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Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R09-91/063
September 1991

EPA

Superfund Record of Decision:

Van Waters & Rogers, CA

50272-101

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Van Waters & Rogers, CA
First Remedial Action - Final

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16. Abstract (Limit: 200 words)

The 13.7-acre Van Waters & Rogers site is a commercial chemical storage, handling, and distribution facility in San Jose, California. Land use in the area is predominantly commercial and industrial. Nearby surface drainage features include Coyote Creek, approximately 1,200 feet to the east, and the Guadalupe River, approximately 6,000 feet to the west, that discharge to San Francisco Bay 9 miles to the north. Since 1976, Van Waters & Rogers has used the site for bulk chemical transfers; storage in drums and underground tanks; chemical blending, packaging, and distribution; and rinsing of containers. Surface features from which releases of organic chemicals have occurred are above-ground storage tanks, rail-mounted tank cars, drum fillers, underground storage tank (UST) fill pipe manifolds, and a hazardous waste storage area. Subsurface features include 37 USTs; subsurface product transfer piping; and the subsurface storm drain system, which eventually discharges to the Guadalupe River. Fourteen USTs are not in service and are currently empty. With the exception of one tank used to store diesel fuel, all USTs have been used to store various industrial chemicals including PCE, toluene, and xylenes. During a survey of regional hazardous waste facilities in 1982, the State

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Van Waters & Rogers, CA
First Remedial Action - Final
Contaminated Media: soil, debris, gw
Key Contaminants: VOCs (PCE, TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 48
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R09-91/063
Van Waters & Rogers, CA
First Remedial Action - Final

Abstract (Continued)

identified VOCs, selected aliphatic hydrocarbons, aromatic hydrocarbons, ketones, glycols, and alcohols in onsite soil and ground water. Potential sources of contamination include a 1977 accidental release of PCE from an above-ground 12,000-gallon tank at the loading dock and various leaks from USTs and associated piping. Van Waters & Rogers began an interim ground water remediation program in 1986 that involves ground water extraction and treatment using air stripping with onsite discharge to the storm drain. This Record of Decision (ROD) provides a final remedy for onsite contaminated soil, debris, and ground water. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including PCE and TCE.

The selected remedial action for this site includes treating approximately 8,100 cubic yards of soil "hot spots" containing more than 10 mg/kg of one or more of PCE, TCA, and TCE using in-situ vapor extraction; temporarily capping 46,000 cubic yards of soil containing greater than 1 mg/kg total VOCs, including areas containing USTs until tank removal can take place; removing USTs at a later date and investigating adjacent soil; expanding the existing upper aquifer ground water pumping and treatment system by adding an air stripping unit and converting existing monitoring wells to extraction wells, wherever possible; treating the off-gases from the new air stripping unit; treating the lower aquifer by either granular activated carbon or air stripping; discharging the treated ground water onsite to the storm drain system; monitoring soil and ground water; and implementing institutional controls including deed restrictions. The estimated present worth cost for this remedial action is $4,997,000, which includes a net present value O&M cost of $4,374,000.

PERFORMANCE STANDARDS OR GOALS: Clean-up goals for soil are intended to minimize contaminant migration to ground water. Chemical-specific initial soil goals for PCE and TCE are 10 mg/kg. Final soil goals will be 1 mg/kg for total VOCs. Chemical-specific ground water clean-up goals are based on State and Federal MCLs and risk levels, and include PCE 5 ug/l (MCL) and TCE 5 ug/l (MCL).

RECORD OF DECISION

VAN WATERS AND ROGERS

SUPERFUND SITE

SAN JOSE, CALIFORNIA

SEPTEMBER 11, 1991

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

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PART I. DECLARATION

1.0 SITE NAME AND LOCATION

Van Waters and Rogers, Inc.
2256 Junction Avenue
San Jose, California 95131

2.0 STATEMENT OF BASIS AND PURPOSE

This Record of Decision ("ROD") presents the selected remedial actions for the Van Waters and Rogers Superfund site in San Jose, California. This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. Section 9601 et. seq., and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Section 300 et. seq., ("NCP"). The attached Administrative Record Index (Attachment) identifies the documents upon which the selection of the remedial action is based. The State of California concurs with the selected remedy.

3.0 ASSESSMENT OF THE SITE

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

4.0 DESCRIPTION OF THE REMEDY

The selected remedy for the VW&R site consists of:

- Capping of entire site
- Groundwater extraction and treatment for groundwater cleanup

- o Soil vapor extraction and treatment for soil cleanup
- o Removal of underground storage tanks and additional investigation of soil around them. If additional remediation is required, the soil vapor extraction system will be expanded to include the tank area
- o Shallow aquifer groundwater monitoring
- o Deed restrictions

These remedial actions address the principal threats and principal risks remaining at the site by removing and permanently destroying the contaminants from soils and removing the contaminants from ground water, thereby significantly reducing the toxicity, mobility or volume of hazardous substances in both media. These response actions will greatly reduce the possibility of contamination of existing potable water supplies and potential future water supplies.

5.0 DECLARATION

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

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

John Wise
Deputy Regional Administrator

9.11.91
Date

PART II. DECISION SUMMARY

This Decision Summary provides an overview of the problems posed by the Van Waters & Rogers site ("VW&R" or "the site"), the remedial alternatives, and the analysis of the remedial alternatives. This Decision Summary explains the rationale for the remedy selection and describes how the selected remedy satisfies the statutory requirements.

1.0 SITE NAME, LOCATION, AND DESCRIPTION

1.1 SITE NAME AND LOCATION

Van Waters and Rogers, Inc.
2256 Junction Avenue
San Jose, California 95131

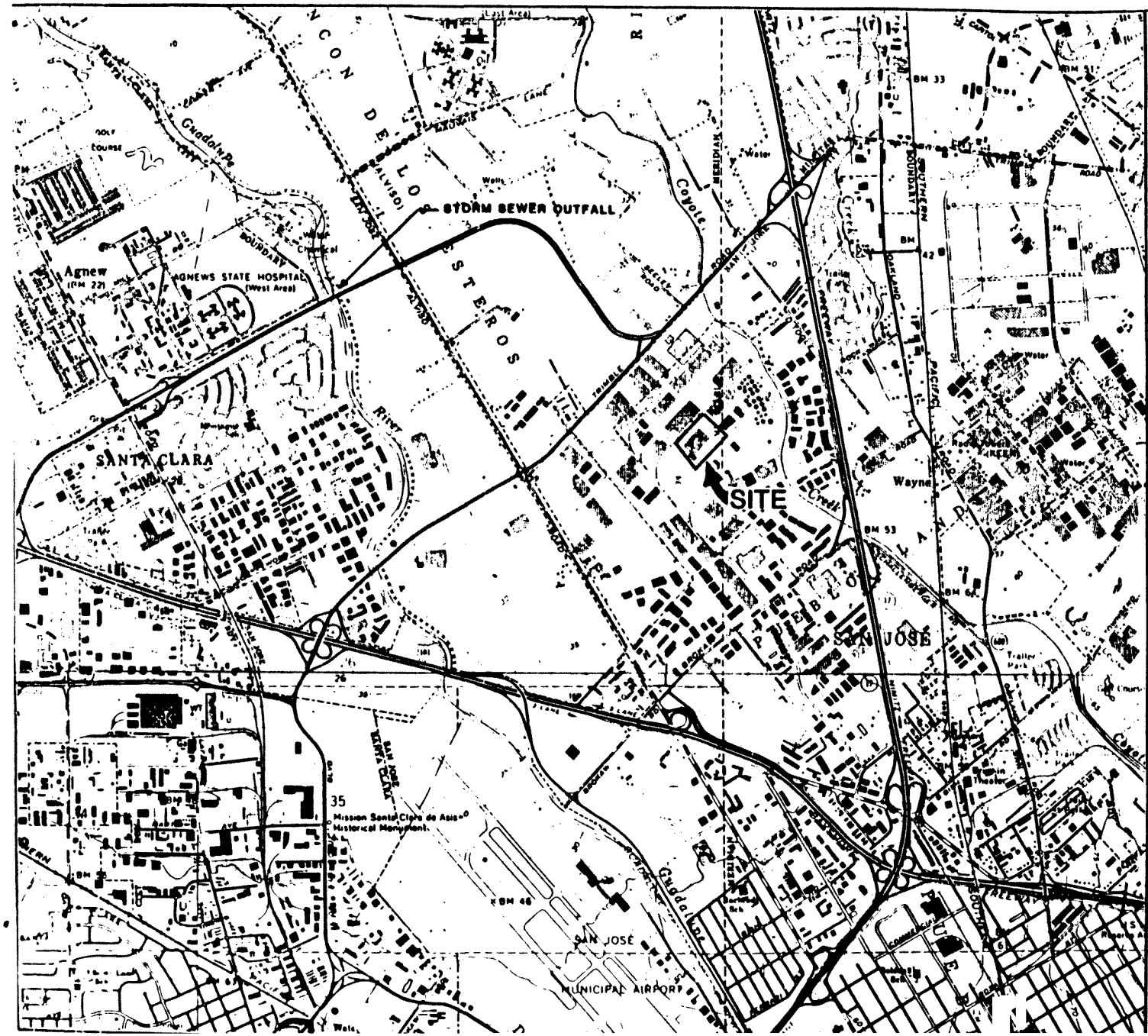
1.2 REGIONAL TOPOGRAPHY

The VW&R site is located in the Santa Clara Valley, a gently-sloping alluvial plain (Figure 1). Major topographic relief features include the Diablo Range to the northeast and the Santa Cruz and Gavilan Ranges to the southwest. Nearby surface drainage features include Coyote Creek, approximately 1200 feet to the east of the site, and the Guadalupe River, approximately 6000 feet to the west. Both of these drainage features discharge into San Francisco Bay nine miles to the north.

1.3 ADJACENT LAND USE

The 13.7 acre VW&R facility is located in a zoned commercial/ industrial area, about three miles north of downtown San Jose (Figure 2). Land use in the vicinity of the site includes road and rail transportation corridors, light to heavy manufacturing facilities, warehouse and distribution facilities, oil storage facilities, riparian habitats, and agricultural plots. Land use immediately adjacent to the site includes road and rail transportation facilities; food products packaging and distribution facilities; a consumer electronics warehouse/distribution facility; a public utility yard; several small retail outlets; and vacant lots.

The site is located within a triangle bounded by the Bayshore Freeway (U.S. Highway 101) to the west, the Nimitz Freeway (Interstate Highway 880) to the east, and Trimble Road/Montague Expressway to the north. The Santa Clara County light rail transportation corridor is located approximately 3000 feet to the west of the site. San Jose International Airport is located approximately two miles southwest of the site.



