUATION	09/19/84	- OSWER/OERR - ORD/HERL	FINAL	165	1	EPA/540/2-84-003A
2317	22	SLURRY TRENCH CONSTRUCTION FOR POLLUTION MIGRATION CONTROL	02/01/84	- OERR - ORD/HERL	FINAL	220	1	EPA/540/2-84-001
2318	22	SYSTEMS TO ACCELERATE IN SITU STABILIZATION OF WASTE DEPOSITS	09/01/86	- AMDURER, M., ET.AL./ENVIROSPHERE CO. - ORUBE, W./HWERL	FINAL	285	1	EPA/540/2-86/002
2319	22	TECHNOLOGY SCREENING GUIDE FOR TREATMENT OF CERCLA SOILS AND SLUDGES	09/01/88	- OSWER/OERR	FINAL	130	1	EPA/540/2-88/004
2320	22	TREATMENT TECHNOLOGY BRIEFS: ALTERNATIVES TO HAZARDOUS WASTE LANDFILLS	07/01/86	- HWERL	FINAL	35	2	EPA/600/8-86/017
** R1/FS - GROUND-WATER MONITORING & PROTECTION								
2403	24	GROUND-WATER PROTECTION STRATEGY	08/01/84	- OFFICE OF GROUND-WATER PROTECTION	FINAL	65	2	EPA/440/6-84-002

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2404	24	GUIDELINES FOR GROUND-WATER CLASSIFICATION UNDER THE EPA	12/01/86	- OFFICE OF GROUND-WATER PROTECTION	DRAFT	600	2		
2407	25	RCRA GROUND WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT (TEGD)	09/01/86	- EPA	FINAL	270	2		OSWER #9950.1
** ARARS									
3001	25	CERCLA COMPLIANCE AND OTHER ENVIRONMENTAL STATUTES	10/02/85	- PORTER, J.W./OSWER	FINAL	19	1	1) POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	OSWER #9234.0-2
3002	25	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL	08/08/88	- OERR	DRAFT	245	2		OSWER #9234.1-01
3003	25	EPA'S IMPLEMENTATION OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986	05/21/87	- THOMAS, L.M./EPA	FINAL	4	2		
3005	25	INTERIM RCRA/CERCLA GUIDANCE ON NON-CONTIGUOS SITES AND ON-SITE MANAGEMENT OF WASTE AND TREATMENT RESIDUE	03/27/86	- PORTER, J.W./OSWER	FINAL	8	2	1) COMBINING HAZARDOUS WASTE SITES FOR REM. ACTION	OSWER #9347.0-1

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2407	25	RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT(TECD) [SECONDARY REFERENCE]	09/01/86	- EPA	FINAL	270	2		OSWER #9950.1
9001	32	RCRA/CERCLA DECISIONS MADE ON REMEDY SELECTION [SECONDARY REFERENCE]	06/24/85	- KILPATRICK, M./COMPLIANCE BRANCH, OWPE	FINAL	3	2		
** WATER QUALITY									
4001	26	GUIDANCE DOCUMENT FOR PROVIDING ALTERNATE WATER SUPPLIES	02/01/88	- OERR	FINAL	64	2		OSWER #9355.3-03
4002	26	INTERIM FINAL GUIDANCE ON REMOVAL ACTION LEVELS AT CONTAMINATED DRINKING WATER SITES	10/06/87	- OSWER/OERR	FINAL	9	2		OSWER #9360.1-01
** RISK ASSESSMENT									
5000	27	ATSDR HEALTH ASSESSMENTS ON NPL SITES	06/16/86	- DEPT. OF HEALTH AND HUMAN SERVICES/ATSDR	DRAFT	14	2		
5001	27	CHEMICAL, PHYSICAL & BIOLOGICAL PROPERTIES OF COMPOUNDS PRESENT	09/27/85	- CLEMENT ASSOCIATES, INC.	FINAL	320	2		OSWER #9850.3

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		AT HAZARDOUS WASTE SITES						
5003	27	GUIDELINES FOR CARCINOGEN RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, P.33992)	09/24/86	- EPA	FINAL	13	2	
5004	27	GUIDELINES FOR EXPOSURE ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, P. 34042)	09/24/86	- EPA	FINAL	14	2	
5005	27	GUIDELINES FOR HEALTH ASSESSMENT OF SUSPECT DEVELOPMENTAL TOXICANTS (FEDERAL REGISTER, SEPTEMBER 24, 1986. P. 34028)	09/24/86	- EPA	FINAL	14	2	
5006	27	GUIDELINES FOR MUTAGENECITY RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, P. 34006)	09/24/86	- EPA	FINAL	8	2	
5007	27	GUIDELINES FOR THE HEALTH RISK ASSESSMENT OF CHEMICAL MIXTURES (FEDERAL REGISTER, SEPTEMBER 24, 1986, P.34014)	09/24/86	- EPA	FINAL	13	2	
5008	28+	HEALTH EFFECTS ASSESSMENT	09/01/84	- ORD/CHEA/ECAO	FINAL	1750	2	EPA/540/1-86/001-058