SCALE

0 2000 4000 FEET

USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)
MILPITAS, DATED 1961, PHOTOREVISED 1981
SAN JOSE WEST, DATED 1961, PHOTOREVISED
1980. SCALE = 1:24000

FIGURE 1

SITE LOCATION MAP

VAN WATERS & ROGERS, INC.
SAN JOSE, CALIFORNIA

GEOSYSTEM

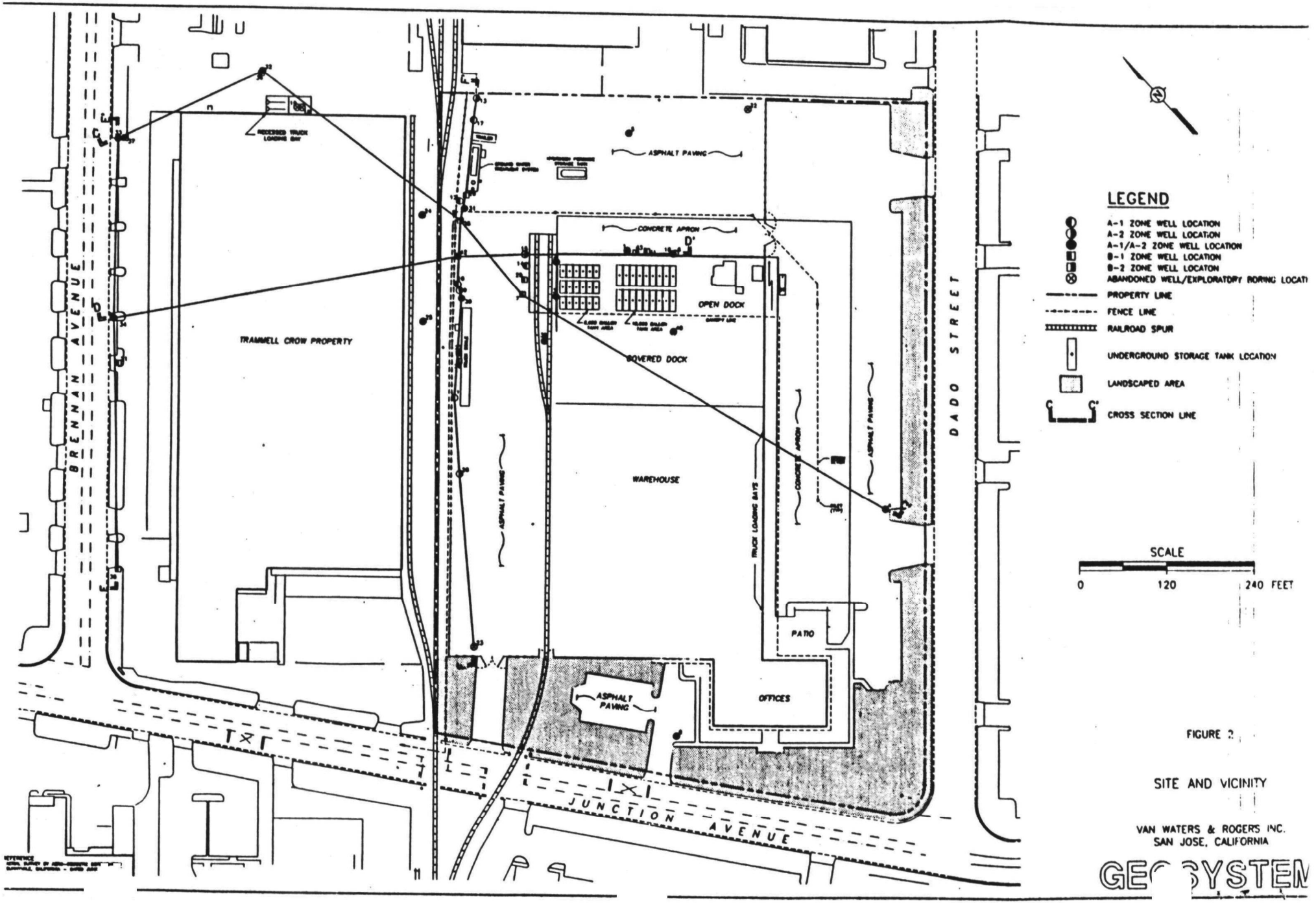


FIGURE 2

SITE AND VICINITY

VAN WATERS & ROGERS INC.
SAN JOSE, CALIFORNIA

GEO SYSTEM

The nearest residential areas are a mobile home park about 1.5 miles to the northeast (on the east side of the Nimitz Freeway) and an active farm approximately 2500 feet north of Trimble Road. A vacant lot that was formerly an agricultural plot is located immediately southeast of the site. The riparian habitats are those associated with the Guadalupe River and Coyote Creek. To the east of the site, on the west bank of Coyote Creek, is a large oil and petroleum products storage facility.

1.4 HISTORICAL LAND USE

Northern San Jose was once a predominantly agricultural area, but has been intensively developed over the last 10 to 15 years. The land on which the Van Waters & Rogers site is located was used for agricultural purposes until 1975, when the site was purchased and developed by VW&R. Van Waters & Rogers, Inc., a wholly owned subsidiary of Univar, has operated a facility at the site since 1976.

1.5 HYDROGEOLOGY

The Santa Clara Valley is a large structural depression in the Central Coastal Range of California. The Valley is filled with alluvial and fluvial deposits from the adjacent mountain ranges. These deposits are up to 1500 feet in thickness. At the base of the adjacent mountains, gently sloping alluvial fans of the basin tributaries laterally merge to form an alluvial apron extending into the interior of the basin.

The Santa Clara Valley groundwater basin in divided into two broad areas: 1) the forebay, and 2) the confined area, where the VW&R facility is located. The forebay occurs along the elevated edges of the basin where the basin receives its principal recharge. The confined area is located in the flatter interior portion of the basin and is stratified or divided into individual beds separated by significant aquitards. The confined area is divided into the upper and lower aquifer zones. The division is formed by an extensive regional aquitard that occurs at depths ranging from about 100 feet near the confined area's southern boundary to about 150 to 250 feet in the center of the confined area and beneath San Francisco Bay. The thickness of this regional aquitard varies from about 20 feet to over 100 feet.

Several aquifer systems occur in the upper aquifer zone separated by aquitards which may be leaky or very tight. The lower aquifer zone occurs beneath the practically impermeable regional aquitard. The regional aquitard occurs at approximately 100 to 150 feet below grade in the area of the VW&R site. Numerous individual aquifers occur below the aquitard in the lower aquifer zone and all groundwater in the lower aquifer is confined.

The site and vicinity is underlain by a semi-perched, shallow water-bearing zone of relatively low permeability silty clay and clayey sand, referred to as the A-aquifer. A-aquifer water level data have consistently indicated groundwater flow to the northwest. The average depth at which groundwater is encountered is about ten to 14 feet below grade; the bottom of the aquifer extends to approximately 45 feet below grade. The A-aquifer has been divided, according to soil type, into the A-1 and A-2 zones. Observations during A-aquifer tests have indicated that the hydraulic connection between the A- and B-aquifers downgradient of the open dock area at the site is limited.

The A-aquifer is underlain by the more permeable B-aquifer, which consists of the B-1 and B-2 zones; water level measurements on wells completed in the B-1 zone indicate groundwater flows to the northwest. The average thickness of the B-1 zone is estimated to be about 28 feet. Based on stratigraphy encountered in some wells and borings in the B-2 zone, it appears that the B-2 zone is separated from the overlying B-1 zone by a relatively thin stratum of stiff, gray-brown, sandy or clayey silt. Pump tests in wells along the northern site boundary have indicated that the saturated thickness of the B-1- and B-2-zones is approximately 45 feet.

1.6 WATER USE

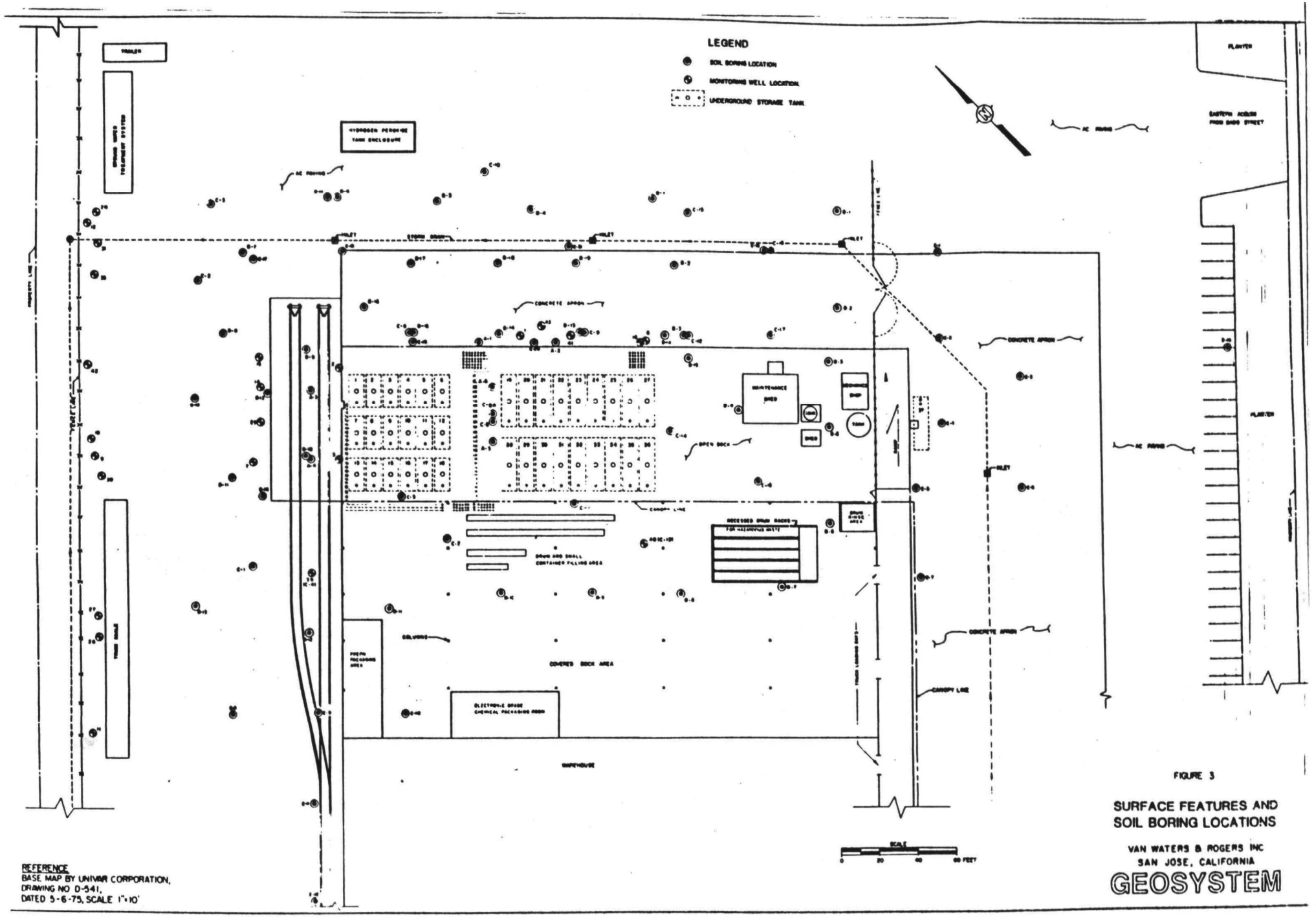
The nearest municipal water supply wells are in the Breeding Avenue Well Field operated by the City of San Jose, about 2000 feet east-southeast and hydraulically upgradient of the site. Other wells are located to the north of Trimble Road, about 2500 feet to the north of the site. The majority of the active water-producing wells in the vicinity extract water from aquifers well beneath the A- and B- aquifers. Although the Santa Clara Valley was historically a predominantly agricultural area, no active or inactive agricultural wells have been identified in the area immediately downgradient from the site.

The mobile home park located 1.5 miles to the northeast of the VW&R site is served by a municipal water supply system. The farm residence and other agricultural holdings north of the site are serviced by individual domestic water supply wells.

1.7 SURFACE AND SUBSURFACE STRUCTURES

The most prominent feature of the 13.7 acre site is a large, single story warehouse structure (Figure 3). The eastern side of the warehouse features a covered dock and an open dock. The remainder of the site is either paved or landscaped. Reinforced concrete aprons adjoin the loading bays along the south side of the building and the elevated, open dock on the east side of the warehouse.

Other prominent surface features include a rail spur along the north side of warehouse building; a rail spur along the northern site boundary; a 13,500-gallon capacity, aboveground hydrogen peroxide storage tank surrounded by a concrete secondary containment wall; a truck scale; a groundwater treatment system;



REFERENCE
BASE MAP BY UNIVAR CORPORATION,
DRAWING NO D-541,
DATED 5-6-75, SCALE 1"=10'

FIGURE 3

SURFACE FEATURES AND
SOIL BORING LOCATIONS

VAN WATERS & ROGERS INC
SAN JOSE, CALIFORNIA

GEOSYSTEM

and a portable office trailer. The portion of the site in which commercial operations are concentrated is fenced and is accessed via two gates.

Surface features from which releases of organic chemicals to the surface and/or subsurface environment could potentially have occurred include aboveground storage tanks, rail-mounted tank cars, the drum fillers, the underground storage tank fill pipe manifolds, and the hazardous waste storage area. Subsurface features include underground storage tanks, subsurface product transfer piping, and the subsurface storm drain system.

The facility contains 37 underground storage tanks with capacities of 6000- and 10,000-gallons. All but one of the underground storage tanks are located beneath the elevated open dock. The remaining tank, which stores diesel fuel, is located beneath the concrete truck apron near the ramp leading to the open dock. Subsurface product transfer piping for the 36 chemical storage tanks is located beneath the open dock. In general, the subsurface product transfer pipes run from the two manifolds on the eastern edge of the open dock to the 36 underground chemical storage tanks, and then to the main manifold near the drum filling station. Product transfers are achieved using portable, aboveground pumps.

Other underground product transfer pipes are associated with the underground diesel fuel storage tank and the aboveground hydrogen peroxide storage tank. The subsurface piping associated with the diesel tank runs from the tank to the nearby dispenser island, a distance less than 10 feet. The subsurface piping associated with the hydrogen peroxide tank runs from the tank to the open dock area.

The on-site storm drain system consists of a subsurface concrete pipe served by five on-site inlet boxes. There are two additional inlet boxes within the 15-foot railroad easement. The most easterly of these receives the effluent from the groundwater treatment system. The storm drain system eventually discharges to the Guadalupe River, immediately downstream of the Montague Expressway overpass.

Runoff from chemical storage/handling areas is prevented from entering the storm drain inlets near the concrete apron by concrete berms around the drain inlets.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 HISTORY OF SITE ACTIVITIES

VW&R is a commercial chemical storage, handling and distribution facility that has been in operation since 1976. Principal operations and activities at the site include bulk chemical transfers between tank trucks, railroad tank cars, and underground storage tanks; chemical storage in drums and underground tanks; chemical blending, packaging, and distribution; and rinsing of containers.

Fourteen of the underground storage tanks have been taken out of service and are currently empty. With the exception of one tank used for diesel fuel storage, VW&R presently uses, or has used in the past the tanks to store the following industrial chemicals: 1,1,1-trichloroethane (TCA), methylene chloride, tetrachloroethylene (PCE), selected aliphatic hydrocarbons, aromatic hydrocarbons (including xylene and toluene), ketones, glycols, and alcohols.

2.2 HISTORY OF SITE INVESTIGATIONS

Subsurface investigations at the VW&R site began in December 1982, following the California Regional Water Quality Control Board (RWQCB) survey of facilities in the San Francisco Bay Region known to handle hazardous materials and waste. Site investigations have been performed in phases by several consultants for VW&R since then under orders from the RWQCB.

Subsurface investigations initiated at the site in December 1982 revealed the presence of various industrial chemicals in the soil and groundwater at the facility. These chemicals included TCA, trichloroethylene (TCE), PCE, 1,1-dichloroethane (DCA), 1,1- and 1,2-dichloroethylene (DCE), methylene chloride, vinyl chloride, toluene, xylene, ketones, and alcohol. The highest concentrations are located north of the open dock, the area where most chemical handling has occurred.

2.3 HISTORY OF ENFORCEMENT ACTIONS

On October 2, 1984, the Environmental Protection Agency (EPA) proposed adding the VW&R site to the National Priorities List (NPL), subject to regulation under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Amendments to the Resource Conservation and Recovery Act (RCRA) by the Hazardous and Solid Waste Amendments (HSWA) of 1984 greatly expanded RCRA corrective action authorities. Pursuant to HSWA, EPA dropped the VW&R site from the list of proposed NPL sites in October 1989. As a RCRA Storage Facility, VW&R is subject to the corrective action authorities of Subtitle C of RCRA.

Under the South Bay Multi-Site Cooperative Agreement between EPA and the RWQCB, the RWQCB has been acting as the lead regulatory agency for this site. The following orders and permits have been adopted or issued for the VW&R site:

- Site Cleanup Requirements Order No. 85-87, adopted July 17, 1985
- Bay Area Air Quality Management District (BAAQMD) operating permit No. 31053, issued February 13, 1986
- Waste Discharge Requirements Order No. 87-6 (NPDES No. CA0028991), adopted February 18, 1987
- Site Cleanup Requirements Order No. 89-018 (rescinding Order No. 85-87), adopted January 18, 1989

3.0 COMMUNITY RELATIONS

The RWQCB has maintained an aggressive Community Relations program for the VW&R site. The RWQCB published a notice in the July 10, 1991 and July 17, 1991 issues of the San Jose Mercury News announcing the proposed final Remedial Action Plan and opportunity for public comment at the RWQCB Hearing of July 17, 1991 in Oakland, California, and announcing the opportunity for public comment at an evening community meeting at City Hall in San Jose on July 18, 1991. No members of the public attended the meeting. A presentation of the proposed final cleanup plan was made at the July 17, 1991 RWQCB Hearing. The 30-day comment period was from July 17, 1991 until August 16, 1991.

Fact sheets were mailed to interested residents, local government officials, and media representatives. Fact Sheet 1, mailed in December 1989, summarized the pollution problem, the results of investigations to date, and the interim remedial actions. Fact Sheet 2, mailed in July 1991, described the cleanup alternatives that were evaluated and explained the Proposed Plan for final site remedial actions. It also announced opportunities for public comment at the Board Hearing of July 17, 1991 in Oakland and at the Public Meeting of July 18, 1991 in San Jose and described the availability of further information at the Information Repository at the City of San Jose Public Library. The Responsiveness Summary summarizes responses to significant comments received during the public comment period. Fact Sheet 3, to be mailed in September 1991, will explain the final cleanup plan adopted by the RWQCB.

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION

4.1 SCOPE OF THE RESPONSE ACTION

The remedy selected and described in this ROD includes continuation and expansion of existing interim remedial actions as well as additional remedial actions selected for the VW&R site.

4.1.1 INTERIM REMEDIAL MEASURES

VW&R began an interim groundwater remediation program in December 1986. The program currently includes groundwater extraction from six A-aquifer wells and one B-1 zone well. The A-1 zone Well 14, which was initially used as an extraction well, was shut down on November 10, 1988 because of repeated dewatering due to its proximity to A-2 zone extraction Well 15. The average total extraction rates in 1987, 1988 and 1989 were 11.3, 16.5 and 19.1 gallons per minute (gpm).

Extracted groundwater is currently treated by air stripping and discharged to the storm drain system via NPDES permit. The original groundwater treatment system included an air stripping unit and a bio-oxidation unit in series. Based on the air stripping unit effluent quality and the economic inefficiency of the bio-oxidation unit, VW&R requested and received approval from

the RWQCB to eliminate the bio-oxidation unit from the groundwater treatment system. VW&R removed the bio-oxidation unit from service in early July 1990.

The capture zone created by the existing extraction wells appears to be effectively containing the groundwater contamination plume below the VW&R site.

4.1.2 SELECTED REMEDY

The selected groundwater remedy for VW&R consists of expanded groundwater extraction and treatment by air stripping; monitoring; and institutional controls. Additional A-aquifer extraction wells will be installed near the open dock and northern site boundary. The total groundwater pumping rate from the A-aquifer will be 40 gpm. Additional B-aquifer extraction wells will be installed near the open dock and hydraulically downgradient of the rail spur. The total groundwater pumping rate from the B-aquifer will be 100 gpm.

Due to accessibility problems in the area of the underground tanks, soil will be remediated in two phases. Because of this, both initial and final cleanup requirements have been established for soils. Immediate requirements are for temporary capping of the entire site (until the underground tanks can be excavated); treatment of soil "hot spot" areas by in-situ soil vapor extraction (ISVE); and institutional controls. Final soil requirements include continued ISVE; and investigation and cleanup as necessary in and around the underground tank farm when these areas become accessible. Treated groundwater will continue to be discharged under NPDES permit to the storm drain system. The air stripper and ISVE treatment will include air emissions control if emissions exceed levels permitted by the BAAQMD.

4.2 ROLE OF THE RESPONSE ACTION

The selected remedy addresses the risks posed by contaminated groundwater in the upper aquifer zone and the principal threats posed by contaminated soils on site. The principal threats are: further lateral migration of the groundwater contamination plume emanating from the VW&R site; potential vertical migration of contaminated groundwater into the lower aquifer zone; and migration of contaminants from onsite soil into groundwater.

The objective of the selected remedy is to remove and permanently destroy the contaminants from both soils and groundwater or to significantly reduce the toxicity, mobility or volume of hazardous substances in both media. The selected response actions will greatly reduce the possibility of contamination of current and potential water supplies.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 SOURCES OF CONTAMINATION

The potential sources investigated at the VW&R site include an accidental release of PCE from an aboveground 12,000-gallon blend tank in 1977 at the loading dock and leaks from underground storage tanks and associated piping. Soil and groundwater investigations indicated the distribution of PCE and other volatile organic compounds (VOCs) located in the vicinity of the loading dock.