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		DOCUMENTS (58 CHEMICAL PROFILES) VOL. 28: ACETONE, ARSENIC, ASBESTOS, BARIUM, BENZO(A)PYRENE, CADMIUM, ETC.		- OSWER/OERR					
5009	31	INTEGRATED RISK INFORMATION SYSTEM (IRIS) [A COMPUTER-BASED HEALTH RISK INFORMATION SYSTEM AVAILABLE THROUGH E-MAIL--BROCHURE ON ACCESS IS INCLUDED]	/ /	- CHEA	FINAL	--	2		
5011	31	PUBLIC HEALTH RISK EVALUATION DATABASE (PHRED) [USER'S MANUAL AND TWO DISKETTES CONTAINING THE DBASEIII PLUS SYSTEM ARE INCLUDED]	09/16/88	- OERR/TOXICS INTEGRATION BRANCH	FINAL	--	2		
5013	31	SUPERFUND EXPOSURE ASSESSMENT MANUAL	04/01/88	- OERR	FINAL	160	1		OSWER #9285.5-1
5014	31	SUPERFUND PUBLIC HEALTH EVALUATION MANUAL	10/01/86	- OERR - OSWER	FINAL	500	1		OSWER #9285.4-1
5015	31	TOXICOLOGY HANDBOOK	08/01/85	- LIFE SYSTEMS, INC.	DRAFT	126	2		OSWER #9850.2

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				- TYBURSKI, T.E./OWPE					
8000	32	ENDANGERMENT ASSESSMENT GUIDANCE (SECONDARY REFERENCE)	11/22/85	- PORTER, J.W./OSWER	FINAL	11	2		OSWER #9850.0-1
** COST ANALYSIS									
6000	32	REMEDIAL ACTION COSTING PROCEDURES MANUAL	10/01/87	- JRB ASSOCIATES/CH2M HILL - ORD/MERL - OSWER/OERR	FINAL	56	1		
6001	32	REMOVAL COST MANAGEMENT MANUAL	04/01/88	- OSWER/OERR	FINAL	170	1		OSWER #9360.0-02B
** COMMUNITY RELATIONS									
7000	32	COMMUNITY RELATIONS IN SUPERFUND: A HANDBOOK (INTERIM VERSION)	06/01/88	- OERR	FINAL	188	2	1) CHAP. 6 OF THE COM. REL. HANDBOOK 11/03/88	OSWER #9230.0-03B
** ENFORCEMENT									
8001	32	INTERIM GUIDANCE ON POTENTIALLY RESPONSIBLE PARTY PARTICIPATION IN REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES	05/16/88	- PORTER, J.W./OSWER	FINAL	37	2		OSWER #9835.1A

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** NEW ADDITIONS								
9002	33	INTERIM FINAL GUIDANCE ON PREPARING SUPERFUND DECISION DOCUMENTS	06/01/89		INTERIM FINAL			OSWER #9355.3-02
9003	33	SUPERFUND GROUND WATER ISSUE: GROUND WATER SAMPLING FOR METALS ANALYSES	10/01/88	-PULS, R.W. -BARCELONA, M.J.				EPA/540/4-89/001
9005	33	GROUND WATER ISSUE: PERFORMANCE EVALUATIONS OF PUMP-AND-TREAT REMEDIATIONS	/ /	-KEELEY, J.F.				EPA/540/4-89/005
9009	33	NATIONAL OIL & HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY GUIDANCE, PART 300, 40 CFR CH. 1 (7/1/85 EDITION), pp. 664 - 755	07/01/85			92		
9010	33	SUPERFUND AMENDMENTS & REAUTHORIZATION ACT OF 1986 (SARA)	10/17/86	99TH CONGRESS OF U.S.		130		
9011	1	RISK ASSESSMENT GUIDANCE FOR SUPERFUND - VOLUME 1, HUMAN HEALTH EVALUATION MANUAL (PART A)	12/01/89		INTERIM FINAL			EPA/540/1-89/002

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9012	2	RISK ASSESSMENT GUIDANCE FOR SUPERFUND - VOLUME 2, ENVIRONMENTAL EVALUATION MANUAL	03/01/89		INTERIM FINAL			EPA/540/1-89/001A
9015		CERCLA COMPLIANCE WITH OTHER LAWS MANUAL: PART II - CLEAN AIR ACT AND OTHER ENVIRONMENTAL STATUTES AND STATE REQUIREMENTS	08/01/89		INTERIM FINAL			OSWER 9234.1-02
9019		SUPERFUND LDR GUIDE #7: DETERMINING WHEN LAND DISPOSAL RESTRICTIONS (LDRs) ARE "RELEVANT AND APPROPRIATE" TO CERCLA RESPONSE ACTIONS	12/01/89			2		OSWER 9347.3-08FS
9020		RISK ASSESSMENT GUIDANCE FOR SUPERFUND HUMAN HEALTH RISK ASSESSMENT: U.S. EPA REGION IX RECOMMENDATIONS	12/15/89		INTERIM FINAL			
9021		A GUIDE TO DEVELOPING SUPERFUND RECORDS OF DECISION	05/00/90		FACT SHEET	4		OSWER 9335.3-02FS-1
9022		GUIDANCE ON REMEDIAL INVESTIGATIONS UNDER CERCLA	06/01/85		FINAL			OSWER 9355.0-06B

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9023		GUIDANCE ON FEASIBILITY STUDIES UNDER CERCLA	06/01/85		FINAL			OSWER 9355.0-05C
9038		NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCIES PLAN: FINAL RULE, PART II, 40 CFR PART 300 (3/8/90 EDITION) pp. 8666-8865	03/08/90			200		
9042		REGION 9 ENVIRONMENTAL PROTECTION AGENCY DRINKING WATER STANDARDS AND HEALTH ADVISORY TABLE	01/91	BRUCE MACLER		27		EPA-OW-ODW