5.2 DESCRIPTION OF CONTAMINATION

5.2.1 SUBSURFACE STRUCTURES/SOIL INVESTIGATIONS

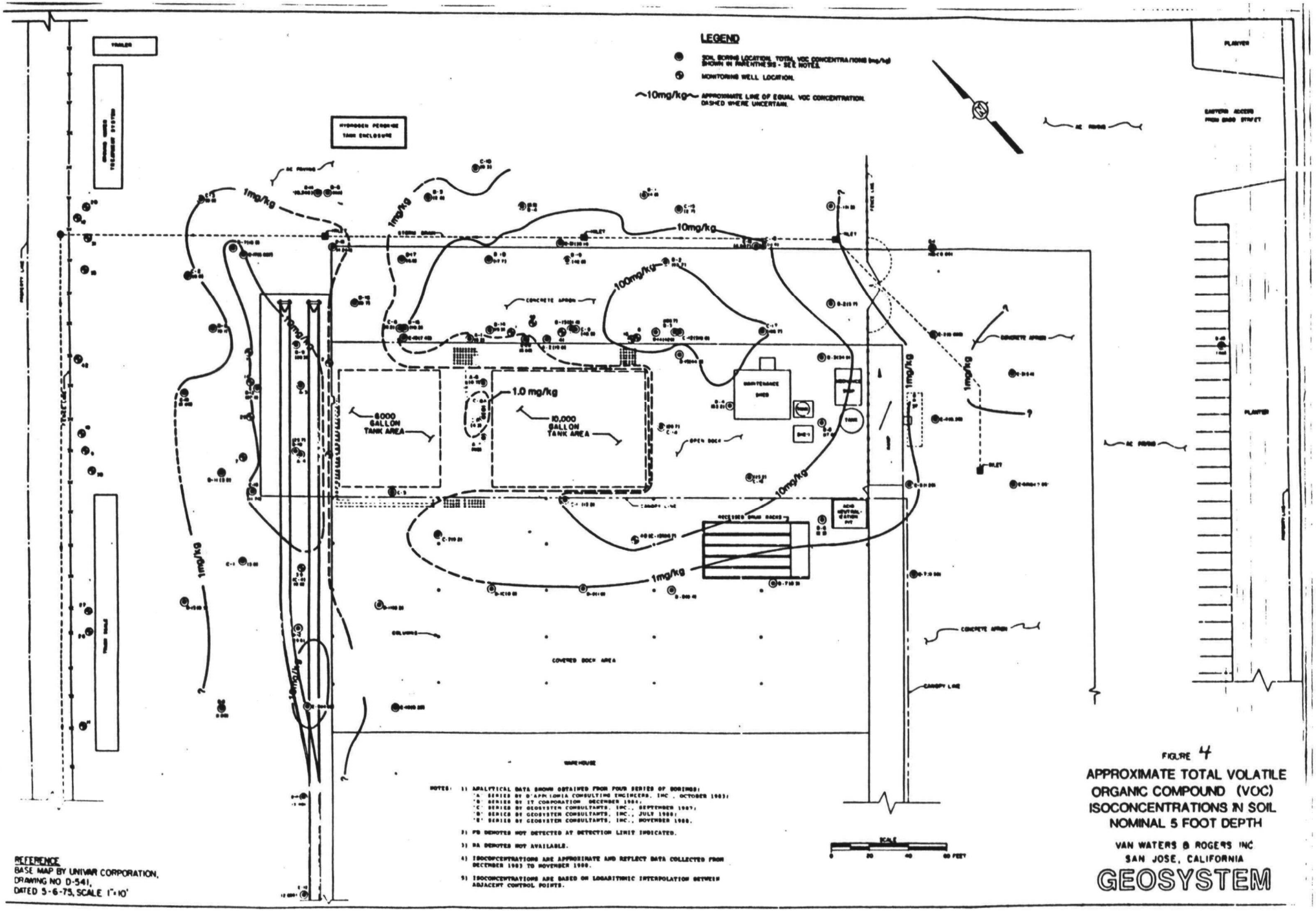
The highest VOC concentrations in soil are located along the northern edge of the loading dock and near the rail spur. Soil VOC contamination extends approximately 50 - 80 feet north and east of the loading dock. Soil in the area of the loading dock contains VOCs in concentrations in excess of 100 ppm. Figures 4 and 5 illustrate the areas of total VOC concentrations in soil at 5-foot and 10-foot depths, respectively. These chemical isoconcentration contours are based on five sets of soil quality data collected over a five-year period from October 1983 to November 1988.

The volume of soil containing greater than 1 ppm total VOCs is approximately 46,000 cu. yds.; the volume of soil at greater than 100 ppm total VOCs is approximately 830 cu. yds. PCE is the most widespread VOC in soil. The volume of soil containing greater than 1 ppm PCE is approximately 21,100 cu. yds.

Fourteen of the 37 underground storage tanks have been emptied and taken out of service based on the results of tank integrity tests; however, the tanks remain in place. Areas located immediately adjacent to and underneath the underground storage tanks are currently inaccessible and have not been fully characterized. The selected remedy includes removal of the underground storage tanks by 1996. At that time, additional investigations will define the extent of any contamination in the area.

5.2.2 GROUNDWATER INVESTIGATIONS

Groundwater contamination at the VW&R site is limited to the upper aquifer zone (the A-aquifer and the upper portion of the B-aquifer). The groundwater contamination plume measures approximately 500 feet by 500-800 feet laterally and extends to a depth of 80 feet. As with soil contamination at the site, PCE is the VOC detected most frequently and in the highest concentrations. Figure 6 provides PCE isoconcentration contours in the A-aquifer. The highest VOC concentrations are present in those wells in or adjacent to the open dock and rail spur areas. Concentrations of VOCs in the A-aquifer near the open dock have exceeded 10,000 ppb for PCE. The maximum concentration of PCE has been 55,000 ppb in the area of the loading dock.



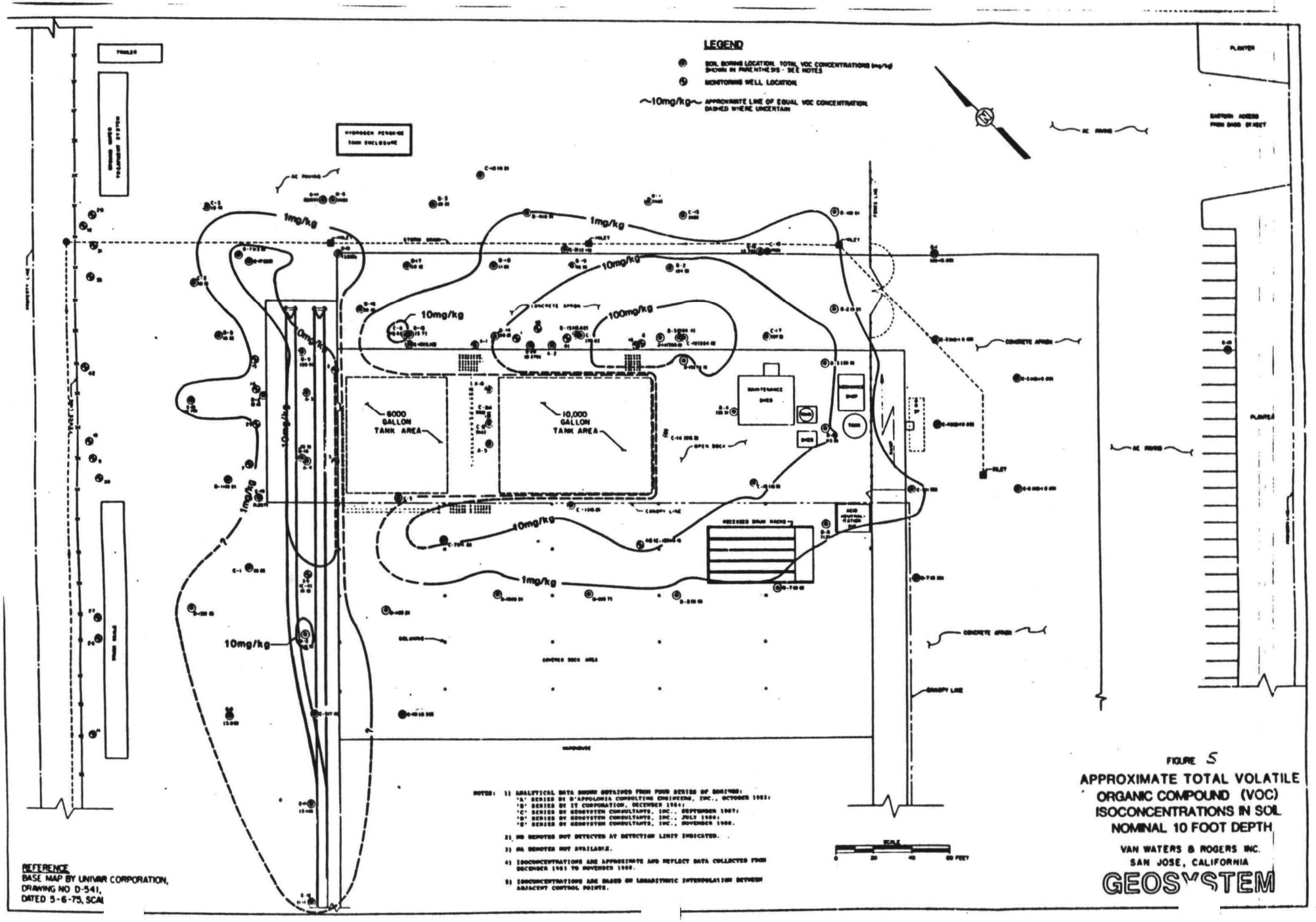
NOTES:
1) ANALYTICAL DATA SHOWN OBTAINED FROM FOUR SERIES OF BORINGS:
'A' SERIES BY D'APPOLONIA CONSULTING ENGINEERS, INC., OCTOBER 1983;
'B' SERIES BY IT CORPORATION DECEMBER 1984;
'C' SERIES BY GEOSYSTEM CONSULTANTS, INC., SEPTEMBER 1987;
'D' SERIES BY GEOSYSTEM CONSULTANTS, INC., JULY 1988;
'E' SERIES BY GEOSYSTEM CONSULTANTS, INC., NOVEMBER 1988.
2) ND DENOTES NOT DETECTED AT DETECTION LIMIT INDICATED.
3) NA DENOTES NOT AVAILABLE.
4) ISOCONCENTRATIONS ARE APPROXIMATE AND REFLECT DATA COLLECTED FROM DECEMBER 1983 TO NOVEMBER 1988.
5) ISOCONCENTRATIONS ARE BASED ON LOGARITHMIC INTERPOLATION BETWEEN ADJACENT CONTROL POINTS.

REFERENCE
BASE MAP BY UNIVAR CORPORATION, DRAWING NO D-541, DATED 5-6-75, SCALE 1"=10'

FIGURE 4
APPROXIMATE TOTAL VOLATILE ORGANIC COMPOUND (VOC) ISOCONCENTRATIONS IN SOIL NOMINAL 5 FOOT DEPTH

VAN WATERS & ROGERS INC
SAN JOSE, CALIFORNIA

GEOSYSTEM



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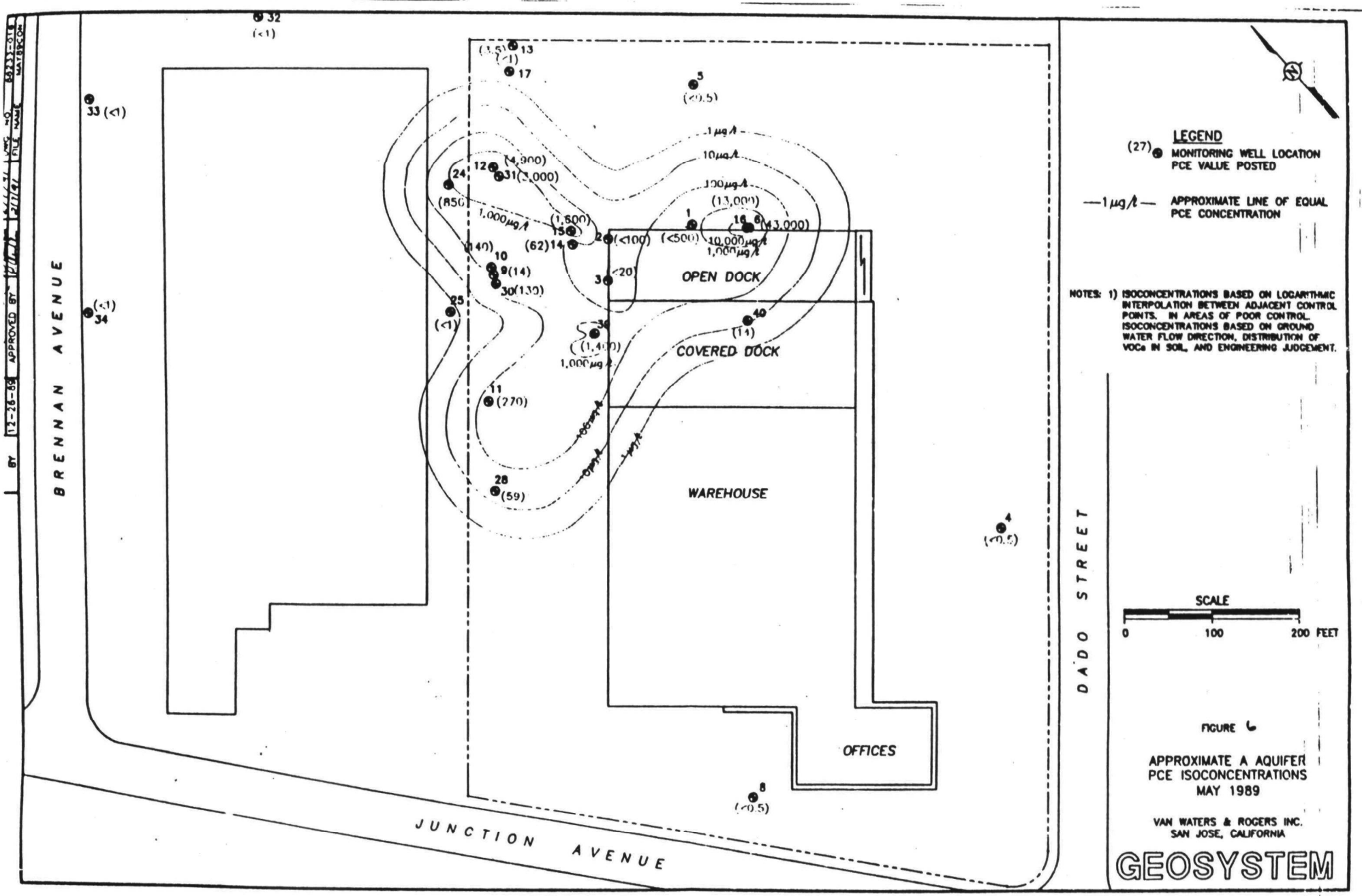
REFERENCE
BASE MAP BY UNIVAR CORPORATION,
DRAWING NO D-541,
DATED 5-6-75, SCAL

FIGURE 5
APPROXIMATE TOTAL VOLATILE ORGANIC COMPOUND (VOC) ISOCONCENTRATIONS IN SOIL NOMINAL 10 FOOT DEPTH
VAN WATERS & ROGERS INC.
SAN JOSE, CALIFORNIA
GEOSYSTEM


BRENNAN AVENUE
JUNCTION AVENUE
DADO STREET
OPEN DOCK
COVERED DOCK
WAREHOUSE
OFFICES
LEGEND
(27) MONITORING WELL LOCATION PCE VALUE POSTED
—1 µg/l— APPROXIMATE LINE OF EQUAL PCE CONCENTRATION
NOTES: 1) ISOCONCENTRATIONS BASED ON LOGARITHMIC INTERPOLATION BETWEEN ADJACENT CONTROL POINTS. IN AREAS OF POOR CONTROL, ISOCONCENTRATIONS BASED ON GROUND WATER FLOW DIRECTION, DISTRIBUTION OF VOCs IN SOIL, AND ENGINEERING JUDGEMENT.
SCALE
0 100 200 FEET
FIGURE 6
APPROXIMATE A AQUIFER
PCE ISOCONCENTRATIONS
MAY 1989
VAN WATERS & ROGERS INC.
SAN JOSE, CALIFORNIA
GEOSYSTEM

VW&R has completed 26 groundwater monitoring and extraction wells in the A-aquifer. The lateral extent of the groundwater contamination plume is within VW&R's property boundaries except at the western edge, where the plume extends approximately 100 to 150 feet beneath the adjacent property. The western boundary of the plume in the A-aquifer requires additional definition; extraction of groundwater at Well 28 in this area as part of the selected remedy is expected to help to define this boundary. The plume has also migrated slightly beyond the northern boundary of the site, but at concentrations below cleanup standards.

There are 10 monitoring and extraction wells in the B-1 zone and three in the B-2 zone of the B-aquifer. The maximum concentration of PCE detected in the upper portion of the B-aquifer is 1100 ppb, again from a well in the area of the loading dock. The boundary of the plume in the B-1 zone is relatively well defined except in the area of the rail spur located near the open dock and north/northwest of the underground storage tanks. Implementation of the groundwater extraction system in the B-1 zone is expected to help define the plume boundary in this area. The current plume definition in both the A- and B-aquifers is sufficient to select a final groundwater remedy. Additional monitoring well(s) may be needed for long-term plume definition and monitoring.

Table 1 lists average and maximum concentrations for chemicals of concern in soil and groundwater at the VW&R site.

6.0 SUMMARY OF SITE RISKS

6.1 TOXICITY ASSESSMENT

The Baseline Public Health Evaluation (BPHE) conducted for the VW&R site identified twenty compounds as the primary compounds of interest. From these, the following eight chemicals of concern in soil and groundwater at the site were identified:

acetone
1,1-dichloroethylene (1,1-DCE)
cis-1,2-dichloroethylene (cis-1,2-DCE)
methylene chloride
tetrachloroethylene (PCE)
1,1,1-trichloroethane (1,1,1-TCA)
trichloroethylene (TCE)
vinyl chloride

The following criteria were used to select chemicals of concern at the VW&R site:

- Frequency of detection. Typically, when at least twenty samples are available, chemicals detected in less than five percent of the samples are not considered to be of concern. At the VW&R site, some chemicals were sampled infrequently (e.g., less than 20 samples) and these chemicals were included as chemicals of concern in the risk assessment.

TABLE 1

CHEMICALS OF CONCERN AT VAN WATERS & ROGERS

Chemical	Mean*	Maximum Concentration	Frequency of Detection
Soil:	(ppm)	(ppm)	
Acetone	11	500	16/26
1,1-Dichloroethylene	0.5	24	81/209
1,2-Dichloroethylene (cis/trans)	0.6	7.5	33/134
Methylene chloride	5.4	210	33/150
Tetrachloroethylene	2.6	250	144/210
1,1,1-Trichloroethane	0.7	997	112/209
Trichloroethylene	0.9	37	103/209
Vinyl chloride	0.5	1	6/150
A-Aquifer Groundwater:	(ppb)	(ppb)	
Acetone	1,900	74,000	12/103
1,1-Dichloroethylene	240	56,000	84/180
1,2-Dichloroethylene (cis/trans)	680	38,000	121/180
Methylene chloride	36,000	670,000	28/180
Tetrachloroethylene	610	96,000	124/180
1,1,1-Trichloroethane	230	430,000	121/180
Trichloroethylene	170	40,000	100/180
Vinyl chloride	420	66,000	72/180
B-Aquifer Groundwater:			
Acetone	18	34	2/95
1,1-Dichloroethylene	4.0	1,100	12/106
1,2-Dichloroethylene (cis/trans)	9.1	170	9/106
Methylene chloride	8.9	14	4/106
Tetrachloroethylene	40	3,300	41/106
1,1,1-Trichloroethane	9.8	1,500	44/106
Trichloroethylene	8.9	1,600	31/106
Vinyl chloride	2.5	2.5	1/106

* Geometric mean of detects only

- Historical use. Chemicals that were used or stored on site or were reported to have been spilled or leaked from underground storage tanks may be selected as chemicals of concern. Chemicals that have been stored on site and detected in environmental media at the VW&R site include acetone, ethylene glycol, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, tetrachloroethylene, toluene, 1,1,1-trichloroethane, and xylenes.

- Toxicity. Chemicals for which available information indicated low toxicity, and which are present in low concentrations compared to the other chemicals present, were not selected as chemicals of concern. Chemicals for which EPA has not established toxicity criteria for human health were also not considered as chemicals of concern. All Group A and B carcinogens were included in BPHE calculations.

6.2 EXPOSURE ASSESSMENT

The BPHE identified and evaluated exposure pathways for both the current land use condition and for hypothetical future land use conditions. Assessment of potential risk under the current land use scenario was conducted to determine the degree that chemical residues currently present in soil and groundwater at the site may impact the health of humans who currently live or work at or in the vicinity of the site. Assessment of potential risk under the future land use scenario was conducted with the assumptions that the site and vicinity would be converted to a typical residential area and that the population will use the upper aquifer ground water as a potable domestic water supply.

Through a process of identifying and evaluating all of the potential exposure pathways associated with the contamination, the BPHE process identified complete exposure pathways at the site. A complete exposure pathway has four components: a source and mechanism of chemical release to the environment, an environmental transport medium (e.g., air, soil), a potential human exposure point, and a likely route of human exposure (e.g., inhalation). No complete exposure pathways were identified for current use conditions. The two exposure pathways that were identified as potentially complete for future land use were ingestion and inhalation of shallow groundwater from the A-aquifer and B-1 zone underlying the site.

Under current land use conditions, the groundwater underlying the site is not used for any purposes and has not impacted deeper aquifer regions used for drinking water. Direct contact with contaminated soil and wind erosion of soil contaminants are not likely to occur since the site is paved. Release of soil contaminants to ambient air by volatilization is also unlikely under current conditions. Since the site is paved and underlain by clay, the upward migration of volatile contaminants is considered unlikely.

Under future use conditions, the VW&R site could be developed as commercial or residential property. If this were to occur without

remediation of the site, on-site workers and residents could be exposed to site contaminants. Conversion of the property to residential uses is less likely than conversion to other industrial or commercial uses, due to the industrial nature of the adjacent properties. However, residential uses would lead to higher potential exposures than would commercial uses, due to the potential for greater frequency of exposure to contaminated media. In addition, the residential population could also include more sensitive individuals such as asthmatics, young children and the elderly. For these reasons, residential use scenarios were developed to provide a conservative indicator of potential future risks from site contamination.

An additional pathway of potential concern could result from exposure to VOCs migrating to the surface from contaminated groundwater. This exposure pathway is currently considered an unlikely health risk. The risks from the emission of contaminants from the subsurface are currently difficult to quantify and a formal risk assessment of this pathway for a worst case future residence was not conducted. There are currently no residences above or in the immediate vicinity of the plume. As noted above, it is unlikely that future residences will be built above the plume since this area is not currently zoned for residential development. Deed restrictions on the VW&R property as part of the selected remedy will prevent residential development above the groundwater contamination plume. This pathway will be evaluated at the time of the five-year review (as discussed in Section 10.0) using EPA-approved methodology currently under development.

Under a future use risk scenario, two exposure pathways were evaluated for groundwater: 1) inhalation exposure to compounds from the A-aquifer and B-1 zone during showering or bathing, and 2) ingestion of 2 liters of A-aquifer and B-1 zone groundwater every day for 30 years. Dermal exposure to chemicals in household water was considered to be minimal in comparison to inhalation and ingestion, and was not evaluated as a significant route of exposure. The average exposure to each chemical contaminant was based on the mean of all values reported above the detection limit for samples collected from June 1986 to December 1988.

6.3 RISK CHARACTERIZATION

Table 2 summarizes the potential human health risks at the VW&R site (Upperbound Lifetime Excess Cancer Risk Numbers and non-carcinogenic Hazard Indices associated with future exposures to chemicals in groundwater and soil).

To be protective of human health, concentrations of chemicals that have been determined to cause or are suspected to potentially cause cancer, based on animal studies, must be reduced. The concentrations must be at a level such that ingestion of 2 liters of water containing the chemicals, everyday for 30 years, can theoretically be expected to produce no more than one excess cancer incidence per ten thousand adults (a risk of 1×10^{-4}) to one excess cancer incidence per one million adults (a risk of 1×10^{-6}). This Carcinogenic Risk Range is considered an appropriate risk range for

TABLE 2

SUMMARY OF SITE RISKS

	Total Upperbound Lifetime Excess Cancer Risks		Noncarcinogenic Hazard Index	
	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case
Current Use Scenario:				
No complete exposure pathways				
Future Use Scenario:				
Groundwater Ingestion:				
A-Aquifer	2×10^{-3}	6×10^{-3}	> 1 (10)	> 1 (10)
B-1 Zone	4×10^{-5}	1×10^{-2}	< 1	> 1 (20)
Inhalation of Groundwater Contaminants:				
A-Aquifer	4×10^{-4}	1×10^{-3}	1	1
B-1 Zone	2×10^{-5}	2×10^{-2}	< 1	< 1

cleanup actions. The sum of Upperbound Lifetime Excess Cancer Risk Numbers for all chemicals of concern must fall within this range.

For non-carcinogenic chemicals, hazard indices are calculated by dividing the amount of each chemical that a person might be exposed to over time (the Chronic Daily Intake) by the level for each chemical above which adverse health effects may occur (the Reference Dose). The sum of these ratios for all the chemicals of concern is the Hazard Index (HI). A HI of 1 or less means that no adverse health effects should occur from drinking water.

Under the future risk scenario, the total average case carcinogenic risk from VOCs in A-Aquifer groundwater at the VW&R site was calculated at 2.4×10^{-3} and the total plausible maximum case calculated at 7×10^{-3}. The total non-carcinogenic Hazard Index (HI) for VOCs from use of shallow groundwater was greater than 1 for either average or maximum case scenarios.

6.3 PRESENCE OF SENSITIVE HUMAN POPULATIONS

As noted earlier, the VW&R site is located in an exclusively industrial/commercial zoned area. There are no residences overlying the contaminant plume. There are also no public parks, schools, hospitals, or convalescent homes within or near the plume boundaries. The nearest residences are a mobile home park approximately 1.5 miles to the northeast and a farm approximately 2500 feet to the north/northwest.

6.4 PRESENCE OF SENSITIVE ECOLOGICAL SYSTEMS

The VW&R site is located in an industrial area with little native vegetation or wildlife. Nearby aquatic environments include the Guadalupe River, which receives surface runoff from the site and treated groundwater discharged under an NPDES permit into the storm drain system tributary to the river. Surface runoff from chemical storage/handling areas is prevented from entering the storm drain inlets near the concrete apron by concrete berms around the drain inlets. Established limits under the NPDES permit are intended to protect aquatic life. Thus, no adverse impacts are expected on aquatic populations in the Guadalupe River.

Coyote Creek is closer to the site than the Guadalupe River; however, based on topography and the configuration of the storm drain system, Coyote Creek is not affected by activities at the site. Both the Guadalupe River and Coyote Creek discharge into San Francisco Bay, approximately nine miles away from the site.

For terrestrial animals or birds, potential impact from exposure to surface water is not expected to be significant due to the nature of the chemicals and those of the species. Bioaccumulation in the food chain is not likely to be significant. The VW&R site and immediate vicinity does not constitute critical habitat for endangered species nor does it include or impact any wetlands.

6.5 CONCLUSION

Actual or threatened releases of hazardous substances from the VW&R site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health, welfare or environment. Based on the fact that a variety of the VOCs detected at the site pose significant health risks as carcinogens or noncarcinogens and that complete exposure pathways exist, EPA has determined that remediation is warranted.

7.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Under Section 121(d)(1) of CERCLA, § 9621, remedial actions must attain a degree of clean-up which assures protection of human health and the environment. Additionally, remedial actions that leave any hazardous substance, pollutant, or contaminant on-site must meet a level or standard of control that at least attains standards, requirements, limitations, or criteria that are "applicable or relevant and appropriate" under the circumstances of the release. These requirements, known as "ARARs", may be waived in certain instances, as stated in Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4).

"Applicable" requirements are those clean-up standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant or contaminant, remedial action, location, or other circumstance at a CERCLA site. "Relevant and appropriate" requirements are clean-up standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well- suited to the particular site. For example, requirements may be relevant and appropriate if they would be "applicable" but for jurisdictional restrictions associated with the requirement. See the National Contingency Plan, 40 C.F.R. Section 300.6, 1986).

The determination of which requirements are "relevant and appropriate" is somewhat flexible. EPA and the State may look to the type of remedial actions contemplated, the hazardous substances present, the waste characteristics, the physical characteristics of the site, and other appropriate factors. It is possible for only part of a requirement to be considered relevant and appropriate. Additionally, only substantive requirements need be followed. If no ARAR covers a particular situation, or if an ARAR is not sufficient to protect human health or the environment, then non-promulgated standards, criteria, guidance, and advisories must be used to provide a protective remedy.

7.1 TYPES OF ARARS

There are three types of ARARs. The first type includes "contaminant specific" requirements. These ARARs set limits on concentrations of specific hazardous substance, pollutants, and contaminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards. The second type of ARAR includes location-specific requirements that set restrictions on certain types of activities based on site characteristics. These include restriction on activities in wetlands, floodplains, and historic sites. The third type of ARAR includes action-specific requirements. These are technology- based restrictions which are triggered by the type of action under consideration. Examples of action-specific ARARs are Resource Conservation and Recovery Act ("RCRA") regulations for waste treatment, storage, and disposal.

ARARs must be identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as remedies.

7.2 CHEMICAL-SPECIFIC ARARS AND TBCS

Section 1412 of the Safe Drinking Water Act, 42 U.S.C. Section 300(g)(1)

Under the authority of Section 1412 of the Safe Drinking Water Act, Maximum Contaminant Level Goals (MCLGs) that are set at levels above zero, shall be attained by remedial actions for ground or surface water that are current or potential sources of drinking water, where the MCLGs are relevant and appropriate under the circumstances of the release based on the factors in §300.400(g)(2).

The appropriate remedial cleanup standard for each chemical of concern (except acetone) in groundwater is the MCLG (if not equal to zero), the federal MCL, or the state MCL, whichever is most stringent. As there is no chemical-specific ARAR or TBC for acetone, a cleanup standard was calculated using a risk-based approach.

California Department of Health Services Drinking Water Action Levels (DWALs)

California Department of Health Services (DHS) DWALs are health-based concentration limits set by the DHS to limit public exposure to substances not yet regulated by promulgated standards. They are advisory standards that apply at the tap for public water supplies. These DWALs are not ARARs, but are "To Be Considereds," or TBCs. ARARs with more stringent requirements take precedence over these DWALs.

Table 3 lists the chemicals of concern at the VW&R site and their cleanup standards.

California's Resolution 68-16

California's "Statement of Policy With Respect to Maintaining High Quality of Waters in California," Resolution 68-16, affects remedial standards. The policy requires maintenance of existing water quality unless it is demonstrated that a change will benefit

the people of the state, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed by other state policies.

7.3 ACTION SPECIFIC ARARS AND TBCS

National Pollutant Discharge Elimination System (NPDES)

NPDES substantive permit requirements and/or RWQCB Waste Discharge Requirements (WDRs) are potential ARARs for effluent discharges. The effluent limitations and monitoring requirements of an NPDES permit or WDRs legally apply to point source discharges such as those from a treatment system with an outfall to surface water or storm drains. The RWQCB established effluent discharge limitations and permit requirements based on Water Quality Standards set forth in the San Francisco Bay Regional Basin Plan.

EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-28

OSWER Directive 9355.0-28, "Control of Air Emissions from Superfund Groundwater Air Strippers at Superfund Groundwater Sites," applies to future remedial decisions at Superfund sites in ozone non-attainment areas. Future remedial decisions include Records of Decision (RODs), Significant Differences to a ROD and Consent Decrees. The VW&R site is in an ozone non-attainment area. OSWER Directive 9355.0-28 requires such sites to control total volatile organic compound emissions from air strippers and soil vapor extractors to fifteen pounds per day per facility. This directive is not an ARAR, but is a TBC. ARARs with more stringent requirements take precedence over the directive.

Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 47

The BAAQMD Board of Directors adopted Regulation 8, Rule 47, "Air Stripping and Soil Vapor Extraction Operations." This rule applies to new and modified operations. The rule consists of two standards:

- Individual air stripping and soil vapor extraction operations emitting benzene, vinyl chloride, perchloroethylene, methylene chloride and/or trichloroethylene are required to control emissions by at least ninety percent by weight. Operations emitting less than one pound per day of these compounds are exempt from this requirement if they pass a District risk screen.

- o Individual air stripping and soil vapor extraction operations emitting greater than fifteen pounds per day of organic compounds other than those listed above are required to control emissions by at least ninety percent by weight.

Regulation 8, Rule 47 is an ARAR for the implementation of the remedy at the VW&R site.

Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions

The contaminated groundwater contains spent solvents that are RCRA listed wastes. TCE is an F001 listed waste, and TCA is an F002 listed waste. Adsorbents and other materials used for remediation of groundwater VOCs, such as activated carbon, chemical-absorbing resins or other materials used in the treatment of groundwater or air, will contain the chemicals after use. RCRA land disposal restrictions are not applicable but are relevant and appropriate to disposal of treatment media due to the presence of constituents which are sufficiently similar to RCRA wastes.

In addition, RCRA Land Disposal Restrictions may be an ARAR for those alternatives involving excavation of contaminated soil for on-site treatment.

BAAQMD Regulation 8, Rule 40 (February 15, 1989)

This regulation is an ARAR applying to the aeration of VOC-containing soil resulting from the excavation of underground storage tanks. This rule allows uncontrolled releases if the organic content of the soil is less than 50 mg/kg; otherwise, control of 90 percent of the emissions is required.

7.4 LOCATION-SPECIFIC ARARs

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act is an applicable requirement for the locations adjacent to the Guadalupe River and other tributary streams and marshes.

8.0 DESCRIPTION OF ALTERNATIVES

8.1 REMEDIAL ACTION OBJECTIVES

Cleanup of groundwater contamination at the VW&R site focuses on the following remedial action objectives:

1) Prevention of current or future exposure of human receptors to contaminated groundwater or soil

2) Restoration of the contaminated groundwater for potential future use as a drinking water source

3) Control of contaminant migration

4) Monitoring of contaminant concentrations in the groundwater.

8.2 CLEANUP STANDARDS

Soil: No ARARs exist for soil. Due to accessibility problems in and around the underground storage tank area and beneath existing structures, soil cleanup levels are separated into interim and final standards for the VW&R site. As an interim cleanup standard, soil "hot spots" (defined as accessible areas in which the concentrations of any one of the chemicals PCE, TCA or TCE exceed 10 ppm) will be remediated to levels not to exceed 10 ppm, in order to minimize the potential migration of soil contaminants to groundwater. The final soil cleanup standard (after characterization of the soil surrounding the tanks and associated piping at the time the tanks are removed) will be continued remediation of all contaminated soil until concentrations of 1 ppm total VOCs are achieved.

Groundwater: Cleanup standards for all chemicals of concern (except acetone) in the A- and B-aquifers are the ARARs identified in Table 3. For acetone, a risk-based approach using exposure assumptions was used to establish a cleanup standard that would be protective of human health. Treatment of groundwater at the VW&R site to these levels will result in an acceptable excess cancer risk of 4×10^{-5} and a non-carcinogenic hazard index (HI) of less than 1.

Table 4 lists the cleanup standards for the chemicals of concern and the corresponding health risks of leaving these chemicals in the groundwater at these levels. Concentrations of other chemicals detected at the site will be reduced in the process of achieving the cleanup standards for the eight chemicals of concern.

The point of compliance for groundwater remediation is throughout the aquifer and includes all groundwater wells. Cleanup standards for extracted groundwater that will be discharged to the storm drain system are listed in the current NPDES permit for VW&R's interim remedial actions. These standards apply at the point of discharge and are protective of human health and the surface water environment.

Air: The BPHE did not identify chemicals of concern in the air, with the exception of those chemicals emitted to the air during current interim groundwater treatment. These emissions are regulated under the current or future modified BAAQMD permit; therefore, no additional remedial action objectives have been generated for air emissions.

TABLE 3

GROUNDWATER CLEANUP STANDARDS
FOR CHEMICALS OF CONCERN
(Concentrations in ppb)

Chemical	Federal MCL/MCLG	California MCL	Target Cleanup Level
Acetone	----	----	4200*
1,1-Dichloroethylene	7/7	6	----
cis-1,2-Dichloroethylene	70/70	6	----
Methylene chloride	5/0 **	----	----
Tetrachloroethylene	5/0	5	----
1,1,1-Trichloroethane	200/200	200	----
Trichloroethylene	5/0	5	----
Vinyl chloride	2/0	0.5	----

* Target cleanup level calculated using risk-based approach

** Proposed

TABLE 4

GROUNDWATER CLEANUP STANDARDS AND CORRESPONDING RISKS

Final Remediation Levels			Corresponding Risk Levels	
Chemical	Remediation Level (ppb)	Basis	Carcinogen	Non-Carcinogen
Acetone	4200	Risk	----	0.840
1,1-DCE	6	CA MCL	2.8×10^{-5}	0.013
cis-1,2-DCE	6	CA MCL	----	0.012
Methylene chloride	5	MCL	1.9×10^{-6}	0.002
PCE	5	MCL	7.0×10^{-7}	0.010
1,1,1-TCA	200	MCL	----	0.018
TCE	5	MCL	3.1×10^{-7}	0.014
Vinyl chloride	0.5	CA MCL	4.0×10^{-7}	---
			4.0×10^{-5}	0.899

8.3 REMEDIAL ACTION ALTERNATIVES

Alternatives addressing soil and groundwater contamination and remedial action objectives were developed from a list of technologies that remained after an initial screening of technologies and general response actions.

Only two groundwater remedial technologies were retained for further evaluation: 1) No Action for both the A- or B-aquifer and 2) extraction and treatment of A-aquifer groundwater by air stripping and extraction and treatment of B-aquifer groundwater by GAC or air stripping. Based on cost and concentration factors, treatment of extracted groundwater by air stripping appears to be the more appropriate process option for A-aquifer ground water, whereas treatment by either GAC or air stripping is preferable for groundwater extracted from the B-aquifer. For the purposes of developing remedial alternatives for detailed evaluation, air stripping has been proposed for A-aquifer groundwater and GAC or air stripping have been proposed for B-aquifer groundwater.

The approach to groundwater remediation in Alternatives 2, 3, 4 and 5 is similar. The remaining technologies evaluated for soil cleanup included capping, in-situ vapor extraction (ISVE), above-ground aeration, and low-temperature thermal desorption.

Alternative 1 - No Action

The No Action alternative serves as a baseline for comparing other remedial alternatives. Under the No Action alternative, no additional remedial technologies would be implemented and operations of presently implemented remedial actions would cease; however, groundwater monitoring would continue.

Alternative 2 - Capping and Groundwater Treatment

Alternative 2 consists of capping of soils containing more than 1 ppm total VOCs; A-aquifer remediation by extraction and treatment by air stripping; and B-aquifer remediation of groundwater by extraction and treatment by Granular Activated Carbon (GAC) or air stripping. Capping would be accomplished by paving the rail spur area with an appropriate paving material and sealing the existing asphalt and concrete-paved areas, where needed. The A-aquifer extraction system would consist of the existing interim remedial system and additional extraction wells installed in the vicinity of the open dock and along the northern site boundary. The total extraction rate from the existing and new A-aquifer extraction wells is expected to be approximately 40 gpm. The existing permitted air stripping unit would be utilized in the treatment of extracted A-aquifer groundwater to the extent possible. To accommodate the increased rate of extraction, an additional air stripping unit would be installed. The current BAAQMD permit does not require emissions control. The off-gas from the second air stripping unit would be treated in accordance with BAAQMD regulations.

The B-aquifer extraction system would include wells near the open dock and hydraulically downgradient from the rail spur. This configuration of extraction wells is expected to significantly reduce migration toward the northern site boundary and minimize off-site migration of organic chemicals at concentrations above the target cleanup levels. Existing monitoring wells would be converted to extraction wells wherever possible. The total rate of extraction from the B-aquifer is expected to be approximately 100 gpm. B-aquifer groundwater would be treated by either GAC (since the average VOC concentrations are expected to be relatively low) or air stripping.

Treated groundwater will be discharged to the Guadalupe River, via the storm sewer system, under a modified NPDES permit issued by the RWQCB.

Alternative 3 - ISVE Treatment of Soil "Hot Spots" and Groundwater Treatment

Under Alternative 3, groundwater would be extracted from the A- and B-aquifers and treated as outlined under Alternative 2. Currently accessible areas of soil containing more than 10 ppm of one or more of the chemicals PCE, TCA and TCE (areas termed "hot spots") would be treated using ISVE. This would involve approximately 8100 cu. yds. of soil. The estimated time to reach groundwater cleanup standards is 13 years; the estimated time to reach final cleanup standards for soil using ISVE is approximately 3 years.

Alternative 4 - Capping, ISVE of "Hot Spots," and Groundwater Treatment

This alternative represents a combination of Alternatives 2 and 3. Soil containing greater than 1 ppm total VOCs would be capped and accessible "hot spots" as described in Alternative 3 would be treated using ISVE. A- and B-aquifer groundwater would be extracted and treated as in Alternative 2.

Alternative 5 - Cleanup to Background Levels for Groundwater and 1 ppm Total VOCs for Soil

This alternative involves immediate remediation of all vadose zone soil containing more than 1 ppm total VOCs; and groundwater remediation to background levels, in both the A and B aquifer, by extraction and treatment. The approach to groundwater remediation is similar to that in Alternatives 2, 3 and 4; however, remediation would continue for an estimated 63 years, until background groundwater quality conditions were achieved. Three different approaches to soil remediation have been evaluated:

5-a) Excavation of onsite soils containing greater than 1 ppm total VOCs with treatment by aboveground aeration;

5-b) Excavation of onsite soils containing greater than 1 ppm total VOCs with treatment by low temperature thermal desorption;

5-c) ISVE in areas where total VOC concentrations exceed 1 ppm. Over 200 ISVE wells would be needed for this option.

The areas at which soil contains more than 1 ppm total VOCs include the covered dock, open dock, concrete apron, and significant portions of the adjacent areas. An estimated 46,000 cu. yds. of soil would be remediated. Excavation would necessitate the demolition of the open and covered docks. It is assumed for purposes of comparison with other alternatives that an excavation of this magnitude could only be performed subsequent to closure of the facility. Soil remediation by ISVE in Alternative 5c would involve installing over 200 vapor extraction wells on 20-foot centers throughout an area of 75,200 square feet centered around the open dock.

9.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section provides an explanation of the criteria used to select the remedy, and an analysis of the remedial action alternatives in light of those criteria, highlighting the advantages and disadvantages of each of the alternatives.

9.1 CRITERIA

The alternatives were evaluated using nine component criteria. These criteria, which are listed below, are derived from requirements contained in the National Contingency Plan (NCP) and CERCLA Sections 121(b) and 121(c).

1. Overall protection of human health and the environment
2. Short term effectiveness in protecting human health and the environment
3. Long-term effectiveness and permanence in protecting human health and the environment
4. Compliance with ARARs (ARARs are detailed in Section 7.0)
5. Use of treatment to achieve a reduction in the toxicity, mobility or volume of the contaminants
6. Implementability
7. State acceptance/Support Agency acceptance
8. Community acceptance
9. Cost

9.2 ANALYSIS OF ALTERNATIVES

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Except for Alternative 1, all of the remedial alternatives are protective of human health and the environment. Alternatives 2 through 5, if implemented, would each reduce potential excess cancer risks associated with the ingestion or inhalation of organic chemical-containing groundwater to less than 1×10^{-4}. These alternatives would also reduce potential noncarcinogenic adverse health effects and result in a HI of less than 1. As groundwater remediation to target cleanup levels (Alternatives 2, 3 and 4) results in acceptable carcinogenic and non-carcinogenic health risks, the additional effort and expense to remediate groundwater to background levels (Alternative 5) is not warranted. The hydraulic containment systems associated with Alternatives 2 through 5 prevent offsite migration of contaminated groundwater.

With respect to soil, Alternatives 5-a and 5-b provide the greatest overall degree of protection for human health and the environment. These two alternatives would permanently remove and destroy the majority of contaminants in soil. Alternatives 2, 3, 4 and 5-c provide somewhat less protection by leaving detectable levels of VOCs in soils. However, capping (Alternatives 2 and 4) would prevent direct contact with contaminated soil at the site and prevent leaking to groundwater.

COMPLIANCE WITH ARARS

Alternative 1 would not meet all drinking water ARARs; all other alternatives would. Site remediation by either Alternatives 5-a, 5-b or 5-c would be expected to comply with the state Resolution 68-16.

NPDES permit requirements would be met by proper design and operation of either treatment system. The Fish and Wildlife Coordination Act would not be an ARAR for any alternatives because the treatment system would ensure that discharged water was protective of human health and the environment.

RCRA land disposal restrictions would apply to the spent carbon from Alternatives 3 through 5. The spent carbon could be treated before reuse or disposal by an incineration process. Alternatives 5-a and 5-b may not meet land disposal restrictions for the excavated soil.

Soil remediation by either of Alternative 5-a or 5-b may not comply with potential action-specific BAAQMD ARARs for air due to the large mass of organic chemicals that would be expected to volatilize during excavation and/or aeration. Alternatives 3 through 5 would need to comply with OSWER Directive 9355.0-28 and BAAQMD Regulation 8, Rule 47 because of the air stripper emissions. These ARARs are addressed by the BAAQMD permitting process. If permit modifications become necessary, emissions could be captured and destroyed by available technology.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative 1 allows conditions at the site to remain unmitigated. There is no direct reduction in the toxicity, mobility or volume of VOC-contaminated soil or groundwater. Alternative 5 would remove and/or destroy most of the contaminants present in soil, thus reducing volume.

Alternatives 2, 3 and 4 would produce comparable reductions in the toxicity and mobility of the contaminants but employ different soil remediation technologies. Alternative 2 employs capping to reduce the mobility of the organic chemicals in vadose zone soil either upward to the atmosphere or downward to the water table. Alternative 3 employs ISVE to remove the VOCs from soil. As soil remediation by ISVE would result in lower residual VOC concentrations, the reduction in toxicity and mobility would be greater for Alternative 3 than for Alternative 2. Alternative 4 combines capping and ISVE in hot spots and so reduces toxicity and mobility to levels lower than either of Alternatives 2 or 3. As Alternative 2 is unlikely to achieve nondetectable concentrations of VOCs, the volume of contaminated soil would be essentially unchanged. Alternatives 3, 4 and 5 will reduce VOC concentrations and thus the volume of contaminated soil.

LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 1 is not effective in that the baseline excess risk conditions that necessitate remediation remain unmitigated. If implemented, Alternative 5 would be the most effective and permanent of the alternatives. However, the complete remediation afforded by Alternative 5 is not practical.

Alternatives 2, 3 and 4 offer a considerable reduction in excess risk by capping and/or remediating contaminated soils. Although contaminated soil would remain in place after implementation, the combination of surface paving, hydraulic containment and institutional controls is believed to provide adequate protection. As the cleanup levels attainable by ISVE are likely to be lower than the current soil conditions, the excess risk associated with Alternatives 3 and 4 is likely to be somewhat lower than that for Alternative 2.

In terms of the adequacy and reliability of controls, Alternatives 2 through 5 are comparable as each employs similar institutional controls and hydraulic containment systems. Each alternative features some form of site security, surface paving to minimize infiltration, and groundwater extraction/treatment. The degree of reliability of these measures is similar for Alternatives 2 through 5.

SHORT-TERM EFFECTIVENESS

Alternative 1 does not involve disturbance of contaminated soil or groundwater, and thus there are no risks to workers or the community directly related to its implementation. The short-term effectiveness of Alternatives 2, 3 and 4 is similar in terms of

groundwater remediation, but Alternative 5 differs significantly due to the time required (63 years) to achieve background levels. Alternatives 2 through 5 also vary significantly in terms of soil remediation and involve progressively higher levels of site disturbance. Alternatives 2, 3 and 4 involve potential exposure to contaminated soil during paving, drilling for vapor or groundwater extraction wells, and during the handling and treatment of contaminated groundwater. Some small releases of organic vapors to the atmosphere would be expected during these activities; however, the associated potential risk to the community and the environment is expected to be negligible provided adequate safety precautions are taken. The potential risk to workers involved in implementing Alternatives 2, 3 and 4 is considered low and manageable.

Alternative 5 could involve open excavation during which significant quantities of organic vapors would be expected to volatilize. In addition, Alternative 5 could include aeration as the principal means of remediating soils. In terms of protection of the community, protection of workers, and potential adverse environmental impacts, Alternative 5 is considered least effective in the short term.

In terms of the time required to achieve the remedial response objectives for soil, Alternative 5-b would require the least amount of time. Soil remediation using Alternative 5-b could be completed within six months, despite the large volume of soil to be remediated. Soil remediation by ISVE (Alternatives 3, 4 and 5-c) would require about three years. Excluding the No Action alternative, and given that groundwater remediation under Alternative 5 is least time effective, Alternative 2 is expected to be the most effective, with Alternatives 3 and 4 being equally the next most effective.

IMPLEMENTABILITY

In terms of construction and operation, the No Action alternative is clearly the most easily implementable. Alternatives 2 through 5 are similar with respect to groundwater, but vary considerably in terms of construction and operation of the soil remediation technologies. Alternative 2 involves capping as well as upgrading of currently paved surfaces and would be the simplest to construct and maintain.

Alternative 3 features the next most implementable soil remediation technology in that construction of the ISVE system is straightforward. Operation of the ISVE system, particularly the high vacuum extraction system and vapor treatment system, would be relatively complex. System monitoring would be required, with periodic adjustments to flow rates and the operation of the vapor treatment unit. Alternative 4, which involves adding an engineered cap to the soil remediation measures of Alternative 3, would be similar to Alternative 3 in terms of implementability.

Alternative 5 is the most difficult to construct and operate in terms of soil remediation and is not practical at an operating facility. Alternative 5 involves extensive site modifications,

i.e., demolition and tank removals or the installation of hundreds of ISVE wells, prior to being implemented. ISVE on this scale is not considered practical at an operating facility due to the complexity of the vapor transfer piping associated with the wells. The initial setup and operation of the low temperature thermal desorption unit would be highly specialized and time consuming.

In terms of permitting and the availability of services, the requirements for Alternatives 2 through 5 vary but no critical difficulties are anticipated. No permits or services are required for Alternative 1. Alternatives 2 through 5 would involve air quality permitting and NPDES permitting for the treatment and discharge of groundwater. Permitting requirements for soil would likely be least stringent for Alternative 2 and most stringent for Alternative 5. Permitting for Alternative 5-a may be difficult considering BAAQMD regulations. Permitting for Alternative 5-b may also be difficult, as this alternative features the thermal destruction of organic chemical vapors by relatively complex processes. Alternatives 3, 4 and 5-c will also require BAAQMD permits. Field testing might also be required to demonstrate compliance with the BAAQMD's requirement that emissions be reduced by 90 percent by weight.

The technologies and the associated services included in the alternatives are available and field proven.

COST

Table 5 presents total overall costs (O&M plus Direct and Indirect Capital Costs) for the five alternatives. The only costs associated with Alternative 1 are expected to be related to continued groundwater monitoring and decommissioning the interim groundwater remediation system. Groundwater monitoring costs are estimated at $148,000 per year based on the current scope of the quarterly monitoring program. Assuming that monitoring continues for 30 years, the net present value (NPV) of the estimated monitoring costs is $2,275,000. (The NPVs for Alternative 1 and the other alternatives are based on a net interest rate of 5 percent.

The principal costs for Alternative 2 would be for capping currently unpaved areas, sealing existing paved surfaces, installing groundwater extraction/treatment facilities, and long-term monitoring. The principal costs for Alternative 3 would be for the installation of the ISVE system, the procurement of the ISVE system off-gas treatment facilities, groundwater extraction/ treatment facilities, and long-term monitoring. The principal costs for Alternative 4 would be for capping currently unpaved areas, sealing existing paved surfaces, installing the ISVE system, the procurement of the ISVE system off-gas treatment facilities, groundwater extraction/treatment facilities, and long-term monitoring.

The principal costs associated with Alternatives 5a and 5b would be demolition of the open and covered docks; underground storage tank closure; excavation; soil treatment; backfilling and site

TABLE 5

ESTIMATED COSTS FOR REMEDIAL ALTERNATIVES
(Costs in thousands)

Alternative	1	2	3	4	5-a	5-b	5-c
Direct Capital Cost	22	173	389	409	3,416	9,259	1,205
Indirect Capital Cost	12	114	206	214	470-528	450-507	505
NPV of O&M for Soil	---	132	400	438	---	---	1,312
NPV of O&M for Groundwater[1]	2,275[2]	3,936	3,936	3,936[3]	7,990[3]	7,990[3]	7,990[3]
Total	2,309	4,355	4,931	4,997	11,876-11,934	17,699-17,756	10,012

NPV = net present value

[1] based on 13 years of operation unless noted otherwise
[2] based on 30 years of operation
[3] based on 60 years of operation

restoration; and groundwater treatment. The principal costs associated with Alternative 5c would be for procuring/installing the large number of ISVE wells, the vapor transfer piping, and the vapor treatment unit. The principal O&M costs would be those associated with groundwater treatment.

SUPPORT AGENCY ACCEPTANCE

The Feasibility Study and the Proposed Plan Fact Sheet were reviewed by California Regional Water Quality Control Board (RWQCB). The RWQCB concurs with EPA's preferred alternative.

COMMUNITY ACCEPTANCE

The Proposed Plan was presented to the community of Mountain View in a fact sheet and at a public meeting. No technical comments were submitted regarding the alternatives. Other comments received are addressed in the Response Summary.

9.3 SELECTED REMEDY

9.3.1 DESCRIPTION OF REMEDY

The selected remedy is a modified version of Alternative 4. The selected remedy provides for expanded groundwater extraction and treatment and a temporary soil cap. The selected remedy also provides for interim remediation of soil "hot spot" areas and final cleanup in and around the underground storage tank area when this area becomes accessible after the tanks are removed in 1996.

9.3.1.1 SOILS

The selected soil remediation combines three technologies to minimize the potential for organic compounds in soil to migrate into A-aquifer groundwater. These technologies are capping, in-situ soil vapor extraction (ISVE), and hydraulic containment. Capping includes sealing the existing paved surfaces where necessary and capping the rail spur ballast adjacent to the dock to prevent surface water infiltration into the soil above the water table. This will minimize the potential for leaching of organic compounds into the groundwater. ISVE will provide additional protection against the migration of chemicals into the groundwater. The hydraulic containment provided by the groundwater extraction system will be an additional safeguard against the potential for organic chemicals in soil to migrate via groundwater.

Remedial actions for soils have been designed with corresponding initial and final cleanup standards and include a final remedy which provides coordination with current and future operations at the site, and removes the long-term threat to water quality, as follows:

Initial Actions:

- Temporary cap placement until removal of underground tanks occurs. Evaluation of the effectiveness of the temporary cap using the SESOIL model indicated that the thicknessof the cap must be 31 cm with a permeability of at least 1 x 10^{-7} cm/sec.

- In-situ soil vapor extraction of accessible hot spot areas to levels not to exceed 10 ppm of any of the chemicals PCE, TCE or TCA.

- Institutional controls consisting of site security, worker protection and training and current land use zoning for commercial/industrial.

Final Actions:

- Continued ISVE until levels of 1 ppm total VOCs is achieved, unless no impact on water quality can be demonstrated at higher concentrations.

- At the time of the removal of the underground tanks, and when areas beneath existing structures become accessible, additional soil and groundwater characterization and reevaluation of alternatives to meet the 1 ppm cleanup standard.

9.3.1.2 GROUNDWATER

A-aquifer groundwater remediation consists of extraction of groundwater via a series of extraction wells, with treatment of the groundwater by air stripping. The existing interim remediation system would be supplemented by additional extraction wells installed near the open dock and along the northern site boundary. B-aquifer remediation consists of extraction from wells near the dock area. The extracted groundwater will be treated using either GAC or air stripping, as discussed previously. Remediation of B-aquifer groundwater will focus on the source area behind the open dock. Source area remediation is expected to achieve cleanup levels throughout the B-aquifer.

Groundwater would be treated using the existing air stripper or a new treatment system would be installed if groundwater extraction rates exceed the capacity of the current system. Air stripper off-gas would be regulated under the existing or modified BAAQMD permit and treated effluent would be discharged under a modified RWQCB-issued NPDES permit. Extraction and treatment of A- and B-aquifer groundwater will continue until drinking water quality is achieved.

In addition, the final groundwater remedy includes:

- Long term monitoring will be required after cleanup levels are achieved.
- A deed restriction prohibiting use of on-site groundwater for drinking water until final cleanup standards are achieved.

9.3.2 BASIS OF SELECTION

The modified version of Alternative 4 was selected because it will: minimize the migration of VOCs from soil to prevent degradation of groundwater; reduce toxicity, mobility and volume; be protective of human health and the environment by achieving the cleanup levels within the Carcinogenic Risk Range of 1×10^{-4} to 1×10^{-6}, and a noncarcinogenic HI below 1; meet all identified ARARs; be cost-effective; and utilize implementable treatment technologies.

Continued operation of groundwater extraction, treatment and discharge facilities at the site and ISVE in vadose zone soils, combined with a cap, will decrease the volume of the chemicals of concern in the groundwater and the toxicity of the groundwater. The groundwater extraction, treatment and discharge alternative has already been implemented at the VW&R site as an interim remedial measure. An in-situ vapor extraction system of approximately 10 to 20 wells can be implemented relatively easily. Costs associated with groundwater extraction facilities have already been incurred by VW&R in implementing the interim remedial measures.

Alternatives 2, 3 and 4 share a common approach to groundwater remediation and differ only in the soil remediation technologies selected to minimize groundwater contamination. All three are protective, comply with ARARs, are effective, and are practical in terms of cost-effectiveness and the impact on facility operations. Alternative 1 is not appropriate since it does not meet ARARs, and Alternative 5 is not appropriate since it is not practical at an operating facility and is not cost-effective. Soil leaching model results presented in the RI/FS demonstrate that Alternative 2 would minimize potential leaching of VOCs from soil to groundwater, while Alternative 3 would decrease VOC concentrations in soil "hot spots." A greater degree of groundwater protection is provided by combining the soil remediation approaches of Alternatives 2 and 3, as in the modified Alternative 4.

The selected remedy does not create any unacceptable short-term risks. Although the selected remedy leaves the underground storage tanks in place until 1996, VW&R is currently under a monthly tank integrity testing program monitored by the Santa Clara Valley Fire Department. In addition, a continuous monitoring system will be installed. Thus, any leaks that may occur before the underground tanks are removed in 1996 will be detected. An additional safeguard is provided by the monitoring wells downgradient from the underground storage tank area.

Air stripping and carbon adsorption are equally effective at treating the groundwater contaminants, and only differ regarding treatment residuals. Under the current BAAQMD permit, residual contaminants from the existing air stripper are released directly to the air. Residual contaminants adsorbed to the liquid-phase granular activated carbon would be destroyed during regeneration or confined to a small concentrated volume in a proper landfill.

Deed restrictions will be in place to prevent the construction of any residences over areas which are potential sources of contaminants volatilizing from soil or groundwater beneath the site to the surface. At the time of the required five-year review, the need for continued deed restrictions for the site will be determined using the approved EPA methodology for assessing risk from indoor or outdoor exposure to residents on and near the site.

10.0 STATUTORY DETERMINATIONS

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

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